ZIBI BLOCK 204

Site Servicing Report

City of Ottawa, Ontario

CIMA+

CIMA+ file number: A000931
November 21, 2022
Revision No.2

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Site Servicing Report

City of Ottawa, Ontario

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1. Introduction

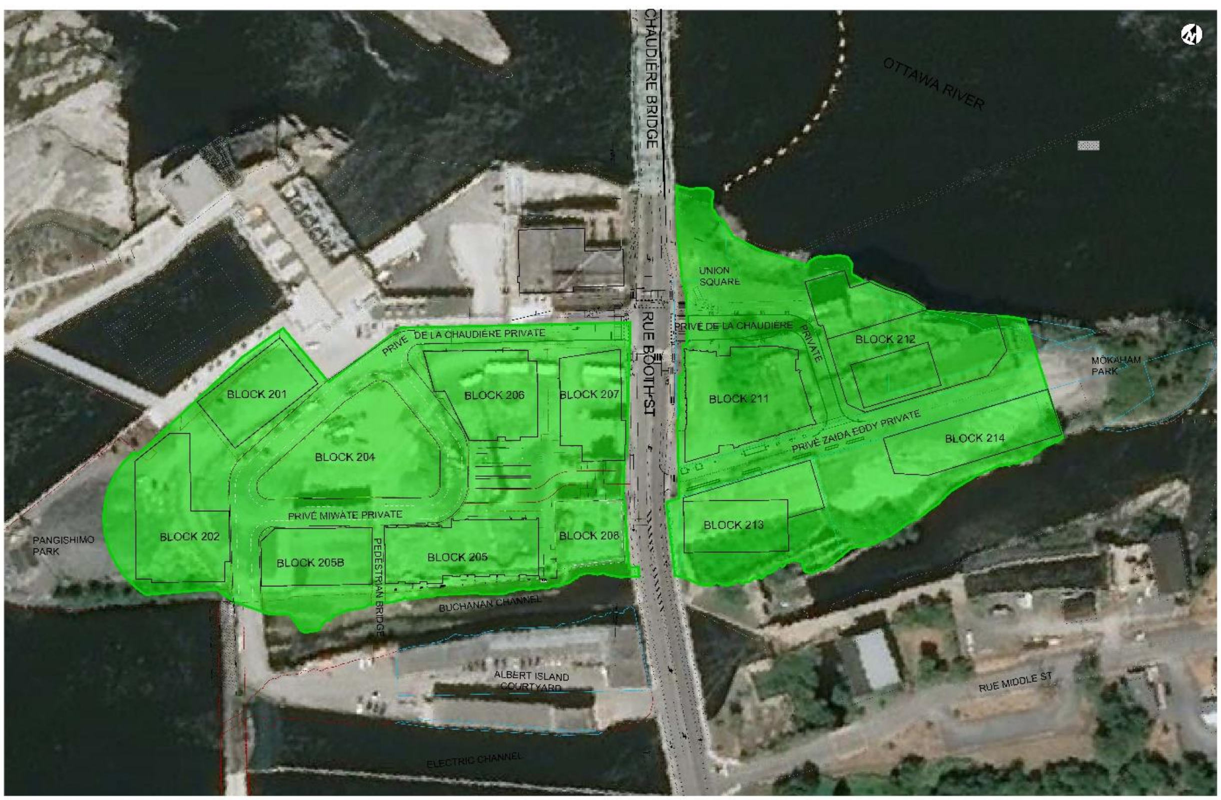
CIMA+ was retained by Windmill Dream on holdings LP to prepare a Site Servicing and Stormwater Management Report for the proposed construction of mixed uses (retail and residential) high-rise building on Chaudière Island, Ottawa, Ontario henceforth referred to as ZIBI – Block 204.

The purpose of this assessment is to confirm that the proposed development can be adequately serviced by the existing municipal and private infrastructure (water, sanitary, and storm) surrounding the site. This assessment shall be used in support of the application for Site Plan Control.

1.1 Site Description and Proposed Development

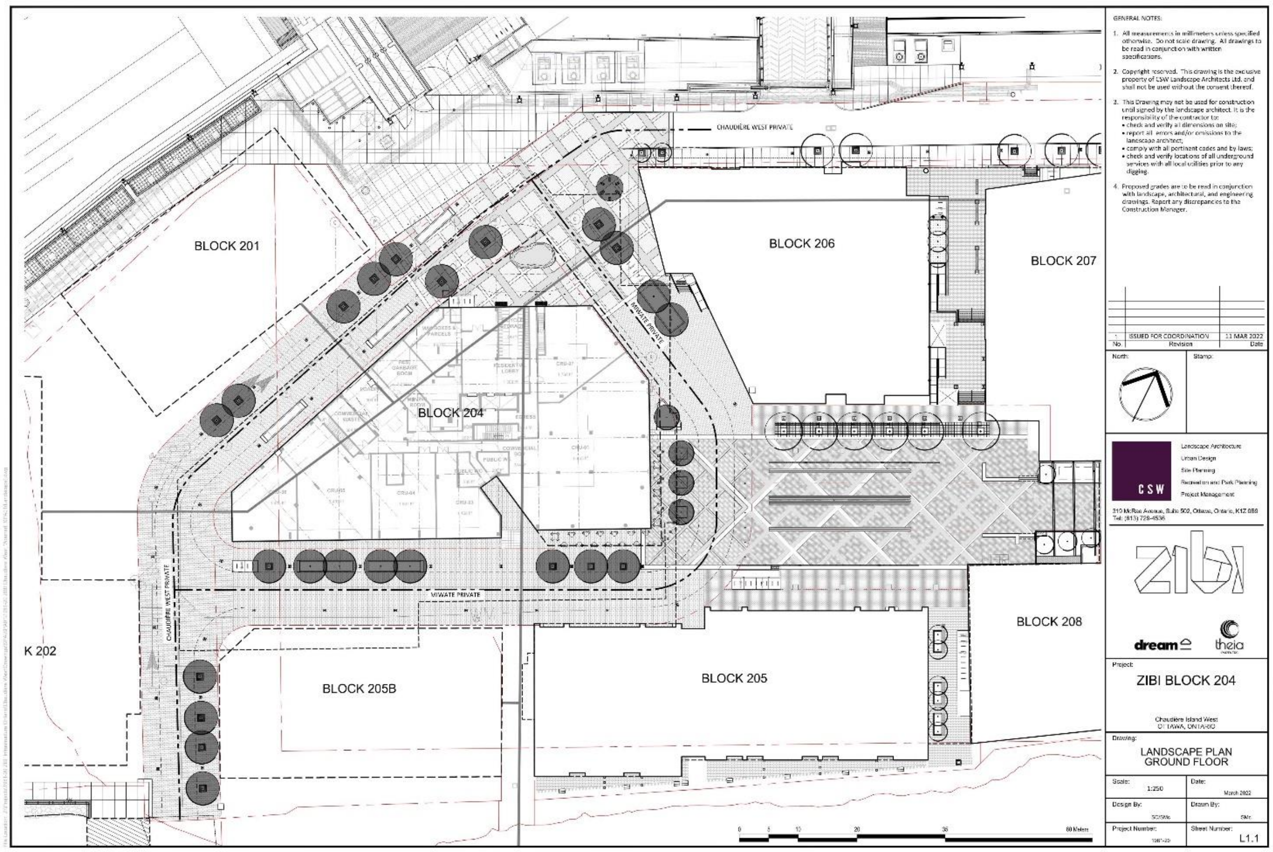
The site is located on Chaudière Island, Ottawa on the west side of Booth Street and Chaudière Bridge. (Refer to **Figure 1** below). As an update to the current status, the overall ZIBI site received site plan approval on May 2018 following the submission of a Master Servicing report from the engineering consulting firm David Schaeffer Engineering Ltd (DSEL). In August 2018, DSEL submitted a Functional Servicing and Storm Water Management Report – Phase 1 which includes Block 204. This site servicing report was prepared respecting the approval already confirmed for the aforementioned Phase 1.

Figure 1-1: Site Location - Plan View.



ZIBI – Block 204 is comprised of twenty-two (22) storey building including one level of underground parking surrounded with woonerf landscaping street type design. The building footprint is about +/- 2700 m^2 for the first level, over an underground parking of 4200 m^2. The underground parking has significant larger surface than the building footprint since it is connected with other underground parking infrastructure (205A and 206) to the east and design to include further underground parking connections. Each additional building floor varies between 775 m^2 and 1225 m^2. Refer to **Figure 2** for a conceptual site plan of the proposed development (prepared by Neuf Architects Inc/CSW Landscape Architecture).

Figure 1-2: Conceptual Site Plan.



1.2 Review of Available Background Documentation

The following design guidelines have been used to estimate the theoretical servicing requirements for the proposed development; while geoOttawa, a detailed topographic survey prepared by Stantec, and the available as-built drawings provided by the client and City of Ottawa Information Centre have been used to determine the existing municipal services location, size, material, and inverts fronting the site.

+ Ottawa Sewer Design Guidelines (October 2012), as amended by all applicable Technical Bulletins;
+ Ottawa Design Guidelines – Water Distribution (2010), as amended by all applicable Technical Bulletins;
+ Ministry of the Environment Design Guidelines for Sewage Works (2008).

- Ministry of the Environment Stormwater Management Planning and Design Manual (2003).
- Ministry of the Environment Design Guidelines for Drinking-Water Systems (2008); and
- Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (1999).

1.3 Existing Infrastructure

Chaudière Island is presently in the course of re-development. On the west side of the island, the construction of Buildings 205A and 208 (see Figure 1) were undertaken, now completed, and occupied. Buildings 206 and 207 (see Figure 1) are presently through construction. They are presently completing the underground parking and should be ready for occupancy 2024.

As identified using the detailed topographic survey completed by Stantec Geomatics Ltd, geoOttawa and the available Utility Record Drawings provided by the City of Ottawa Information Centre, the following municipal infrastructure are available within the right-of-way fronting the proposed development site (refer to **Appendix E** for Existing Conditions Plan). The municipal services collectors on Booth and Chaudière Streets are all constructed and connected with the City of Ottawa networks. A new pumping station, to be located on the east side of Booth Street on Chaudière Island, is presently through approvals.

Booth Street

- 203mm diameter ductile iron watermain (North of Middle Street);
- 305mm diameter PVC watermain (South of Middle Street);
- 250mm diameter sanitary sewer.
- 525mm diameter storm sewer.

Chaudière Private Street

- 203mm diameter ductile iron watermain;
- 250mm diameter sanitary sewer;
- 450mm diameter storm sewer.

1.4 Consultation and Permits

In response to the pre-consultation requirements defined in the City's Development Servicing Study Checklist, the following agencies were consulted in support of the preparation of this report. The Development Servicing Study Checklist as well as all relevant correspondence with the consulted agencies can be found in **Appendix A**.

City of Ottawa

The City of Ottawa Information Centre was contacted to obtain any Reports, Studies, Engineering, and/or Utility Plans including sanitary sewer, storm sewer, watermain, gas, etc. within or adjacent to the site location. The available as-built plans were obtained, while no existing reports or studies were available. Given a detailed utility survey was previously completed by Stantec Geomatics Ltd for the project the UCC drawings were not obtained.

CIMA+ also contacted Allison Hamlin from the City of Ottawa and Abdul Mottalib, City of Ottawa to obtain any site-specific servicing and stormwater management design criteria for the proposed development. The provided comments and criteria relevant to the Site Servicing and Stormwater Management Report are referenced within the appropriate sections of this report.

Rideau Valley Conservation Authority (RVCA)

The subject site falls under the jurisdiction of the Rideau Valley Conservation Authority (RVCA). As previously mentioned, a functional Servicing and Storm Water Management Report – Phase 1 for ZIBI development was submitted in August 2018 which included the RVCA reviewed and approval. These approved criteria were acknowledged and respected as part of this site plan approval report.

Ministry of the Environment, Conservation and Parks (MECP)

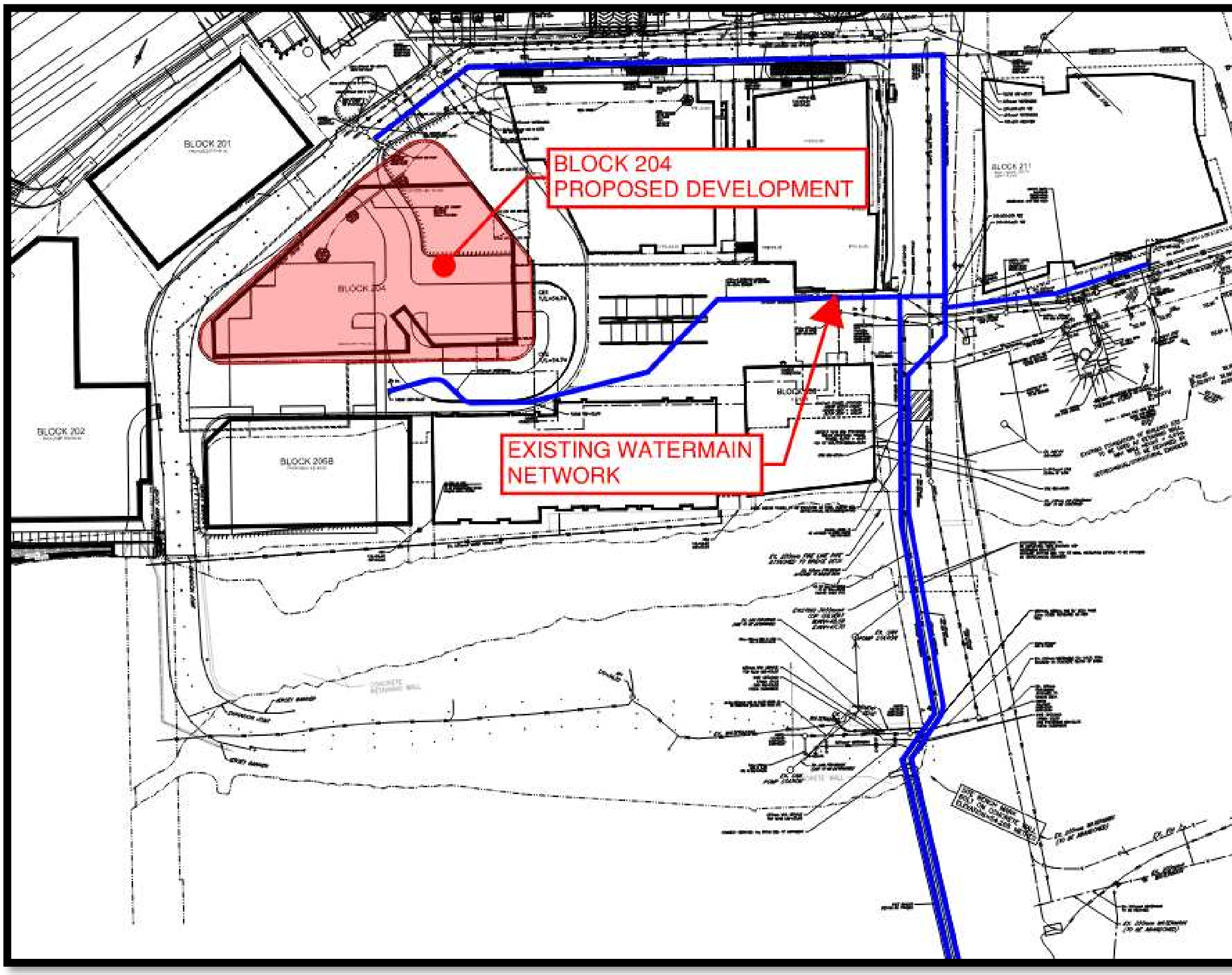
It is expected that the application can be submitted to the MECP, if required, as direct submission from Dream following City's Ottawa review.

2. Water Servicing

2.1 Existing Condition

The current ZIBI development is comprised of watermain networks along Booth Street, Chaudière Private and through the underground parking lot below the Head Street Square Courtyard. These the watermain networks vary between 200mm and 300mm in diameter. Refer to Functional Servicing and Stormwater Management Report by DSEL dated August 2018 for technical information about existing watermain network. Refer also to **Figure 2-1** below for visual representation of existing watermain network.

Figure 2-1 Existing Watermain Network



2.2 Water Supply Design Criteria

The design criteria for determining the water demand requirements for the proposed development follow the parameters outlined in the Ottawa Design Guidelines – Water Distribution (2010) and associated technical bulletins, as well as the MOE Design Guidelines for Drinking-Water Systems (2008). Namely, the following parameters have been used in determining the water demands:

Table 2-1: Water Supply Design Criteria

Design Criteria	Residential / Commercia Areas
Average Day Demand for Residential	350 L/capita/day
Maximum Daily Demand for Residential	2.5 × average daily demand
Maximum (Peak) Hour Demand for Residential	5.5 × average daily demand
Average Day Demand Retail	2.5 $L/m^2/day$
Average Day Demand Amenity	2.5 $L/m^2/day$
Maximum Daily Demand for Retail and Amenity	1.5 x average daily demand
Maximum (Peak) Hour Demand	1.8 x Maximum Daily Demand
Desired Operating Pressure under Normal Operating Conditions	50 to 70 psi
Minimum Operating Pressure under Normal Operating Conditions	40 psi
Maximum Operating Pressure under Normal Operating Conditions	80 psi
Minimum Operating Pressure under Maximum Daily Demand + Fire Flow	20 psi

In addition to those design criteria identified in **Table 2-1**, the following comments and criteria must be considered in the water supply servicing strategy in accordance with City Guidelines:

- The subject site is located within the 1W pressure zone;
- Residential buildings with a basic day demand greater than 50 m^3/day (0.57 L/s) are required to be connected to a minimum of two (2) water services separated by an isolation valve to avoid a vulnerable service area;
- Fire flow demand requirements shall be based on the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection 1999 and Technical Bulletin ISTB-2018-02;
- Exposure separation distances shall be defined on a figure to support the FUS calculation and required fire flow (RFF);
- Hydrant capacity shall be assessed if relying on any public hydrants to provide fire protection, particularly if high design fire flows are being proposed, to demonstrate the Required Fire Flow (RFF) can be achieved. Identification of which hydrants are being considered to meet the RFF on a fire hydrant coverage figure is required as part of the boundary conditions request.

2.3 Proposed Water Supply Servicing and Calculations

Water Demands

The water supply demands for the proposed development are presented in **Table 2-2** below. The demands were developed utilizing the development statistics provided by Neuf Architects Inc. and those design criteria identified in *Section 2.1*. Refer to **Appendix B** for detailed calculations.

Table 2-2: Water Demands Block 204

Demand Type	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Maximum (Peak) Hour Demand (L/s)
Residential	1.58	3.95	8.69
Retail & Amenity	0.09	0.13	0.23
Total	**1.67**	**4.08**	**8.92**

Given the basic day demand is more than 50 m³/day (0.57 L/s), two connection is required.

Peaking Factor used for Maximum daily and maximum hourly are from City of Ottawa Water Distribution guideline.

The Water demands for the entire ZIBI site have been updated and are presented in **Table 2-3** below. Flows from existing building came from previous servicing reports. Refer to **Appendix B** for detailed calculations.

Table 2-3: Water Demands Block 204, 211, 206, 207, 205A, 208, EO

Demand Type	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Maximum (Peak) Hour Demand (L/s)
Total	**5.77**	**13.00**	**25.89**

Proposed Watermain Network Extension

The existing 300mm watermain along Chaudière Island will be extended around Block 204 and connect to the existing watermain stub south of the site. This will create a loop and increase service level and redundancy within the ZIBI watermain network. The proposed design is as per the approved Master Servicing Study (MSS). The proposed watermain extension will have an additional two fire hydrants and will have service connection stubs for the future development of Block 201, 202 and 205B. Each building will require two separate water connection separated by an isolation valve. A portion of the watermain network will be located inside the underground parking garage. Detailed design by the mechanical consultant will be provided upon completion.

Proposed Service Connection

The proposed connection point for Block 204 will connect to the 300mm Watermain along Chaudière Private. The building will have two 150mm service connection separated by a valve for redundancy purposes.

Required Fire Flow (RFF)

The required fire flow for the site was developed using the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection 1999 and Technical Bulletin ISTB-2018-02. It was determined that an RFF of **21,000 L/min (350 L/s)** would be required to provide adequate protection.

It was assumed that multiple private hydrants would be required to meet the fire flow requirements and a fire hydrant coverage figure was prepared is support of the boundary conditions request from the City.

The proposed Block 204 will have a fully supervised sprinkler system with continuously monitored fire alarms conforming to NFPA 13 standards. Refer to **Appendix A** for signed and seal letter from mechanical engineer.

Refer to **Appendix B** for detailed calculations, including supporting figures for exposure distances and hydrant coverage.

Municipal Boundary Conditions

Using the proposed demands, required fire flow, and supporting figures the City provided boundary conditions for hydraulic analysis for current conditions, based on computer model simulation. The boundary conditions are as follows:

Table 2-4: Watermain Boundary Conditions

Hydraulic Condition (HGL = Hydraulic Grade Line)	Boundary Condition (Connection 1) (Head) (m)	Boundary Condition (Connection 2) (Head) (m)
	Booth Street 305 mm diameter	Booth Street 203 mm diameter
Minimum HGL	107.7	107.7
Maximum HGL	115.7	115.7
Maximum Day + Fire Flow	102.2	98.1

Water Supply Adequacy

Table 2-5 below was developed to compare the current and existing scenario versus what was approved in the Master Servicing Study by DSEL dated June 18, 2018 **(REFER TO APPENDIX H).** As demonstrated, the existing and proposed development for the ZIBI site is on track (with a 3.1% variation when comparing average day demand) to follow the water demand identified in the master servicing study. The water demand for the proposed Block 204 is lower than what was anticipated during the Master Servicing Report. The Max Fire Flow identified in the Master Servicing Study was 22,000L/min which is over the current Max Fire Flow for Block 204 at 21,000. This demonstrates that the current water infrastructure has adequate capacity to support the current and proposed development of Block 204.

Table 2-5: WATER DEMAND COMPARISON BETWEEN MASTER SERVICING REPORT VS EXISTING AND PROPOSED CONDITIONS

Approved Master Servicing Study by DSEL dated June 18, 2018				Existing and Proposed Conditions			
BLOCK	Average Day (L/min)	Max Day (L/min)	Peak Hour (L/min)	BLOCK	Average Day (L/min)	Max Day (L/min)	Peak Hour (L/min)
201	66.5	155.8	336.3	201	66.5	155.8	336.3
202	35.9	83.5	179.8	202	35.9	82.6	179.8
203	76.9	174.7	373.9	203	76.9	174.7	373.9
204	113.3	262.7	565.2	204	99.93	244.7	535.24
205A	29.7	68	145.8	205A	24.71	116.62	176.69
205B	31.5	69.3	146.9	205B	31.5	69.3	146.9
206	88	197.1	420.1	206	91.03	223.45	489.13
207	22.2	33.2	59.8	207	39.45	59.18	106.53
208	16.5	24.7	44.6	208	7.43	11.15	20.08
209	55.5	88.4	164.3	209	55.5	88.4	164.3
210	28.5	42.7	76.8	210	28.5	42.7	76.8
211	48.2	116.1	252.6	211	82.92	124.46	224.02
212	103.7	155.5	279.9	212	103.7	155.5	279.9
213	74.5	177.7	385.8	213	74.5	177.7	385.8
214	33.8	50.6	91.1	214	33.8	50.6	91.1
215	33.8	53.8	100	215	33.8	53.8	100
EO	0.6	0.9	1.7	EO	0.6	0.9	1.7
Total	**859.1**	**1754.7**	**3624.6**	Total	**886.67**	**1831.56**	**3688.19**

Yellow	**Existing Block**
Blue	**Proposed Block**
Grey	**Future Block**

The approved master servicing study had identified that the recommended pressures exceeded the 80psi for the average daily demand. Since the proposed water demand is below the approved demand a pressure reducing valves will be required for the proposed development.

Hydrant Analysis

The proposed Block 204 development is surrounded by two new fire hydrant and 2 existing hydrants. Hydrants #5, #8 and #9 will have a max fire flow of 5700L/min. Hydrants #6 will have the rest of the fire flow with a capacity of 3900L/min. Refer to Appendix B for proposed and existing hydrants.

2.4 Water Supply Summary and Conclusions

The water supply design for the proposed development follows the parameters outlined in the Ottawa Design Guidelines – Water Distribution (2010) as amended by all applicable technical bulletins, as well as the MOE Design Guidelines for Drinking-Water Systems (2008).

There is adequate flow and pressure in the water distribution system to meet the required water demands for the proposed development. Pressure reducing valves will be required for the proposed development.

Water Data Card for service connection is to be completed and submitted once design has been finalized and in preparation to Commence Work Notification and Water Permit Application.

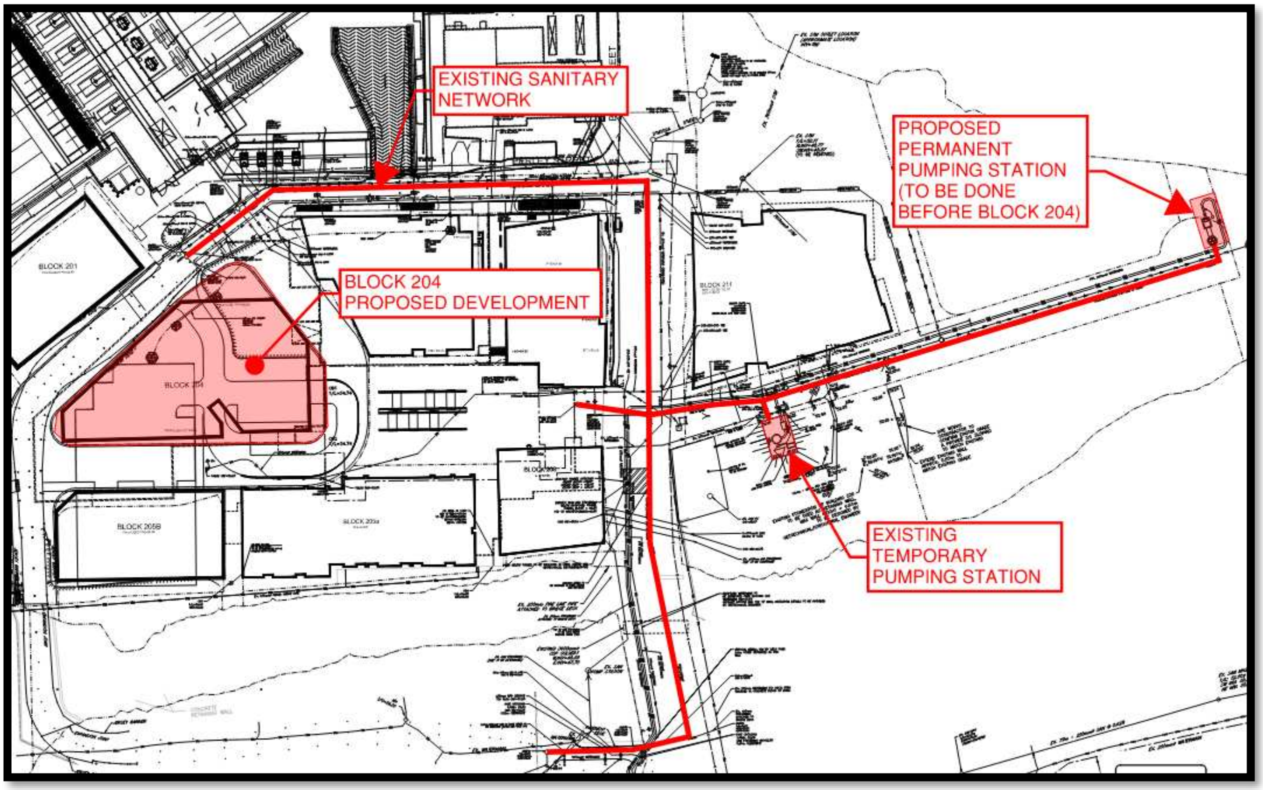
3. Sanitary Servicing

3.1 Existing Conditions

The current site is comprised of a sanitary network that extends from Chaudière Private, Booth Street and Zaida Eddy Street. The sanitary network is comprised of 250-300mm diameter sewer. See **Figure 3-1** for extent of existing network. The sanitary network currently is discharging into a temporary pumping station within the footprint of the existing building 535 to service the first phase of the ZIBI development. As per the report prepared by Hatch dated November 2018, the current station has a max wet weather peak flow capacity of 13 L/s.

The Technical Memorandum for Block 206 prepared by DSEL dated March 2021, stated that the new development of Block 206 exceeded 80% of the temporary pump capacity and that the new permanent pumping station needed to be built before the next block development. The design of the permanent pumping station is currently going through Site Plan application. Refer to ZIBI Pumping Station Preliminary Design Report by Hatch in **Appendix C**.

Figure 3-1 Existing Sanitary Network



3.2 Sanitary Servicing Design Criteria

The design criteria for determining the sanitary peak flow rates for the proposed development follow the parameters outlined in the City of Ottawa Sewer Design Guidelines, 2012 as amended by all applicable Technical Bulletins. Namely, the following parameters have been used in determining the peak sanitary flow rates:

Table 3-1: Sanitary Peak Flow Determination Design Criteria

Design Criterion	Residential and Commercial Areas
Residential Base Flow	280 L/capita/day
Commercial Base Flow	2.8 L/m^2/day
Populations – Studio	1.4 Persons Per Unit
Population – 1 Bedroom	1.4 Persons Per Unit
Population – 2 Bedroom	2.1 Persons Per Unit
Population – 3 Bedroom	2.7 Persons Per Unit
Peaking Factor for Residential	Determined by Harmon Equation

	$$P.F. = 1 + \left[\frac{1}{4 + \left(\frac{P}{1,000}\right)^{\frac{1}{2}}}\right] \times 0.8$$ (P = population; P.F. = peaking factor) Maximum P.F. = 4.0 Minimum P.F. = 2.0
Peaking Factor for Commercial	1.5
Dry Weather Infiltration Rate	0.05 L/s/effective gross hectare (for all areas)
Wet Weather Infiltration	0.28 L/s/effective gross hectare (for all areas)
Total Infiltration Allowance	0.33 L/s/effective gross hectare (for all areas)

3.3 Proposed Sanitary Servicing and Calculations

Proposed Sanitary Network Extension

The proposed Sanitary network extension will be as per the approved Master Servicing Study. A detailed Sanitary Calculation sheet has been developed with all the existing and future flows. Refer to **Appendix C** for detail calculations.

Proposed Sanitary Peak Flows

The estimated peak flows from the proposed development and existing development based on the design criteria listed in **Table 3-1** are outlined in the following Table.

Table 3-2: Block 204 Peak Sanitary Flows

Flow Type	Total Flow Rate (L/s)
Total Estimated Average Flow Rate	1.53
Total Estimate Peak Flow Rate (Exclude extraneous flow)	4.71

Refer to **Appendix C** for detailed calculations.

Table 3-3: Total Peak Sanitary Flows (Block 204, 211, 206, 207, 205A, 208, EO)

Flow Type	Total Flow Rate (L/s)
Total Estimated Average Dry Weather Flow Rate	5.94
Total Estimate Peak Dry Weather Flow Rate	15.00
Total Estimate Peak Wet Weather Flow Rate	15.84

Refer to **Appendix C** for detailed calculations.

Block 204 Sanitary Service Connections

Block 204 sanitary servicing will be connected to the new extended 250mm sanitary network by gravity. Connections shall be 200 mm PVC DR26 at a gradient of 2%.

3.4 Sanitary Servicing Summary and Conclusions

The sanitary servicing design for the proposed development conforms to the requirements of the City of Ottawa Sewer Design Guidelines, 2012, as amended by all applicable Technical Bulletins.

New pumping Station will need to be built and operational before the occupancy of Block 204.

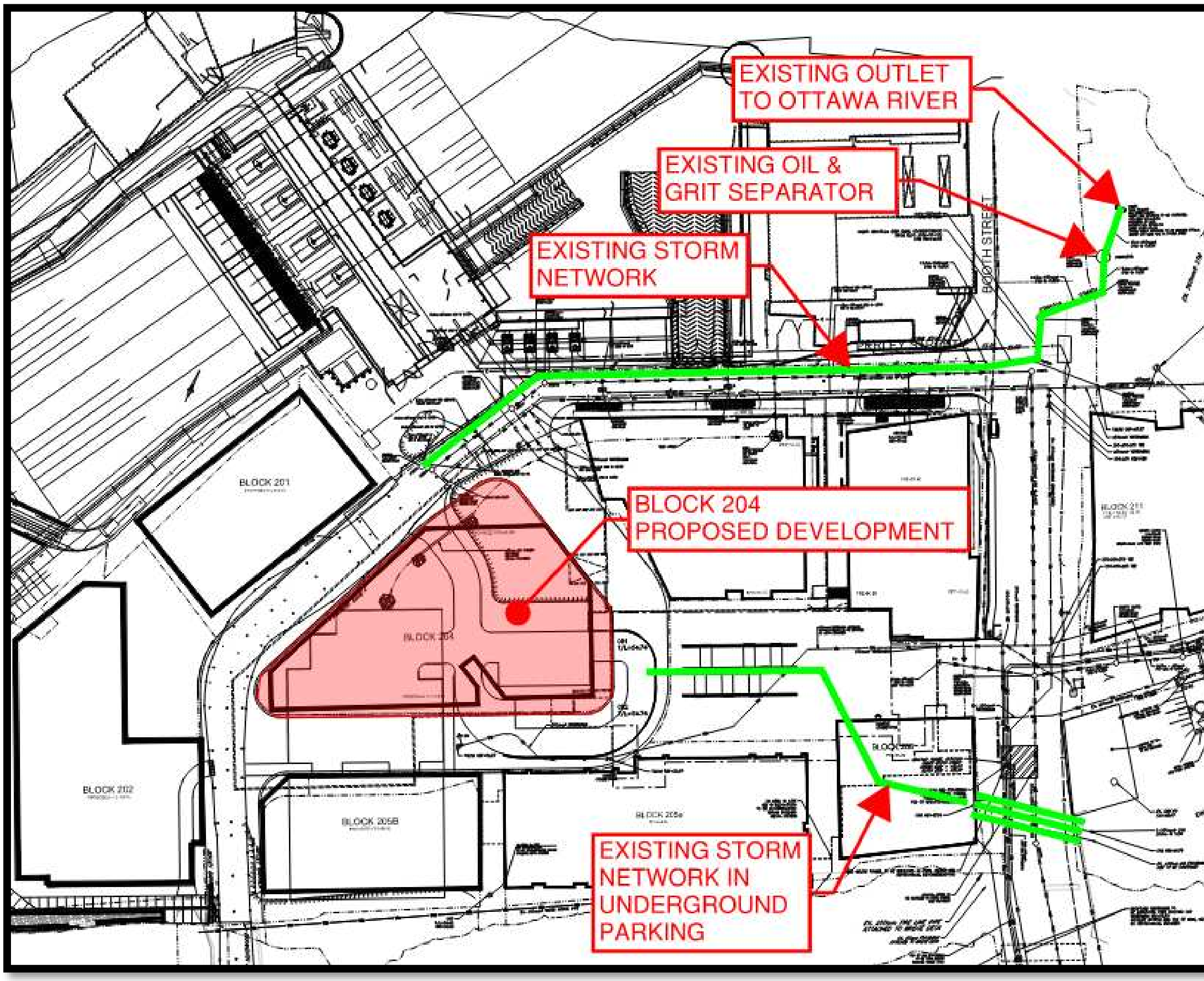
Peak wastewater demands are below the ultimate sanitary flow in the approved Master Servicing Study who confirmed that there is adequate residual capacity in the city of Ottawa system to accommodate the proposed wastewater flow.

4. Storm Servicing and Stormwater Management

4.1 Existing Conditions

The western part of ZIBI development is comprised of two existing storm networks. The storm network located in the upper of the development drains most of the north and west parts of the island and discharges to an outlet on the East side of Booth and onto the Ottawa River. The second storm network drains the courtyard between Block 205A, 206 and 204 and is discharge into the underground parking lot where it eventually crosses Booth Street and onto the Ottawa River. See **Figure 4-1** below for existing storm configuration.

Figure 4-1 Existing Storm Network



As per the Functional Servicing and Stormwater Management Report by DSEL dated August 2018, the Storm Water Management approach was to design and size the Storm Network for a 5-year storm event and that larger storm events are to use major system flow route. Refer to **Table 4-1** for flows that was calculated in the Phase I servicing report.

Table 4-1: Peak Release Flows – Existing Site

	Minor / Major System Flow from Area Fut & 104B (1.059 Ha)			Minor / Major System Flow from Area 104A (0.234 Ha)		
Storm Event	**Minor Flow to HW100 (L/s)**	**Major Flow to Booth (L/s)**	**On-Site Max Flow Depth (m)**	**Minor Flow to Outlet South of 535 (L/s)**	**Major Flow to Booth (L/s)**	**On-Site Max Flow Depth (m)**
2-Year	183.5	0.28	0.0	15.8	0	0
5-Year	246.6	18.2	0.02	22.3	0	0
100-Year	344.5	121.3	0.10	60.0	0	0

The existing storm network is also comprised of a Stormceptor STC4000 capable of treating 80% TSS removal before discharge to the Ottawa River. The storm network that drains the Courtyard into the underground parking garage is also equipped with an internal mechanical system to treat 80% TSS removal. Refer to Functional Servicing and Stormwater Management Report by DSEL dated August 2018 for technical details of the existing Storm Network.

The City of Ottawa has raised concerns with regards to the Oil Grit separator performance to provide 80% TSS removal and have asked CIMA+ to investigate this issue.

The OGS was designed during the Phase 1 of the project to treat the site with an Impervious ratio of 90%. Most of the site was going to be impermeable surfaces (asphalt) with little infiltration. The proposed roadway around Block 204 will have interlock pavers with a subdrain in the middle of the road instead of asphalt and therefore will have more infiltration which will result in a reduction of sediments entering the storm network and passing through the OGS. The runoff coefficient used for the interlock pavers is 0.75 which is a reduction of 15% when compared to asphalt. The proposed conditions for the Western part of ZIBI has a runoff coefficient of 0.79. If we were to substitute the interlock pavers with asphalt the runoff coefficient would be 0.84. This is a 5% reduction across the Western part of ZIBI which in theory should lower the Impervious rate to approximately 85%. It is also important to note that the buildings which are connected to the storm network are considered to have clean runoff but are still being included in the impervious ratio and total area used for the OGS because the flow will ultimately be mixed with asphalt runoff. If we were to exclude the buildings from the analysis the total area would be reduced from 1.34ha to 0.78ha which is almost half the total area.

Although these numbers are theoretical CIMA+ cannot confirm the exact TSS removal that the existing OGS will provide with the changing of asphalt to interlock pavers. However, we are of the opinion that the existing OGS should provide sufficient quality control especially since the receiving body is the Ottawa River which in the past only required a Basic TSS removal (60%) due to the high sediment level already within the river.

4.2 Storm Servicing Strategy and Design Criteria

As stated in the Servicing Report by DSEL, quantity control is not required for the site as it will not increase flood risk to the Ottawa River. However, the site plan configuration has been modified since the last stormwater report and a larger area than what was anticipated will be draining to the storm network. Therefore, a full SWM analysis of Western Chaudière Island was completed. Due to the additional surface draining into the existing storm network, roof retention of Block 204 will be implemented in order to not exceed the anticipated peak flow that was identified in the Phase 1 approved report.

As stated in the Servicing Report by DSEL, the site currently has a Stormceptor to ensure 80% TSS removal is achieved as per the set requirement by the Rideau Valley Conservation Authority. Therefore, no additional quality treatment will be required for the proposed development.

4.3 Proposed Storm Servicing and Stormwater Management Design and Calculations

Proposed Storm Network Extension

The proposed storm sewer extension has been sized to capture the 5-year storm event. A Storm Sewer Hydraulic Design sheet using the rational method has been developed to analyze the existing and proposed storm network for the 2, 5 and 100-year storm event. Refer to **Appendix D** for detail calculations.

Proposed Flow Rates and Stormwater Quantity Control

To calculate the peak flow rate, an evaluation of the runoff coefficient was done. The site is comprised of landscape surface, interlock pavers and hard surfaces such as roof and pavement. Refer to **Table 4-2** for the values that were used. The City of Ottawa Sewer Design Guideline does not have an attributed value for interlock pavers and therefore the value of 0.75 was used for from the MTO Drainage Management Manual (1997). Refer to **Appendix D** for table. For the 100-year Storm, the runoff coefficient has been increased by 25% as per City of Ottawa Guideline.

Table 4-2: Runoff Coefficient

Type of surface	Runoff Coefficient
Landscape	0.2
Interlock Pavers	0.75
Hard surface	0.9

For the hydraulic analysis of the storm network, a time of concentration of 10 minutes was used for the beginning of the network. The Block 204 will be doing water retention and will have a release rate of 21.13L/s. The flow restriction on the roof will result in 47m^3 of water retention.

Around 30% of the roof surface will be developed as green surface and has been considered in the calculations. Below is a table that summarized the peak flow for different storm event and compares the anticipated flow from the Phase I servicing report.

Table 4-2: Post-development Flow Rate

	(Existing)	(Proposed)
Rain event	Phase I anticipated Flow to HW 100 (1.059ha) (L/s)	From STM-111 to HW 100 (1.27ha) (L/s)
2-year	183.78	176.56
5-year	264.8	234.09
100-year	465.8	457.48

The main network draining to HW 100 (Outlet structure) has a greater area than what was anticipated during the design of Phase I. However, due to the retention done by Block 204 and using a runoff coefficient of 0.75 for interlock pavers, we obtain a peak flow that is lower than what was anticipated. (Refer to table 4-2)

The Courtyard area (Catchment A10) that drains into the underground parking lot has been reduced in size from the previous Phase 1 development. Phase 1 had anticipated an area of 0.234ha with a runoff coefficient of 0.80 draining into the underground parking lot. The proposed development will only have 0.196ha with a runoff coefficient of 0.75 draining into the underground parking lot system. Since the area and runoff coefficient are both lower than what was anticipated, it is safe to say that the flow going into the underground network will be reduce and will not exceed the flows that were calculated in the Phase 1 approved report.

Stormwater Service Connections

The Block 204 and future Blocks will have a storm service of 250mm diameter with a minimum slope of 1%. The service line will be used to convey the roof flow and foundation drain.

4.4 Storm Servicing and Stormwater Management Summary and Conclusions

The storm servicing design for the proposed development conforms to the requirements of the City of Ottawa Sewer Design Guidelines, 2012, as amended by all applicable Technical Bulletins.

The peak flow rate for the 100-year storm is below the anticipated flow that was calculated during the Phase I report. Therefore, no additional storm analysis was done.

Roof Flow Control Declaration will be provided upon completion of the Mechanical and Structural design.

5. Conclusion

The purpose of this assessment is to confirm that the proposed development can be adequately serviced using the existing municipal infrastructure (water, sanitary, and storm) surrounding the site. This assessment shall be used in support of a Site Plan Control Application to allow for the construction of Block 204.

The important information and findings as a result of this assessment are as follows:

- The anticipated water demands for the ZIBI site are **346.49 L/min** (average day), **21,847.34 L/min** (max day + fire flow), and **1497.4 L/min** (peak hour). Based on the boundary conditions provided by the City an additional private hydrant will be required on site to provide adequate fire flow. There is adequate flow and pressure in the water distribution system to meet the required potable water demands for the proposed development.
- The estimated sanitary flow for the proposed Block 204 development is **1.56 L/s** (average flow rate) and **4.74 L/s** (peak flow rate);
- The estimated sanitary flow for the ZIBI site is **5.96 L/s** (average flow rate), **15.02 L/s** (peak dry weather), and **15.86 L/s** (peak wet weather). The new permanent pumping station designed by Hatch will need to be in operation before the Block 204 occupancy. The City of Ottawa has indicated that they can accept the anticipated sanitary flow for full built-up of the ZIBI development in the Master Servicing Study (MSS);
- Storm Peak Flow to HW-100 outlet for the 100-year event is lower than what was anticipated in the Phase I servicing report. The area of the Courtyard has been decreased from the Phase 1 report and therefore will have a lower flow that what was anticipated;
- The site is currently equipped with an Oil Grit Separator and therefore no additional quality treatment was proposed for the development;
- Roof Flow Control Declaration will be provided upon completion of the Mechanical and Structural design.

We trust this Site Servicing and Stormwater Management Report is to your satisfaction. If you have any questions regarding this report, please do not hesitate to contact any of the signatories.

A

Appendix A
Correspondence

Julien Sauvé

From: Hamlin, Allison <Allison.Hamlin@ottawa.ca>
Sent: Wednesday, January 19, 2022 9:32 AM
To: Paul Cope; Darrin Rankine; Justin Robitaille
Cc: Mottalib, Abdul; Paudel, Neeti; Wang, Randolph; Patel, Parthvi
Subject: Pre-application Consultation Follow-up Email - ZIBI Block 204, 317 Miwate Private

--EXTERNAL--

Hello,

Thank you for meeting with us to discuss the fourth phase of development at Zibi. Your presentation was very helpful.

Please refer to the below and attached notes regarding the Pre-Application Consultation Meeting held on January 6, 2022, for the 22-storey, mixed-use, high-rise development at Zibi (Block 204, 315 priv� M�w�te Private, Chaudi�re Island).
Below are staff's preliminary comments based on the information presented at the time of the pre-consultation meeting:

Planning

- A site plan application (Complex) will be required.
- Zoning: MD5[2172] S332; OP(2003): Central Area and Central Area Secondary Plan, Mixed Use on Schedule Q; New OP: Ottawa River Islands Special District within the Downtown Core Transect.
- Please provide details of if/how lands will be severed and how the woonerf will be added to the plan of condo in your cover letter.
- Please provide a legal description and a legal survey of the subject lands with your application. A topographical sketch will not be sufficient.

Transportation

- TIA requirements - An addendum with trips, MMLOS and TDM for this site is accepted. It is recommended that the development provide as many TDM measures to enable and encourage travel by active modes.
- Ensure continuous, safe, and accessible pedestrian connections is provided from the site to the transit service on Booth Street. Recommend providing a close/ direct active mode connection through Block 204, 206 and 207 to Booth Street.
- Site triangles at the following locations on the final plan will be required:
  - Local Road to Local Road: 3 metre x 3 metres
- On site plan:

  - Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
  - Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
  - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
  - Show lane/aisle widths.
  - Sidewalk is to be continuous across access as per City Specification 7.1.
- AODA legislation applies for all areas accessible to the public. Consider using Accessibility Design Standards

Urban Design

- A Design Brief is required as part of the submission. The Terms of Reference is attached for convenience.
- Please consider both the Design Framework and Development Principles and the Heritage Interpretive Plan within the analysis.
- The site is within a Design Priority Area and formal review by the City's Urban Design Review Panel is required. The applicant can also benefit from informal review by the UDRP prior to submitting the application. Please reach out to the City's UDRP coordinator at udrp@ottawa.ca for scheduling details. Please note the UDRP is currently under high pressure with respect to project scheduling. Priority is given to projects at the stage of formal review.
- With respect to the design presented at the pre-consultation meeting, the programming and general site organization appears to have followed the approved master plan for the island. The detailed analysis and architectural aspirations presented by the architect are also appreciated. However, certain aspects of the design, particularly the positioning, shape, and the massing articulation of the tower are not most convincing.
  - Locating the tower to the northmost part of the site, while creating opportunities for a south-facing roof top amenity space, crowds the north shore of the island with a wall of towers. Do the benefits of this design strategy outweigh the shortcomings? Have the overall microclimate conditions of the site and the surrounding area been fully examined?
  - The generally rectangular shape of the tower appears to be quite arbitrary for the site and its location and does not respond to geometry of the site and the surrounding contextual elements effectively.
- Moving forward, it is important to continue to explore site plan and massing options taking into consideration the views of the island from the various vantage points as well as the overall optimal microclimate conditions of the site and the island. It is recommended as a best practice that a shadow study and a desk top wind study be prepared for each massing options explored to facilitate decision making.

Infrastructure

Capacity issues for sewers

- Please find the Servicing Report Template & Study Guidelines" in the attachment and prepare the servicing study accordingly. For capacity issue, please see section 3.2.1 page 3-3 and follow this section. A completed checklist with corresponding references from the servicing study is mandatory for the completeness of the study. Please add a completed checklist in the report.
  - Sanitary: as per approved master plan
  - Storm: as per approved master plan
  - Water: as per approved master plan
  - Sewage Pumping Station: Block 204 triggers Sewage Pumping Station. Sewage pumping station approval is required for this site as per the master plan agreement.

Required information for Water boundary conditions (not required if you're using existing service)

- Boundary conditions are required to confirm that the require fire flows can be achieved as well as availability of the domestic water pressure on the city street in front of the development. Please use Table 3-3 of the MOE Design Guidelines for Drinking-Water System to determine Maximum Day and Maximum Hour peaking factors for 0 to 500 persons and use Table 4.2 of the Ottawa Design Guidelines, Water Distribution for 501 to 3,000 persons.

1. Location of Service
2. A sketch of the proposed water service to the city watermain
3. Street Number & Name
4. Type of development and units
5. Amount of fire flow required ___l/s (Calculation as per the FUS Method).
6. Average daily demand: -l/s
7. Maximum daily demand: -l/s
8. Maximum hourly daily demand: -l/s

- Please note proposed development will require 2 separate service connections from the city watermains if the basic day demand is greater than 50m3/day to avoid the creation of a vulnerable service area. Two water meters will be required for two service connections and the service connections will have to be looped.

Underground and above ground building footprints

- All underground and above ground building footprints and permanent walls need to be shown on the plan to confirm that any permanent structure does not extend either above or below into the existing property lines, sight triangles and/or future road widening protection limits.

Grade limitations for underground ramps

- Underground ramps should be limited to a 12% grade and must contain a subsurface melting device when exceeding 6%. If the ramp's break over slope exceeds 8%, a vertical-curve transition or a transition slope of half the ramp slope should be used.

Stormwater management criteria

- Quantity and quality control of the storm flow will be implemented as per master plan.

Monitoring MHs

- Onsite Monitoring MHs are required for sewers (sanitary and storm) if there will be commercial component with the residential development.

Studies required for Site Plan application

  - Serviceability Study
  - Erosion and sediment Control Plan, it can be combined with grading plan
  - Stormwater Management Report
  - Geotechnical Study
  - Phase 2 Noise Control Detailed Study
  - ESA-Phase 1 Study and Phase 2: Updated Phase II is required to ensure further contamination has not occurred and a description of the remediation process with available test results for our review.
  - Filling of RSC.
  - Wind Analysis
  - Sewage Pumping Station

MOECC SWM Requirement:

- It will be indicated in the first review comments whether an ECA is required for that submission.

Relevant information

- Servicing & site works shall be in accordance with the following documents:

  - Ottawa Sewer Design Guidelines (2012)
  - Ottawa Design Guidelines – Water Distribution (2010)
  - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
  - City of Ottawa Slope Stability Guidelines for Development Applications (2004)
  - City of Ottawa Environmental Noise Control Guidelines (2006)
  - City of Ottawa Park and Pathway Development Manual (2012)
  - City of Ottawa Accessibility Design Standards (2012)
  - Ottawa Standard Tender Documents (2015)
  - Ontario Provincial Standards for Roads & Public Works (2015)

- Record drawings and utility plans can be purchased from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

City Surveyor

  - The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.

- o Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.

Questions regarding the above requirements can be directed to the City's Surveyor, Bill Harper, at Bill.Harper@ottawa.ca

Community Representative Comments

- Please see attached minutes

Other

- o Plans are to be standard A1 size (594 mm x 841 mm) sheets, utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400 or 1:500).
- o All PDF submitted documents are to be unlocked and flattened.
- o You are encouraged to contact the Ward Councillor, Councillor Catherine McKenney, about the proposal.

Please refer to the links to Guide to preparing studies and plans and fees for further information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-application consultation comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined. Please do not hesitate to contact me if you have any questions.

Regards,

Allison Hamlin, MCIP, RPP
Planner III (A) | *Urbaniste III (A)*
Development Review Central | *Examen des demandes d'am�nagement secteur centre*
Planning, Real Estate and Economic Development Department | *Services de la planification, des biens immobiliers et du d�veloppement �conomique*
City of Ottawa | *Ville d'Ottawa*
110 Laurier Avenue West. Ottawa, ON | *110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1*
613.580.2424 ext./ *poste* 25477
ottawa.ca/planning / *ottawa.ca/urbanisme*

'

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November 03, 2022

City of Ottawa
110 Laurier Ave West
Ottawa, ON, K1P 1J1

Attention: To whom it may concern

RE: Zibi Block 204 Condominium, 315 Miwatè Private, Ottawa, ON RJC No. OTT.131975.0001
Design Loading for Fire Vehicle Access

This letter is to confirm the loading used for the design of the structure for the development at 315 Miwatè Private (Zibi Block 204).

This letter confirms that the suspended slabs and supporting structure accessible to fire service vehicles will be designed for a minimum uniform live load of 15 kPa.

More information about the design loads and applicable areas can be found on our structural drawings.
We trust the above is satisfactory; however, if further information is required please do not hesitate to contact the undersigned.

Yours truly,

Read Jones Christoffersen Ltd.

Ken Turcotte, P.Eng.
Design Engineer
Structural Engineering

Smith + Andersen
1600 Carling Ave Suite 530 Ottawa Ontario K1Z 1G3
613 230 1186 f 613 230 2598 smithandandersen.com

2022-08-29

City of Ottawa
Infrastructure Services and Community Sustainability
110 Laurier Avenue West
Ottawa, ON
K1P 1J1

Attention: City Building Official

RE: ZIBI BLOCK 204, 315 PRIVÉ MÌWÀTE PRIVATE
S+A PROJECT # 22087.000.M.001
SPRINKLER SYSTEM DESIGN

Dear City Building Official:

This letter is to confirm that the sprinkler system will be designed as a fully supervised system that will be continuously monitored with fire alarm. System shall be designed to NFPA 13 and conform to all applicable NFPA standards.

Yours truly,

SMITH + ANDERSEN

Elaine Guenette B.A.Sc., P.Eng., LEED AP
Principal

LICENSED PROFESSIONAL ENGINEER
2022.08.29
E.J.GUENETTE
100166730
22087.000
PROVINCE OF ONTARIO

22087.000.m.001.l001

C.C. Justin Alarie – Smith + Andersen

B

Appendix B
Water Supply Calculations

PROJECT NAME:	ZIBI Block 204
CIMA+ PROJECT NUMBER:	A000931
CLIENT:	DREAM
PROJECT STATUS:	Site Plan Application

WATER CONSUMPTION CALCULATIONS

APPLICABLE DESIGN GUIDELINES:

1. Ottawa Design Guidelines - Water Distribution (2010)
2. City of Ottawa Technical Bulletin ISTB-2018-02, ISDTB-2014-02 and ISD-2010-02
3. MOE Design Guidelines for Drinking-Water Systems

RESIDENTIAL AND COMMERCIAL WATER DEMANDS:

RESIDENTIAL DESIGN CRITERIA:

Residential Average Day Demand:	350	L/c/day
Maximum Day Peaking Factor:	2.5	x Average Daily Demand
Maximum (Peak Hour) Peaking Factor:	5.5	x Average Daily Demand

Per Unit Populations:

Table 4.1 Per Unit Populations

Unit Type	Persons Per Unit
Single Family	3.4
Semi-detached	2.7
Duplex	2.3
Townhouse (row)	2.7
Apartments:	
Bachelor	1.4
1 Bedroom	1.4
2 Bedroom	2.1
3 Bedroom	3.1
Average Apt.	1.8

EQUIVALENT POPULATION :

Unit Type	Number of Units	Persons Per Unit	Population
1 Bedroom Apartments	141	1.4	197
2 Bedroom Apartments	79	2.1	166
Studio	19	1.4	27
Total	**239**		**390**

RETAIL & AMENITY DESIGN CRITERIA:

Contributing Retail & Amenity Area:	2,964.000	m^2
Retail & Amenity Average Day Demand:	2.5	$L/m^2/d$
Maximum Day Peaking Factor:	1.5	x Average Daily Demand
Maximum (Peak Hour) Peaking Factor:	1.8	x Maximum Daily Demand

WATER DEMANDS:

Demand Type	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Maximum (Peak) Hour Demand (L/s)
Residential	1.58	3.95	8.69
Retail & Amenity	0.09	0.13	0.23
Total	**1.67**	**4.08**	**8.92**

NOTES:

1. Maximum Day and Maximum Hour residential peaking factors determined using Table 3-3 of the MOE Design Guidelines for Drinking-Water System for 0 to 500 persons.

2. Given basic day demand less than 50 m³/day (0.57 L/s), only one connection is required.

Prepared by: Julien Sauvé, P.Eng. PEO #100200100 — Date: 2022/04/05

Verified by: André Chaumont, P.Eng. PEO #90409194 — Date: 2022/04/05

PROJECT NAME:	ZIBI Block 204
CIMA+ PROJECT NUMBER:	A000931
CLIENT:	DREAM
PROJECT STATUS:	Site Plan Application

WATER CONSUMPTION CALCULATIONS

APPLICABLE DESIGN GUIDELINES:

1. Ottawa Design Guidelines - Water Distribution (2010)
2. City of Ottawa Technical Bulletin ISTB-2018-02, ISDTB-2014-02 and ISD-2010-02
3. MOE Design Guidelines for Drinking-Water Systems

WATER DEMANDS:

Phase	Block	Type	Unit Rate		No Units	Avg Day L/min	Max Day L/min	Peak Hour L/min
1	208	Office	75	L/9.3m²/d	975	5.46	8.19	14.75
1	208	Retail	2.5	L/m²/d	736	1.28	1.92	3.45
1	208	Restaurant	125	L/seat/d	8	0.69	1.04	1.88
1	205A	Res	474.6	L/unit/d	71	23.4	114.66	173.16
1	205A	Retail	2.5	L/m²/d	754	1.31	1.96	3.53
3	207	Office	75	L/9.3m²/d	4544	25.45	38.17	68.71
3	207	Retail	2.5	L/m²/d	567	0.98	1.48	2.66
3	207	Restaurant	125	L/seat/d	150	13.02	19.53	35.16
4	206	Res	280	L/unit/d	447	86.92	217.29	478.04
4	206	Retail	2.5	L/m²/d	857	1.49	2.23	4.02
4	206	Amenity	2.5	L/m²/d	1509	2.62	3.93	7.07
2	211	Office	75	L/9.3m²/d	14480	81.09	121.64	218.95
2	211	Retail	2.5	L/m²/d	1082	1.88	2.82	5.07
5	204	Res	350	L/p/d	390.00	94.79	236.98	521.35
5	204	Retail	2.5	L/m²/d	1216.00	2.11	3.17	5.70
5	204	Amenity	2.5	L/m²/d	1748.00	3.03	4.55	8.19
1	EO	Office	75	L/p/d	12	0.63	0.94	1.69
					Total	346.16	780.50	1553.39

NOTES:

1. Maximum Day and Maximum Hour residential peaking factors determined using City of Ottawa Water Design Guidelines.

Prepared by: Julien Sauvé, P.Eng.
PEO #100200100
Date: 2022/04/05

Verified by: André Chaumont, P.Eng.
PEO #90409194
Date: 2022/04/05

PROJECT NAME: ZIBI Block 204

CIMA+ PROJECT NUMBER: A000931
CLIENT: DREAN
PROJECT STATUS: Site Plan Control

FIRE FLOW ASSESSMENT

APPLICABLE DESIGN GUIDELINES:

1. Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999
2. Ottawa Design Guidelines - Water Distribution (2010) including Appendix H per ISTB-2018-02
3. City of Ottawa Technical Bulletin ISTB-2018-02
4. MOE Design Guidelines for Drinking-Water Systems

STEP A - DETERMINE THE TYPE OF CONSTRUCTION

Type of Construction	Coefficient (C)	Value Selected (C)
Fire-resistive Construction (> 3 hours)	0.6	0.7
Fire-resistive Construction (> 2 hours)	**0.7**	
Non-combustible Construction	0.8	
Ordinary Construction	1.0	
Wood Frame Construction	1.5	

STEP B - DETERMINE THE FLOOR AREA

Floor/Level	Floor Area Per Level (sq. ft.)	Floor Area Per Level (m2)	Fire Resistive Building	Protected Openings (one hour rating)	Area of Structure Considered (m2)
GFA Level 1:	22,128	2,056	YES	YES	22,128
Mezzanine	7,879	732			183
GFA Level 2:	12,437	1,155			289
GFA Level 3:	12,537	1,165			-
GFA Level 4:	12,537	1,165			-
GFA Level 5:	12,537	1,165			-
GFA Level 6:	11,340	1,054			-
GFA Level 7:	11,340	1,054			-
GFA Level 8:	11,340	1,054			-
GFA Level 9:	7,707	716			-
GFA Level 10:	7,528	699			-
GFA Level 11:	7,528	699			-
GFA Level 12:	7,528	699			-
GFA Level 13:	7,528	699			-
GFA Level 14:	7,528	699			-
GFA Level 15:	7,528	699			-
GFA Level 16:	7,528	699			-
GFA Level 17:	7,528	699			-
GFA Level 18:	7,528	699			-
GFA Level 19:	7,528	699			-
GFA Level 20:	7,528	699			-
GFA Level 21:	7,528	699			-
GFA Level 22:	7,528	699			-
GFA Level Mechanical Penthouse	1,943	181			-
TOTAL FLOOR AREA (A):	**221,589**	**20,586**			**22,600**

PROJECT NAME:	ZIBI Block 204
CIMA+ PROJECT NUMBER:	A000931
CLIENT:	DREAN
PROJECT STATUS:	Site Plan Control

FIRE FLOW ASSESSMENT

STEP C - DETERMINE THE HEIGHT IN STOREYS

Floor/Level	Number of Storeys	Percent of Floor Area Considered
Ground Level:	1	100%
Mezzanine	1	25%
Level 2:	1	25%
Level 3:	1	-
Level 4:	1	-
Level 5:	1	-
Level 6:	1	-
Level 7:	1	-
Level 8:	1	-
Level 9:	1	-
Level 10:	1	-
Level 11:	1	-
Level 12:	1	-
Level 13:	1	-
Level 14:	1	-
Level 15:	1	-
Level 16:	1	-
Level 17:	1	-
Level 18:	1	-
Level 19:	1	-
Level 20:	1	-
Level 21:	1	-
Level 22:	1	-
Mechanical Penthouse	1	-
HEIGHT IN STOREYS:	**24**	

STEP D - DETERMINE BASE FIRE FLOW (ROUND TO NEAREST 1,000 L/min)

$$F = 220C\sqrt{A}$$

Where:

F is the required fire flow in L/min

C is the coefficient related to the type of construction, and;

A is the total floor area of the building in m^2

Coefficient Related to Type of Construction (C) = 0.7

Floor Area Considered (A) = 22,600 m^2

REQUIRED (BASE) FIRE FLOW (F) =	**23000** **L/min** (Rounded to Nearest 1,000 L/min)

STEP E - DETERMINE THE INCREASE OR DECREASE FOR OCCUPANCY AND APPLY TO STEP D (STEP D x STEP E, DO NOT ROUND)

Occupancy Class	Occupancy Factor	Value Selected (C)
Non-combustible	0.75	
Limited combustible	**0.85**	
Combustible	1.00	**0.85**
Free burning	1.15	
Rapid burning	1.25	

REQUIRED (BASE) FIRE FLOW (F) =	**19550** **L/min** (Not rounded)

PROJECT NAME:	ZIBI Block 204
CIMA+ PROJECT NUMBER:	A000931
CLIENT:	DREAN
PROJECT STATUS:	Site Plan Control

FIRE FLOW ASSESSMENT

STEP F - DETERMINE THE DECREASE, IF ANY, FOR AUTOMATIC SPRINKLER PROTECTION AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Sprinkler System Design	Sprinkler Design Charge	Value Selected (C)	Total Charge
Automatic sprinkler system conforming to NFPA standards	-30%	Yes	-30%
Standard water supply	-10%	Yes	-10%
Fully supervised system	-10%	Yes	-10%
TOTAL CHARGE FOR SPRINKLER SYSTEM			**-50%**

DECREASE FOR SPRINKLER PROTECTION =	**-11500**	**L/min** (Not rounded)

STEP G - DETERMINE THE TOTAL INCREASE FOR EXPOSURES AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Façade	Separation Distance (m)	Length-height Factor of Exposed Wall (m-storeys)	Assumed Construction of Exposed Wall of Adjacent Structure	Total Charge
North Façade	16.0	1222	Fire Resistive or Ordinary with Unprotected Openings	15%
East Façade	16.0	256	Fire Resistive or Ordinary with Unprotected Openings	15%
South Façade	17.0	1420	Fire Resistive or Ordinary with Unprotected Openings	15%
West Façade	17.0	56	Fire Resistive or Ordinary with Unprotected Openings	11%
TOTAL CHARGE FOR EXPOSURES				**56%**

INCREASE FOR EXPOSURES =	**12880**	**L/min** (Not rounded)

STEP H - DETERMINE FIRE FLOW INCLUDING ALL INCREASES AND REDUCTIONS ((STEP E + STEP F + STEP G, ROUND TO NEAREST 1,000 L/min)

TOTAL REQUIRED FIRE FLOW (RFF) =	**21000**	**L/min** (Rounded to Nearest 1,000 L/min)
	350.00	**L/s**
	5548	**USGPM**

PROJECT NAME:	ZIBI Block 204
CIMA+ PROJECT NUMBER:	A000931
CLIENT:	DREAN
PROJECT STATUS:	Site Plan Control

FIRE FLOW ASSESSMENT

NOTES/COMMENTS:

STEP A - DETERMINE THE TYPE OF CONSTRUCTION

1. Building is made of typical Reinforced Concrete and has a fire rating of two hours. Extrapolation was used to determine the coefficient

STEP B - DETERMINE THE FLOOR AREA

1. Assumed vertical openings and exterior vertical communications are properly protected (one hour rating), thus only the area of the largest floor plus 25% of each of the two immediately adjoining floors accounted for per Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999

STEP C - DETERMINE THE HEIGHT IN STOREYS

1. One levels of underground parking not considered as they are at least 50% below grade (note F of Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999)

STEP D - DETERMINE BASE FIRE FLOW (ROUND TO NEAREST 1,000 L/min)

1. No notes or comments.

STEP E - DETERMINE THE INCREASE OR DECREASE FOR OCCUPANCY AND APPLY TO STEP D (STEP D x STEP E, DO NOT ROUND)

1. Occupancy selected will fall under C-2 occupancy type as per Neuf Architect.

STEP F - DETERMINE THE DECREASE, IF ANY, FOR AUTOMATIC SPRINKLER PROTECTION AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

1. Sprinkler system will be fully supervised.

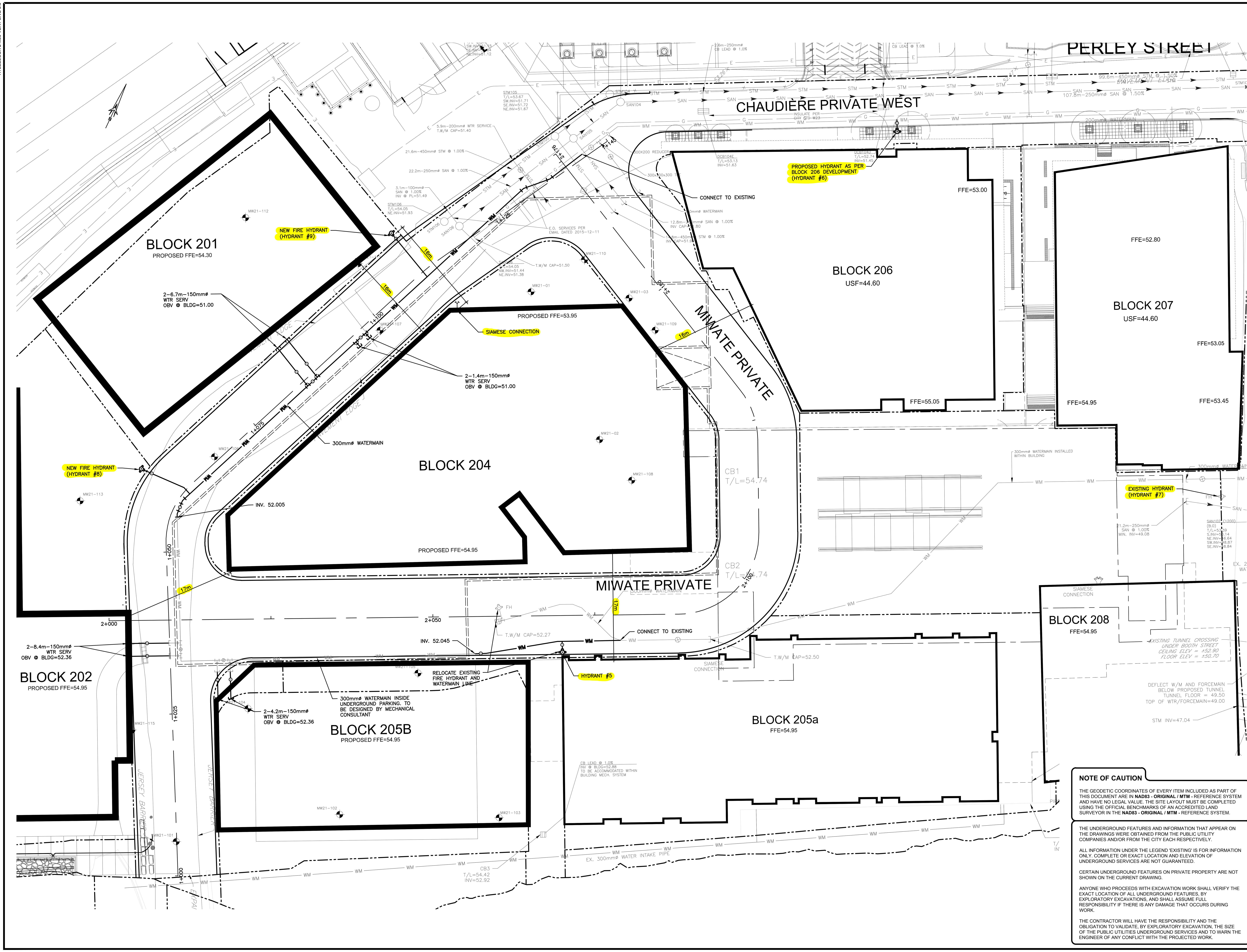
STEP G - DETERMINE THE TOTAL INCREASE FOR EXPOSURES AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

1. Refer to sketch in Appendix for distance used in calculation.

STEP H - DETERMINE FIRE FLOW INCLUDING ALL INCREASES AND REDUCTIONS ((STEP E + STEP F + STEP G, ROUND TO NEAREST 1,000 L/min)

1. No notes or comments.

Prepared by:	Julien Sauvé, P.Eng. PEO# 100173201	Date:	2022/04/05
Verified by:	André Chaumont, P.Eng. PEO #90409194	Date:	2022/04/05



NOTE OF CAUTION

THE GEODETIC COORDINATES OF EVERY ITEM INCLUDED AS PART OF THIS DOCUMENT ARE IN **NAD83 - ORIGINAL / MTM** - REFERENCE SYSTEM AND HAVE NO LEGAL VALUE. THE SITE LAYOUT MUST BE COMPLETED USING THE OFFICIAL BENCHMARKS OF AN ACCREDITED LAND SURVEYOR IN THE **NAD83 - ORIGINAL / MTM** - REFERENCE SYSTEM.

THE UNDERGROUND FEATURES AND INFORMATION THAT APPEAR ON THE DRAWINGS WERE OBTAINED FROM THE PUBLIC UTILITY COMPANIES AND/OR FROM THE CITY EACH RESPECTIVELY.

ALL INFORMATION UNDER THE LEGEND 'EXISTING' IS FOR INFORMATION ONLY. COMPLETE OR EXACT LOCATION AND ELEVATION OF UNDERGROUND SERVICES ARE NOT GUARANTEED.

CERTAIN UNDERGROUND FEATURES ON PRIVATE PROPERTY ARE NOT SHOWN ON THE CURRENT DRAWING.

ANYONE WHO PROCEEDS WITH EXCAVATION WORK SHALL VERIFY THE EXACT LOCATION OF ALL UNDERGROUND FEATURES, BY EXPLORATORY EXCAVATIONS, AND SHALL ASSUME FULL RESPONSIBILITY IF THERE IS ANY DAMAGE THAT OCCURS DURING WORK.

THE CONTRACTOR WILL HAVE THE RESPONSIBILITY AND THE OBLIGATION TO VALIDATE, BY EXPLORATORY EXCAVATION, THE SIZE OF THE PUBLIC UTILITIES UNDERGROUND SERVICES AND TO WARN THE ENGINEER OF ANY CONFLICT WITH THE PROJECTED WORK.

No.	Date	Description	By
1	APR. 11, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:

DESIGNED BY / APPROVED BY

ENGINEER: CIMA+

CLIENT: ZIBI

PROJECT NAME: ZIBI ONTARIO BLOCK 204 OTTAWA, ONTARIO

SHEET TITLE: EXPOSURE SEPARATION DISTANCES AND FIRE HYDRANT COVERAGE

DISCIPLINE: CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: 1:250
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No:
SHEET No: of 11	

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C

Appendix C
Wastewater Collection Calculations

PROJECT NAME: ZIBI - Ontario - Urban_Development
CIMA+ PROJECT A000931
CLIENT: Windmill DREAM Ontario 207 LP
PROJECT STATUS: Site Plan Application

WASTEWATER PEAK FLOW DETERMINATION

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012
2. City of Ottawa Technical Bulletin ISTB-2018-01
3. Ontario Building Code 8.2.1.3.B.

DOMESTIC CONTRIBUTIONS:
RESIDENTIAL DESIGN CRITERIA:

Residential Average Flow: 280 L/c/day
Residential Peak Factor: Harmon Equation (Min 2.0 and Max 4.0)

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * K$$

where:
P=Population
K=Correction Factor =0.8

Per Unit Populations:

Table 4.2 Per Unit Populations

Unit Type	Persons Per Unit
Single Family	3.4
Semi-detached	2.7
Duplex	2.3
Townhouse (row)	2.7
Apartments:	
Bachelor	1.4
1 Bedroom	1.4
2 Bedroom	2.1
3 Bedroom	3.1
Average Apt.	1.8

For the design of new systems, the average residential flow of 280 L/capita per day (as noted in Figure 4.3) shall be used. The peaking factor shall be derived from the Harmon Formula with the minimum permissible peaking factor being 2.0 and the maximum being 4.0. A correction factor of 0.8 shall then be applied to the Harmon Peaking factor.

- Infiltration Allowance (Dry weather): 0.05 L/s/effective gross ha (for all areas)
- Infiltration Allowance (Wet weather): 0.28 L/s/effective gross ha (for all areas)
- Infiltration Allowance (Total I/I): 0.33 L/s/effective gross ha (for all areas)

COMMERCIAL & INSTITUTIONAL CONTRIBUTIONS:
COMMERCIAL AND INSTITUTIONAL DESIGN CRITERIA:

Retail Average Flow:	28000	L/ha/day	2.8	$L/m^2/day$
Restaurant Average Flow:	125	L/seat/day		
Office Average Flow:	75	$L/9.3m^2/day$	8.1	$L/m^2/day$
Office Average Flow:	75	L/c/day		
Commercial Peak Factor:	1.5			

Effective Gross Area:	3	ha
DryWeather Infiltration rate	0.05	L/s/effective gross ha
WetWeather Infiltration rate	0.28	L/s/effective gross ha
Total Infiltration Allowance:	0.33	L/s/effective gross ha
Peak Extraneous Flow:	**0.99**	L/s

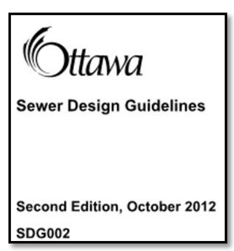
AVERAGE FLOW:

Phase	Block	Type	Unit Rate		Floor Area	Population	Number of Seats	Average Flow (L/s)	Peak Factor	Peak Flow (L/s)
1	208	Office	8.1	L/m2/day	2527	-	-	0.24	1.5	0.35
1	205A	Residential	280	L/c/day	-	127	-	0.41	3.4	1.40
1	205A	Retail	2.8	L/m2/day	750	-	-	0.02	1.5	0.04
2	211	Office	8.1	L/m2/day	14480	-	-	1.35	1.5	2.03
2	211	Retail	2.8	L/m2/day	1082	-	-	0.04	1.5	0.05
3	207	Office	8.1	L/m2/day	6451	-	-	0.60	1.5	0.90
3	207	Retail	2.8	L/m2/day	575	-	-	0.02	1.5	0.03
3	207	Restaurant	125	L/seat/day	-	-	150	0.22	1.5	0.33
4	206	Residential	280	L/c/day	-	447	-	1.45	3.4	4.93
4	206	Retail	2.8	L/m2/day	799	-	-	0.03	1.5	0.04
4	204	Residential	280	L/c/day	-	390	-	1.26	3.4	4.30
4	204	Retail	8.1	L/m2/day	1216	-	-	0.11	1.5	0.17
4	204	Amenity	8.1	L/m2/day	1748	-	-	0.16	1.5	0.24
1	EO	Office	75	L/c/day	-	10	-	0.01	1.5	0.01
1	ZIBI	Office	75	L/c/day	-	20	-	0.02	1.5	0.03

Total	**5.94**	**14.85**
Total Dryweather Flow		**15.00**
Total Wetweather Flow		**15.84**

NOTES:

1. Base sanitary flow, population densities, and infiltration rate are based on City of Ottawa design guidelines.
2. Harmon Equation has been used to calculate the residential peak factor for sanitary flows (see above) - maximum value of 4.0.
3. Population densities per City of Ottawa Sewer Design Guidelines, 2012, Section 4.3, Table 4.2 Per Unit Populations.



Prepared by: Zakaria Moumine, EIT — Date: 2022/08/22
PEO# 100564657

Verified by: Julien Sauvé, P.Eng. — Date: 2022/08/22
PEO# 100200100

ZIBI - Ontario - Urban_Development
A000931 (360)
HYDRAULIC CALCULATIONS FOR SANITARY SEWERS

Manning Coefficient:	0.013
Maximum permitted velocity :	3.00
Minimum permitted velocity :	0.60

Hydraulic Calculations for Sanitary Sewers

Building Flow	Section	Dia.	Length	Slope	Capacity (full)	Velocity (full)	Flow	Cumulative Flow	Velocity (actual)	% Full
		mm	m	%	m³/s	m/s	m³/s	m³/s	m/s	
Building 202 / 205B	SAN-109 to SAN-108	250	30.6	0.35%	0.035	0.72	0.00665	0.00665	0.55	19%
	SAN-108 to SAN-107	250	9.9	0.35%	0.035	0.72	0.00000	0.00665	0.55	19%
Building 204 / 201	SAN-107 to SAN-106	250	57.2	0.35%	0.035	0.72	0.00916	0.01581	0.70	45%
	SAN-106 to SAN-105	250	22.2	1.00%	0.059	1.21	0.00000	0.01581	1.02	27%
	SAN-105 to SAN-104	250	9.2	1.10%	0.062	1.27	0.00000	0.01581	1.05	26%
Building 206 / 207 / EO	SAN-104 to SAN-103	250	107.8	1.50%	0.073	1.48	0.00624	0.02205	1.28	30%
	SAN-103 to SAN-102	250	67.3	0.42%	0.039	0.79	0.00000	0.02205	0.81	57%
ZIBI / 205a / 208/ 209	SAN-102 to SAN-101	250	18.3	0.45%	0.040	0.81	0.00462	0.02667	0.86	67%
Building 211 / 213	SAN-101 to SAN-100A	250	14.8	0.50%	0.042	0.86	0.00798	0.03465	0.96	83%
Building 212	SAN-100A to SAN-401A	300	75.9	0.23%	0.047	0.66	0.00520	0.03985	0.74	85%
Building 214 / 215	SAN-401A to SAN-402A	1,500	61.5	0.23%	3.393	1.92	0.00340	0.04325	0.66	1%
	SAN-402A to SAN PS	525	4.2	3.90%	0.849	3.92	0.00000	0.04325	2.05	5%

Remarks :

1. Slope of 2.00% has been assumed for all building connections.
2. Sewer runs generally do not achieve minimum flushing velocities (0.6m/s) under actual peak flow conditions, where the height of flow is less that 30% of the sewer diameter in accordance with City of Ottawa and MOE guidelines. A flushing program is to be implemented.
3. Sanitary Flows used for Future development are from the Master Servicing Study

Prepared by: Julien Sauvé, P.Eng
PEO# 100200100

Date: 2022/08/22

Verified by: André Chaumont, P.Eng
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Date: 2022/08/22

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March 14, 2022

Ms. Taryn Glancy, P.Eng.
Project Manager
Zibi
6 Booth Street, Albert Island
Ottawa, ON K1R 6K8

Dear Taryn:

Subject: Preliminary Design for the Pumping Station to Service the Zibi Development on Chaudière Island - City of Ottawa

Hatch is pleased to present the Preliminary Design Report for the Zibi Permanent Pumping Station in the City of Ottawa.

We trust that this report is sufficient for your review and approval. Should you have any further questions, please do not hesitate to contact us.

Very truly yours,

Peter Rüsch, M.Eng., P.Eng., PMP
Municipal Flow Assurance Lead - North America
T 905.940.5497
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Zibi Pumping Station, Chaudière Island, City of Ottawa

[redacted]liminary Design Report

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Revision and Version Tracking

Report Title: Zibi Pumping Station, Chaudière Island, City of Ottawa – Preliminary Design Report

Submission Date: March 14, 2022

Version #	Filename:	Author	Checker	Approver	Date:
V0.50	Draft 1: Zibi Pumping Station Chaudière Island, Ottawa - Preliminary Design Report	P. Rüsch / A Gibbs	P. Rüsch	P. Rüsch	July 30, 2021
V0.90	Zibi Pumping Station Chaudière Island, Ottawa - Preliminary Design Report	P. Rüsch / A Gibbs	P. Rüsch	P. Rüsch	November 26, 2021
V0.95	Zibi Pumping Station Chaudière Island, Ottawa - Preliminary Design Report	P. Rüsch / A Gibbs	P. Rüsch	P. Rüsch	December 2, 2021
V1.00	Zibi Pumping Station Chaudière Island, Ottawa - Preliminary Design Report	P. Rüsch / A Gibbs	P. Rüsch	P. Rüsch	March 14, 2022

Peter Rüsch: Project Engineer

This document has been formatted for double side printing.

Table of Contents

1 Introduction

This report has been prepared for Zibi for the preliminary design of a new sewage pumping station to be located on Chaudière Island in the City of Ottawa. A site plan is attached in Appendix 1: Figure 1. The pumping station will service the planned Zibi development on Chaudière Island.

The internal collection system will collect sewage by gravity to a low point near the proposed pumping station; refer to the site plan for details. The proposed pumping station is designed to lift the collected sewage through two existing forcemains to a manhole located on Brickhill Street (near Pimisi Station) in Ottawa, to be treated elsewhere.

The purpose of this report is to:

- Provide the design criteria and rational used to provide a preliminary design for the sewage pumping station;
- List specific requirements incorporated in the design;
- Outline the preliminary arrangement of the pumping station and site requirements;

This report is to be reviewed, and submitted to the City of Ottawa for review and comments for inclusion into the final design. This report is also to be submitted as part of the Environmental Compliance Approval (ECA) application.

2 Methodology

2.1 Capacity of the Pumping Station

Zibi, after review of the phasing of the development, requested a final capacity of the pumping station at 45 L/s, with a likely sewage flow of 30 to 35 L/s. Refer to an e-mail from Zibi in Appendix 4.

In line with the City of Ottawa requirements, a wet well with submersible pumps with an underground control valve chamber will form the core pumping station. The pumping station will be equipped with 2 duty and 1 standby pumps.

The invert of the incoming sewer and the forcemain is dictated by the existing ground levels / sewer designs and the requirements for storage in the wet well / approach pipe of the pumping station. The final inverts were set by Hatch, taking the incoming sewer, storage requirements, and operational levels / volumes into account.

For approval purposes, the firm capacity of this pumping station will be 45 L/s, with an expected peak flow of 30-35 L/s. Refer to Section 3.3 for a detailed description of pump/forcemain combinations and resulting capacities.

3 Design of the Pumping Station

3.1 Existing System Components / Elevations / Other Requirements

The MECP Design Guidelines (online version) call for a flow velocity of at least 0.6 m/s in forcemains, however Hatch's preference is for a velocity of above 1.0 m/s (ideally 1.25 m/s to 1.5 m/s) to maintain adequate self-cleaning velocities in the forcemain. The forcemains are pre-existing for this project, with an ID of 201 mm. This will result in a velocity of 0.95 m/s (at 30 L/s) and 1.42 m/s at 45 L/s. Therefore, the flow velocity requirements of the City and the MECP will be fully met.

Since there is inadequate storage in existing sewers and manholes to allow for emergency storage exceeding 30 minutes, a storage pipe will provide additional storage for the pumping station. In conjunction with a dedicated diesel drive standby generator, the storage will primarily serve to provide additional time to troubleshoot the station, should there be a failure / outage. An emergency overflow has been indicated upstream of the pumping station, connecting to an existing storm sewer. An overflow elevation of 47.109 m has been provided in as-built drawings for the sewers on site. We understand that this level was set to ensure that no basements will be flooded. The station will be designed for a minimum time-to-overflow of 30 minutes at 45 L/s, which will result in a minimum time-to-overflow of 45 minutes at 30 L/s. Since the expected flows are at the lower end of the design range, the actual storage time will be at the higher end of the design range.

3.2 Approach Pipe

The pumping station uses an approach pipe to bridge the elevation difference to the pumping station wet well from the end of the storage pipe, thus creating good suction conditions for the pumps. The key purpose is to create smooth flow conditions that will not entrain air, to avoid issues associated with air in the forcemain. The approach pipe is designed to have a hydraulic jump at the junction of the incoming supercritical flow and the subcritical flows into the wet well. This will allow for self-cleaning of the approach pipe as sewage cycles between the operating levels.

3.3 Station Configuration

After a detailed analysis, it was determined that three pumps (2 duty, 1 standby) appears to be a more desirable station configuration. With this arrangement, two pumps are required to meet duty of 45 L/s using a single forcemain. Each pump can pump 30 -35 L/s using a dedicated forcemain. Therefore, with two pumps and two forcemains in operation a maximum capacity of approximately 60-70 L/s can be achieved. This results in a more energy efficient design, while accommodating flow variations between 30 and up to 50 L/s with two pumps and two forcemains in service and still meeting the desired 45 L/s with a single forcemain in service. The third pump operates as a standby pump in all cases.

3.4 Sizing of the Wet Well

Sizing of the wet well was performed for a single pump pumping through a dedicated forcemain achieving a flow of up to 35 L/s. Other operational scenarios are less severe and will be accommodated by this arrangement. The wet well capacity required to achieve a given pump cycle time, with one pump in service, can be calculated as follows:

$$V = \frac{T_c \cdot Q}{4}$$

Where:

V = wet well volume in L;

T_c = Pump Cycle Time in seconds;

Q = Pump discharge rate, in L/s

Since normally three pumps are available, 8 starts and stops per hour equally spread over 3 pumps were used to calculate the wet well volume (for pumps of this size, generally between 15 and 30 starts per hour are allowed). The active wet well volume required can be calculated as:

$$V = \frac{T_c \cdot Q}{4} = \frac{450s \cdot 35\ L/s}{4} = 3940L$$

Given the physical size of the pumps, and operational volume requirements, Hatch recommends a wet well within a precast chamber 2400mm x 3000mm to fit the pumps and piping. Allowing for 90% of the area being usable (to allow for some benching, equipment), this provides an area of:

$$A = 0.9 * \ l * w = 0.9 \ * 2.438 * 3.048 = 6.69m^2$$

A live wet well depth may be calculated as:

$$H = \frac{V}{A} = \frac{3.94m^3}{6.69m^2} = \sim 0.59m$$

3.5 Storage Requirements

In the event of an equipment failure the station will have the storage capacity to prevent incoming sewage flow from spilling into the storm system for at least 30 minutes. Significant storage within the wet well is not practical due to site considerations, hence a storage pipe was designed. The storage pipe is a 51.7m

1500 mm sewer between SANMH 401A and SANMH 402A. Low flow benching has been added to the storage pipe to accommodate all sewage flows under normal operating conditions (up to 45 L/s). The storage pipe elevations have been set to provide full storage at 100 mm below the overflow to the storm sewer. The maintenance hole SANMH 401A will be increased in diameter to 2400mm and the maintenance hole SANMH 402A will be increased in diameter to 3000mm. Hatch has confirmed both of these maintenance holes can accommodate joining to a 1500 mm sewer. The storage pipe will, net of the low flow channel and the benching, have a storage volume of 1.55 m^3/m.

3.6 Station Levels

The system operating levels are controlled with a combination of an ultrasonic level sensor and backup floats. The low water level (LWL) is set at the sequent depth for 45 L/s of the approach pipe, this level is set at 44.35m. LWL1, at which Pump 1 starts, is set at 44.95m, 0.60m higher than LWL. Pump 1 will be set to run at 25 L/s to reduce energy consumption while ensuring suitable conveyance velocities in the forcemain. LWL2, is set at 45.15m, at which point Pump 2 starts at 25 L/s and the first pump continues to run at 25 L/s for a combined duty of up to 50 L/s. Should the sewage level further increase, to high water level (HWL), set 0.20m above the LWL2 at 45.35m, both pumps to run at full speed, 30-35 L/s each for a total pumpage of 60-70 L/s. Should sewage levels continue to rise, the alarm high water level (HHWL) will be reached. This arrangement allows for additional emergency capacity to prevent overflows, and should be utilized unless the discharge cannot be accepted by the downstream sewer. The HHWL has been set to coincide with the top of the low flow channel in the storage pipe. The low-low water level is set 0.20m below the LWL to raise an alarm and also turn of the pump. A float is set 0.10m below the LLWL as a backup to turn off the pumps in the event of a transducer failure. The wet well invert (station floor) is 0.55m below the LLWL to allow for variety of pumps to be installed and allow for construction tolerances.

Table 1 - Level Elevation Summary

Level	Elevation	Notes
Station Floor	43.60m	
Low-Low Water Level	44.15m	Alarm level (float at 44.05m).
Low Water Level	44.35m	First pumps stops.
Low Water Level 1	44.95m	First pump starts (~25 L/s). Second pump stops.
Low Water Level 2	45.15m	Second pump starts (~2 x 25 L/s, from 1 x 35 L/s).
High Water Level	45.35m	Two pumps running each at 30 to 35 L/s.
High-High Water Level	45.55m	Alarm level (float at 45.65m).

Should only a single forcemain be operational, 45 L/s capacity will be met with 2 pumps running at full speed. Under peak flow conditions this may utilize some storage, however it would be expected that under circumstances where only a single forcemain is available, the station will be manned and that vac-trucks will be kept on standby.

3.7 Sizing and Pressure Class of the Forcemain, and System Curve

The forcemains are existing, and the sizing was indicated above, as were the expected velocities. A review of the forcemain profile confirmed that the forcemains are not continuously rising to the high point; this usually indicates a potential for transients. Variable frequency drives (VFDs) will be used in the station, primarily to improve energy consumption and to allow for longer runtimes. In addition, they will aid in limiting transients during normal operation by ramping up and ramping down the pump speed to control sewage flow rates. VFDs can also be used increase operational speed to perform controlled and periodic flushing of the forcemains if full speed pumping operation does not regularly occur.

The static head of this pumping station will range between 15.1m (for High-High Water Level) and 16.3 m during normal operation (Based on Low Water Level) based on the operating levels as defined in section 3.6 above, and the forcemain discharge elevation of 60.69 m. Forcemain distances and losses are calculated based on as-built drawings sent to Hatch.

A system curve has been calculated from 0-80 L/s using the HW-C factors of 120, 130 and 140 for the 200 mm SDR-26 PVC forcemain for single and dual forcemain operation. Minor losses were estimated by allowing for a 'k' value of 2 for fittings inside the pumping station and 16.1 for the forcemains. This 'k' value results in an additional dynamic head of 1.8 m at a flow rate of 45.0 L/s.

Friction losses are noted as follows, at 45 L/s and 30 L/s respectively:

- Hazen Williams C (HW-C) = 120: 14.1 m and 6.7 m
- HW-C = 130: 12.2 m and 5.7 m
- HW-C = 140: 10.6 m and 5.0 m

From the friction loss difference, and the general transient understanding, it is advisable to limit pumping capacity to 30 L/s, unless higher capacities are required.

A graph of the system curve is attached as Appendix 1: Figure 3. The following lines have been plotted:

- Maximum static head, and friction losses based on a HW-C of 120, along with minor losses;
- Intermediate static head (LWL1), and friction losses based on a HW-C of 130, along with minor losses;
- Minimum static head (OWL), and friction losses based on a HW-C of 140, along with minor losses.

Since the forcemain is < 300 mm diameter, the pump selection was based on the maximum curve. The full calculations are shown in Appendix 2.

3.8 Pump Selection

From the hydraulic system curve, three identical pumps have been pre-selected for the proposed pumping station – these are KSB 80-253/224XFG-K. Hatch has reached out to other manufacturers and the option presented is currently deemed the most suitable selection for this application.

Each pump is a submersible wastewater pump with a 255 mm diameter impeller. It operates with 600 V, 60 Hz, 3 phase motor with an output rating of 18.64 kW at 1777 rpm. These pumps require a minimum water level of 0.45 m, therefore the floor level proposed in section 3.6 of 0.75 m below the LWL is suitable.

With submersible pumps the NPSH requirements are met by designing the station to operate above the minimum water level. Hatch has calculated the NPSH available at the station and has confirmed that it will exceed the NPSH required by the pump manufacturer by a suitable margin for flows up to ~ 50 L/s per pump. The additional submergence below the LLWL alarm level contributes to having increased NPSH margin available.

The data sheet for the proposed pump is attached in Appendix 3. The pump curve for single and two pump operation has been plotted on the system curve derived in Section 3.7 above.

3.9 Variable Frequency Drives

As noted above, VFD drives will reduce energy costs, and transient issues during normal operation. In addition, the VFDs will lessen the inrush current to the pumps, and will allow for a higher number of starts per hour.

3.10 Emergency Backup Times and Emergency Overflow

Storage is available above the HHWL in the wet well, storage pipes and maintenance holes SANMH 401A and SANMH 402A. Any storage upstream of SANMH 401A was considered negligible.

The overflow elevation of the system was presented to Hatch as 47.109m on drawing, "PLAN AND PROFILE OF ZAIDA EDDY PRIVATE, SHEET No. 6" provided by Zibi. It is expected that the City/MECP will require a minimum emergency storage of 30 minutes of sewage flows, this would require a total storage of 81,000 L of storage. The storage time prior to overflow is 41 minutes at the full incoming flow condition, and is 53 minutes when the incoming flow rate is 35 L/s.

In the event of the surrounding water exceeding the 100 year flood level (46.81m), the system overflow may be compromised. A duckbill check valve should be installed on the overflow connection in SANMH 402A to eliminate water flowing into the station through the overflow connection during flood conditions.

3.11 Regular and Emergency Maintenance

With a three pump / two forcemain configuration, the pumps can either pump through both forcemains concurrently, or one at a time. With a flow rate of 25 L/s for single pump operation, operation of a single pump / two forcemain will result in low flow velocities. It is therefore proposed that the valves in the control valve chamber be adjusted to suit operation of a pump / forcemain combination, with 1 pump assigned to one forcemain and the other 2 pumps to the other forcemain. It is recommended that the assignment is changed every 6 month as part of regular maintenance. A selector switch will be incorporated into the pump controls to ensure that the pumps will function correctly.

3.12 Operation, Maintenance and Service Manuals

Access for maintenance personnel to the wet well will be provided through a hinged access cover with a locking device. Standard manhole ladders, set in the pre-cast concrete chamber, as well as safety platforms will be in accordance with applicable design standards for the given depth of the wet well. Three additional access openings, with locks and hinged covers, will facilitate maintenance of the pumps.

The wet well and the control valve chamber will both be located underground with locked access hatches. Therefore, additional security measures such as fencing should be unnecessary.

Operation, Maintenance and Service Manuals will be provided in accordance with the requirements of Section 7.1.5.3 of the City of Ottawa Pumping Station Design Guidelines. These manuals should be kept at a convenient location near the pumping station.

4 Electrical Works

4.1 Power Supply

A dedicated 3-phase supply will be made available for the pumping station. Details of the power supply requirement are provided in Appendix 1. There is an existing generator for the station, that was purchased by Zibi for the temporary pumping station. This generator was sized with the permanent station in mind and Hatch has confirmed it can be used at the permanent station. More information on the backup generator is available in Appendix 5.

4.2 Control Panel

The control panel will contain the control schematic (3-position mode selector switch, push-buttons and any other ancillary equipment required to provide a safe pump control). These components will be supplied as loose equipment, in the same package as the submersible pumps. The general contractor will install, commission and start-up the control system as per the pump control supplier documentation.

4.2.1 Operation

The pump control shall be based on the “Lead-Lag” principle. The operator can select three modes of operation from 2 selector switches:

- MANUAL mode: Each pump can be started and stopped individually, from push-buttons;
- AUTO mode: Pumps start and stop as per the “Lead-Lag” principle.
  At the first start Pump P-1 will be the lead pump and will start at the LWL1 level. Should the level reach LWL2, then the lag pump P-2 starts. The lag pump will stop once the LWL1 is reached. The lead pump stop once the LWL level is reached. Once both pumps are stopped, pump P-2 becomes the “lead” pump and P-3 the “lag” pump and P-1 becomes the standby pump. After each operation, the “lead” position alternates.
- OFF position: All pumps are stopped.

The control panel will include the LIT-1 ultrasonic level transducer. This transducer will provide the level inputs, (LWL, LWL1, LWL2, HWL) to be used to control the pumps.

Floats will be used to control the alarm levels (LLWL, HHWL) in addition to the ultrasonic transducer, and as backup to the transducer. An alarm will activate when the floats are used to control the pumps indicating the ultrasonic transducer is in a state of failure.

The controls for the submersible pumps will be provided by the pump manufacturer.

Each pump circuit is fitted with a thermomagnetic circuit breaker with instantaneous magnetic trip and adjustable overload relay.

Control power for pump schematic is to be provided from a Un-interruptible Power Supply (UPS). The UPS will power the level transmitter and auto-dialer.

A heating element with a thermostat will control the temperature of the control panel.

The following items shall also be included in the motor control panel:

- Duplex receptacle with ground fault protection;
- Lightning arrester;
- Motor temperature surveillance;
- Intrinsically safe relays for level switches installed in classified area;
- Pump Protection Relays for submersible motor protection;
- Smoke detector for smoke alarm;
- Manual transfer switch for generator operation of the station;
- Dry contacts for the alarm function of high-high water level, pump faults, power failure, smoke alarm, diesel generator fault, illegal entry is to be wired to the alarm control panel.

The time totalizer and event counter will enable staff to monitor the performance of pumps. A flow meter can be provided if required, however due to the limited space on site, and no receiving SCADA endpoint is not recommended. It is recommended that volume calculations are based on runtimes.

Each pump will be monitored for failing to respond to a "start" command. The pump failing to respond will be locked out and the lag pump will assume the lead duty position.

A separate “Alarm Control Panel” (ACP) will be provided on the outside of the pumping station main control panel. The ACP will house the alarming control logic required and a programmable auto-dialer to relay alarms. The dialler will store at least 4 pre-set emergency numbers, and will dial in case of an alarm until the dialed call is acknowledged. As a backup, an industrial outdoor strobe/audible alarm unit will also be mounted on the outside of the ACP that will be activated only in case of an auto-dialer failure, or if the auto-dialer alarm is not acknowledged within an adjustable short period of time. Alarm notifications instructions will also be added near the strobe light/audible alarm for manual alarming. The ACP can also be replaced (in future) with a SCADA system, should this become a requirement.

5 Confined Space Entry Requirements

The proposed wet well pumping station is classified as "confined space" similar to any underground maintenance hole or chamber.

Entry to the wet well is subject to the following requirements:

- Ontario Regulation 632/05 (Confined Spaces)
  http://www.elaws.gov.on.ca/html/regs/english/elaws_regs_050632_e.htm
- Confined Spaces Guidelines prepared by the Ontario Ministry of Labour
  http://www.labour.gov.on.ca/english/hs/pdf/gl_confined.pdf

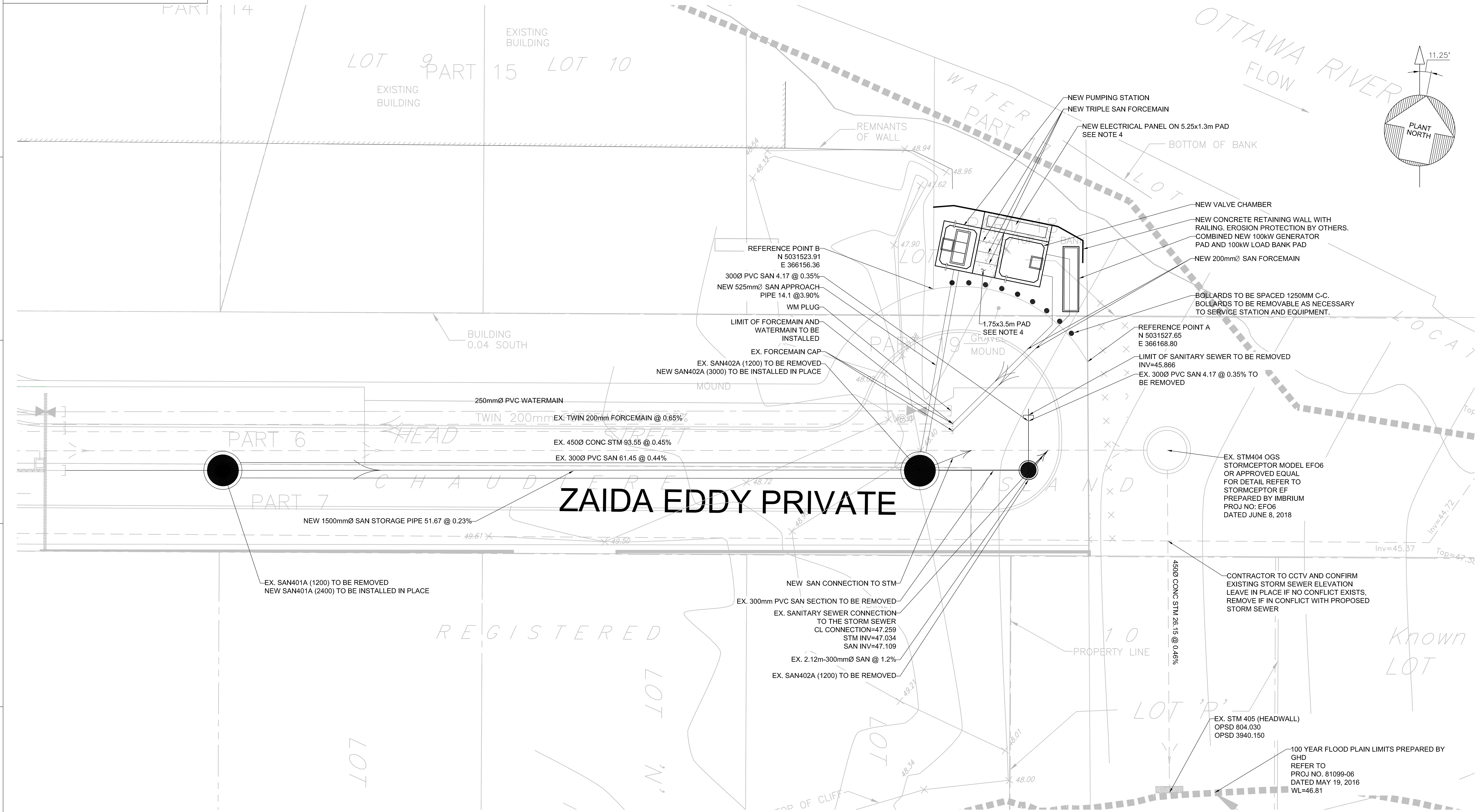
Entry procedures shall be developed by the owner of the Pumping Station in accordance with the above noted regulations and laws, and safety equipment shall meet legal requirements and be maintained in strict accordance with manufacturer’s requirements.

Appendix 1

Figures

- Site Plan
- System Schematic
- Process Mechanical Layout and Details
- Electrical Single Line Diagram
- Electrical Layout
- Structural Details

H364639-0000-220-251-0001
DWG. No.



SITE PLAN 1

0 1.5 3 4.5 6 7.5
SCALE IN METRES

NOTE:

1. DRAWING BASE PLAN USED PROVIDED BY DSEL JANUARY 8, 2021. HATCH HAS NOT VERIFIED THE CORRECTNESS OF THESE DRAWINGS AND SHALL NOT BE RESPONSIBLE FOR ANY INACCURACIES AS A RESULT OF ERRORS IN THE BASE DRAWINGS.
2. CONTRACTOR TO CONFIRM ALL INVERTS OF EXISTING SEWERS PRIOR TO CONSTRUCTION COMMENCING.
3. REFERENCE POINTS TO BE FIELD VERIFIED PRIOR TO CONSTRUCTION COMMENCING.
4. PADS TO BE FLUSH WITH TOP OF STATION AND VALVE CHAMBER.

FOR CLIENT REVIEW

HATCH

DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	

REG. PROFESSIONAL

No.	DESCRIPTION	BY	CHK'D	DATE
C	FOR CLIENT REVIEW	J.B.	P.R.	12-03-2021
B	FOR CLIENT REVIEW	J.B.	P.R.	11-24-2021
A	FOR CLIENT REVIEW	J.B.	P.R.	11-19-2021

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	J.BAJAGIC	NR	11-19-2021
DESIGNER	A.GIBBS	NR	11-19-2021
CHECKER	A.GIBBS/P.RUSCH		11-19-2021
DESIGN COORD.			-
RESP. ENG.	P.RUSCH		11-19-2021
LEAD DISC. ENG.			-
ENG. MANAGER			-
PROJ. MANAGER	P.RUSCH		11-19-2021

DRAWING APPROVAL STATUS: Client Review

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ZIBI WINDMILL DREAM ONTARIO PUMPING STATION

CIVIL SITE PLAN

SCALE 1:150 OR AS NOTED
DWG. No. H364639-0000-220-251-0001
REV C

SHEET SIZE: A1

USERNAME: BAJAGIC, JANKO
DATE: 12/3/2021 TIME: 9:50:48 AM
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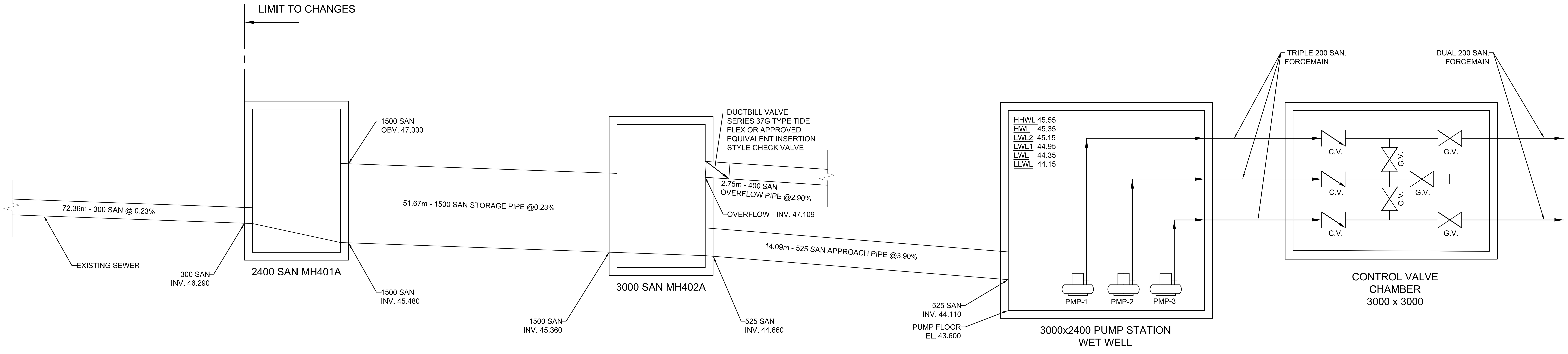

SCHEMATIC DIAGRAM 1
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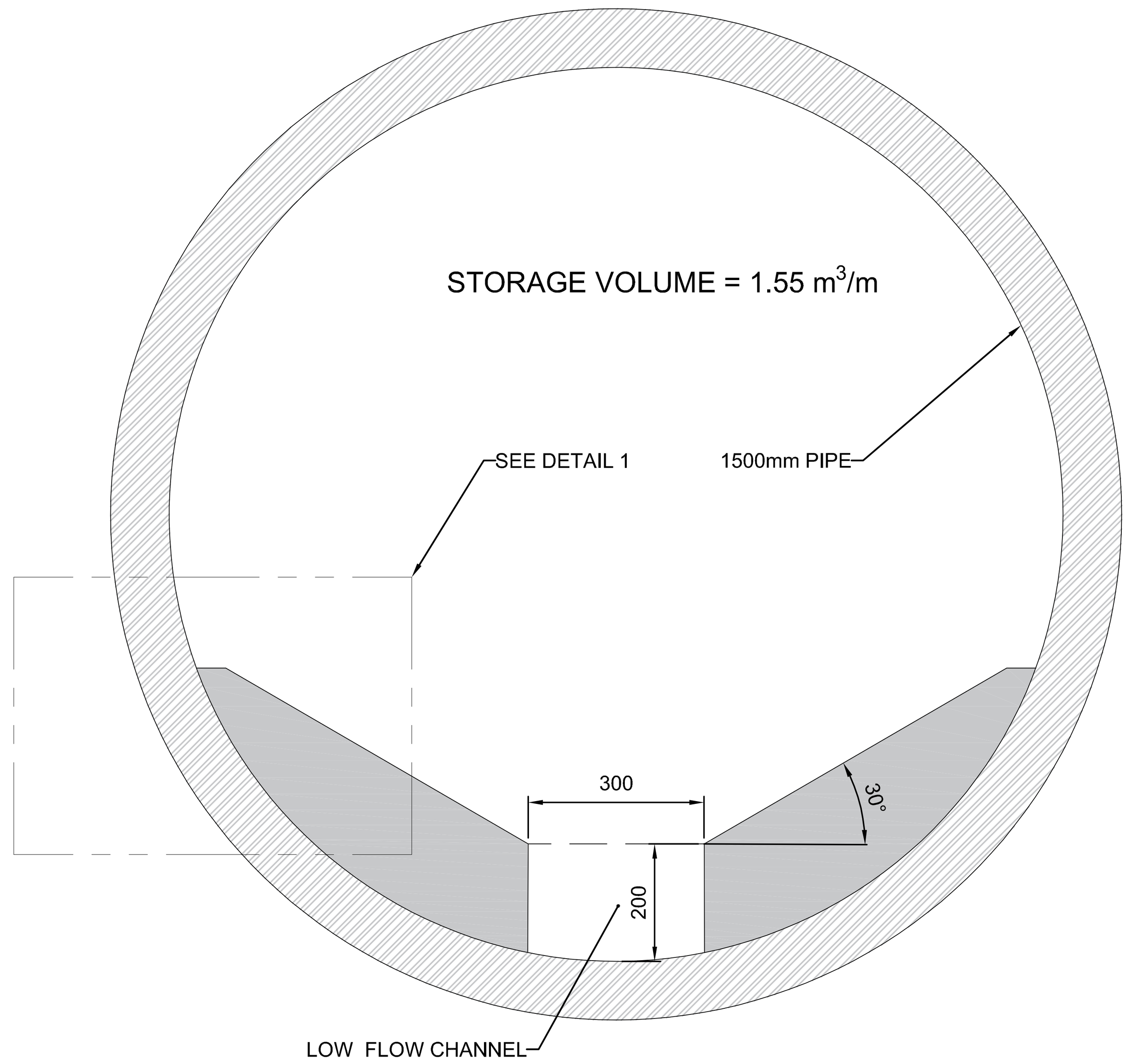
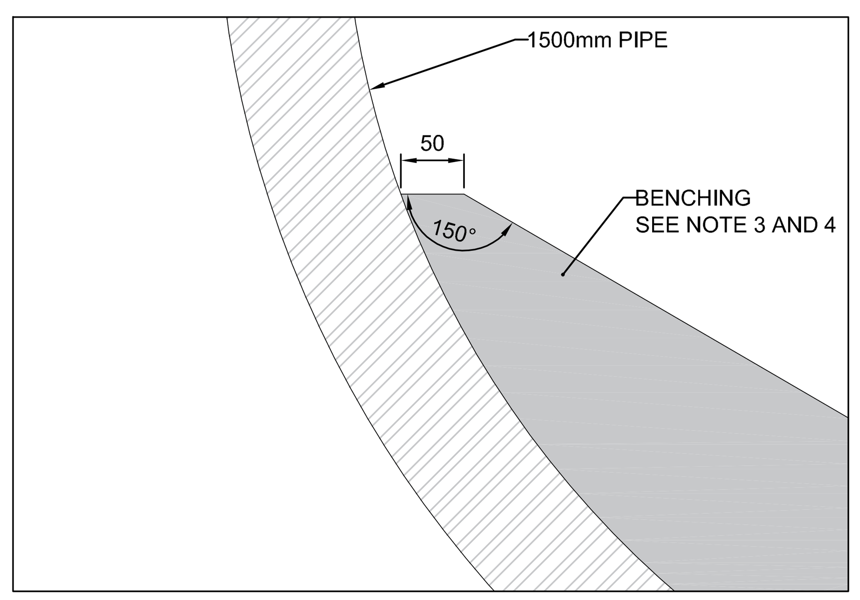


BENCHING DETAILS - STORAGE PIPE 1
1:10



DETAIL 1
1:5

GENERAL NOTES:

1. ALL ELEVATIONS SHOWN ARE IN METERS.
2. ALL PIPE SIZES AND DIMENSIONS ARE SHOWN MILLIMETERS.
3. ALL CONCRETE BENCHING SHOULD CONFORM TO CAN 3-A23.3-M77 (LATEST REVISION):
   - 28 DAY STRENGTH: 30MPa
   - SLUMP: 50mm
   - ENTRAINED AIR: 6%
4. BENCHING TO BE 30MPa CONCRETE AS PER NOTE 3. ALL BENCHING SHALL BE RE-ENFORCED AS PER CSA A23.3 FOR SLABS

FOR CLIENT REVIEW

DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	

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No.	DESCRIPTION	BY	CHK'D	DATE
D	FOR CLIENT REVIEW	J.B.	P.R.	03-14-2022
C	FOR CLIENT REVIEW	J.B.	P.R.	12-03-2021
B	FOR CLIENT REVIEW	J.B.	P.R.	11-26-2021
A	FOR CLIENT REVIEW	J.B.	P.R.	11-19-2021

REVISIONS

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	J.BAJAGIC	NR	11-19-2021
DESIGNER	A.GIBBS	NR	11-19-2021
CHECKER	A.GIBBS/P.RUSCH		11-19-2021
DESIGN COORD.			-
RESP. ENG.	P.RUSCH		11-19-2021
LEAD DISC. ENG.			-
ENG. MANAGER			-
PROJ. MANAGER	P.RUSCH		11-19-2021

DRAWING APPROVAL STATUS: Information

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ZIBI WINDMILL DREAM ONTARIO PUMPING STATION

PROCESS MECHANICAL SCHEMATIC PLAN AND DETAIL

SCALE NTS OR AS NOTED

DWG. No. H364639-0000-240-262-0001

REV D

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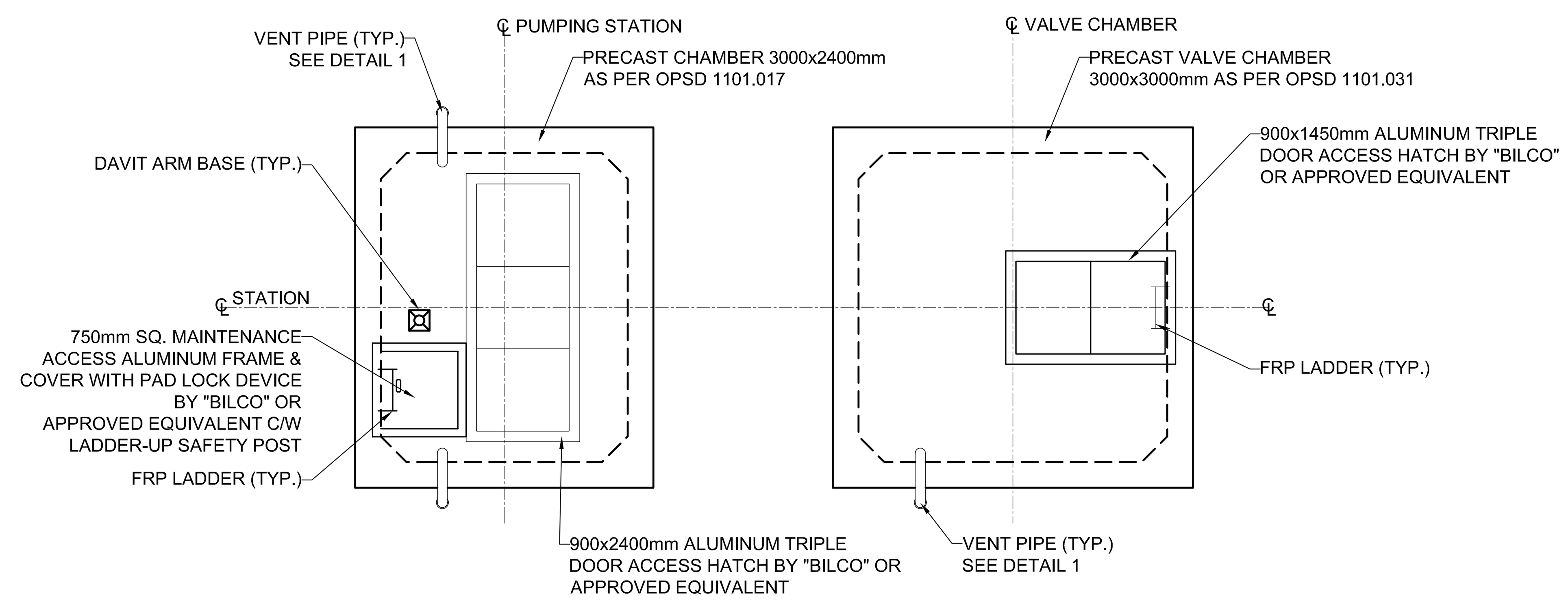
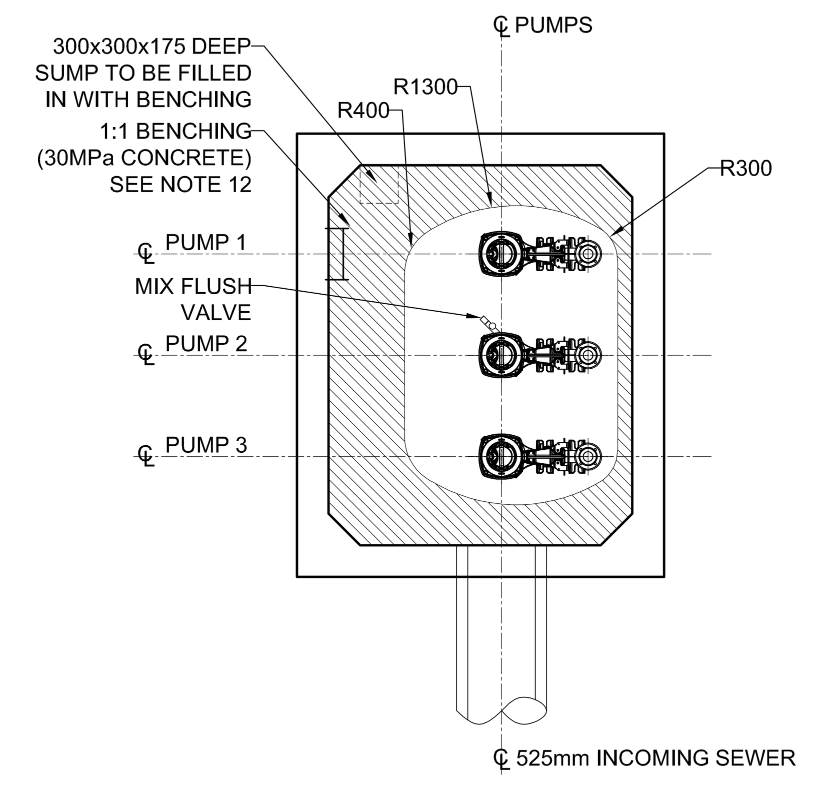
DWG. No. H364639-0000-240-262-0001

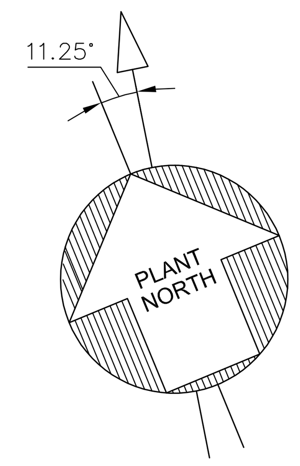
DWG. No. H364639-0000-240-251-0001



ROOF PLAN 1 –

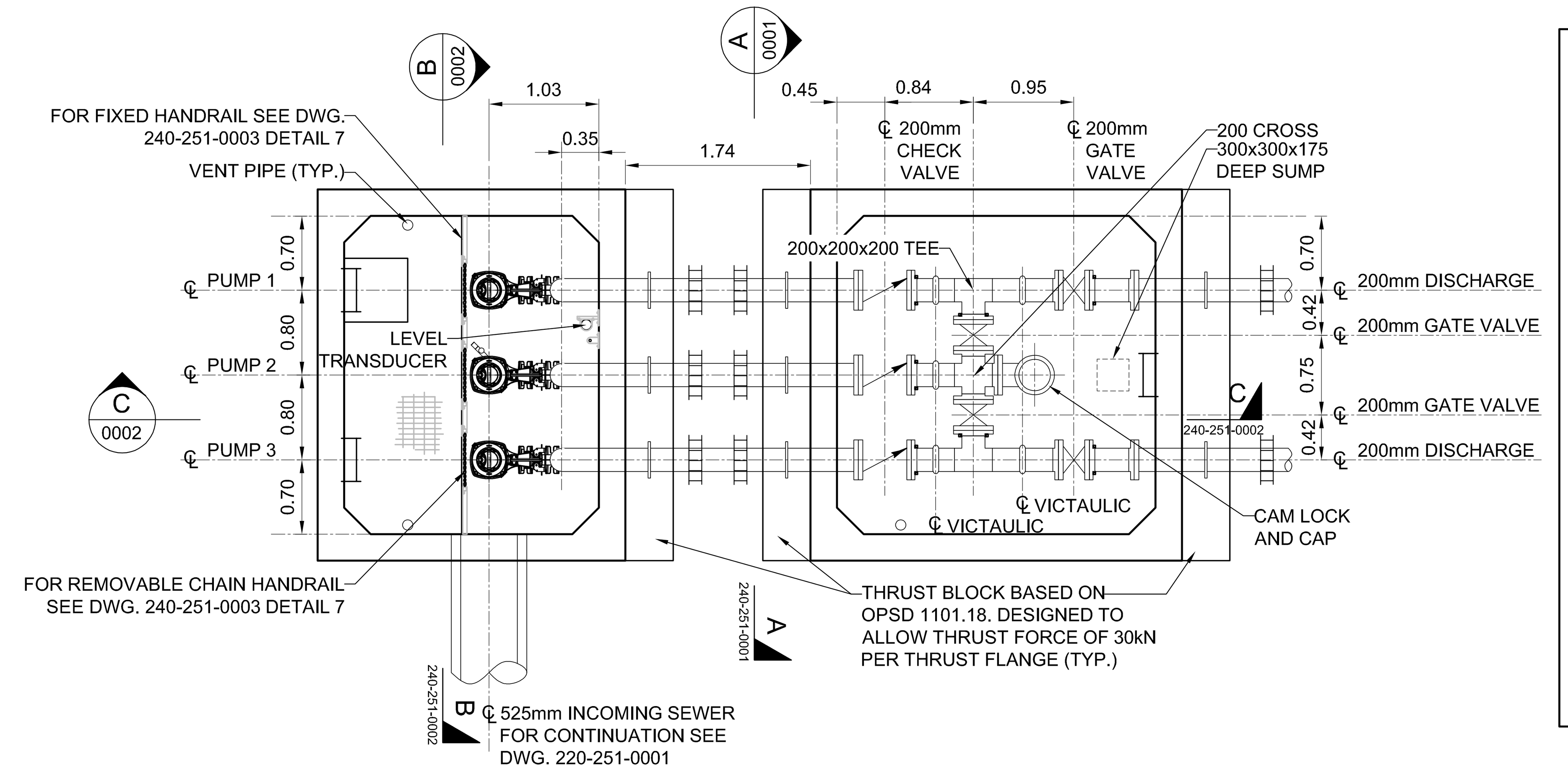


BENCHING PLAN 3 –

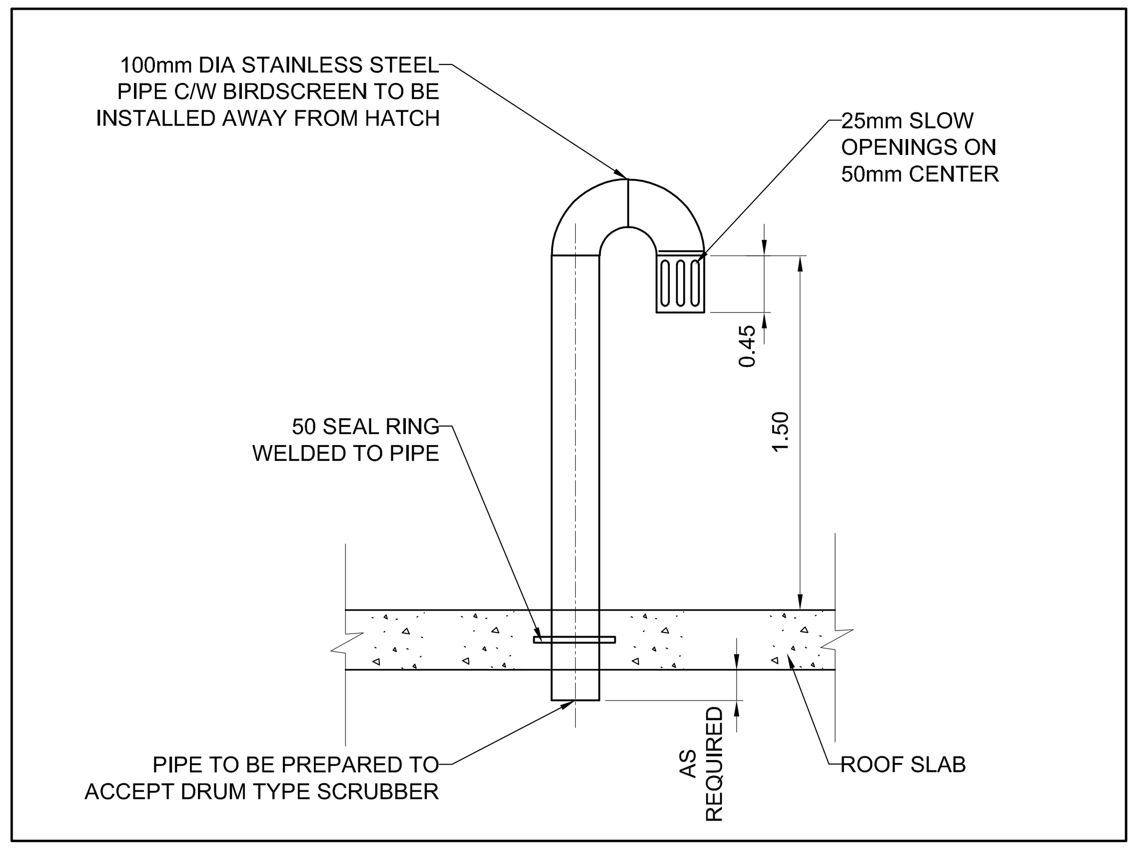


GENERAL NOTES:

1. ALL ELEVATIONS SHOWN ARE IN METERS.
2. ALL PIPE SIZES AND DIMENSIONS ARE SHOWN MILLIMETERS.
3. REFER TO SITE PLAN DRAWING H364639-0000-220-251-0001 FOR POSITION AND ORIENTATION OF PUMPING STATION.
4. ALL PIPES TO HAVE FLEXIBLE JOINTS OUTSIDE OF THE PUMPING STATION. FORCEMAIN JOINT IS TO BE CONSTRUCTED WITH TIE RODS.
5. ALL VICTAULIC COUPLINGS FOR STAINLESS STEEL SHALL BE STYLE 77. ALL VICTAULIC COUPLINGS SHALL BE EPOXY COATED OR HOT DIP GALVANIZED.
6. ALL CONCRETE BENCHING SHOULD CONFORM TO CAN 3-A23.3-M77 (LATEST REVISION):
   - 28 DAY STRENGTH: 30MPa
   - SLUMP: 50mm
   - ENTRAINED AIR: 6%
7. CHAMFER ALL EXPOSED CONCRETE CONES/EDGES 20mm.
8. BACKFILL SHALL BE FREE-DRAINING MATERIAL (MTO GRANULAR "B" OR APPROVED EQUAL), MINIMUM 300mm, THICKNESS, AND BE COMPACTED TO 100% STANDARD PROCTOR DENSITY.
9. BACKFILLING SHALL PROCEED UNIFORMLY ON ALL SIDES OF THE STRUCTURE (AS APPLICABLE), IN MAX. 0.2 METER LAYERS AND WITH MAX. 0.5 METER DIFFERENCE IN ELEVATION BETWEEN LEVELS BEHIND ANY SIDE TO BE BACKFILLED.
10. REFER TO SPECIFICATIONS FOR PUMP MODEL
11. ELECTRICAL PANEL TO BE HOUSED IN SEPARATE ENCLOSURE.
12. BENCHING TO BE 30MPa CONCRETE AS PER NOTE 6. ALL BENCHING SHALL BE RE-ENFORCED AS PER CSA A23.3 FOR SLABS



FLOOR PLAN 2 –



ROOF VENT DETAIL 1 –
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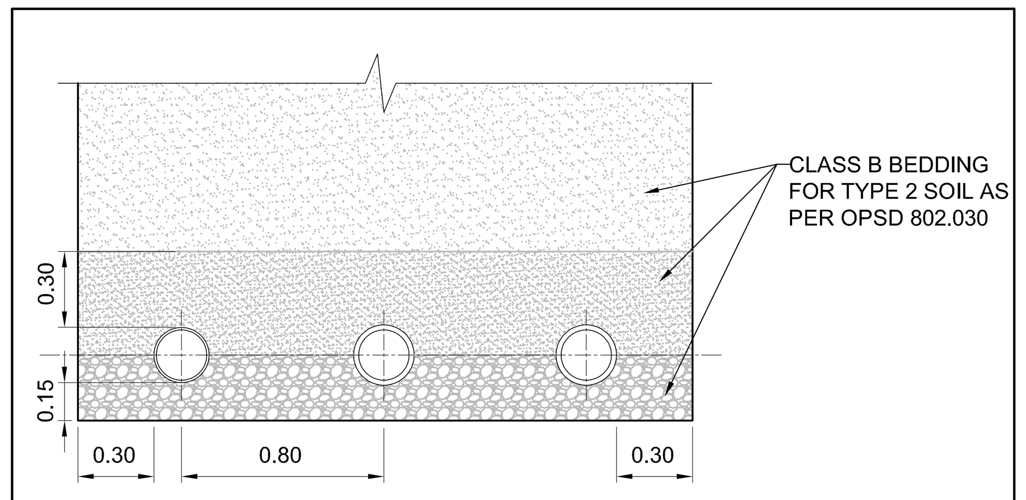

SECTION A 0001
1:25

REFERENCE DRAWINGS	
DRAWING No.	DRAWING TITLE

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FOR CLIENT REVIEW

THIS DRAWING WAS PREPARED FOR THE EXCLUSIVE USE OF WINDMILL DREAM ONTARIO LP ("ZIBI") AND IS ISSUED PURSUANT TO THE ZIBI WINDMILL DREAM PUMPING STATION AGREEMENT BETWEEN ZIBI AND HATCH LTD. ("HATCH"). UNLESS OTHERWISE AGREED IN WRITING WITH ZIBI OR SPECIFIED ON THIS DRAWING, (A) HATCH DOES NOT ACCEPT AND DISCLAIMS ANY AND ALL LIABILITY OR RESPONSIBILITY ARISING FROM ANY USE OF OR RELIANCE ON THIS DRAWING BY ANY THIRD PARTY OR ANY MODIFICATION OR MISUSE OF THIS DRAWING BY ZIBI, AND (B) THIS DRAWING IS CONFIDENTIAL AND ALL INTELLECTUAL PROPERTY RIGHTS EMBODIED OR REFERENCED IN THIS DRAWING REMAIN THE PROPERTY OF HATCH.

REVISIONS

No.	DESCRIPTION	BY	CHK'D	DATE
B	FOR CLIENT REVIEW	J.B.	P.R.	12-03-2021
A	FOR CLIENT REVIEW	J.B.	P.R.	11-26-2021

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	J.BAJAGIC	NR	11-26-2021
DESIGNER	A.GIBBS	NR	11-26-2021
CHECKER	A.GIBBS/P.RUSCH		11-26-2021
DESIGN COORD.			
RESP. ENG.	P.RUSCH		11-26-2021
LEAD DISC. ENG.			-
ENG. MANAGER			-
PROJ. MANAGER	P.RUSCH		11-26-2021

DRAWING APPROVAL STATUS: Client Review

zibi

ZIBI WINDMILL DREAM ONTARIO PUMP STATION

PROCESS MECHANICAL PLAN AND DETAILS

SCALE 1:50 OR AS NOTED | DWG. No. H364639-0000-240-251-0001 | REV B

SHEET SIZE: A1

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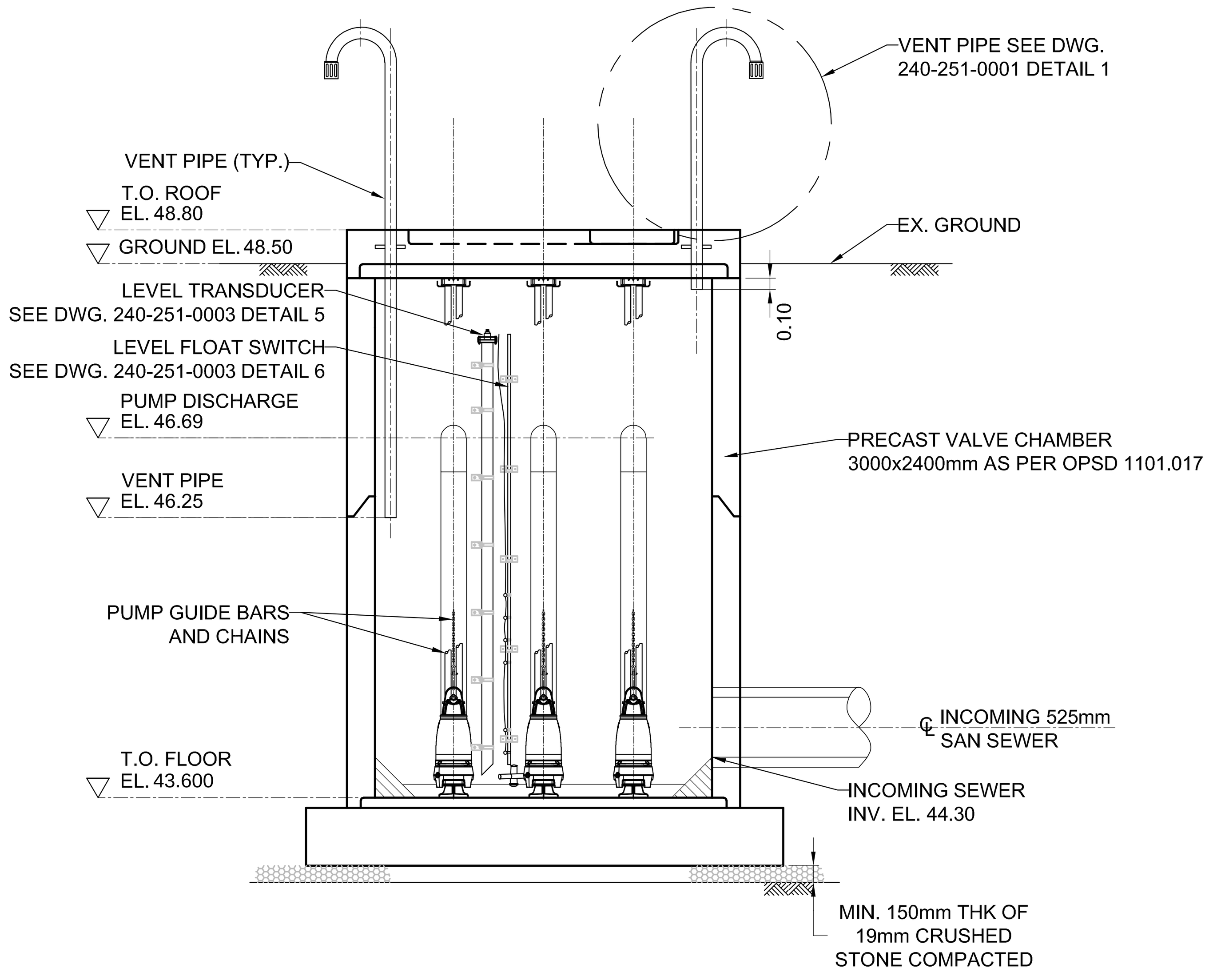

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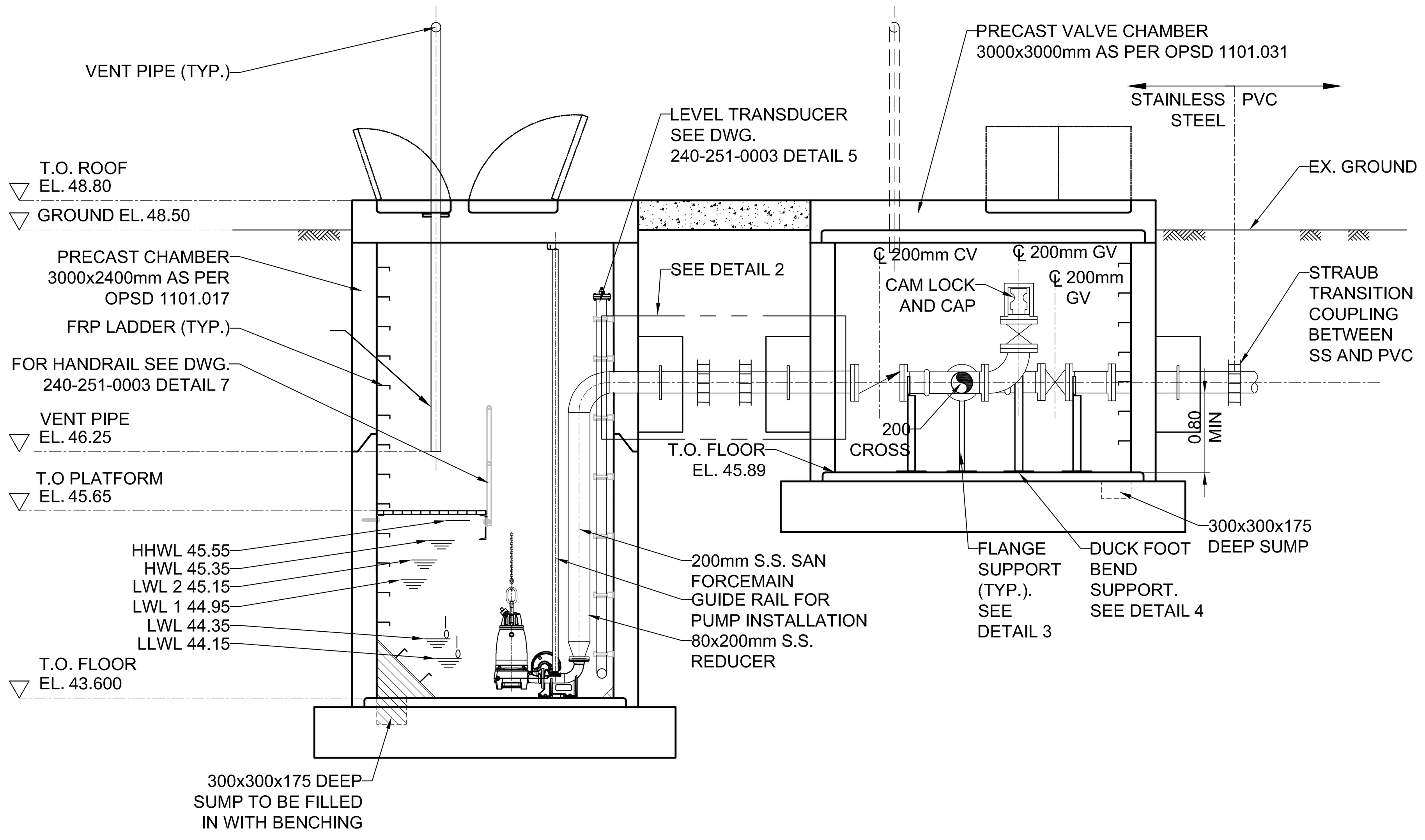
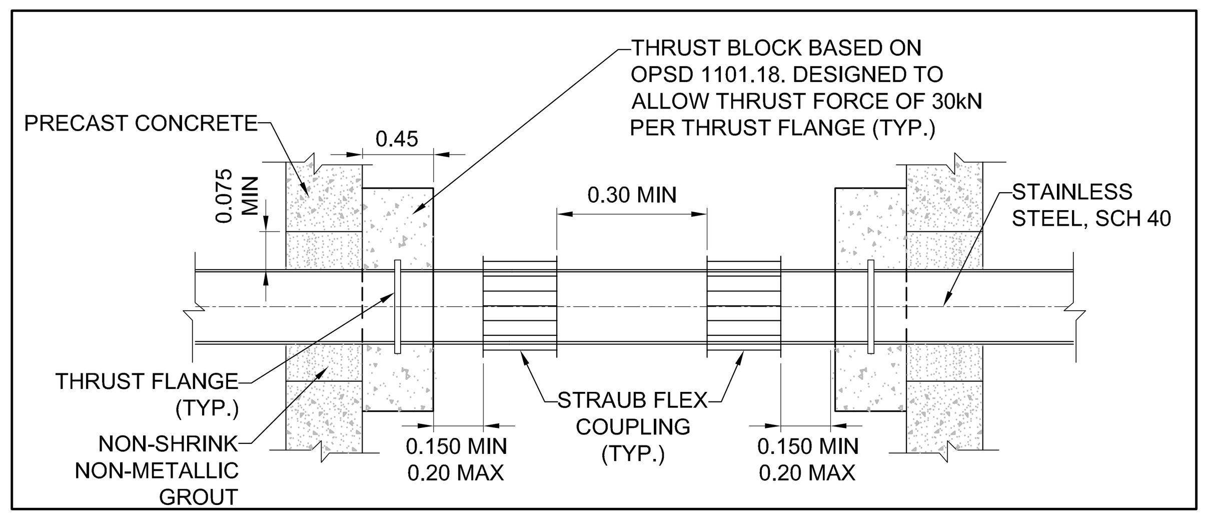
SCALE 0001



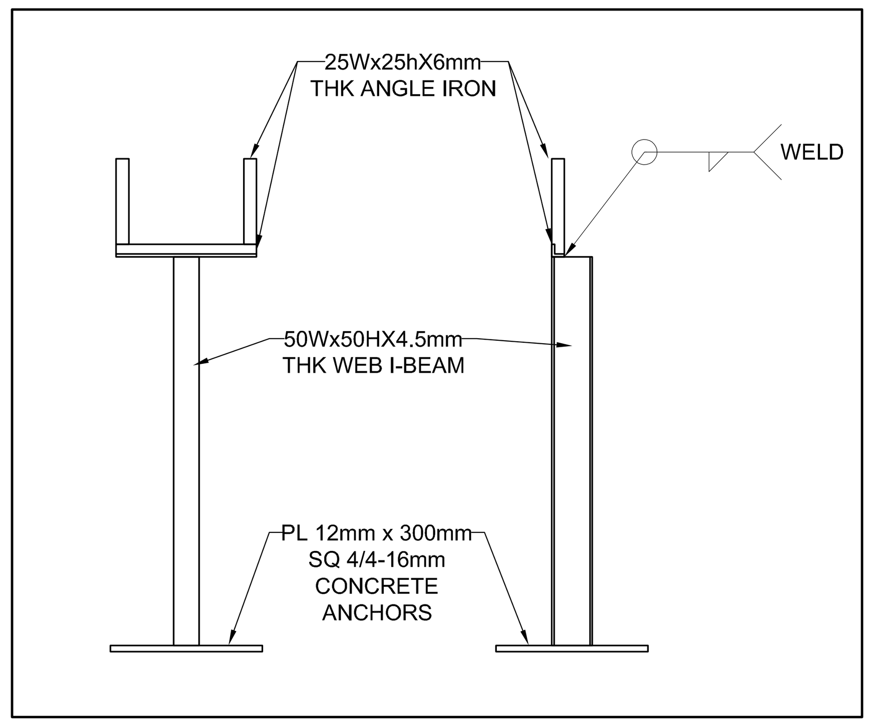
SECTION C
SCALE 0001

GENERAL NOTES:

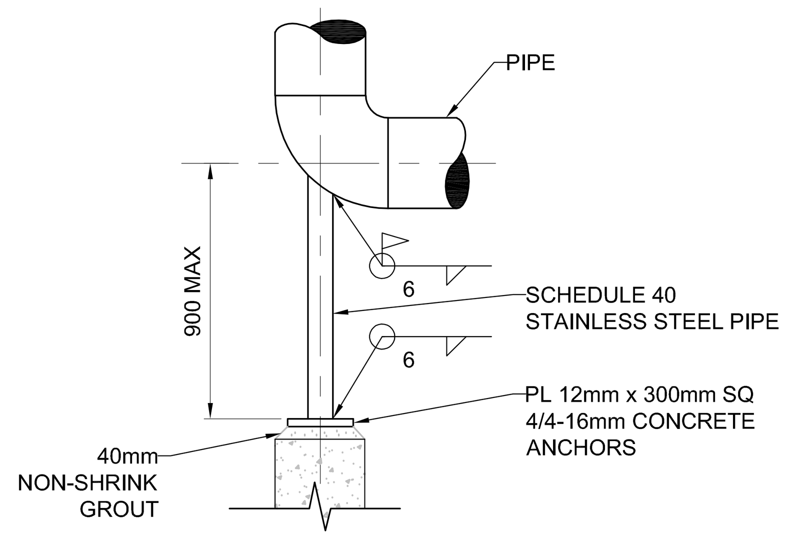
1. ALL ELEVATIONS SHOWN ARE IN METERS.
2. ALL PIPE SIZES AND DIMENSIONS ARE SHOWN MILLIMETERS.
3. REFER TO SITE PLAN DRAWING H364639-0000-220-251-0001 FOR POSITION AND ORIENTATION OF PUMPING STATION.
4. ALL PIPES TO HAVE FLEXIBLE JOINTS OUTSIDE OF THE PUMPING STATION. FORCEMAIN JOINT IS TO BE CONSTRUCTED WITH TIE RODS.
5. ALL CONCRETE SHOULD CONFORM TO CAN 3-A23.3-M77 (LATEST REVISION):
   - 28 DAY STRENGTH: 30MPa
   - SLUMP: 50mm
   - ENTRAINED AIR: 6%
6. CHAMFER ALL EXPOSED CONCRETE CONES/EDGES 20mm.
7. BACKFILL SHALL BE FREE-DRAINING MATERIAL (MTO GRANULAR "B" OR APPROVED EQUAL), MINIMUM 300mm, THICKNESS, AND BE COMPACTED TO 100% STANDARD PROCTOR DENSITY.
8. BACKFILLING SHALL PROCEED UNIFORMLY ON ALL SIDES OF THE STRUCTURE (AS APPLICABLE), IN MAX. 0.2 METER LAYERS AND WITH MAX. 0.5 METER DIFFERENCE IN ELEVATION BETWEEN LEVELS BEHIND ANY SIDE TO BE BACKFILLED.
9. PROVIDE POLYETHYLENE SLIP MEMBRANE ALL AROUND STRUCTURE (TO PREVENT SOIL ADFREEZING) TO A MIN. DEPTH OF 2.0m BELOW FINISHED GRADE.
10. REFER TO SPECIFICATIONS FOR PUMP MODEL
11. ELECTRICAL PANEL TO BE HOUSED IN SEPARATE ENCLOSURE.
12. CONTRACTOR TO PROVIDE AND INSTALL SIX FROST STRAPS EQUALLY SPACED AROUND THE PERIMETER OF EACH CHAMBER, EXTENDING FROM BASE SLAB TO CAP. REFER TO OPSD 701.100 FOR FROST STRAP DIMENSION, MATERIALS AND INSTALLATION REQUIREMENTS.
13. BENCHING TO BE 30MPa CONCRETE AS PER NOTE 6. ALL BENCHING SHALL BE RE-ENFORCED AS PER CSA A23.3 FOR SLABS



TYP. DETAIL OF PIPE ENTRY AND EXIT THROUGH PRECAST MH (2)
N.T.S.



SUPPORT DETAIL (3)
N.T.S.



PIPE DIAMETER	SUPPORT DIAMETER	PLATE THICKNESS	ANCHOR BOLT DIAMETER
75	65	10	M 10
100 THRU 300	80	10	M 12
350 AND 400	100	10	M 12
450 AND 500	150	12	M 16

SUPPORT DETAIL (4)
N.T.S.

DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	

REG. PROFESSIONAL

FOR CLIENT REVIEW

No.	DESCRIPTION	BY	CHK'D	DATE
C	FOR CLIENT REVIEW	J.B.	P.R.	03-14-2022
B	FOR CLIENT REVIEW	J.B.	P.R.	12-03-2021
A	FOR CLIENT REVIEW	J.B.	P.R.	11-26-2021

REVISIONS

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	J.BAJAGIC	NR	11-22-2021
DESIGNER	A.GIBBS	NR	11-22-2021
CHECKER	A.GIBBS/P.RUSCH		11-26-2021
DESIGN COORD.			-
RESP. ENG.	P.RUSCH		11-26-2021
LEAD DISC. ENG.			-
ENG. MANAGER			-
PROJ. MANAGER	P.RUSCH		11-26-2021

DRAWING APPROVAL STATUS: Client Review

zibi

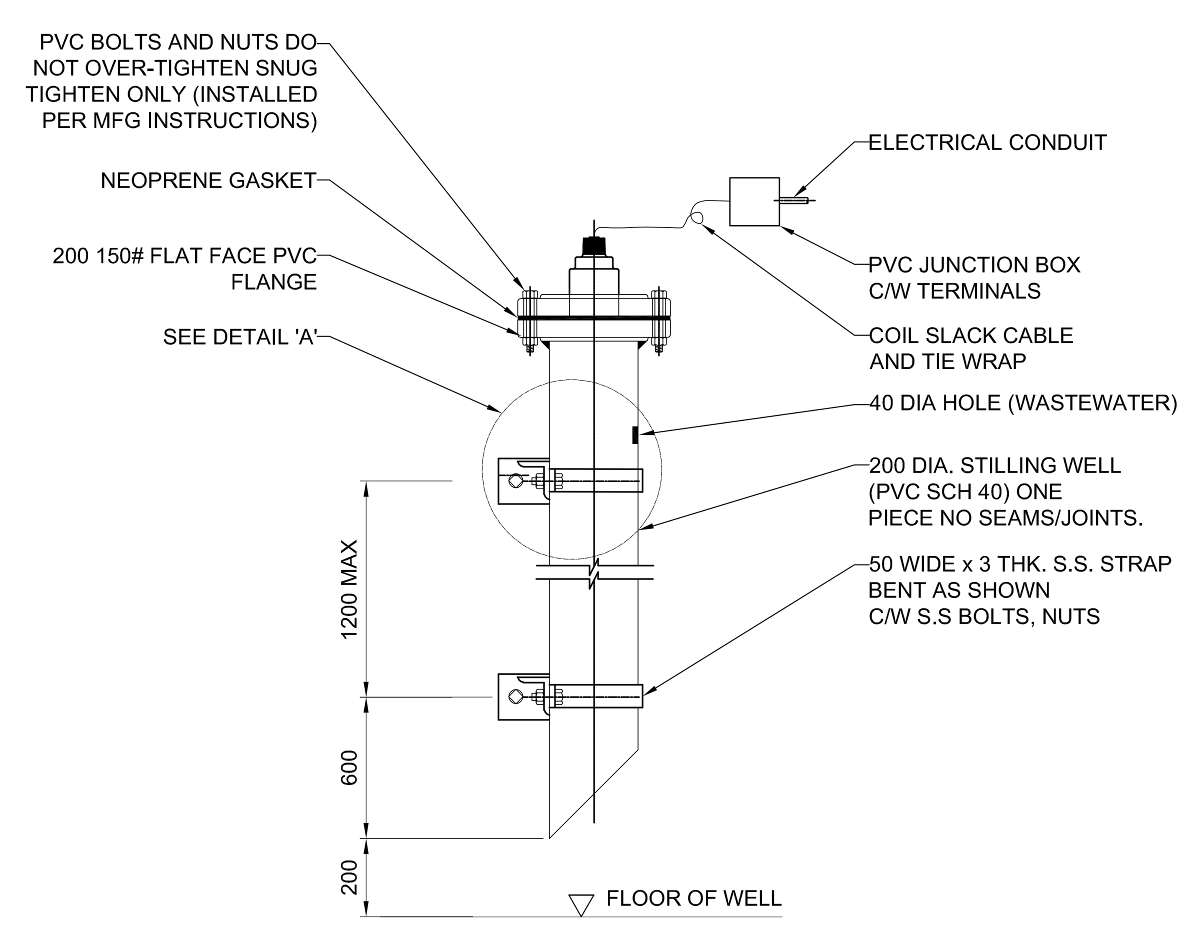
ZIBI WINDMILL DREAM ONTARIO PUMP STATION

PROCESS MECHANICAL SECTION B, C AND DETAILS

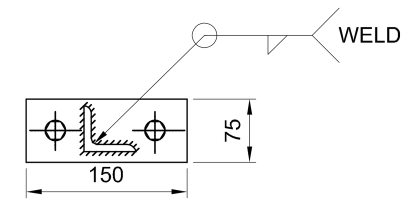
SCALE 1:50 OR AS NOTED | DWG. No. H364639-0000-240-251-0002 | REV C

SHEET SIZE: A1

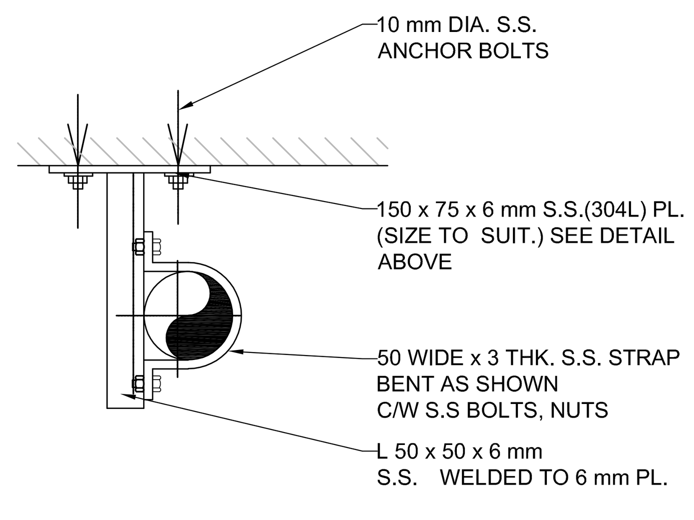
DWG. No. H364639-0000-240-251-0003



ULTRASONIC LEVEL SENSOR WITH STILLING PIPE



MOUNTING PLATE

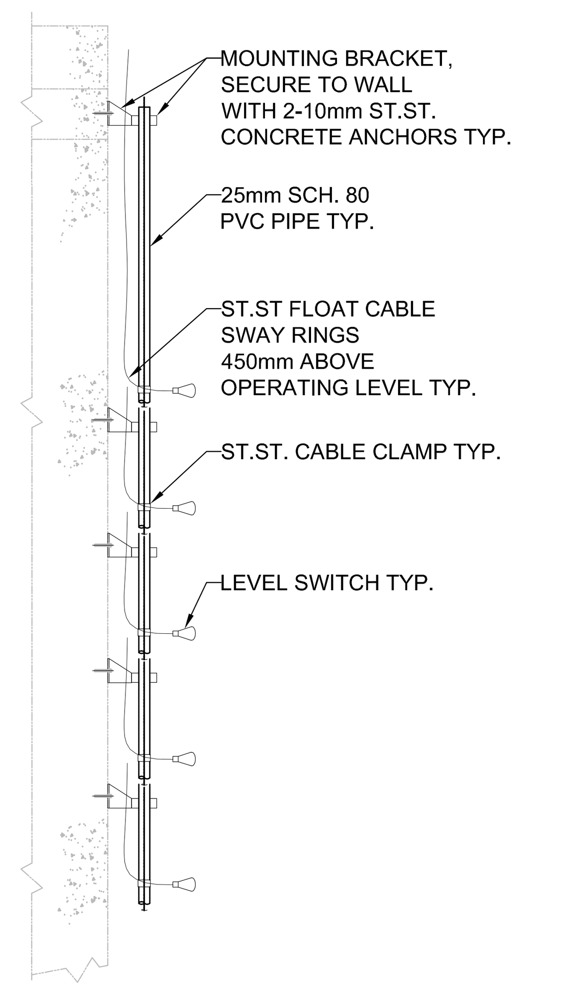


DETAIL

GENERAL NOTES:

1. ARRANGEMENT SHOWN IS AN EXAMPLE ONLY. FINAL ARRANGEMENT OF INSTRUMENTS AND EQUIPMENT SIZES TO BE FINALIZED AT SHOP DRAWING SUBMITTAL STAGE.
2. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR EACH OF THE PROPOSED ARRANGEMENT FOR REVIEW BY THE PROJECT MANAGER. NO FABRICATION SHALL COMMENCE PRIOR TO RECEIPT OF RECEIVED DRAWINGS
3. ALL INSTRUMENTS TO BE MOUNTED SO THEY CAN BE READILY REMOVED AND SERVICED UTILIZING UNIONS, TUBE CONNECTIONS, ETC.
4. INSTRUMENTS ARE TO BE INDIVIDUALLY LAID OUT TO PROVIDE SUFFICIENT CLEARANCE FOR MAINTENANCE AND HOUSEKEEPING.
5. ALL WALL MOUNTED EQUIPMENT TO HAVE 12.7 (1/2") STAINLESS STEEL STANDOFF WASHER OR SPACER.

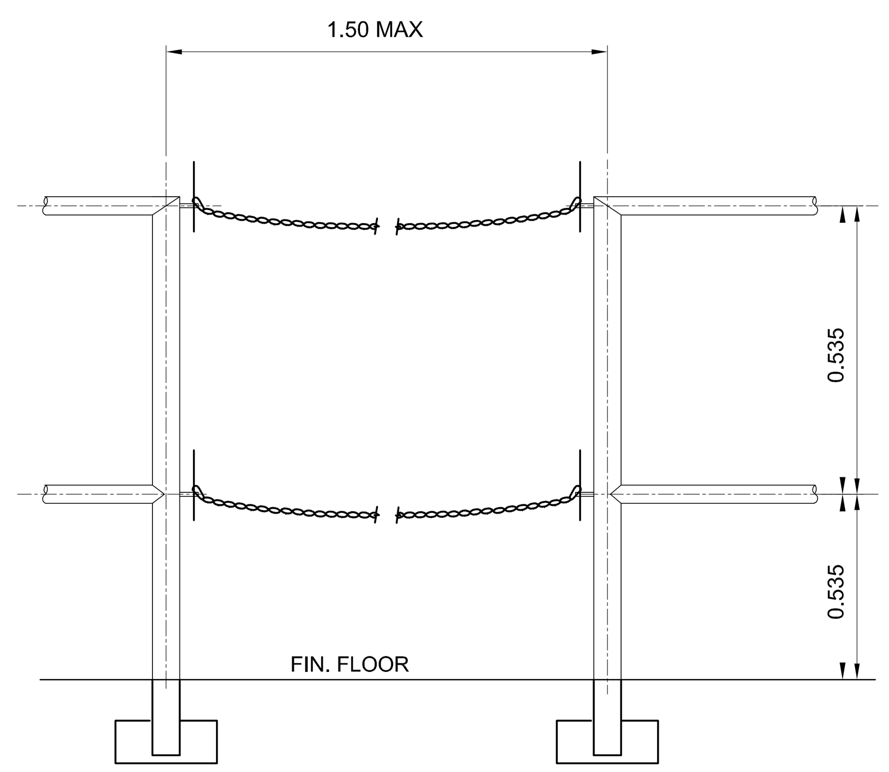
ULTRASONIC LEVEL SENSOR AND STILLING PIPE DETAIL 5 / –



NOTES:

1. LEVEL FLOAT SWITCH - 5 REQUIRED
2. FOR ELEVATIONS SEE ELECTRICAL DWG SET.

LEVEL FLOAT SWITCH DETAIL 6 / –



HANDRAIL DETAIL 7 / –

DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	

REG. PROFESSIONAL

FOR CLIENT REVIEW

No.	DESCRIPTION	BY	CHK'D	DATE
B	FOR CLIENT REVIEW	J.B.	P.R.	12-03-2021
A	FOR CLIENT REVIEW	J.B.	P.R.	11-26-2021

REVISIONS

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ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	J.BAJAGIC	NR	11-26-2021
DESIGNER	A.GIBBS	NR	11-26-2021
CHECKER	A.GIBBS/P.RUSCH		11-22-2021
DESIGN COORD.			-
RESP. ENG.	P.RUSCH		11-26-2021
LEAD DISC. ENG.			-
ENG. MANAGER			-
PROJ. MANAGER	P.RUSCH		11-26-2021

DRAWING APPROVAL STATUS: Client Review

zibi

ZIBI WINDMILL DREAM ONTARIO PUMP STATION

PROCESS MECHANICAL DETAILS

SCALE NTS OR AS NOTED | DWG. No. H364639-0000-240-251-0003 | REV B

SHEET SIZE: A1

USERNAME: BAJAGIC, JANKO
DATE: 12/3/2021 TIME: 9:57:33 AM
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H364639-0000-260-262-0001
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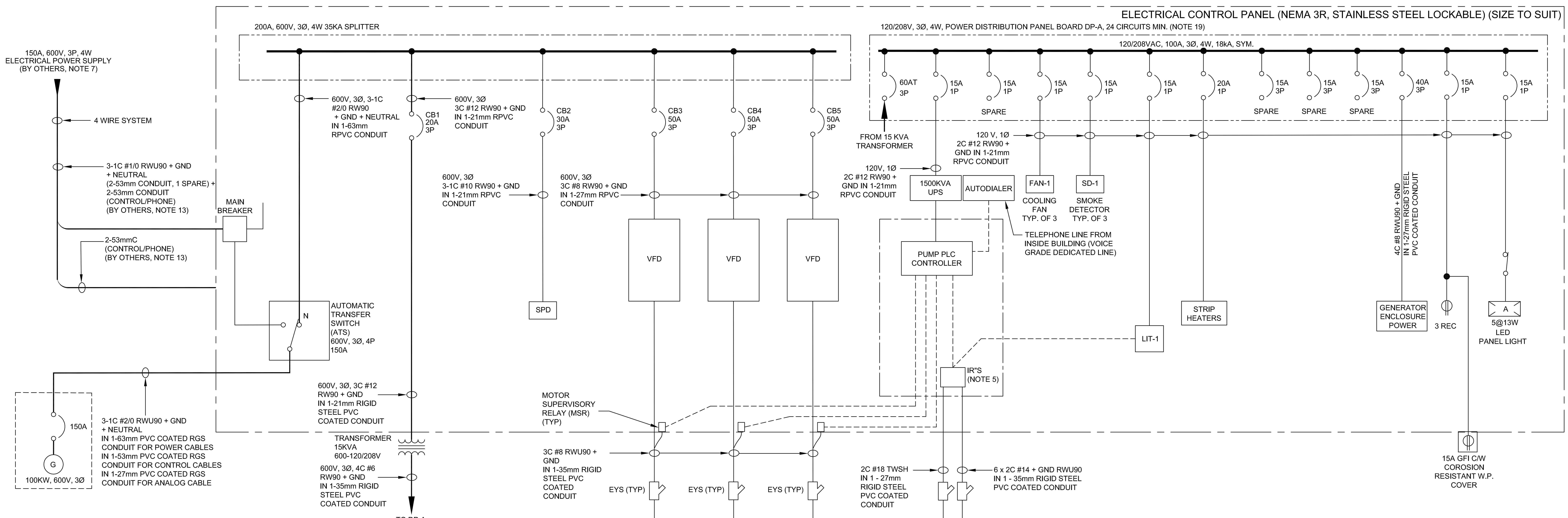
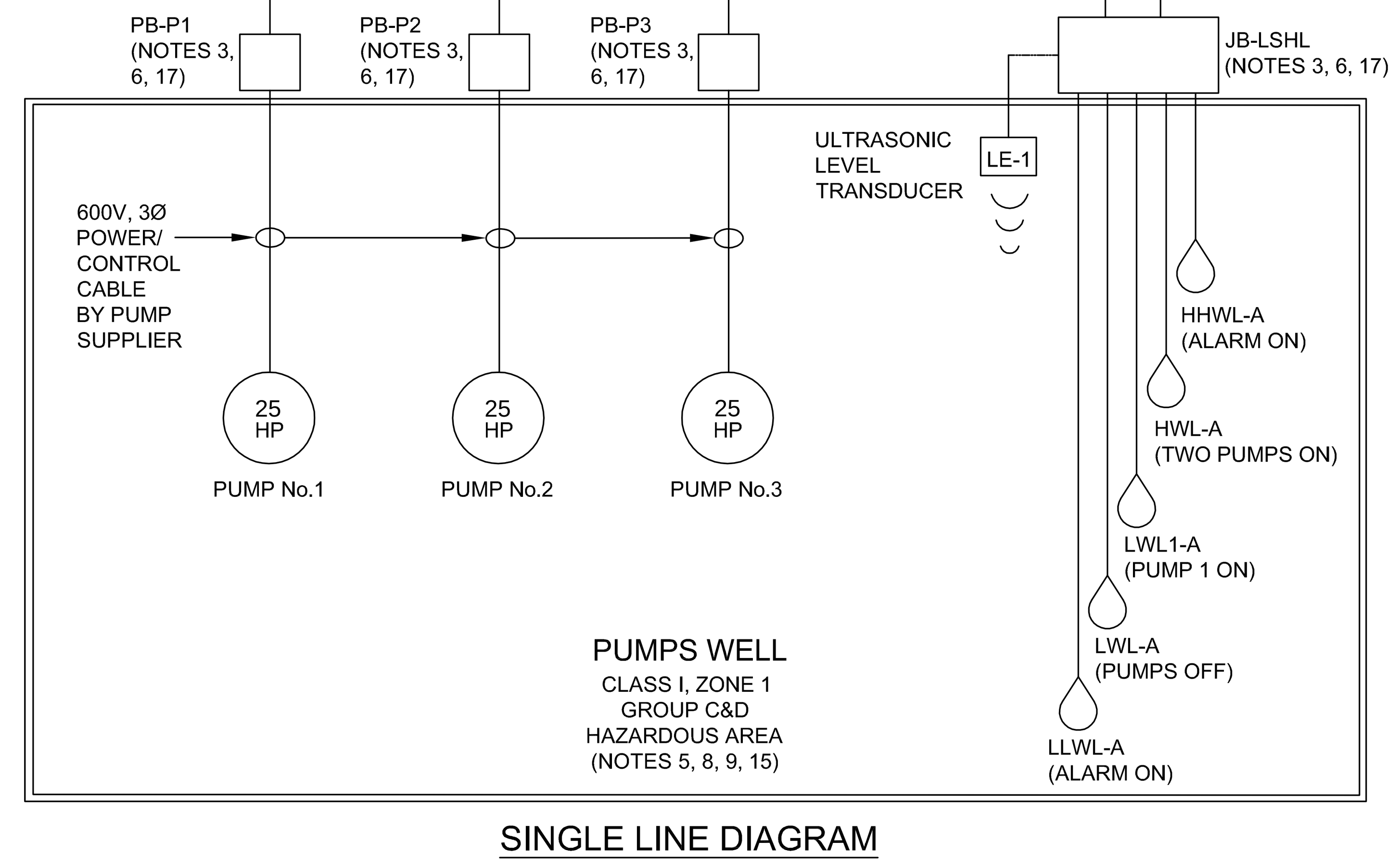




SINGLE LINE DIAGRAM

Ultrasonic			Float		
NOTES	Name	Level (m)	Level (m)	Name	NOTES
			45.65	HHWL-A	ALARM
ALARM LEVEL	HHWL	45.55			
			45.45	HWL-A	PUMP 2 ON
BOTH PUMPS FULL SPEED	HWL	45.35			
PUMP 2 ON	LWL2	45.15			
			45.05	LWL1-A	PUMP 1 ON PUMP 2 OFF
PUMP 1 ON PUMP 2 OFF	LWL1	44.95			
PUMP 1 OFF	LWL	44.35			
			44.25	LWL-A	PUMP 1 OFF
ALARM	LLWL	44.15			
			44.05	LLWL-A	ALARM

NOTES:

1. PROVIDE COMPLETE GROUNDING SYSTEM AS PER THE OESC LATEST EDITION AND TO THE SATISFACTION OF THE ELECTRICAL AUTHORITY HAVING JURISDICTION.
2. ALL CONDUCTORS TO BE COPPER RW90 (RWU90) UNLESS OTHERWISE INDICATED.
3. PROVIDE POWER BOXES WITH TERMINAL BLOCKS SUITABLE FOR CLASSIFIED AREA.
4. PROVIDE NEMA 4X WITH TERMINAL BLOCKS FOR INTRINSICALLY SAFE CIRCUITS.
5. PROVIDE INTRINSICALLY SAFE RELAYS (IR's) AS REQUIRED TO MEET CLASS I, ZONE 1 GROUP C & D CLASSIFICATION.
6. INSTALL POWER BOXES AND JB-LSHL AT PUMPS WELL LOCATION.
7. ELECTRICAL POWER SUPPLY AND OVERCURRENT PROTECTION DEVICE BY OTHERS. POWER SUPPLY UNDERGROUND CABLES AND DUCT BANK TO NEW OUTDOOR ELECTRICAL PANEL BY OTHERS COMPLETE WITH CABLE TERMINATIONS.
8. ALL WIRING METHODS IN CLASSIFIED AREAS ARE TO BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF SECTIONS 18 AND 22 OF THE LATEST EDITION OF THE ONTARIO ELECTRICAL SAFETY CODE.
9. ALL ELECTRICAL EQUIPMENT, PUMPS, AND MOTORS FOR USE IN CLASSIFIED AREAS MUST BE APPROVED FOR INSTALLATION IN SUCH CLASSIFIED AREA DIVISION INDICATED.
10. ALL SIDE MOUNTED EQUIPMENT TO BE RATED EEMAC 4X. LOCKABLE ENCLOSURE.
11. POWER BOXES AND JB-LSHL ON OUTSIDE OF PUMP WELL. ALL POWER AND JUNCTION BOXES TO BE EXPLOSION PROOF RATED.
12. OUTDOOR CONTROL PANEL NEMA 3R, COMPLETE WITH LOCKABLE DOOR HANDLE, DOOR SWITCH TO DETECT ILLEGAL ENTRY, AND SMOKE DETECTOR.
13. ELECTRICAL POWER SUPPLY UNDERGROUND DUCT BANK TO BE PROVIDED BY OTHERS. UTILITY POWER CABLES, COMMUNICATION AND TELEPHONE WIRING REQUIRED FROM THE SERVICE TO THE PUMP STATION CONTROL PANEL SHALL BE PROVIDED BY OTHERS.
14. THE PANEL LAYOUT SHOWN IS INTENDED TO RELAY THE MINIMUM SCOPE OF WORK AND HARDWARE REQUIRED. ACTUAL LAYOUT MAY VARY TO SUIT FIELD CONDITIONS. THE CONTRACTOR TO SUBMIT COMPLETE AND DETAILED PANEL LAYOUT SHOP DRAWING FOR REVIEW. PANEL DOOR TO BE LOCKABLE.
15. ALL EQUIPMENT WITHIN THE HAZARDOUS LOCATION SHALL BE APPROVED FOR THAT LOCATION.
16. THE CONTRACTOR IS RESPONSIBLE FOR MOUNTING OF ALL NEW POWER AND CONTROL PANELS, TRANSFORMER, JUNCTION AND POWER BOXES COMPLETE WITH REQUIRED CONCRETE PADS AND HARDWARE.
17. WIRE GAUGE MAY CHANGE PENDING RECOMMENDED BREAKER SETTING BY PUMP MANUFACTURER. MINIMUM ACCEPTED SIZE IS #8 AWG FOR POWER CABLES, #14 FOR CONTROL CABLES.
18. AUTOMATIC TRANSFER SWITCH TO BE INSTALLED INSIDE ELECTRICAL ENCLOSURE.
19. POWER DISTRIBUTION PANELBOARD BY EATON POW-R-LINE C SERIES OR APPROVED EQUAL.

DRAWING No. | DRAWING TITLE
REFERENCE DRAWINGS
REG. PROFESSIONAL

FOR CLIENT REVIEW

No.	DESCRIPTION	BY	CHK'D	DATE
B	FOR CLIENT REVIEW	L.B.	G.N.	03-14-2022
A	FOR CLIENT REVIEW	L.B.	G.N.	12-03-2021

REVISIONS

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	L.BO	NR	12-03-2021
DESIGNER	G.NING	NR	12-03-2021
CHECKER	G.NING		12-03-2021
DESIGN COORD.			-
RESP. ENG.	G.NING		12-03-2021
LEAD DISC. ENG.			-
ENG. MANAGER			-
PROJ. MANAGER	P.RUSCH		12-03-2021

DRAWING APPROVAL STATUS: Client Review

zibi

ZIBI WINDMILL DREAM ONTARIO PUMPING STATION

ELECTRICAL SINGLE LINE DIAGRAM

SCALE NTS OR AS NOTED | DWG. No. H364639-0000-260-262-0001 | REV B

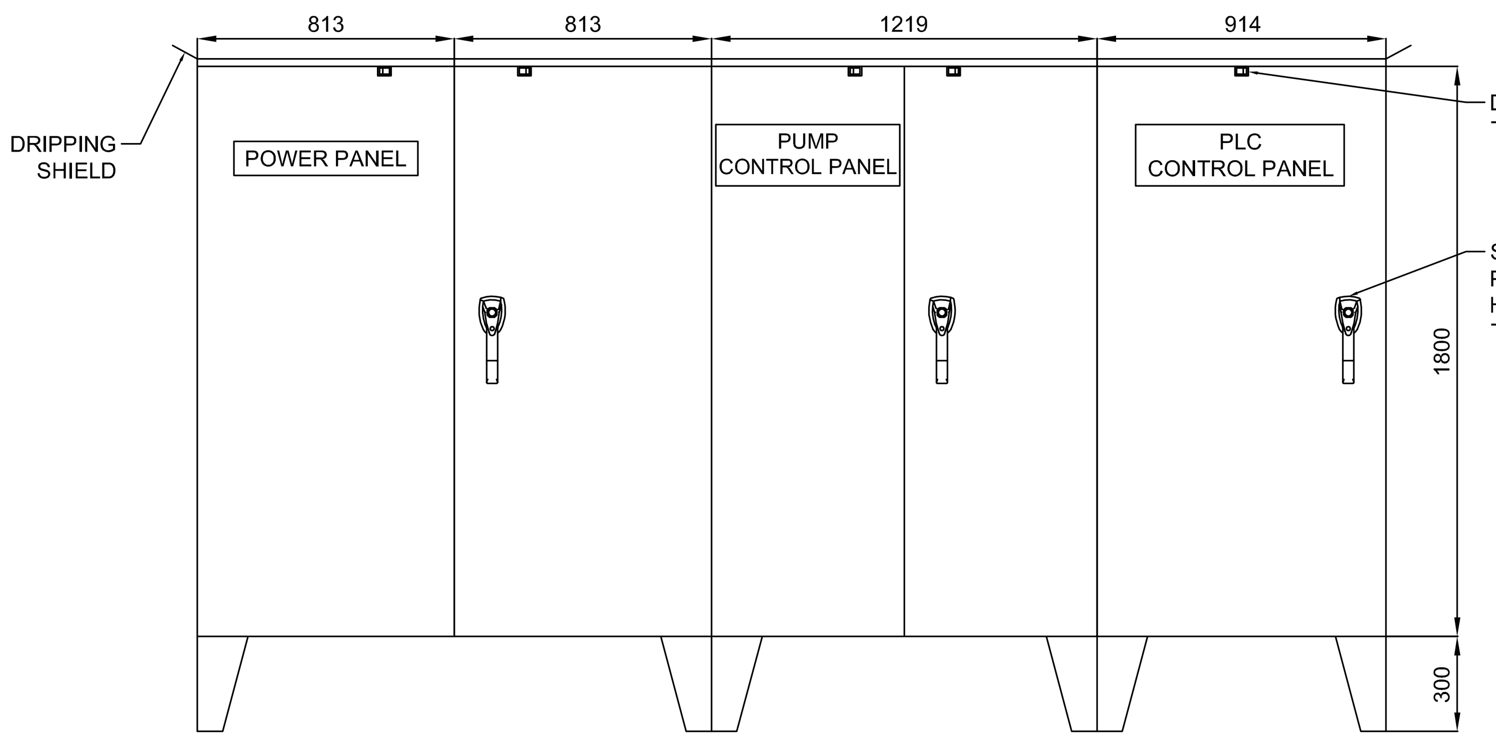
SHEET SIZE: A1

USERNAME: BO, LAN
DATE: 12/3/2021 TIME: 1:16:05 PM
FILE: C:\PWWORKING\HATCH-DPD-CANADA_CENTRAL\DMS34491\H364639-0000-260-262-0001

DWG. No. H364639-0000-260-262-0002

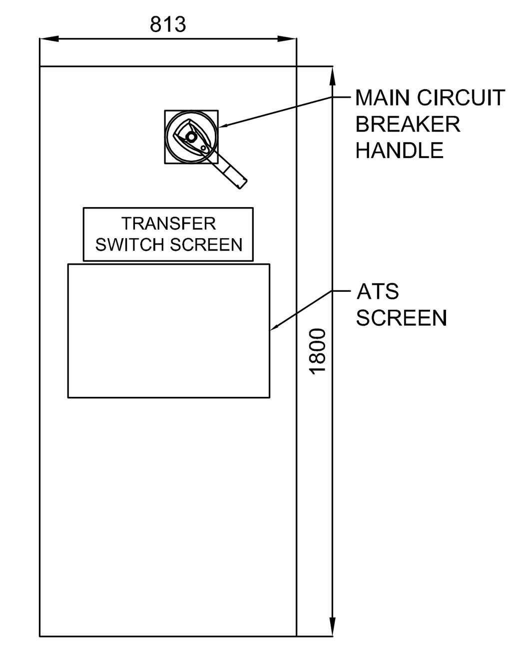
NOTES:

1. PROVIDE COMPLETE GROUNDING SYSTEM AS PER THE OESC LATEST EDITION AND TO THE SATISFACTION OF THE ELECTRICAL AUTHORITY HAVING JURISDICTION.
2. ALL SIDE MOUNTED EQUIPMENT TO BE RATED EEMAC 4X. LOCKABLE ENCLOSURE.
3. OUTDOOR CONTROL PANEL NEMA 3R, COMPLETE WITH LOCKABLE DOOR HANDLE, DOOR SWITCH TO DETECT ILLEGAL ENTRY, AND SMOKE DETECTOR.
4. PROVIDE NEMA 4X WITH TERMINAL BLOCKS FOR INTRINSICALLY SAFE CIRCUITS.
5. THE CONTRACTOR IS RESPONSIBLE FOR MOUNTING OF ALL NEW POWER AND CONTROL PANELS, TRANSFORMER, JUNCTION AND POWER BOXES COMPLETE WITH REQUIRED CONCRETE PADS AND HARDWARE.
6. AUTOMATIC TRANSFER SWITCH TO BE INSTALLED INSIDE ELECTRICAL ENCLOSURE.
7. PUMP PACKAGE TO INCLUDE VFDS AND PUMP PLC CONTROLLER(S) AS REQUIRED. ONE SUPPLIER SHALL BE RESPONSIBLE FOR THE PROVISION OF THE PUMP PACKAGE.
8. POWER DISTRIBUTION PANELBOARD BY EATON POW-R-LINE C SERIES OR APPROVED EQUAL.
9. MAIN BREAKER TO BE MECHANICALLY INTERLOCKED WITH ENCLOSURE TO PREVENT OPENING OF ENCLOSURE WHEN MAIN BREAKER IS IN THE CLOSED POSITION.
10. THE PANEL LAYOUT SHOWN IS INTENDED TO RELAY THE MINIMUM SCOPE OF WORK AND HARDWARE REQUIRED. ACTUAL LAYOUT MAY VARY TO SUIT FIELD CONDITIONS. THE CONTRACTOR TO SUBMIT COMPLETE AND DETAILED PANEL LAYOUT SHOP DRAWING FOR REVIEW. PANEL DOOR TO BE LOCKABLE.



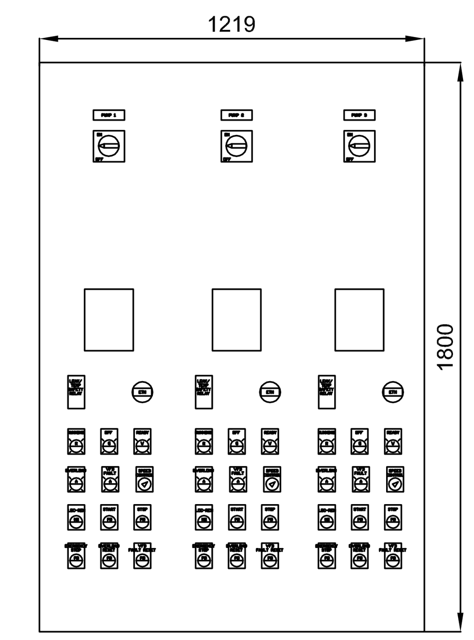
POWER AND CONTROL PANEL OUTER DOOR LAYOUT

SCALE: 1:20



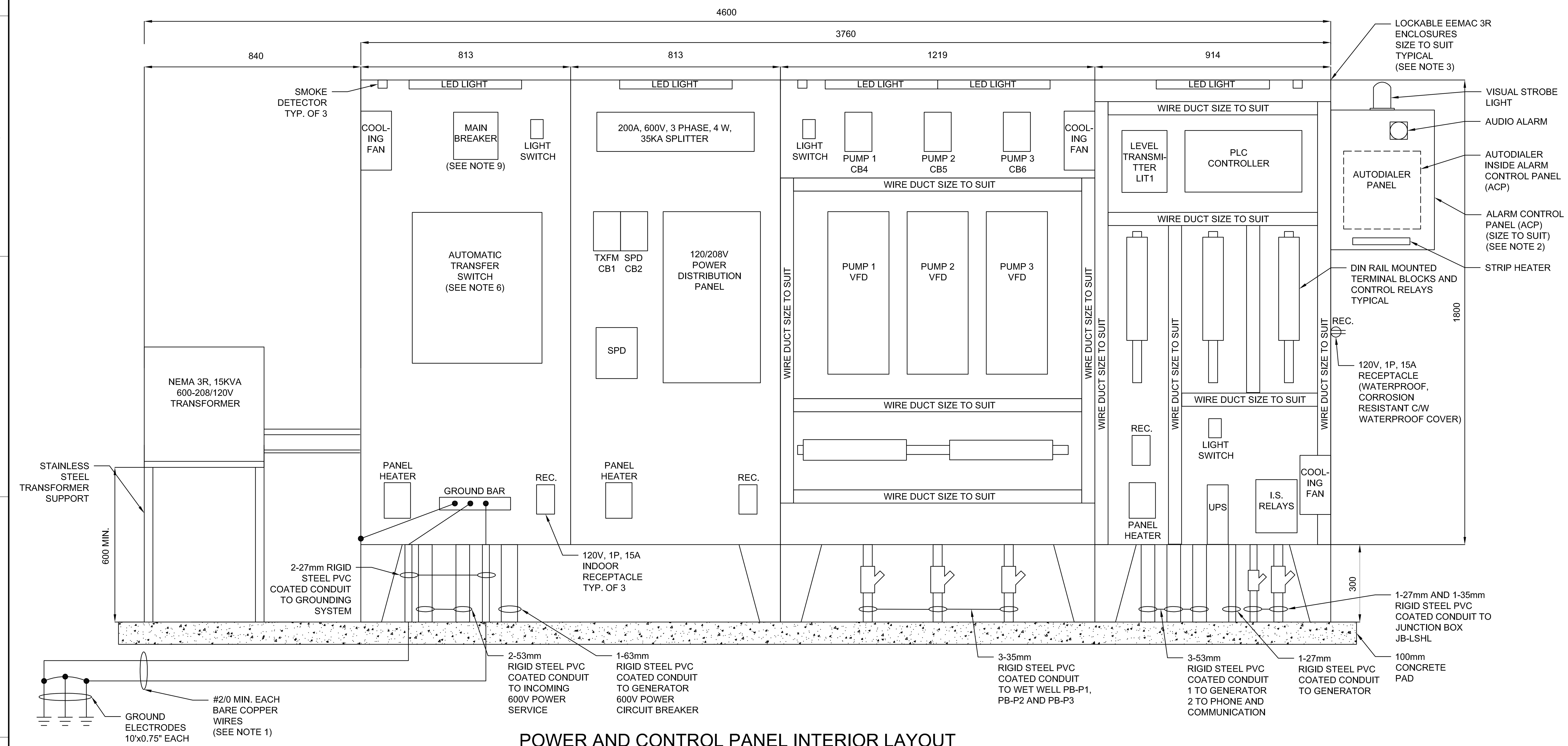
POWER PANEL INNER DOOR LAYOUT

SCALE: 1:20



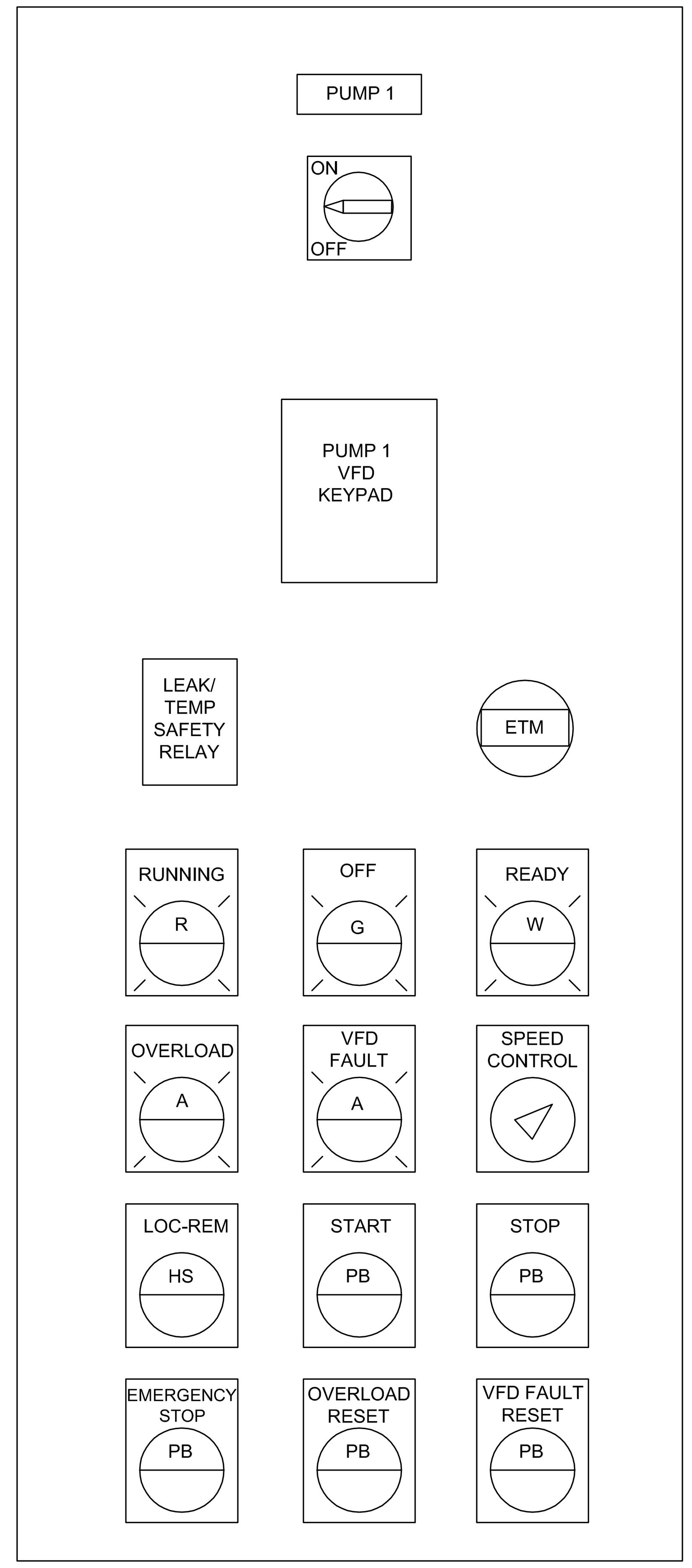
PUMP CONTROL PANEL INNER DOOR LAYOUT

SCALE: 1:20



POWER AND CONTROL PANEL INTERIOR LAYOUT

SCALE: 1:10



PUMP 1 INNER DOOR LAYOUT (TYP. FOR PUMP 2 AND PUMP 3)

SCALE: 1:10

DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	

REG. PROFESSIONAL

FOR CLIENT REVIEW

HATCH

No.	DESCRIPTION	BY	CHK'D	DATE
A	FOR CLIENT REVIEW	L.B.	G.N.	12-03-2021

REVISIONS

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	L.BO	NR	12-03-2021
DESIGNER	G.NING	NR	12-03-2021
CHECKER	G.NING		12-03-2021
DESIGN COORD.			-
RESP. ENG.	G.NING		12-03-2021
LEAD DISC. ENG.			-
ENG. MANAGER			-
PROJ. MANAGER	P.RUSCH		12-03-2021

DRAWING APPROVAL STATUS: Client Review

zibi

ZIBI WINDMILL DREAM ONTARIO PUMPING STATION

ELECTRICAL POWER AND CONTROL PANEL LAYOUT

SCALE 1:10 / 1:20 OR AS NOTED

DWG. No. H364639-0000-260-262-0002

REV A

SHEET SIZE: A1

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DATE: 12/3/2021 TIME: 1:19:57 PM
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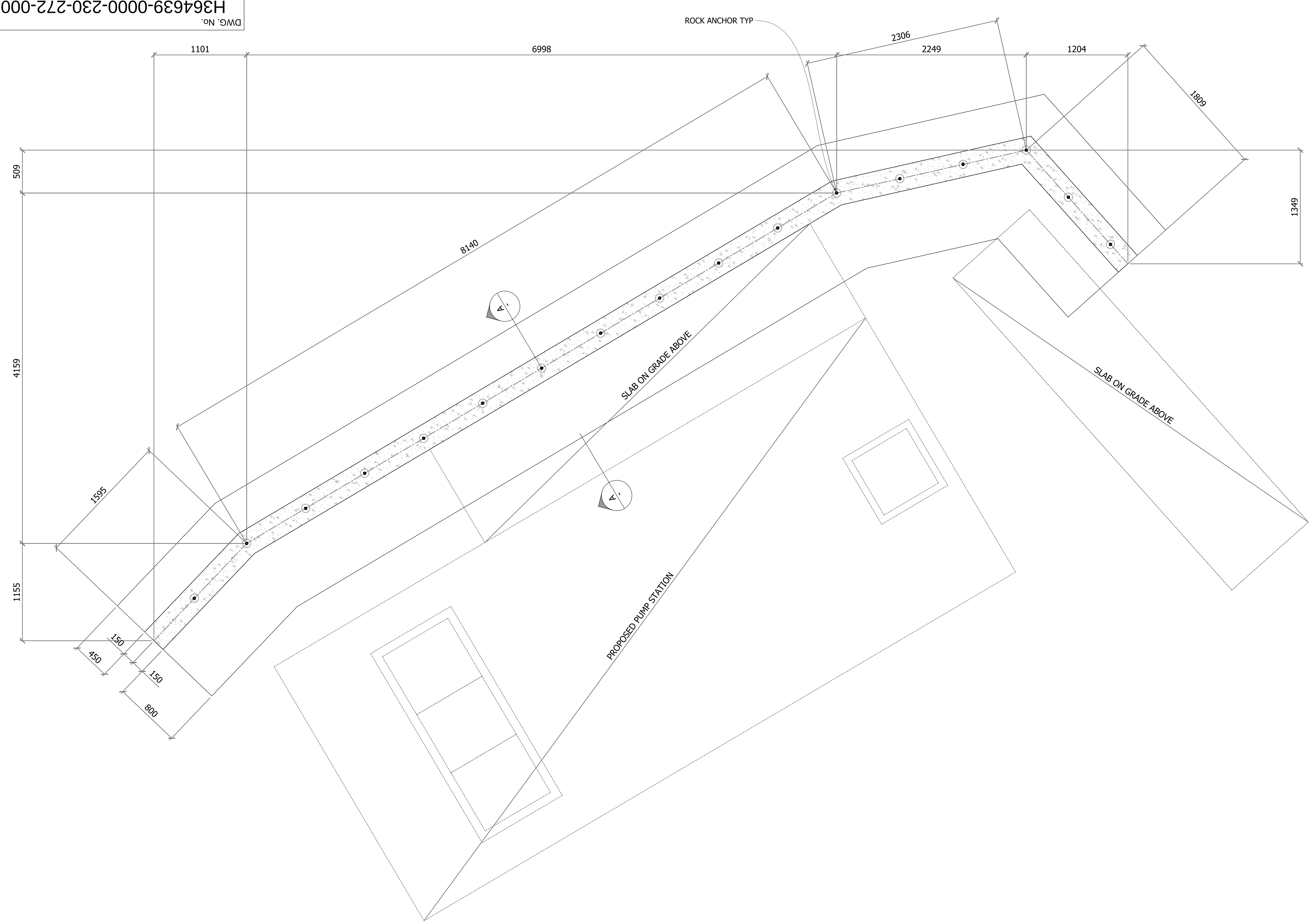
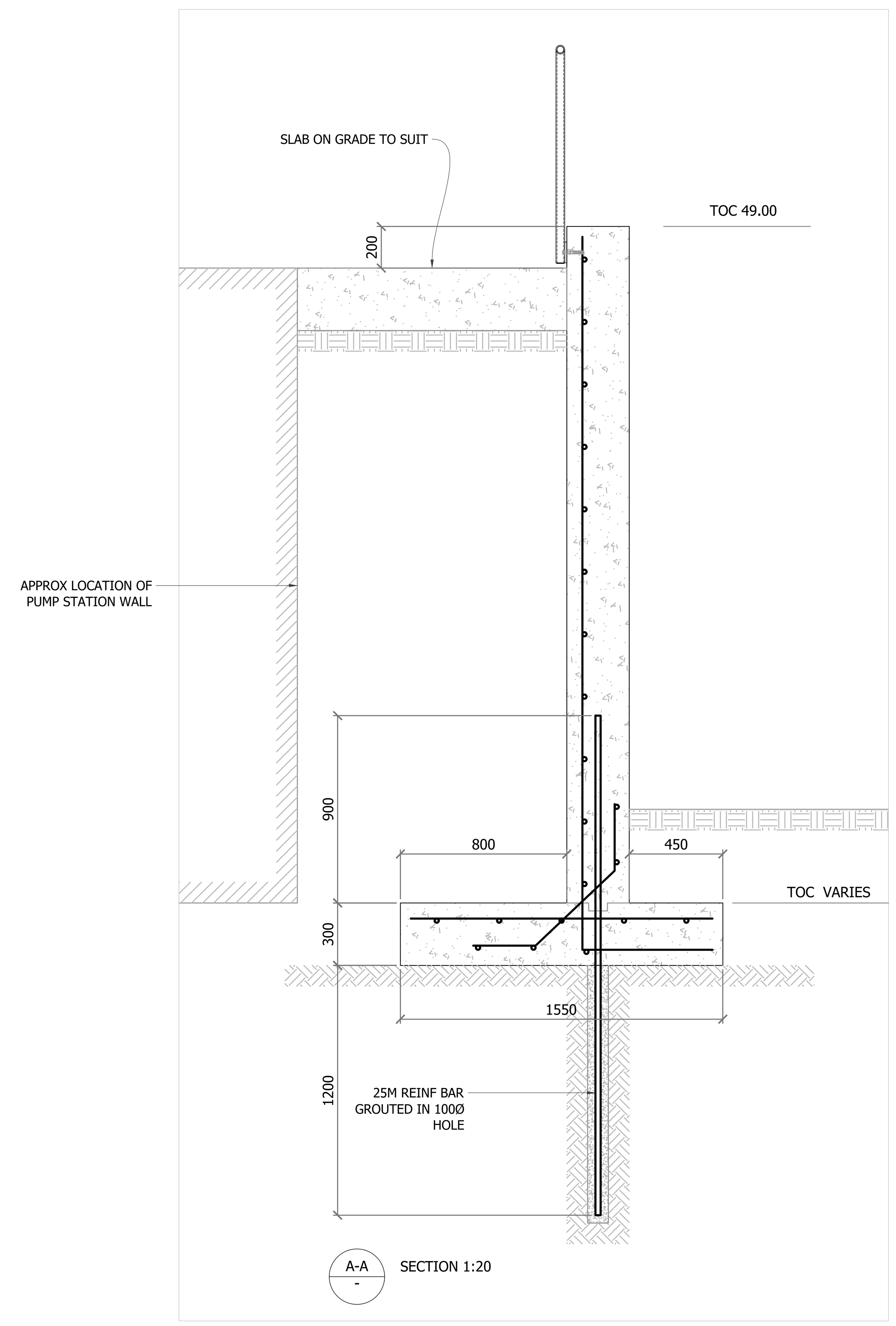
DWG. No. H364639-0000-230-272-0001



PLAN AT TOP OF RETAINING WALL FOOTING



SECTION 1:20

DRAWING No.	DRAWING TITLE
REFERENCE DRAWINGS	

REG. PROFESSIONAL

FOR CLIENT REVIEW

No.	DESCRIPTION	BY	CHK'D	DATE
A	FOR CLIENT REVIEW	A.P.	J.M.	03-14-2022

REVISIONS

HATCH

ROLE	NAME	SIGNATURE	DATE
DRAFTSPERSON	ARP	NR	MAR 2022
DESIGNER	JPM	NR	MAR 2022
CHECKER	JPM		MAR 2022
DESIGN COORD.	-		PR
RESP. ENG.	-		-
LEAD DISC. ENG.	-		-
ENG. MANAGER	-		-
PROJ. MANAGER	-		-

DRAWING APPROVAL STATUS: -

ZIBI WINDMILL DREAM ONTARIO PUMPING STATION

STRUCTURAL
RETAINING WALL DETAILS

SCALE VARIES OR AS NOTED | DWG. No. H364639-0000-230-272-0001 | REV A

SHEET SIZE: A1

USERNAME: JEFFREY P. MARSH
DATE: 2022-03-11 TIME: 4:59:24 PM
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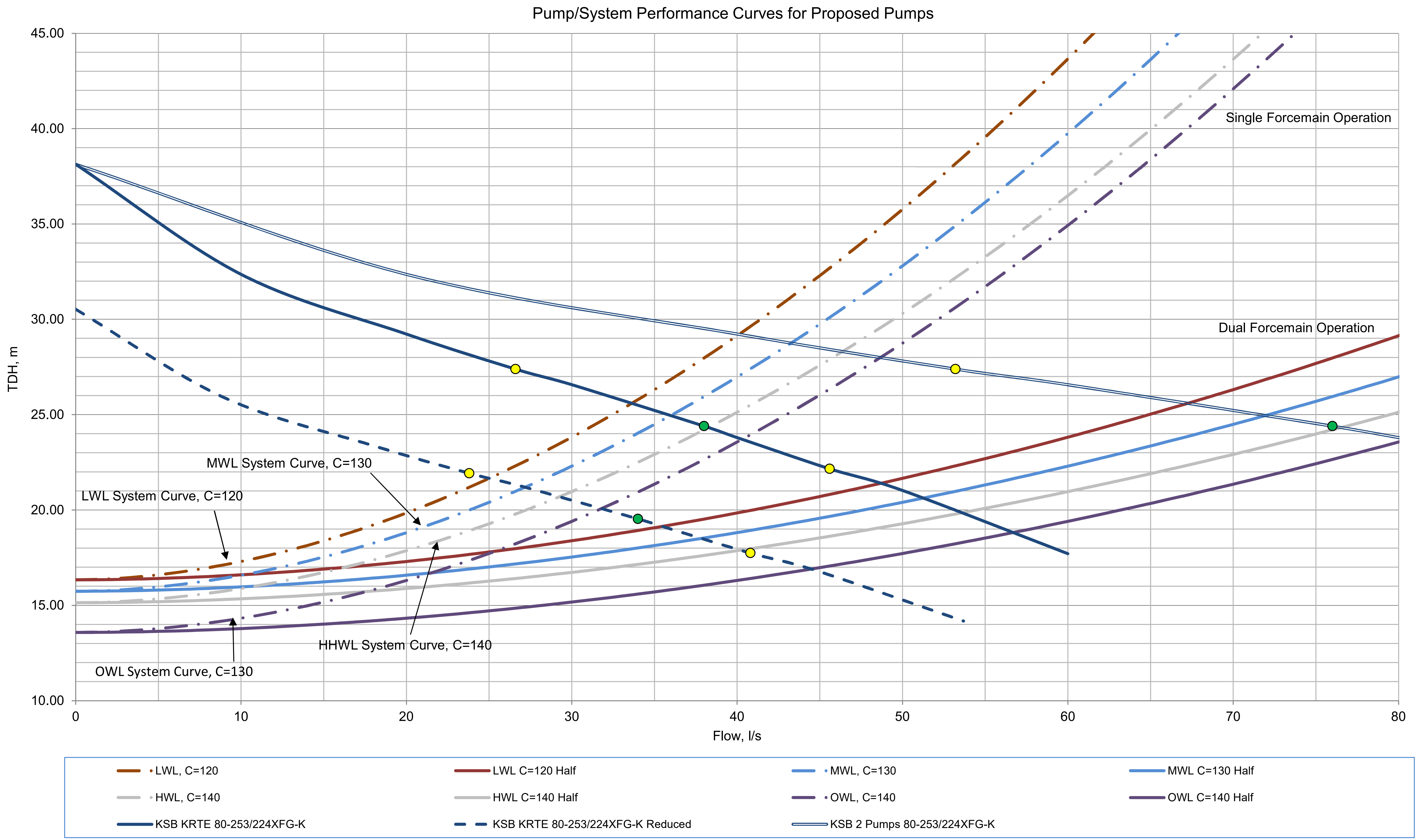
Appendix 2
System Curve and Calculations



Pump/System Performance Curves for Proposed Pumps
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
TDH, m
0
10
20
30
40
50
60
70
80
Flow, l/s
Single Forcemain Operation
Dual Forcemain Operation
MWL System Curve, C=130
LWL System Curve, C=120
HHWL System Curve, C=140
OWL System Curve, C=130
LWL, C=120
LWL C=120 Half
MWL, C=130
MWL C=130 Half
HWL, C=140
HWL C=140 Half
OWL, C=140
OWL C=140 Half
KSB KRTE 80-253/224XFG-K
KSB KRTE 80-253/224XFG-K Reduced
KSB 2 Pumps 80-253/224XFG-K

Windmill Dream Hydraulic Calculations

Incoming Sewer Hydraulics

			Design Notes
Upstream Invert at Maintenance Hole SAN401A	46.290	m	Invert on drawing "Zaida Eddy Private" (717_Block 211_PP1_Asbuilts.pdf)
Extra Drop within Maintenance Hole SAN401A	0.81	m	
Exit Invert at Maintenance Hole SAN401A	45.480	m	
Storage Pipe Length	51.67	m	Dimensioned off of "Zaida Eddy Private" (717_Block 211_PP1_Asbuilts.pdf)
Storage Pipe Slope	0.23%		Continuing slope from MH SAN100A to MH SAN401A
Entrance Invert at Maintenance Hole SAN402A	45.360	m	

Approach Pipe

Drop within Maintenance Hole SAN402A	0.700	m	
Exit Invert at Maintenance Hole SAN402A	44.660	m	
Approach Pipe Length	14.1	m	
Approach Pipe Slope	3.90%		Calculated to ensure suitable hydraulic jump in approach pipe.
Approach Pipe Diameter	0.533	m	Assuming a 525 nominal diameter pipe.
Invert at Pumping Station	44.110	m	

Minimum Active Volume of Wet Well

Flow to PS (half station capacity = max starts)	**0.045**	m^3/s	
Maximum Flow Rate Per Pump	**0.035**	m^3/s	
Number of Pump Starts per Hour (combined for all pumps)	8		Minimum specified by all manufacturers
Number of Pumps in Operation	1		Designing for station to run with one pump for extended periods
Min. Volume of Wetwell+Approach Pipe (between LWL and LWL1)	3.94	m^3	

Wet Well Dimensions

Width of Wet Well	2.44	m	
Length of Wet Well	3.05	m	
Wet Well Area	7.43	m^2	
Effective Surface Area	6.69	m^2	Excluding benching and pumps. Assuming 90% surface area in wet well remaining.
Minimum Operational Depth (LWL to LWL1)	0.59	m	Calculated Value
Minimum Operational Depth (LWL to LWL1)	0.60	m	Set Value

Water Levels

HHWL (Alarm)	45.55	m	Top of Benching	45.56	m	Aligning to just below top of the low flow channel in storage pipe. Float Level.
HWL (Pumps full speed)	45.35	m				Set as 200mm below alarm. Pump speeds increase to full speed.
LWL2 (Pump 2 on)	45.15	m				Pump 2 Start
LWL1 (Pump 1 on)	44.95	m				Pump 1 Start
LWL (Pumps off)	44.35	m				
LLWL (Alarm)	44.15	m				
Approach Pipe Fill Ratio at LWL	0.45					Per Approach pipe calculator, capacity at 0.45 d/D = 56.6l/s. Adaquate.
Total Active Wet Well Volume (excluding pump motor)	4.01	m^3				Since active volume is greater than minimum volume pumps will not cycle too frequently.

Wet Well Floor

Low-Low Water Level	44.15	m	
Minimum Water Level above Wet Well Floor	0.445	m	Based on pump manufacturers
Additional Safety Factor	0.11	m	
Wet Well Floor	43.60	m	
Top of volute	44.04	m	As per drawing "KSB 80-253/224XFG-K", assuming minimum water level is at the top of the volute.

Storage

Minimum Overflow Time	30	minutes	
Maximum Flow to Pumping Station	0.045	m^3/s	
Storage Volume Required between HWL and Overflow	81.0	m^3	
Overflow Invert	47.109	m	Invert on drawing "Zaida Eddy Private" (717_Block 211_PP1_Asbuilts.pdf)
Wet Well Dimensions			
Width of Wet Well	2.44	m	Assuming a pre-fabricated maintenance hole
Length of Wet Well	3.05	m	
Wet Well Area	7.43	m^2	Using full storage capacity since motors to not extend significantly into volume between HWL and OWL
Storage Volume in Wet Well above HWL	11.6	m^3	
SAN402A Maintenance Hole			
SAN402A Mantenance Hole Diameter	3.05	m	
SAN402A Maintenance Hole Storage above High Water Alarm Level	11.4	m^3	
SAN401A Maintenance Hole			
SAN401A Maintenance Hole Diameter	2.44	m	Confirmed 1500mm RCP can be joined to 2400mm MH as per Decast literature.
SAN401A Maintenance Hole Storage above HWL	7.3	m^3	Assuming storage upstream of SAN401A is insignificant.
Storage Pipe (SAN401A - SAN402A)			
Diameter	**1.52**	m	
Effective Storage (full area less benching and low flow channel)	**1.55**	m^3/m	Refer to Schematic Drawing.
Available Storage Volume	80.1	m^3	Available volume prior to overflow
Storage in Storage Pipe	80.1	m^3	Including Approach Pipe volume unoccupied during operation
Storage in Maintance Holes (Including Wet Well)	30.2	m^3	Including volume in Wet Well above HWL
Total Volume below OWL	110.3	m^3	
Storage Time (incoming flow of 45 L/s)	40.9	minutes	
Storage Time (incoming flow of 35 L/s)	52.5	minutes	

NPSH Requirements

$NPSH_r$ — KSB 80-253/224XFG-K

	KSB - Pump		
	LWL	**LWL 1**	**Overflow**
Flow Rate (L/s)	22.5	30	34
$NPSH_3$ Required (Maximum), (m)	3.3	4.1	4.6
Target/Initial Safety Factor	1.7	1.7	1.7
NPSH Required @ Flow incl. FS (m)	5.61	6.97	7.82

$NPSH_a$ Determination

Pump Station Elevation	44.15	m			Height above sea level at low water level
Atmospheric Pressure	10.33	m	101.3	kPa	Standard atmospheric pressure at site elevation.
h_{vap}, Vapour Pressure at 30^0C	0.43	m			From water property table. A-8 in Sanks.
h_{vol}, partial pressure due to organics	0.6	m			From Sanks
$NPSH_a$ (site specific subtotal)	9.30	m			Using Equation 10-25 in Pumping Station Design (Jones): NPSHA = $H_{bar} + h_s - h_{vap} - h_{fs} - \Sigma h_m - h_{vol}$ - FS

NPSH Comparison

	LWL		LWL 1		OWL	
Pump Flow Rate, Q	22.5	l/s	30	l/s	34	l/s
Total Suction Losses	0.00	m	0.00	m	0.00	m
$NPSH_a$ at liquid Surface	9.30	m	9.30	m	9.30	m
Correction above minimum liquid level of pump	0.31	m	0.91	m	3.07	m
Adjusted $NPSH_a$ (relative to minimum liquid level of pump)	**9.61**	**m**	**10.21**	**m**	**12.37**	**m**
NPSH Required @ Flow including a factor of safety	5.61	m	6.97	m	7.82	m
Final NPSH Safety Factor	2.91		2.49		2.69	

Design Notes: Values selected to represent the potential range of flows. Losses are already factored into suction since hardware is integrated.

Appendix 3
KSB Pump Curve

Data sheet

KSB

Customer item no.:35L/s @ 25m
Communication dated: 11/03/2022
Doc. no.: Zibi Pump
Quantity: 1

Number: ES 8001749776
Item no.: 200
Date: 11/03/2022

KRTE 80-253/224XFG-K

Version no.: 1

Operating data

Requested flow rate	35.000 l/s	Actual flow rate	35.253 l/s
Requested developed head	25.00 m	Actual developed head	25.15 m
Pumped medium	Wastewater, municipal untreated	Efficiency	75.4 %
		Power absorbed	11.88 kW
Pumped medium details	Not containing chemical and mechanical substances which affect the materials	Pump speed of rotation	1777 rpm
		Shutoff head	38.14 m
		Max. power on curve	16.61 kW
Ambient air temperature	20.0 °C	Design	Single system 1 x 100 %
Fluid temperature	20.0 °C		
Fluid density	1030 kg/m³		
Fluid viscosity	1.00 mm²/s	Performance test	Yes
Static head	15.00 m		
Ex-Request acc.to Atex	II T3		

Design

Design	Close-coupled submersible	Calculated temperature increase at shaft seal	K
Orientation	Vertical		
Suction flange pump drilled according to(DN1)	unmachined	Impeller type	Single vane, radial flow (E)
		Wear ring	Casing wear ring
Discharge flange pump drilled according to(DN2)	EN 1092-2 / DN 80 / PN 10	Impeller diameter	255.0 mm
		Free passage size	76 mm
Shaft seal	2 mech. seals in tandem arrangement with oil reservoir	Direction of rotation from drive	Clockwise
		Ex protection	Explosion protection to CSA Class1, Div1, Gr.C, D T3
Shaft seal manufacturer	KSB		
Type	4STK	Color	Ultramarine blue (RAL 5002) KSB-blue
Material code	SIC/SIC/NBR		

Driver, accessories

Driver type	Electric motor	Motor service factor	1.15
Model (make)	KSB	Temperature sensor	PTC resistor
Motor const. type	KSB Sub. motor	Motor winding	575 V
Operating mode	S1, non submerged operation	Number of poles	4
NEMA code letter	H	Starting mode	Direct-on-line starting
Frequency	60 Hz	Connection mode	Delta
Rated voltage	575 V	Motor cooling method	closed-circuit jacket cooling
Rated power P2	18.64 kW	Motor cooling jacket	With
Available reserve	56.87 %	Motor version	X
Rated current	24.5 A	Cable design	Rubber hose
Starting current ratio	6.7	Cable entry	Sealed along entire length
Insulation class	H according IEC 34-1	Power cable	AWG 11-7+15-5
Type of protection	XP/I/1/CD	Number of power cables	1
Motor enclosure	IP68	Moisture sensor	With
Cos phi at 4/4 load	0.85	Cable length	10.00 m
Motor efficiency at 4/4 load	89.9 %		

Data sheet

Customer item no.:35L/s @ 25m
Communication dated: 11/03/2022
Doc. no.: Zibi Pump
Quantity: 1

Number: ES 8001749776
Item no.: 200
Date: 11/03/2022

KRTE 80-253/224XFG-K

Version no.: 1

Materials G

Pump casing (101)	Cast iron A 48 Class 35 B	Casing wear ring (502.1)	Cast iron A 48 Class 35 B
Discharge cover (163)	Cast iron A 48 Class 35 B	Cooling jacket (66-2)	Stainless steel A 276 Type 316 Ti
Shaft (210)	Chrome steel ASTM A276 Type 420 T	Motor housing (811)	Cast iron A 48 Class 35 B
Impeller (230)	Cast iron A 48 Class 35 B	Motor cable (824)	Chloroprene rubber
Bearing bracket (330)	Cast iron A 48 Class 35 B	Screw (900)	Stainless steel A 193 B8M
O-Ring (412)	Nitrile rubber NBR		

Packaging

IPPC Standard ISPM 15	Yes	Packaging for transport	Ship
Packaging category	B1 Wooden or plywood case, cover provided with polyproylene cellular sheet, outdoor storage up to 3 months	Outdoor storage at -40°C to +50°C for up to 3 months. Packet must be covered. No corrosion protection, only transport protection.	
Packaging for storage	Indoor		

Nameplates

Nameplates language	International	Duplicate nameplate	With

Certifications

		Test participation	Non-witnessed
Hydraulic performance test		Quantity, non-witnessed	1
Acceptance standard	ISO 9906 2B	Quantity, witnessed	0
Quantity meas. points Q-H	5		
Certificate	Inspection cert. 3.1 to EN 10204		

Data sheet

Customer item no.:35L/s @ 25m
Communication dated: 11/03/2022
Doc. no.: Zibi Pump
Quantity: 1

Number: ES 8001749776
Item no.: 200
Date: 11/03/2022

KRTE 80-253/224XFG-K

Version no.: 1

Installation parts

Installation type	stationary 2 guide rail
Scope of supply	Pump with installation parts For guide rail arrangements, the guide rails are not included in KSB's scope of supply.
Installation depth	4.50 m
Material concept	G

Duckfoot bend

Size	DN 80
Flange design	ASME
Duckfoot bend size (DN2 / DN3)	DN 80 Drilled according to ASME
Material	Cast iron A 48 Class 35 B
Mounting type	Composite anchor bolts
Foundation rail	Without

Claw

Design	Straight
Size	DN 80

Lifting chain / -rope

Type	Chain
Material	CrNiMo steel 1.4404
Length	5.00 m
Max. load	400 kg
Lifting Bail	With

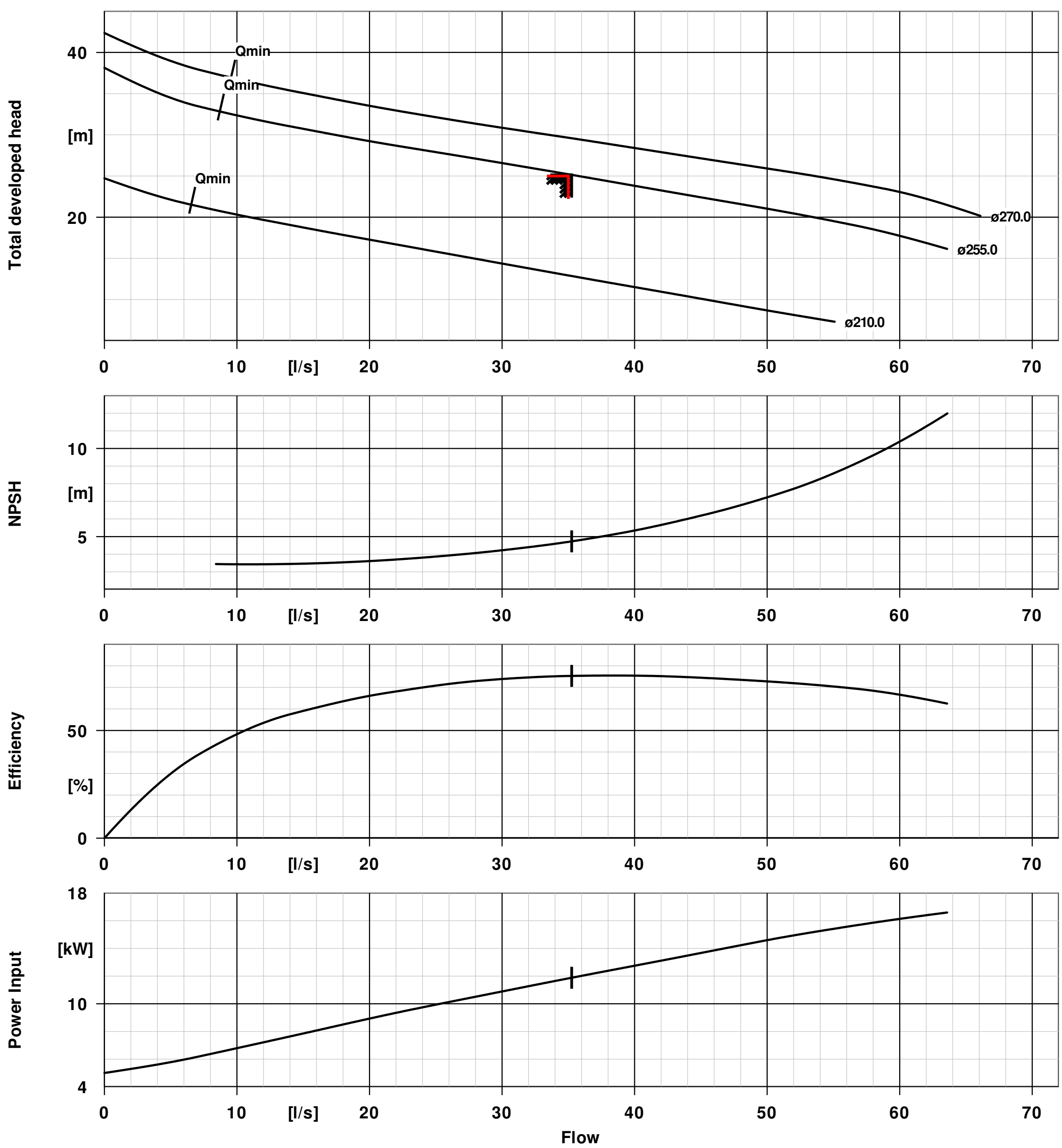
Performance curve

Customer item no.:35L/s @ 25m
Communication dated: 11/03/2022
Doc. no.: Zibi Pump
Quantity: 1

Number: ES 8001749776
Item no.:200
Date: 11/03/2022

Version no.: 1

KRTE 80-253/224XFG-K



Curve data

Speed of rotation	1777 rpm
Fluid density	1030 kg/m³
Viscosity	1.00 mm²/s
Flow rate	35.253 l/s
Requested flow rate	35.000 l/s
Total developed head	25.15 m
Requested developed head	25.00 m
Efficiency	75.4 %
Power absorbed	11.88 kW
NPSH 3%	4.73 m
Curve number	K43404/2
Effective impeller diameter	255.0 mm
Acceptance standard	ISO 9906 2B

Motor data sheet

Customer item no.:35L/s @ 25m
Communication dated: 11/03/2022
Doc. no.: Zibi Pump
Quantity: 1

Number: ES 8001749776
Item no.:200
Date: 11/03/2022

KRTE 80-253/224XFG-K

Version no.: 1

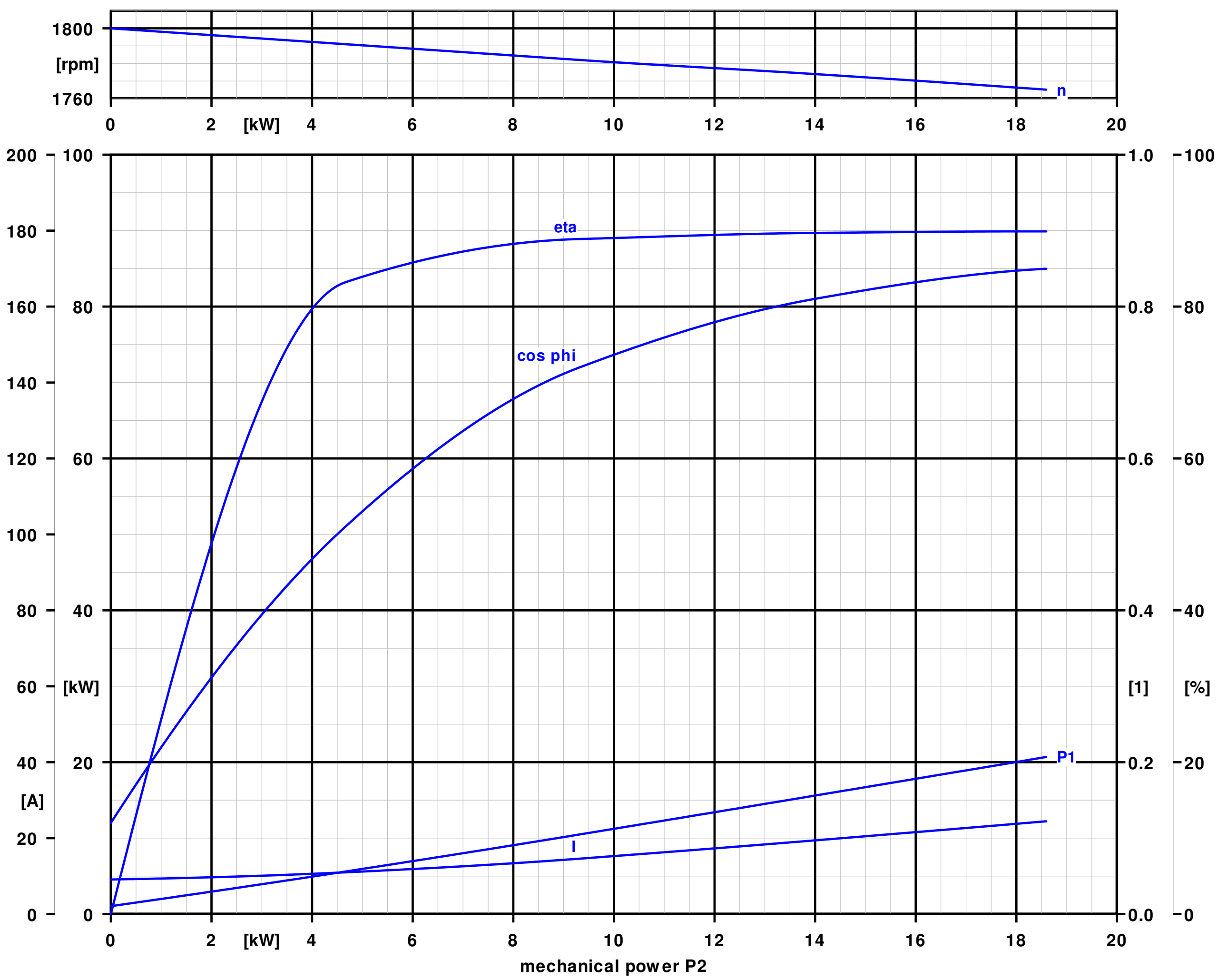
Motor data

Motor manufacturer	KSB	Rated speed	1765 rpm
Motor size	22F	Starting current ratio	6.7
Motor construction type	KSB Sub. motor	Starting mode	Direct-on-line starting
Motor material	Grey cast iron EN-GJL-250	Power cable	AWG 11-7+15-5
Efficiency class	not classified	Number of power cables	1
Rated voltage	575 V	Power cable Ø min.	21.0 mm
Frequency	60 Hz	Power cable Ø max.	23.0 mm
Motor power	18.64 kW	Cable standard	CSA
Rated current	24.5 A	Switching frequency	10.00 1/h

Curve data

The no-load point is not a guarantee point within the meaning of IEC 60034

Load	0.0 %	25.0 %	50.0 %	75.0 %	100.0 %
P2	0.00 kW	4.66 kW	9.32 kW	13.98 kW	18.64 kW
n	1800 rpm	1791 rpm	1782 rpm	1774 rpm	1765 rpm
P1	1.05 kW	5.60 kW	10.49 kW	15.59 kW	20.74 kW
I	9.1 A	11.0 A	14.6 A	19.4 A	24.5 A
Eta	0.0 %	83.2 %	88.9 %	89.7 %	89.9 %
cos phi	0.12	0.51	0.72	0.81	0.85



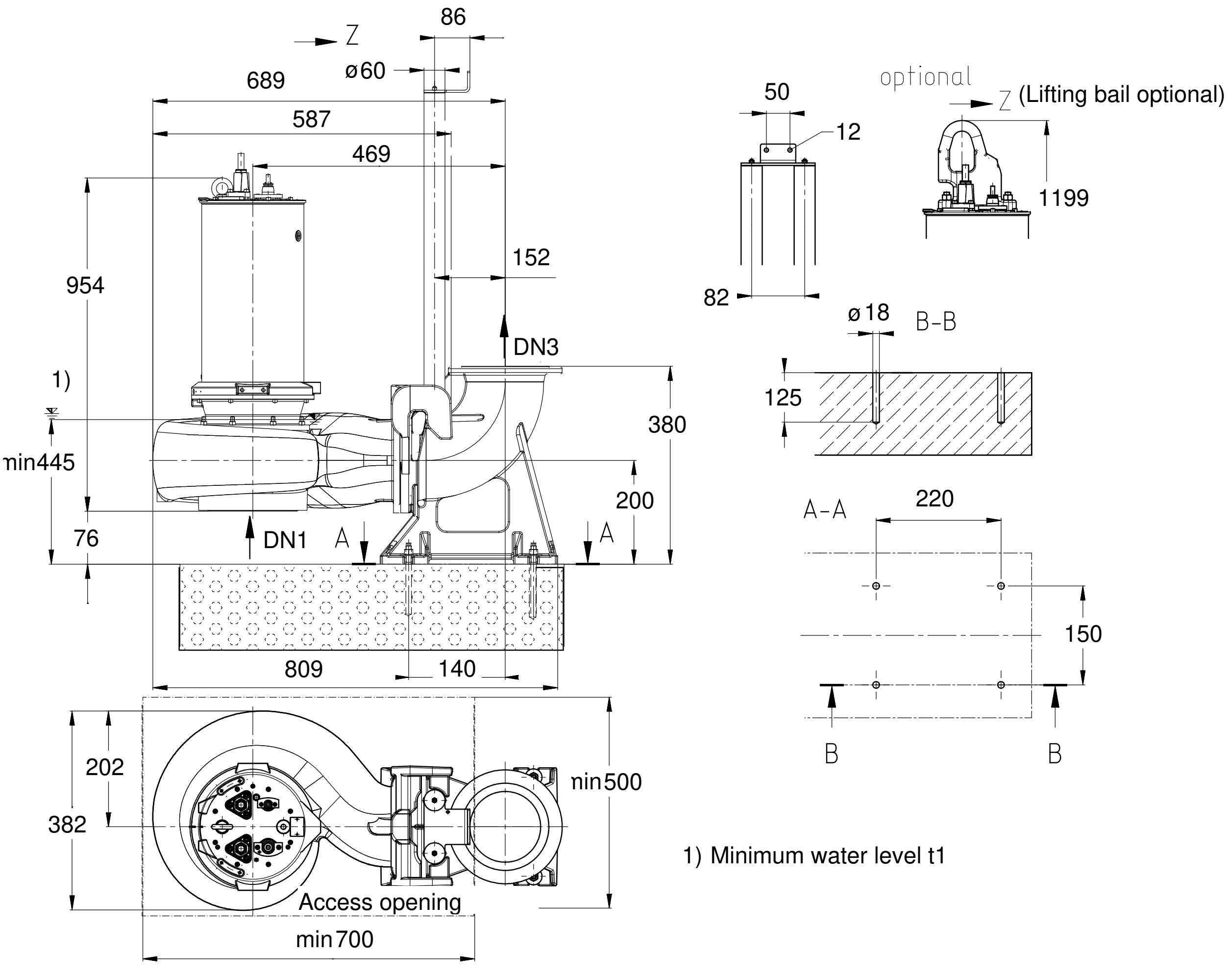
Installation plan

Customer item no.:35L/s @ 25m
Communication dated: 11/03/2022
Doc. no.: Zibi Pump
Quantity: 1

Number: ES 8001749776
Item no.:200
Date: 11/03/2022
Page: 6 / 7

KRTE 80-253/224XFG-K

Version no.: 1



1) Minimum water level t1

Drawing is not to scale

Dimensions in mm

Motor

Motor manufacturer	KSB
Motor size	22F
Motor power	18.64 kW
Number of poles	4
Speed of rotation	1765 rpm
Motor enclosure	IP68

Connections

Suction flange pump drilled according to(DN1)	unmachined
Duckfoot bend size (DN2 / DN3)	DN 80 Drilled according to ASME

Weight net

Pump, Motor, Cable	291 kg
Claw / Foot	35 kg
Total	326 kg

Installation plan

Customer item no.:35L/s @ 25m
Communication dated: 11/03/2022
Doc. no.: Zibi Pump
Quantity: 1

Number: ES 8001749776
Item no.:200
Date: 11/03/2022

KRTE 80-253/224XFG-K

Version no.: 1

Connect pipes without stress or strain!
Dimensional tolerances for shaft axis height: DIN 747

Dimensions without tolerances, middle tolerances to:	ISO 2768-m
Connection dimensions for pumps:	EN735
Dimensions without tolerances - welded parts:	ISO 13920-B
Dimensions without tolerances - gray cast iron parts:	ISO 8062-CT11
Dimensions without tolerances - stainless steel parts:	ISO 8062-CT12

For auxiliary connections see separate drawing.

Appendix 4
Email RE: System Flow

Gibbs, Andrew

From: Taryn Glancy <TGlancy@zibi.ca>
Sent: Friday, June 4, 2021 12:59 PM
To: Rusch, Peter; afobert; Gibbs, Andrew
Subject: Pump Station Design Flows
Attachments: Copy of san-2021-05-10_windmill_worksheet.xlsx

Follow Up Flag: Follow up
Flag Status: Completed

Hi Peter,

We have finalized the design flows for the pump station. Please proceed with design and schedule. Max capacity of the station would be 45 L/s, however likely operating at 30-35 L/s based on our discussions.

I have contacted Gemtec to review the slope stability, and will set up a meeting soon.

Thanks,

TARYN GLANCY, P. ENG.
PROJECT MANAGER

6 Booth St (Albert Island), Ottawa, ON K1R 6K8
C 613-219-2722 E TGlancy@zibi.ca

Appendix 5
Generator Sizing TM-1

Project Memo

H 282834

November 7, 2018

To: David Schaeffer Engineering Limited
Attention: Adam Fobert, P.Eng

From: Peter Rüsch / Grace Ning

cc:

Re: Zibi Development / Chaudiere Island, City of Ottawa
Generator Sizing for Dual Use

1. Introduction

Hatch has been retained by David Schaeffer Engineering Limited (DSEL) to design the pumping facilities for the Zibi Development on Chaudiere Island in the City of Ottawa The pumping facilities will consist of a permanent pumping station, and there may be a temporary pumping station to allow for a longer planning timeframe for the overall site. DSEL has advised that the permanent station will have a peak sanitary flow of 32.7 L/s. Furthermore, Zibi has advised that Zibi requires a standby generator for other purposes on site. Hatch in conjunction with the DSEL suggested that it may be prudent to re-use the generator for the permanent pumping station, if feasible.

The flows from the permanent pumping station will be conveyed through twin forcemains, for discharge at Brickhill Street near Albert Street in the City of Ottawa. Hatch has previously completed a technical memorandum (Forcemain TM) to provide suggested forcemain diameters to DSEL. The forcemain TM is attached to this TM, and it is our understanding that the Forcemain TM may not be approved by the City of Ottawa at the time or writing.

The purpose of this TM is to set out probable pump sizes and derive a load list for the permanent pumping station that will require to be supplied by the generator. It has to be understood that the sizing is based on the background information presented in this memo and, depending on the final layout of the pumping station may result in an inadequate generator.

2. Pump Sizing

Hatch has, in the Forcemain TM derived a likely duty point for the pumping station, and as such has pre-selected 2 pumps for the following duty points:

- 33 L/s, with a total dynamic head of 25 m. This selection mimics the flow of the duty point referenced in the forcemain TM, with an additional allowance of 2.0m for additional depth / friction losses etc. This pump (from Flygt) would have a 15 kW motor.

- 40 L/s, with a total dynamic head of 27 m. This selection provides for a [somewhat] random scenario where the PS needs to either provide for more flows, or for more total dynamic head. This pump from Flygt would have a 22 kW motor.

Hatch has also requested a pump selection from KSB, however these show a larger motor for the smaller pump and a similar sized motor for the larger pump. As such we believe that a pump with a 15 kW motor should adequately cover the duty scenario set out in the forcemain TM.

3. Generator Load Cases (for Pumping Station Use)

In the design of the conceptual layout of the permanent station, Hatch as assumed that, under certain extreme conditions, the second pump could be started, therefore the generator should be compliant with the following load cases:

- Load case 1:
  - Start Pump # 1, 15 kW, Soft Starter (peak current inrush = 3 x nominal)
  - Start Pump # 2, 15 kW, Soft Starter (peak current inrush = 3 x nominal)
  - Add miscellaneous electrical loads, 5 kW total, in 2 steps.
  - Voltage drop to be less than 25%
- Load case 2:
  - Start Pump # 1, 22 kW, VFD (peak current inrush = 2 x nominal)
  - Start Pump # 2, 22 kW, VFD (peak current inrush = 2 x nominal)
  - Add miscellaneous electrical loads, 5 kW total, in 2 steps.
  - Voltage drop to be less than 30%

Pumps of these sizes generally require 600 V power supply, and as such the genset should be a 3 Phase 600 V unit.

Zibi needs to determine the final generator size from the interim demands for other interim uses and the above noted proposed permanent pumping station demands.

Should there be any questions or concerns, please do not hesitate to contact us.

D

Appendix D
Stormwater Management Calculations

EVALUATION OF RUNOFF COEFFICIENTS

Client: DREAM Windmill
Project: ZIBI
Location: Ottawa, Ontario
Project #: A000931

Area	Grassed Area (m²)	Runoff Coefficient	Interlock Pavers Area (m²)	Runoff Coefficient	Hard Surface Area (m²)	Runoff Coefficient	Total Area (m²)	Runoff Coefficient (10-year event)	Runoff Coefficient (100-year)
A1	322	0.20	98	0.75	1946	0.90	2366	0.80	0.95
A2	0	0.20	0	0.75	1228	0.90	1228	0.90	0.95
A3	0	0.20	0	0.75	1572	0.90	1572	0.90	0.95
A4	23	0.20	1358	0.75	728	0.90	2109	0.80	0.95
A5	28	0.20	736	0.75	0	0.90	764	0.73	0.91
A6	634	0.20	0	0.75	1479	0.90	2113	0.69	0.86
A7	0	0.20	959	0.75	0	0.90	959	0.75	0.94
A8	0	0.20	271	0.75	0	0.90	271	0.75	0.94
A9	38	0.20	1299	0.75	0	0.90	1337	0.73	0.92
TOTAL	1045	0.20	4721	0.75	6953	0.90	12719	0.79	0.95
A10	0	0.20	1963	0.75	0	0.90	1963	0.75	0.94
TOTAL	1045	0.20	6684	0.75	6953	0.90	14682	0.78	0.95

Prepared by: Julien Sauvé, P.Eng. Date: 2022-03-17
PEO No.: 100200100

Verified by: André Chaumont, P.Eng. Date: 2022-03-17
PEO No.: 90409194

STORAGE VOLUME CALCULATIONS

Project: ZIBI
Block 204
Project #: A000931
Station OTTAWA SEWER DESIGN GUIDELINES
Date: 4/5/2022 14:02

File Location: ***#VALUE!***

Description: **Storage volume calculations with the rational method**

Specified Release Rate: 100 L/s/ha

Area : A6 0.2113 ha
Runoff Coefficient C : 0.86
Rainfall Event : 100 ans
Discharge Flow Q : 0.02113 m³/s
Discharge Factor K : 1

Design Volume: **47.30 m³**

Rainfall Pluviometry Coefficients	2 year		5 year		10 year	
	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	732.951	732.951	998.071	998.071	1174.184	1174.184
B	6.199	6.199	6.053	6.053	6.014	6.014
C	0.810	0.810	0.814	0.814	0.816	0.816
Rainfall Pluviometry Coefficients	25 year		50 year		100 year	
	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.	30 min. or less	Over 30 min.
A	1402.884	1402.884	1569.58	1569.58	1735.688	1735.688
B	6.018	6.018	6.014	6.014	6.014	6.014
C	0.819	0.819	0.820	0.820	0.820	0.820

Prepared by: Julien Sauvé Date: 3/28/2022
PEO No.: 100200100

Verified by: André Chaumont Date: 3/28/2022
PEO No.: 90409194

Init.________

Rainfall Duration (min) *T* (1)	**Rainfall Intensity** (mm/h) *I* (2)	~~**Rainfall intensity for Climate Ch.** (mm/h) *I (2)*(factor)* (3)~~	**Runoff Volume** (m^3) *CIAT* (4)	**Output Volume** (m^3) *kQT* (5)	**Retention Volume** (m^3) *(4)-(5)* (6)
5.0	242.70	~~266.97~~	36.75	6.339	30.41
10.0	178.56	~~196.41~~	54.08	12.678	41.40
15.0	142.89	~~157.18~~	64.92	19.017	45.90
20.0	119.95	~~131.95~~	72.66	25.356	47.30
25.0	103.85	~~114.23~~	78.63	31.695	46.93
30.0	91.87	~~101.06~~	83.47	38.034	45.44
35.0	82.58	~~90.84~~	87.54	44.373	43.16
40.0	75.15	~~82.66~~	91.04	50.712	40.32
45.0	69.05	~~75.96~~	94.11	57.051	37.06
50.0	63.95	~~70.35~~	96.85	63.39	33.46
55.0	59.62	~~65.59~~	99.32	69.729	29.59
60.0	55.89	~~61.48~~	101.57	76.068	25.50
65.0	52.65	~~57.91~~	103.64	82.407	21.23
70.0	49.79	~~54.77~~	105.56	88.746	16.81
75.0	47.26	~~51.98~~	107.34	95.085	12.25
80.0	44.99	~~49.49~~	109.01	101.424	7.58
85.0	42.95	~~47.25~~	110.58	107.763	2.81
90.0	41.11	~~45.22~~	112.06	114.102	-2.04
95.0	39.43	~~43.38~~	113.46	120.441	-6.98
100.0	37.90	~~41.69~~	114.79	126.78	-11.99
105.0	36.50	~~40.15~~	116.06	133.119	-17.05
110.0	35.20	~~38.72~~	117.28	139.458	-22.18
115.0	34.01	~~37.41~~	118.44	145.797	-27.36
120.0	32.89	~~36.18~~	119.55	152.136	-32.58
125.0	31.86	~~35.05~~	120.62	158.475	-37.85
130.0	30.90	~~33.99~~	121.65	164.814	-43.16
135.0	30.00	~~33.00~~	122.65	171.153	-48.51
140.0	29.15	~~32.07~~	123.61	177.492	-53.89
145.0	28.36	~~31.19~~	124.54	183.831	-59.30
150.0	27.61	~~30.37~~	125.43	190.17	-64.74
155.0	26.91	~~29.60~~	126.31	196.509	-70.20
160.0	26.24	~~28.86~~	127.15	202.848	-75.70
165.0	25.61	~~28.17~~	127.97	209.187	-81.21
170.0	25.01	~~27.51~~	128.77	215.526	-86.75
175.0	24.44	~~26.89~~	129.55	221.865	-92.32
180.0	23.90	~~26.29~~	130.31	228.204	-97.90
185.0	23.39	~~25.73~~	131.04	234.543	-103.50
190.0	22.90	~~25.19~~	131.76	240.882	-109.12
195.0	22.43	~~24.67~~	132.47	247.221	-114.75
200.0	21.98	~~24.18~~	133.15	253.56	-120.41
205.0	21.55	~~23.71~~	133.82	259.899	-126.07
210.0	21.14	~~23.26~~	134.48	266.238	-131.76
215.0	20.75	~~22.83~~	135.12	272.577	-137.45
220.0	20.37	~~22.41~~	135.75	278.916	-143.16

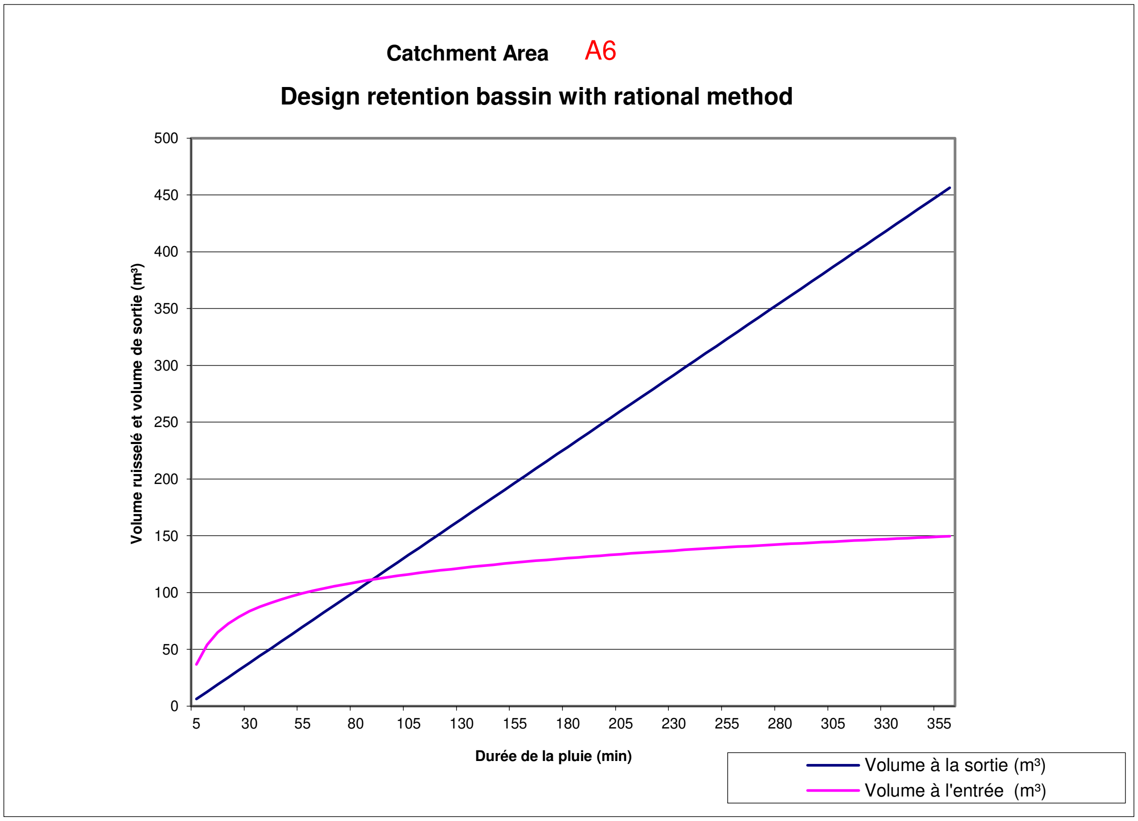
Init.________

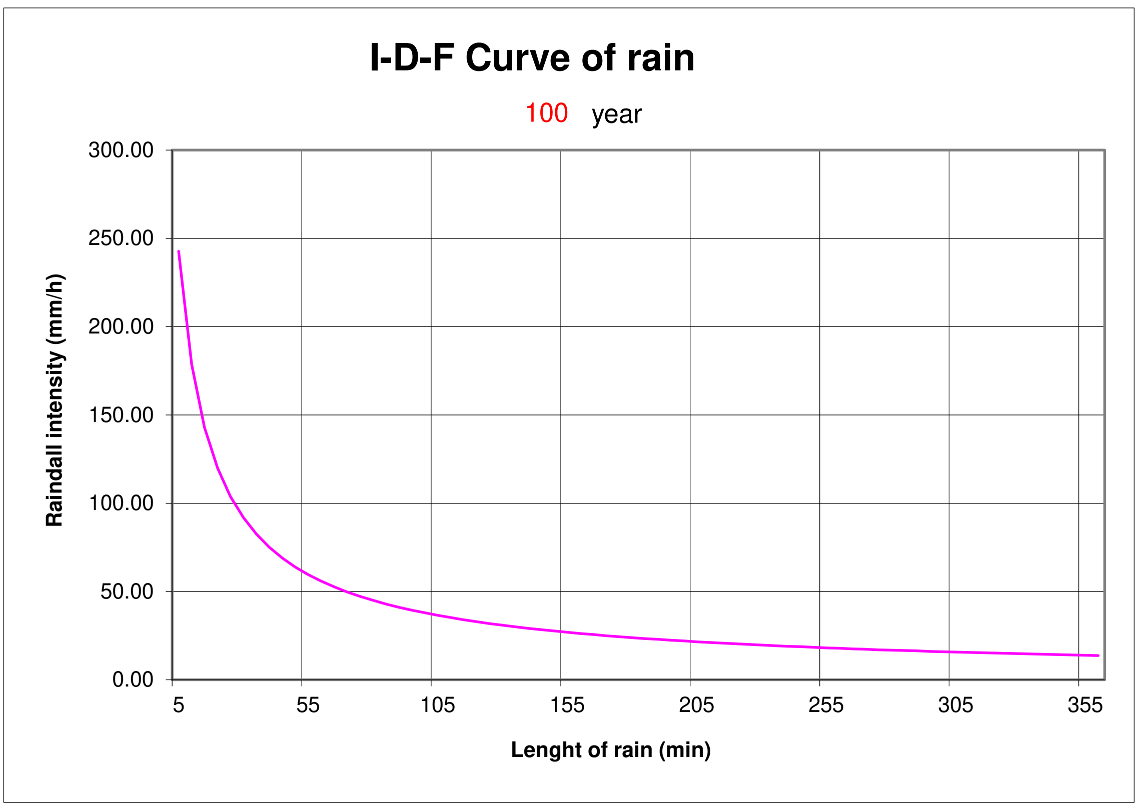
225.0	20.01	~~22.01~~	136.37	285.255	-148.89
230.0	19.66	~~21.63~~	136.97	291.594	-154.62
235.0	19.33	~~21.26~~	137.57	297.933	-160.37
240.0	19.01	~~20.91~~	138.15	304.272	-166.12
245.0	18.69	~~20.56~~	138.72	310.611	-171.89
250.0	18.39	~~20.23~~	139.28	316.95	-177.67
255.0	18.11	~~19.92~~	139.83	323.289	-183.46
260.0	17.83	~~19.61~~	140.37	329.628	-189.26
265.0	17.56	~~19.31~~	140.90	335.967	-195.07
270.0	17.29	~~19.02~~	141.42	342.306	-200.88
275.0	17.04	~~18.75~~	141.94	348.645	-206.71
280.0	16.80	~~18.48~~	142.44	354.984	-212.54
285.0	16.56	~~18.22~~	142.94	361.323	-218.38
290.0	16.33	~~17.96~~	143.43	367.662	-224.23
295.0	16.11	~~17.72~~	143.91	374.001	-230.09
300.0	15.89	~~17.48~~	144.39	380.34	-235.95
305.0	15.68	~~17.25~~	144.86	386.679	-241.82
310.0	15.48	~~17.03~~	145.32	393.018	-247.70
315.0	15.28	~~16.81~~	145.77	399.357	-253.58
320.0	15.09	~~16.60~~	146.22	405.696	-259.47
325.0	14.90	~~16.39~~	146.67	412.035	-265.37
330.0	14.72	~~16.19~~	147.10	418.374	-271.27
335.0	14.54	~~16.00~~	147.53	424.713	-277.18
340.0	14.37	~~15.81~~	147.96	431.052	-283.09
345.0	14.20	~~15.62~~	148.38	437.391	-289.01
350.0	14.04	~~15.44~~	148.79	443.73	-294.94
355.0	13.88	~~15.26~~	149.20	450.069	-300.87
360.0	13.72	~~15.09~~	149.61	456.408	-306.80
Max Volume (V max):					47.30
Design Volume (V design) :					**47.30**

Init.________

ZIBI

Block 204





Init.________

CIMA+

PROJECT NAME: ZIBI
CIMA+ PROJECT NUM A000931
CLIENT: DREAM
PROJECT STATUS: Site Plan Application Block 204

STORM SEWER HYDRAULIC DESIGN SHEET (SSDS) – RATIONAL METHOD

APPLICABLE DESIGN GUIDELINES:
1. City of Ottawa Sewer Design Guidelines, 2012

STORM SEWER DESIGN CALCULATIONS:
DESIGN CRITERIA:
Rainfall Station: City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)
Manning's Coefficient (n): 0.013
Maximum Permitted Velocity: 3.00 m/s
Minimum Permitted Velocity: 0.80 m/s

IDF PARAMETERS AND RATIONAL FORMULA:

Design Storm (year):	2	
IDF Regression Constants: (a)	732.951	
(b)	6.199	
(c)	0.810	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	Q = 2.78*C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area (hectares)

OTHER FORMULAS USED IN CALCULATION TABLE:

Time of Concentration (minutes):	Tc = Ti + Tf	where: Tc = time of concentration (min) Ti = inlet time before pipe (min) Tf = time of flow in pipe (min) = L/(60*V) L = pipe length (m) V = actual velocity (m/s)
Manning's Equation (L/s):	$Q_{cap} = (1/n)*A*R^{2/3}*S^{1/2}$	where: Q_{cap} = flow rate at capacity (L/s) n = Manning's roughness coefficient A = area of flow (m²) R = hydraulic radius (m)* S = slope of pipe (%) * Hydraulic radius is defined as the area of flow (m^2) divided by wetted perimeter (m)

LOCATION			RUNOFF	AREA	FLOW					SEWER DATA								
Street/Catchment Name	From MH/CB	To MH/CB	C =	(ha)	Section 2.78*AC (ha)	Accum 2.78*AC (ha)	Time of Conc (min)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Diameter (mm)	Material Type	Slope (%)	Length (m)	Capacity (full) (L/s)	Velocity (full) (m/s)	Velocity (actual) (m/s)	Time of Flow (min)	Ratio (%)
A8	STM-110	STM-109	0.75	0.027	0.056	0.056	10.00	76.805	4.32	375	PVC	0.30%	32.40	96.03	0.87	0.44	1.24	5%
A9	STM-111	STM-109	0.73	0.134	0.272	0.272	10.00	76.805	20.89	375	CONC	0.20%	59.40	78.41	0.71	0.60	1.66	27%
-	STM-109	STM-108	-	-		0.328	11.66	70.976	23.30	375	PVC	0.30%	11.90	96.03	0.87	0.71	0.28	24%
A7	STM-108	STM-107	0.75	0.096	0.200	0.528	11.94	70.088	37.03	375	PVC	0.30%	9.30	96.03	0.87	0.81	0.19	39%
A5	STM-107	STM-106	0.73	0.076	0.154	0.683	12.13	69.497	47.44	450	PVC	0.40%	57.70	180.32	1.14	0.94	1.02	26%
A6 (Block 204)			0.69	0.211	Controlled Flow by roof drain (100L/s/ha)				21.13									
-	STM-106	STM-105	-	-		0.683	13.15	66.518	66.54	450	CONC	1.02%	21.60	287.94	1.82	1.46	0.25	23%
A4	STM-105	STM-104	0.80	0.211	0.469	1.152	13.39	65.839	96.97	450	CONC	1.12%	10.70	301.73	1.90	1.67	0.11	32%
A1 & A2 & A3	STM-104	STM-103	0.85	0.516	1.219	2.371	13.50	65.550	176.56	450	CONC	1.47%	99.60	345.67	2.18	2.18	0.76	51%
-	STM-103	STM-102B	-	-		2.371	14.26	63.567	171.86	525	CONC	0.64%	11.00	344.05	1.59	1.58	0.12	50%
-	STM-102B	STM-102A	-	-		2.371	14.38	63.276	171.17	525	CONC	0.88%	9.10	403.43	1.87	1.79	0.08	42%
-	STM-102A	STM-101	-	-		2.371	14.46	63.066	170.67	600	CONC	0.75%	14.80	531.75	1.89	1.66	0.15	32%
-	STM-101	STM-102 (OGS)	-	-		2.371	14.61	62.701	169.81	600	CONC	0.38%	7.90	378.50	1.34	1.29	0.10	45%
-	STM-102 (OGS)	HW100	-	-		2.371	14.71	62.453	169.22	600	CONC	0.43%	10.90	402.63	1.43	1.37	0.13	42%
				1.271														

Existing Network

Prepared by: Julien Sauvé, P.Eng.
PEO #100200100
Date: 8/30/2022

Verified by: André Chaumont, P.Eng.
PEO #90409194
Date: 8/30/2022

CIMA+

PROJECT NAME: ZIBI
CIMA+ PROJECT NUM A000931
CLIENT: DREAM
PROJECT STATUS: Site Plan Application Block 204

STORM SEWER HYDRAULIC DESIGN SHEET (SSDS) – RATIONAL METHOD

APPLICABLE DESIGN GUIDELINES:
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STORM SEWER DESIGN CALCULATIONS:
DESIGN CRITERIA:

Rainfall Station:	City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)	
Manning's Coefficient (n):	0.013	
Maximum Permitted Velocity:	3.00	m/s
Minimum Permitted Velocity:	0.80	m/s

IDF PARAMETERS AND RATIONAL FORMULA:

Design Storm (year):	5	
IDF Regression Constants: (a)	998.071	
(b)	6.053	
(c)	0.814	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	$Q = 2.78 \cdot C \cdot I \cdot A$	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area (hectares)

OTHER FORMULAS USED IN CALCULATION TABLE:

Time of Concentration (minutes):	$Tc = Ti + Tf$	where: Tc = time of concentration (min) Ti = inlet time before pipe (min) Tf = time of flow in pipe (min) = L/(60*V) L = pipe length (m) V = actual velocity (m/s)
Manning's Equation (L/s):	$Q_{cap} = (1/n) \cdot A \cdot R^{2/3} \cdot S^{1/2}$	where: Q_{cap} = flow rate at capacity (L/s) n = Manning's roughness coefficient A = area of flow (m^2) R = hydraulic radius (m)* S = slope of pipe (%) * Hydraulic radius is defined as the area of flow (m^2) divided by wetted perimeter (m)

LOCATION			RUNOFF	AREA	FLOW					SEWER DATA								
Street/Catchment Name	From MH/CB	To MH/CB	C =	(ha)	Section 2.78*AC (ha)	Accum 2.78*AC (ha)	Time of Conc (min)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Diameter (mm)	Material Type	Slope (%)	Length (m)	Capacity (full) (L/s)	Velocity (full) (m/s)	Velocity (actual) (m/s)	Time of Flow (min)	Ratio (%)
A8	STM-110	STM-109	0.75	0.027	0.056	0.056	10.00	104.193	5.87	375	PVC	0.30%	32.40	96.03	0.87	0.47	1.14	6%
A9	STM-111	STM-109	0.73	0.134	0.272	0.272	10.00	104.193	28.33	375	CONC	0.20%	59.40	78.41	0.71	0.65	1.53	36%
-	STM-109	STM-108	-	-		0.328	11.53	96.765	31.76	375	PVC	0.30%	11.90	96.03	0.87	0.77	0.26	33%
A7	STM-108	STM-107	0.75	0.096	0.200	0.528	11.78	95.632	50.53	375	PVC	0.30%	9.30	96.03	0.87	0.88	0.18	53%
A5	STM-107	STM-106	0.73	0.076	0.154	0.683	11.96	94.870	64.76	450	PVC	0.40%	57.70	180.32	1.14	1.04	0.92	36%
A6 (Block 204)			0.69	0.211	Controlled Flow by roof drain (100L/s/ha)				21.13									
-	STM-106	STM-105	-	-		0.683	12.88	91.086	83.31	450	CONC	1.02%	21.60	287.94	1.82	1.55	0.23	29%
A4	STM-105	STM-104	0.80	0.211	0.469	1.152	13.11	90.188	125.02	450	CONC	1.12%	10.70	301.73	1.90	1.80	0.10	41%
A1 & A2 & A3	STM-104	STM-103	0.85	0.516	1.219	2.371	13.21	89.810	234.09	450	CONC	1.47%	99.60	345.67	2.18	2.34	0.71	68%
-	STM-103	STM-102B	-	-		2.371	13.92	87.204	227.91	525	CONC	0.64%	11.00	344.05	1.59	1.70	0.11	66%
-	STM-102B	STM-102A	-	-		2.371	14.03	86.822	227.00	525	CONC	0.88%	9.10	403.43	1.87	1.92	0.08	56%
-	STM-102A	STM-101	-	-		2.371	14.11	86.546	226.35	600	CONC	0.75%	14.80	531.75	1.89	1.81	0.14	43%
-	STM-101	STM-102 (OGS)	-	-		2.371	14.25	86.072	225.22	600	CONC	0.38%	7.90	378.50	1.34	1.40	0.09	60%
-	STM-102 (OGS)	HW100	-	-		2.371	14.34	85.748	224.45	600	CONC	0.43%	10.90	402.63	1.43	1.47	0.12	56%
				1.271														

Existing Network

Prepared by: Julien Sauvé, P.Eng.
PEO #100200100
Date: 8/30/2022

Verified by: André Chaumont, P.Eng.
PEO #90409194
Date: 8/30/2022

PROJECT NAME:	ZIBI
CIMA+ PROJECT NUM	A000931
CLIENT:	DREAM
PROJECT STATUS:	Site Plan Application Block 204

STORM SEWER HYDRAULIC DESIGN SHEET (SSDS) – RATIONAL METHOD

APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

STORM SEWER DESIGN CALCULATIONS:

DESIGN CRITERIA:

Rainfall Station:	City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)
Manning's Coefficient (n):	0.013
Maximum Permitted Velocity:	3.00 m/s
Minimum Permitted Velocity:	0.80 m/s

IDF PARAMETERS AND RATIONAL FORMULA:

Design Storm (year):	100	
IDF Regression Constants: (a)	1735.688	
(b)	6.014	
(c)	0.820	
IDF Curve Equation (mm/hr):	$I = a / (\text{Time in min} + b)^c$	
Rational Formula (L/s):	Q = 2.78*C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area (hectares)

OTHER FORMULAS USED IN CALCULATION TABLE:

Time of Concentration (minutes):	Tc = Ti + Tf	where: Tc = time of concentration (min) Ti = inlet time before pipe (min) Tf = time of flow in pipe (min) = L/(60*V) L = pipe length (m) V = actual velocity (m/s)
Manning's Equation (L/s):	$Q_{cap} = (1/n) \cdot A \cdot R^{2/3} \cdot S^{1/2}$	where: Q_{cap} = flow rate at capacity (L/s) n = Manning's roughness coefficient A = area of flow (m²) R = hydraulic radius (m)* S = slope of pipe (%) * Hydraulic radius is defined as the area of flow (m²) divided by wetted perimeter (m)

LOCATION			RUNOFF	AREA	FLOW					SEWER DATA									
Street/Catchment Name	From MH/CB	To MH/CB	C =	(ha)	Section 2.78*AC (ha)	Accum 2.78*AC (ha)	Time of Conc (min)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Diameter (mm)	Material Type	Slope (%)	Length (m)	Capacity (full) (L/s)	Velocity (full) (m/s)	Velocity (actual) (m/s)	Time of Flow (min)	Ratio (%)
A8	STM-110	STM-109	0.94	0.027	0.071	0.071	10.00	178.559	12.60	375	PVC	0.30%	32.40	96.03	0.87	0.60	0.91	13%
A9	STM-111	STM-109	0.92	0.134	0.343	0.343	10.00	178.559	61.20	375	CONC	0.20%	59.40	78.41	0.71	0.78	1.26	78%
-	STM-109	STM-108	-	-		0.413	11.26	167.768	69.33	375	PVC	0.30%	11.90	96.03	0.87	0.94	0.21	72%
A7	STM-108	STM-107	0.94	0.096	0.251	0.664	11.48	166.112	110.32	375	PVC	0.30%	9.30	96.03	0.87	0.87	0.18	115%
A5	STM-107	STM-106	0.91	0.076	0.192	0.856	11.65	164.738	141.08	450	PVC	0.40%	57.70	180.32	1.14	1.26	0.77	78%
A6 (Block 204)			0.86	0.211	Controlled Flow by roof drain (100L/s/ha)				21.13									
-	STM-106	STM-105	-	-		0.856	12.42	159.109	157.39	450	CONC	1.02%	21.60	287.94	1.82	1.86	0.19	55%
A4	STM-105	STM-104	0.95	0.211	0.557	1.414	12.61	157.748	244.13	450	CONC	1.12%	10.70	301.73	1.90	2.11	0.08	81%
A1 & A2 & A3	STM-104	STM-103	0.95	0.516	1.363	2.776	12.70	157.164	457.48	450	CONC	1.47%	99.60	345.67	2.18	2.18	0.76	132%
-	STM-103	STM-102B	-	-		2.776	13.46	152.106	443.44	525	CONC	0.64%	11.00	344.05	1.59	1.59	0.12	129%
-	STM-102B	STM-102A	-	-		2.776	13.57	151.372	441.40	525	CONC	0.88%	9.10	403.43	1.87	1.87	0.08	109%
-	STM-102A	STM-101	-	-		2.776	13.65	150.860	439.98	600	CONC	0.75%	14.80	531.75	1.89	2.11	0.12	83%
-	STM-101	STM-102 (OGS)	-	-		2.776	13.77	150.127	437.94	600	CONC	0.38%	7.90	378.50	1.34	1.34	0.10	116%
-	STM-102 (OGS)	HW100	-	-		2.776	13.87	149.518	436.25	600	CONC	0.43%	10.90	402.63	1.43	1.43	0.13	108%
				1.271														

Existing Network

Prepared by: Julien Sauvé, P.Eng. PEO #100200100 Date: 8/30/2022

Verified by: André Chaumont, P.Eng. PEO #90409194 Date: 8/30/2022

Design Chart 1.07: Runoff Coefficients

- Urban for 5 to 10-Year Storms

Land Use	Runoff Coefficient	
	Min.	Max.
Pavement - asphalt or concrete	0.80	0.95
- brick	0.70	0.85
Gravel roads and shoulders	0.40	0.60
Roofs	0.70	0.95
Business - downtown	0.70	0.95
- neighbourhood	0.50	0.70
- light	0.50	0.80
- heavy	0.60	0.90
Residential - single family urban	0.30	0.50
- multiple, detached	0.40	0.60
- multiple, attached	0.60	0.75
- suburban	0.25	0.40
Industrial - light	0.50	0.80
- heavy	0.60	0.90
Apartments	0.50	0.70
Parks, cemeteries	0.10	0.25
Playgrounds (unpaved)	0.20	0.35
Railroad yards	0.20	0.35
Unimproved areas	0.10	0.30
Lawns - Sandy soil		
- flat, to 2%	0.05	0.10
- average, 2 to 7%	0.10	0.15
- steep, over 7%	0.15	0.20
- Clayey soil		
- flat, to 2%	0.13	0.17
- average, 2 to 7%	0.18	0.22
- steep, over 7%	0.25	0.35

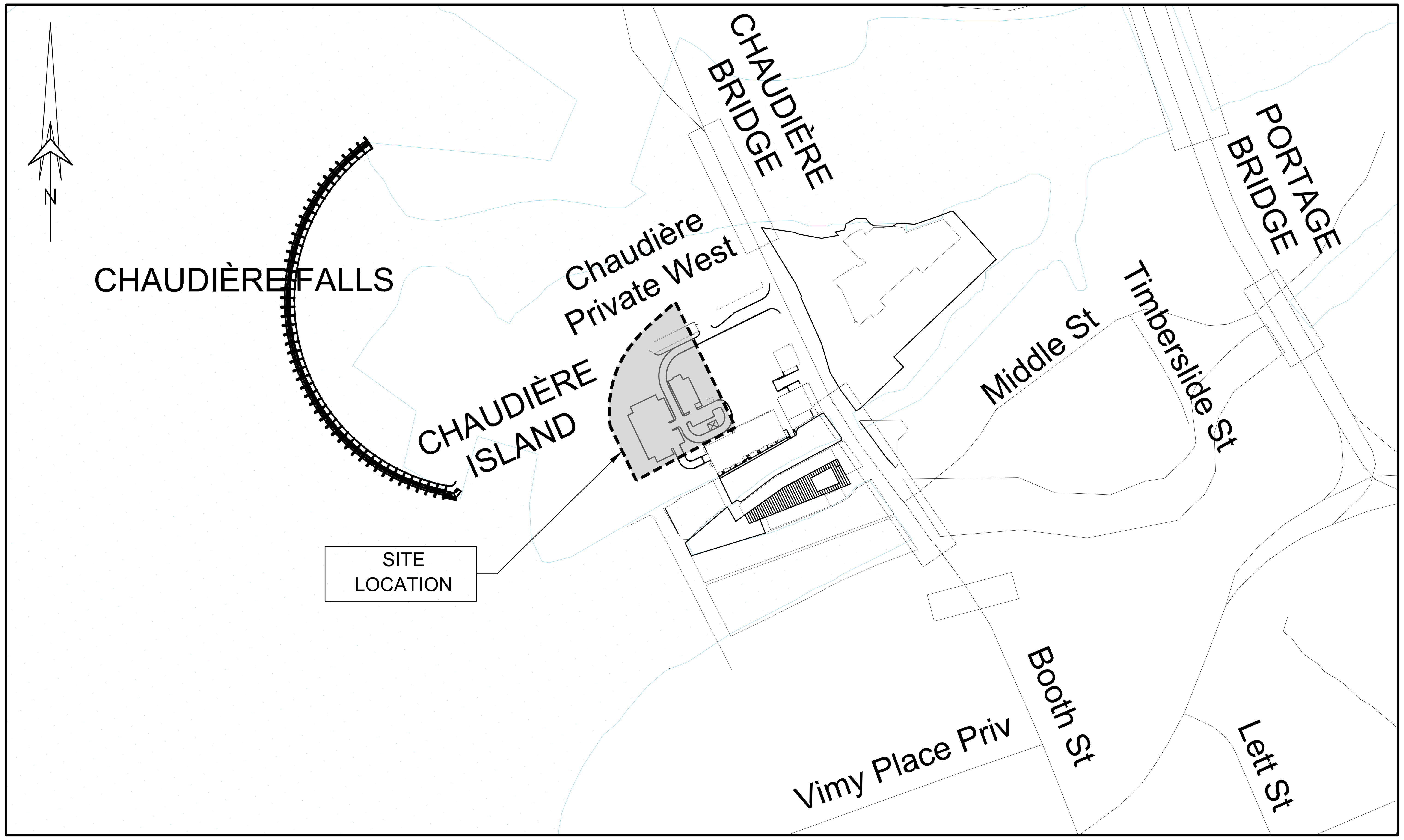
For flat or permeable surfaces, use the lower values. For steeper or more impervious surfaces, use the higher values. For return period of more than 10 years, increase above values as 25-year - add 10%, 50-year - add 20%, 100-year - add 25%.

The coefficients listed above are for unfrozen ground.

E

Appendix E
Drawings

DREAM THEIA
BLOCK 204A L



ZIBI ONTARIO
315 PRIVE MIWATE, CHAUDIÈRE ISLAND
OTTAWA, ONTARIO

NADAO

LIST OF DRAWINGS

PLAN No:	DESCRIPTION
C000	COVER PAGE
C001	TOPOGRAPHICAL SURVEY PLAN
C002	NOTES PLAN
C003	SEDIMENT AND EROSION CONTROL PLAN
C004	GRADE CONTROL AND DRAINAGE PLAN
C005	SITE SERVICING LAYOUT
C006A	PLAN AND PROFILE STA. 1+000 TO 1+145
C006B	PLAN AND PROFILE STA. 2+000 TO 2+100
C007	CROSS–SECTIONS AND DETAILS
C008	STORM WATER MANAGEMENT PLAN

CIMA+

DREAM THEIA BLOCK 204A L
ZIBI ONTARIO, 315 PRIVE MIWATE,
CHAUDIÈRE ISLAND, OTTAWA, ONTARIO
ISSUED FOR SITE PLAN APPLICATION REV 2, NOVEMBER 21st, 2022

City of Ottawa Project # : D07-12-22-0071
City of Ottawa Plan # : 18749

C000

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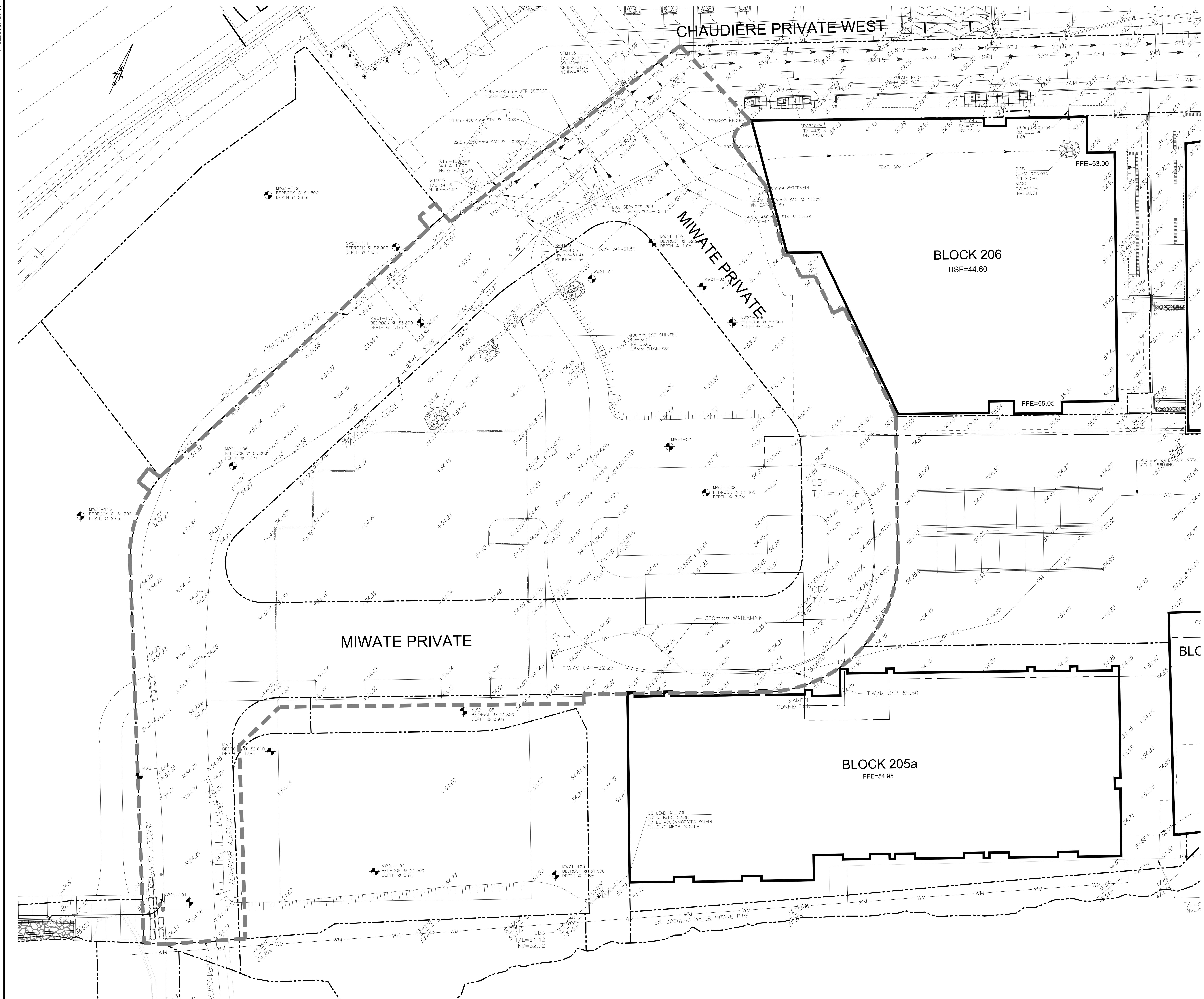
21 November 2022 Devdatsinh Vaghela



EXISTING		PROPOSED
WM	WATERMAIN	
SAN	SANITARY SEWER	
STM	STORM SEWER	
D	DRAIN	
G	GAS LINE (APPROX. LOC.)	
T	UNDERGROUND TELEPHONE (APPROX. LOC.)	
CA	UNDERGROUND TAFFIC CABLE (APPROX. LOC.)	
X	FENCE	
E	UNDERGROUND ELECTRICITY (APPROX. LOC.)	
	OVERHEAD WIRES	
	LOT LINE	
	RIGHT-OF-WAY LIMITS	
	EASEMENT	
	TOP OF SLOPE	
	DITCH CENTER	
	BOTTOM OF SLOPE	
	CATCHBASIN	
	MANHOLE/CATCHBASIN	
	MANHOLE	
	FIRE HYDRANT	
	VALVE	
	REDUCER	
	TEE	
	VALVE CHAMBER	
	PRIVATE UTILITIES (WATERMAIN)	
	NATURAL GAS VALVE	
	SIGN	
	STOP SIGN	
	TRAFFIC LIGHT	
E	ELECTRICITY POLE	
T	TELEPHONE POLE	
E,T	ELECT.-TEL.-STREET LIGHT POLE	
E,T	ELECT.-TEL.-TRANSFORMER POLE	
	PRIVATE STREET LIGHT	
E	ELECTICITY MANHOLE	
	TELEPHONE MANHOLE	
PK	SURVEY STATION	
×54.78	ELEVATION	
INV	INVERT	
MW21-01	BOREHOLE (LOC. APPROX.)	
	WORK LIMIT	

ABBREVIATIONS

STM → STORM
SAN → SANITARY
WM → WATERMAIN
WTR → WATER
INV → INVERT
MH → MANHOLE
CB → CATCHBASIN
T/L → TOP OF LID
OBV → OBVERT
FFE → FINISHED FLOOR ELEVATION
BLDG → BUILDING
SERV → SERVICE

1:250 — 0, 2.5, 5, 10, 15m

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
2	AUG. 31, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:

DESIGNED BY

APPROVED BY

TOPOGRAPHIC INFORMATION

- CHAUDIÈRE AND ALBERT ISLAND TOPOGRAPHIC INFORMATION PROVIDED BY FAIRHALL, MOFFATT & WOODLAND LIMITED, DATED JANUARY 15, 2015.
- BOOTH STREET/FLEET STREET/LLOYD STREET/ALBERT STREET TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LIMITED, DATED APRIL 20, 2018
- TEMPORARY ROAD CHAUDIÈRE & ALBERT STREET TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LIMITED, DATED AUGUST 08, 2019

LEGAL INFORMATION

- LEGAL SURVEY PROVIDED BY STANTEC GEOMATICS LIMITED, DATED 2022

BENCH MARK

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
10	5031271	365915.9320	54.3480	CP
85591	5031480	366018.9270	51.8200	BOLT
86037	5031454	366008.0430	52.0910	PKN
1000010	5031523	365993.0550	51.2040	MON 2018-007

NOTE OF CAUTION

THE GEODETIC COORDINATES OF EVERY ITEM INCLUDED AS PART OF THIS DOCUMENT ARE IN **NAD83 - ORIGINAL / MTM -** REFERENCE SYSTEM AND HAVE NO LEGAL VALUE. THE SITE LAYOUT MUST BE COMPLETED USING THE OFFICIAL BENCHMARKS OF AN ACCREDITED LAND SURVEYOR IN THE **NAD83 - ORIGINAL / MTM -** REFERENCE SYSTEM.

THE UNDERGROUND FEATURES AND INFORMATION THAT APPEAR ON THE DRAWINGS WERE OBTAINED FROM THE PUBLIC UTILITY COMPANIES AND/OR FROM THE CITY EACH RESPECTIVELY.

ALL INFORMATION UNDER THE LEGEND 'EXISTING' IS FOR INFORMATION ONLY. COMPLETE OR EXACT LOCATION AND ELEVATION OF UNDERGROUND SERVICES ARE NOT GUARANTEED.

CERTAIN UNDERGROUND FEATURES ON PRIVATE PROPERTY ARE NOT SHOWN ON THE CURRENT DRAWING.

ANYONE WHO PROCEEDS WITH EXCAVATION WORK SHALL VERIFY THE EXACT LOCATION OF ALL UNDERGROUND FEATURES, BY EXPLORATORY EXCAVATIONS, AND SHALL ASSUME FULL RESPONSIBILITY IF THERE IS ANY DAMAGE THAT OCCURS DURING WORK.

THE CONTRACTOR WILL HAVE THE RESPONSIBILITY AND THE OBLIGATION TO VALIDATE, BY EXPLORATORY EXCAVATION, THE SIZE OF THE PUBLIC UTILITIES UNDERGROUND SERVICES AND TO WARN THE ENGINEER OF ANY CONFLICT WITH THE PROJECTED WORK.

ENGINEER:

CIMA+

CLIENT:
DREAM UNLIMITED
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON, M5C 3H1
613-219-2722

ZIBI (Project Address)
310 Miwate Private
OTTAWA, ONTARIO
K1R 0E1

PROJECT NAME:
ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:
TOPOGRAPHICAL SURVEY PLAN

DISCIPLINE: CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: 1:250
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C001
SHEET No: 1 of 11	

D07-12-22-0071

18749

TITLEBLOCK 24x36 VERT ENG 3.0

GENERAL NOTES

1. GRADE CONTROL AND DRAINAGE - GENERAL

1.1. The Contractor must conform to all laws, codes, ordinances, and regulations adopted by federal, provincial or municipal government councils and government agencies, applying to work to be carried out.

1.2. Unless otherwise indicated, all materials and construction methods to be in accordance with the requirements of the latest edition of the City of Ottawa Design Guidelines, Ontario Provincial Standard Specifications and Drawings (OPSS and OPSD), the Ontario Ministry of Environment, Conservation and Parks (MECP), applicable Conservation Authorities, the municipal standard specifications and drawings, and all other governing authorities as they apply.

1.3. Wherever standards, laws and/or regulations are mentioned they refer to their current versions, modifications included.

1.4. The boreholes and test pits shown on the plan are for information purposes only. Their location on the plan is approximate. The Contractor must refer to the boreholes and test pit records to obtain information about observed stratigraphy on site.

1.5. The Contractor is responsible for obtaining all permits required to complete all works and bear cost of same, including road cut permit and water permit and their associated costs.

1.6. The Contractor is responsible for the coordination of his activities with others on site.

1.7. Submit copies of inspection and test reports to Owner's representative.

1.8. The location of existing underground municipal services and public utilities as shown on the plans are approximate. The Contractor must determine the exact location, size, material and elevation of all existing utilities (on-site and off-site) prior to any excavation work. Damage to any existing services and/or existing utilities during construction, whether or not shown on the drawings must be repaired by the Contractor at his own expense.

1.9. Site preparation includes clearing, grubbing, stripping of topsoil, demolition, removal of unsuitable materials, cut, fill and rough grading of all areas to receive finished surfaces.

1.10. N/A

1.11. Compaction must conform to the following requirements:

Exposed subgrade:
95% Standard Proctor maximum dry density (SPMDD)
Granular Subbase foundations:
99% Standard Proctor maximum dry density (SPMDD)
Granular Base foundations:
99% Standard Proctor maximum dry density (SPMDD)
Asphalt pavement:
As per OPSS.MUNI 310 / City of Ottawa Special Provisions
Subgrade fill (pavement areas - OPSS Select Subgrade Material):
95% Standard Proctor Maximum Dry Density (SPMDD)
Structural fill (building footprints OPSS Granular 'A' or Granular 'B' Type II Material):
98% Standard Proctor Maximum Dry Density (SPMDD)

1.12. If groundwater is encountered during construction, dewatering of excavations could be required as per OPSS.MUNI 518. It is assumed that groundwater may be controlled by sump and pumping methods. As required under the "Ontario Water Resources Act (OWRA)", the Contractor must register all water taking activities on Ontario's "Environmental Activity and Sector Registry (EASR)" if water taking exceeds 50,000 l/day, and obtain a "Permit to Take Water (PTTW)" if water taking exceeds 400,000 l/day. Furthermore, Contractor must provide all necessary measures required to ensure dewatering operations does not affect in any way the integrity of the existing surrounding buildings and must plan his work accordingly. Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16.

1.13. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements and as follows:

1.13.1. Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials to within the required parameters of the receiving body before discharging to storm sewers, watercourses or drainage areas.

1.13.2. Before discharging to storm sewers, watercourses or drainage areas, discharge water must be sampled and tested to ensure quality requirements in accordance with City of Ottawa Sewer Use By-Law No. 2003-514 and the MECP are adhered to. The Contractor is to perform all additional sampling and testing as required by City of Ottawa. All associated fees to be paid by the Contractor.

1.13.3. Where water is not suitable for discharge into the adjacent storm sewers, watercourses or drainage areas it must be discharged into the on-site sanitary sewer collection system, or disposed off-site at an approved disposal facility.

1.13.4. Sanitary Sewer Discharge:

1.13.4.1. When discharging to the sanitary sewer, the Contractor must obtain a Sanitary Sewer Agreement for Dewatering from the City of Ottawa in accordance with City of Ottawa Sewer Use By-Law No. 2003-514 and pay all associated fees.

1.13.4.2. A copy of the signed Sanitary Sewer Agreement for Dewatering must be provided to the Owner's Representative in advance of dewatering and discharge.

1.13.4.3. The Contractor must ensure all requirements of the Discharge Agreement are adhered to and all prerequisite requirements of the Agreement are in place prior to commencing dewatering.

1.13.4.4. Provide flow meter and record discharge rate in accordance with City of Ottawa requirements.

1.13.4.5. Dewatering discharge rate to sanitary sewer not to exceed rate specified by City.

1.13.4.6. For off-site disposal of dewatering effluent, Contractor to provide Departmental Representative proof of receipt that dewatering effluent was received at a licensed landfill facility and pay all associated disposal fees.

1.13.4.7. Contractor must provide name of proposed licensed disposal facility to Owner's Representative in advance of any dewatering waste leaving the site.

1.13.4.8. Contractor is responsible for paying all costs associated with any water quality sampling and testing required.

1.14. The Contractor must maintain benchmarks and landmark references as is. Otherwise these references will be repositioned by a certified land surveyor at the Contractor's expense.

1.15. The Contractor is the only person in charge of safety on the building site. The Contractor is responsible for providing adequate protection of the workers, other personnel and the general public, protection of materials, as well as maintaining in good condition the completed works and works to be completed. The Contractor must supply, install and maintain an appropriate safety fence along the work perimeter until the work is complete.

The Contractor must provide at any time:
- A sufficient number barriers, posters, guards and others to ensure safety;
- Necessary conveniences for the completion of the work such as heating, lighting, ventilation, etc.

1.16. Temporary excavations in the overburden must be completed as per the requirements of the Occupational Health and Safety Act (OHSA), O. Reg. 213/91, Part III - Excavations.

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the star of the excavation until the structure is backfilled.

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsurface soil is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects. Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

1.17. The Contractor must pace deliveries and removals in order to minimize and control stockpiles.

1.18. Excavated soil must not be stockpiled directly at the top of excavations and heavy equipment kept away from the excavation sides.

1.19. Cleanliness on the site:
- The Contractor must clean roadways at his own cost as directed by the Owner's representative;
- All site roads and walkways to and from the construction zone must be kept clean at all times, from mud, dirt, granular material, debris, etc.;
- The Contractor must leave the work area clean at the end of each day;
- Materials and equipment must be laid out in an organized and safe manner;
- All material, equipment and temporary structures which are no longer necessary for the execution of the Contract must be removed from the site;
- If required the Contractor must use screens, bulkheads, or any other recognized means in order to reduce noise, dust, interference, obstruction, etc., in conformity with the requirements of the provincial and municipal authorities having jurisdiction.

1.20. During the construction period the Contractor is responsible for installing and maintaining temporary traffic signage, including traffic signs, traffic markings and temporary traffic lights, and flagmen, as required by the Owner, the Consultant, the Municipality, and other governing authorities.

1.21. The Contractor must control surface runoff from precipitation during construction.

1.22. The Contractor must ensure the following mitigation measures are implemented in order to reduce the risk of ground contamination from petroleum products:

- The list of persons and agencies to contact in the event of an emergency must be posted in plain sight on the work site for the duration of the construction period;
- Machinery must be clean and kept clean to limit any grease or oil deposits inside the work area;
- Frequent inspections must be performed to detect any oil, fuel, grease or other leaks. If a leak is detected, the necessary corrective action must be taken immediately;
- An emergency kit for the recovery of petroleum products must be kept on site at all times.
- The kit must include at least 30 m of absorbent booms, a box of absorbent pads and solid absorbent material (powder or granules). The kit must be stored near the location of work and machinery, and kept within easy reach at all times to ensure a rapid response;
- In the event of a spill the Contractor must immediately report to the Spills Action Centre of the MECP at 1-800-268-6060. Hydrocarbons and contaminated soils will be recovered by a specialized firm.

1.23. The Contractor must ensure the following measures are implemented regarding the handling of concrete:

- Concrete should either be mixed away from the site or should be prepared on paved surfaces if only small quantities are required (i.e. minor repairs);
- Excess concrete must be disposed off-site at a location that meets all regulatory requirements;
- The washing of concrete trucks and other equipment used for mixing concrete should not be carried out within 30 m of a watercourse or wetland and should take place outside of the work site;
- All concrete trucks should collect their wash water and recycle it back into their trucks for disposal off-site at a location meeting all regulatory requirements.

2. DEMOLITION AND REMOVALS

2.1. The Contractor must visit the premises in order to be fully aware of existing conditions on site, including all elements to be removed and demolished. No claim will be accepted due to a poor evaluation of the work to be completed.

2.2. The Contractor must protect and maintain in service the existing works which must remain in place. If they are damaged, the Contractor must immediately make the replacements and necessary repairs to the satisfaction of the Owner's representative and without additional expense to the Owner.

2.3. The Contractor must perform the nessessary clearing and grubbing in accordance with OPSS.MUNI 201.

2.4. The Contractor must carry out necessary saw cuts even if they are not shown on the drawings.

2.5. The Contractor must entirely remove the demolition wreckage from the construction site in accordance with the requirements of the MECP and in accordance with OPSS.MUNI 180 and OPSS.MUNI 510.

- The Contractor must discard recyclable demolition materials in collaboration with a regional recycling company. The Contractor must be able to provide proof, upon request, that the materials were properly recycled and that the chosen recycling company is recognized in the recycling field.
- All other demolition materials must be disposed off-site at authorized licensed landfills and in conformity with the applicable laws and regulations. The Contractor must be able to provide, upon request, copies of the disposal tickets.

2.6. The Contractor is responsible for locating existing public utilities and (if required) submit a request for the interruption of public utility services, such as gas, telephone, power, cable, sewers, watermain, etc.

2.7. The Contractor must conduct all removals required to make the work complete.

2.8. Unless otherwise specified, all materials, products and others coming from the demolition belong to the Contractor.

2.9. Surfaces and works located outside of the construction work limit must be reinstated as they were before beginning of work.

3. GENERAL SUBGRADE PREPARATION

3.1. Earth removal must be inspected by an experienced Geotechnical Engineer to ensure that all unsuitable materials are removed prior to the placement of fill, including concrete and/or others, and to confirm the compaction degree and condition of the founding soils. All unsuitable materials must be hauled off site and disposed as per provincial and municipal regulations.

3.2. Subgrade must be approved by experienced geotechnical personnel before proceeding with placement of fill.

3.3. All granular fill must be placed in maximum 300 mm thick loose lifts and compacted using suitable methods as per the requirements.

3.4. If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material.

3.5. If contaminated material is encountered during the work, the Contractor must dispose off-site all materials from the contaminated area in accordance with the requirements of the MECP and OPSS.MUNI 180. Prior to the start of work the Contractor must provide the name and location of landfill(s) where the contaminated materials will be disposed to the Consultant. The Contractor must obtain from the landfill Owner documents confirming that he has the right to accept the contaminated material. During the work, the contractor must provide the Consultant copies of all check-in receipts issued by the landfill Owner.

3.6. The Contractor is responsible for providing a confirmation that the imported material used as subgrade fill is free of any contaminants such as Petroleum Hydrocarbons (C_{10}-C_{50}), PAH (Polycyclic Aromatic Hydrocarbons), MAH (Monocyclic Aromatic Hydrocarbons) and metals like mercury, silver, arsenic, cadmium, cobalt, chromium, copper, tin, manganese, molybdenum, nickel, lead and zinc.

4. EXCAVATION AND BACKFILL

4.1. Subgrade preparation must be completed as per Section "3.0 General Subgrade Preparation".

4.2. The management of excess materials to comply with OPSS.MUNI 180.

4.3. Topsoil and deleterious fill, such as those containing organic materials, must be stripped from under any buildings, paved areas, pipe bedding, and other settlement sensitive structures.

4.4. Due to the relatively shallow depth of the bedrock surface and the anticipated founding level for the proposed building, all existing overburden material must be excavated from within the proposed building footprint.

4.5. Existing foundation walls and other construction debris must be entirely removed from within the building perimeter. Under paved areas, existing construction remnants, such as foundation walls, must be excavated to a minimum of 1 m below final grade.

4.6. Fill used for grading beneath the building areas must consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material must be tested and approved prior to delivery to the site. The fill must be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building must be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

4.7. Non-specified existing fill along with site-excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD.

4.8. Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

4.9. Based on the bedrock encountered in the area, it is expected that line-drilling in conjunction with hoe-ramming or controlled blasting may be required to remove the bedrock. In areas of weathered bedrock and where only a small quantity of bedrock is to be removed, bedrock removal may be possible by hoe-ramming.

4.10. Rock excavation must conform to OPSS 403.MUNI / City of Ottawa Special Provision F-4031 and to all laws, codes, ordinances and regulations adopted by federal, provincial and municipal government councils and government agencies, applying to the work to be carried out.

4.11. Prior to considering blasting operations, the effects on the existing services, buildings and other structures must be addressed. A pre-blast or construction survey located in proximity of the blasting operations must be conducted prior to commencing construction. The extent of the survey must be determined by the blasting consultant and sufficient to respond to any inquiries/claims related to the blasting operations. As a general guideline, peak particle velocity (measured at the structures) must not exceed 25 mm/s during the blasting program to reduce the risks of damage to the existing structures. The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is an experienced blasting consultant.

4.12. Excavation side slopes in sound bedrock may be completed with almost vertical side walls. As required, obtain confirmation from a geotechnical engineer for safety.

4.13. Construction operations could cause vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible must be incorporated in the construction operations to maintain a cooperative environment with the residents.

4.14. The following construction equipments could cause vibrations: piling equipment, hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, caused by blasting or construction operations could cause detrimental vibrations on the adjoining buildings and structures. Therefore, it is recommended that all vibrations be limited.

4.15. Two parameters determine the recommended vibration limit, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). These guidelines are for current construction standards.

4.16. Considering there are several sensitive buildings in close proximity to the subject site, consideration to lowering these guidelines is recommended. These guidelines are above perceptible human level and, in some cases, could be very disturbing to some people. A pre-construction survey is therefore required to minimize the risks of claims during or following the construction of the proposed building.

5. PAVEMENT STRUCTURES, CURBS, AND SIDEWALKS

5.1. Construction of granular foundation must conform to OPSS.MUNI 314 / City of Ottawa Special Provisions.

5.2. Granular materials used on site must conform to the requirements of OPSS.MUNI 1010.

5.3. Light duty and heavy duty asphalt pavements to be constructed as per Cross Sections on plan C007.

5.4. Road cut reinstatement as per City of Ottawa Detail R10 with surface course key.

5.5. Where the proposed pavement structure abuts the existing pavement, the pavement structure should match the existing pavement layers.

5.6. Construction of asphalt must conform to OPSS.MUNI 310 and OPSS.MUNI 313.

5.6.1. Paving must not be carried out if the roadbed is frozen or wet.

5.6.2. The granular grade must be free of standing water at the time of hot mix asphalt placement. The surface of a pavement upon which hot mix asphalt is to be placed must be dry at the time of hot mix asphalt placement. Following the final compaction of a hot mix asphalt course, a 4 hour minimum time laps must be respected before placing a new new hot mix asphalt course. Additionally, the temperature of the previous course must be 50 °C or less.

5.6.3. As per OPSS.310.07.06.02, the asphalt base coarse must not be placed unless the air temperature at the surface of the road is a minimum of 2°C and rising.

5.6.4. As per OPSS.310.07.06.02, the asphalt surface coarse must not be placed unless the air temperature at the surface of the road is a minimum of 7°C.

5.7. Asphalt concrete material must conform to OPSS.MUNI 1150 for Hot Mix Asphalt and OPSS.MUNI 1151 for Superpave and Stone Mastic Asphalt Mixtures. Minimum Performance Graded (PG) 58-34 asphalt cement must be used for this project.

5.8. Asphalt mix design must be reviewed and approved by a Geotechnical Engineer before paving.

5.9. For all concrete placement during cold weather Contractor must place material in accordance to OPSS.904.MUNI.

5.9.1. When ambient air temperature is 5°C or less, forms for concrete work must be left in place for the duration of the curing period.

5.9.2. When the ambient air temperature is below 0°C at the time of placing, components must be cured with moisture vapour barrier.

5.9.3. Contractor must conform to OPSS.MUNI 904.07.11 for Control of Temperature when subjected to cold weather.

SERVICING NOTES

1. MUNICIPAL SERVICES - GENERAL

1.1. Unless otherwise indicated, all materials and construction methods to be in accordance with the requirements of the latest edition of the Ontario Provincial Standard Specifications and Drawings (OPSS and OPSD), the Ontario Ministry of Environment, Conservation and Parks (MECP), applicable Conservation Authorities, the municipal standard specifications and drawings, and all other governing authorities as they apply.

1.2. Wherever standards, laws and/or regulations are mentioned they refer to their current versions, modifications included.

1.3. The boreholes and test pits shown on the plan are for information purposes only. Their location on the plan is approximate. The Contractor must refer to the boreholes and test pit records to obtain information about observed stratigraphy on site.

1.4. The location of existing underground municipal services and public utilities as shown on the plans are approximate. The Contractor must determine the exact location, size, material and elevation of all existing utilities (on-site and off-site) prior to any excavation work. Damage to any existing services and/or existing utilities during construction, whether or not shown on the drawings must be repaired by the Contractor at his own expense.

1.5. The Contractor is responsible for obtaining all permits required to complete all works and bear cost of same, including water permit and associated costs.

1.6. The Contractor is responsible for the coordination of his activities with others on-site.

1.7. Terminate and plug all service connections at 1.0 meter from edge of the building.

1.8. The Contractor must complete compaction as per OPSS.MUNI 501 and note the following requirements for service trenching:

MATERIALS	COMPACTION
Pipe bedding	95% Standard Proctor Maximum Dry Density
Trench backfill and pipe cover	95% Standard Proctor Maximum Dry Density

1.9. The Contractor is responsible for making or arranging all connections to the existing sewers as per municipal requirements. Prior to connection, the Contractor must provide, to the Engineer and the City for approval, all test results performed on the internal services. Test results must include C.C.T.V. inspection of sewers, infiltration/exfiltration tests for sewers and manholes, deformation tests of sewers, watermain hydrostatic leakage test, flushing and disinfecting operations, and bacteriological water analysis.

1.10. Advise the City Public Works at least 72 hours in advance before any connection to the City services. Coordinate with City as required.

1.11. The Contractor must determine the exact invert (geodetic elevation), diameter and construction material of the existing conduits at the proposed connections. He must also carry out, if necessary, exploratory excavations in order to determine the exact location and inverts of existing duct banks. This information must immediately be provided to the Engineer prior to start undertaking any municipal services work and a 48 hour period must be allocated to the Engineer for design review.

1.12. The Contractor is responsible for all excavation, backfill and reinstatement of all areas disturbed during construction to existing conditions or better and all associated works to the satisfaction of the Engineer and municipal authorities.

- Asphalt reinstatement must be in accordance with OPSS.MUNI 310.
- Landscape areas to be reinstated with 150 mm of topsoil and sod in accordance with OPSS.MUNI 802 and OPSS.MUNI 803.

1.13. It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. Services are expected to be installed by "cut and cover" methods and excavations should not remain open for extended periods of time.

1.14. The pipe bedding for sewer and water pipes must consist of at least 150 mm of OPSS Granular A material The material must be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of its SPMDD. The bedding material should extend at least to the spring line of the pipe.

1.15. The cover material, which must consist of OPSS Granular A, will extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material must be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of its SPMDD.

1.16. Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) must match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill must be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD..

1.17. Dewatering of pipeline, utility and associated structure in rock excavations to be completed as per OPSS.MUNI 403.

1.18. Trenching, backfilling and compacting must conform to OPSS.MUNI 401.

2. WATERMAIN

2.1. Watermain, water service connections and associated appurtenances must be constructed in accordance with the Ontario Provincial Standard Specifications / City of Ottawa Standards Specifications / Ministry of Environment and Climate Change Requirements. Specifically watermains must conform to OPSS.MUNI 441.

2.2. Watermain must be constructed as per OPSS.MUNI 441 and specifically OPSD 802.010 for earth excavations and 802.013 for rock excavation. Bedding and cover material to be OPSS Granular 'A' compacted to 95% Standard Proctor Maximum Dry Density.

2.3. Watermain pipe materials must be class 150 PVC DR 18 or approved equivalent, unless otherwise shown on the Drawings. Materials must conform to OPSS 441.

2.4. All watermain must be installed with a minimum of 2.40 meters cover from finished grade. Where a minimum of 2.40 meters cover is not reached, thermal insulation is required as per City of Ottawa Details W22 and W23.

2.5. Watermain service connections must be installed a minimum of 2.40 meters from any catchbasin, manhole or object that may contribute to freezing. Thermal insulation must be installed as per City of Ottawa Details W22 and W23 where 2.40 meters of separation cannot be achieved.

2.6. Cathodic protection (if required) must be installed as per City of Ottawa Details W40 and W42.

2.7. Thrust block and restraints must be as per City of Ottawa Details W25.3, W25.4, W25.5 and W25.6.

2.8. Valves to be installed as per OPSS 441 and conform to the following:

- All valves must open in a counter clockwise direction;
- Designed for cold water working pressure of 1035 kPa;
- Types must be one of the following:
- Valves less than 75 mm to be brass or bronze gate valves;
- Valves greater than or equal to 75 mm, and less than or equal to 300 mm, to be cast or ductile iron gate valves;
- Valves greater than 300 mm up to and including 500 mm to be gate or butterfly valves;
- Valves greater than 500 mm to be butterfly valves.

2.9. A continuous 12 gauge copper tracer wire must be installed over all watermains. Tracer wire must be tied to all fire hydrants.

2.10. Valve box assembly to be as per City of Ottawa Detail W24.

2.11. When a watermain pipe crosses a sewer pipe, installation must be as per City of Ottawa Detail W25.2.

2.12. Watermains must be thoroughly flushed and cleaned to remove all dirt and debris prior to the disinfection process.

2.13. All watermains must be hydrostatically and bacteriologically tested as per provincial and municipal regulations. It is the Contractor's responsibility to ensure that all requirements are followed.

2.14. The Contractor must make arrangements with and give a minimum of 24 hours' notice to the City for the closing off of necessary valves in the water distribution system. The DREAM representative will operate valves at the time of tie-ins, etc. at no expense to the Contractor under normal conditions; however the Contractor will be responsible for all costs associated with emergency shutdowns if they occur outside of the normal working hours of the DREAM representative (Monday to Friday, 7:00 a.m. to 5:00 p.m.)

2.15. Hydrostatic testing to be completed as per OPSS 441.07.24. Testing must be completed under the supervision of the Contract Administrator. The test section will be either a section between valves or the completed watermain. Test pressure to be 1035 kPa.

2.16. Flushing and Disinfecting to be completed as per OPSS 441.07.25 under the supervision of the Contract Administrator.

2.17. The Contractor must obtain a permit from the City before using an existing fire hydrant located within the City's territory.

2.18. The Contractor must coordinate and pay the cost of connection, inspection and disinfection by municipal personnel.

2.19. Contractor must coordinate the supply and installation of water meter and remote water meter for the building with the mechanical engineer.

2.20. All phases of Zibi Ontario serviced and billed by meter chamber per city standard W32. Individual sub-metering provided based on future condominium requirements.

3. STORM SEWER

3.1. Storm sewers, laterals and storm service connections must be constructed in accordance with the Ontario Provincial Standard Specifications / City of Ottawa Standards Specifications / Ministry of Environment and Climate Change Requirements. Specifically storm sewers must conform to OPSS.MUNI 410.

3.2. PVC storm sewer material to conform to OPSS.MUNI 1841. PVC storm sewers to be installed as per OPSD 802.010 for earth excavation and 802.013 for rock excavation. Bedding and cover material to be OPSS Granular 'A'.

3.3. The allowable deflected pipe diameter when using flexible pipe is as follows:
- Pipes 100 to 750 mm: 7.5% of the base inside diameter of the pipe
- Greater than 750 mm: 5.0% of the base inside diameter of the pipe

3.4. Final backfill material for storm sewers must be approved native material or select subgrade material in conformance with OPSS.MUNI 212.

3.5. Storm sewer pipes must be type PVC SDR-35, unless noted otherwise on the drawings.

3.6. All storm sewers to be C.C.T.V. inspected by the Contractor as per OPSS.MUNI 409. Report must be provided to the Engineer in two (2) copies and the C.C.T.V. inspection in DVD format only.

3.7. Storm manholes, manhole/catchbasins, catchbasins, ditch inlets and valve chambers to be installed as per OPSS 407.

3.8. Adjustment or rebuilding of manholes, manhole/catchbasins, catchbasins, ditch inlets and valve chambers to be completed as per OPSS 408 / City of Ottawa Special Provisions F-4080 and F-4081.

3.9. Excavating, backfilling, and compacting for manholes, manhole/catchbasins, catchbasins, ditch inlets and valve chambers to be completed as per OPSS 402.

3.10. Storm manhole, manhole/catchbasin and catchbasin excavations to be backfilled with OPSS Granular 'B' compacted to 99% Standard Proctor Maximum Dry Density (SPMDD). Joints between sections must be wrapped in a non-woven geotextile.

3.11. Storm manholes and manhole/catchbasins to be as per OPSD 701.010 and must be equipped with safety platform as per OPSD 404.020 when exceeding 5.0 m to the lowest invert.

3.12. Storm manhole frame and cover to be as per OPSD 401.010 Type "A" closed cover.

3.13. A maintenance hole drop structure tee is to be used as per OPSD 1003.010 when the drop from the inlet invert to the outlet invert is greater than 600 mm and less than 1200 mm. A drop structure wye is to be used as per OPSD 1003.020 when the drop exceeds 1200 mm.

3.14. Storm service connections to rigid main sewer pipe to be as per City of Ottawa Detail S11. Connections to flexible main sewer pipe to be as per City of Ottawa Detail S11.1.

3.15. When a minimum cover of 1.5 meters is not reached, frost protection is required.

3.16. For building roof drain sizes and location refer to architectural and mechanical drawings.

3.17. For insulation of storm sewer, refer to city of Ottawa detail W22 and use a value of 1.5m instead of 2.4m to figure out thickness of board insulation

4. SANITARY SEWER

4.1. Sanitary sewers, laterals and service connections must be constructed in accordance with the Ontario Provincial Standard Specifications / City of Ottawa Standards Specifications / Ministry of Environment and Climate Change Requirements. Specifically sanitary sewers must conform to OPSS.MUNI 410.

4.2. PVC sanitary sewer pipe material to type PVC SDR-35, conforming to OPSS.MUNI 1841. PVC sanitary sewers to be installed as per OPSD 802.010 for earth excavation and 802.013 for rock excavation. Bedding and cover material to be OPSS Granular 'A'.

4.3. The allowable deflected pipe diameter when using flexible pipe is as follows:

- Pipes 100 to 750 mm: 7.5% of the base inside diameter of the pipe
- Greater than 750 mm: 5.0% of the base inside diameter of the pipe

4.4. Final backfill material for sanitary sewers must be approved native material or select subgrade material in conformance with OPSS.MUNI 212.

4.5. All sanitary sewers to be C.C.T.V. inspected by the Contractor as per OPSS.MUNI 409. Report must be provided to the Engineer in two (2) copies and the C.C.T.V. inspection in DVD format only.

4.6. Sanitary manholes to be installed as per OPSS 407.

4.7. Adjustment or rebuilding of sanitary manholes to be completed as per OPSS 408.

4.8. Excavating, backfilling, and compacting for sanitary manholes to be completed as per OPSS.MUNI 402.

4.9. Sanitary manholes to be backfilled with OPSS Granular 'B' compacted to 99% Standard Proctor Maximum Dry Density (SPMDD). Joints between sections must be wrapped in a non-woven geotextile.

4.10. Sanitary manholes to be as per OPSD 701.010 and must be equipped with safety platform as per OPSD 404.020 when exceeding 5.0 m to the lowest invert.

4.11. Sanitary manhole frame and cover to be as per OPSD 401.010 Type "A" closed cover.

4.12. A maintenance hole drop structure tee is to be used as per OPSD 1003.010 when the drop from the inlet invert to the outlet invert is greater than 600 mm and less than 1200 mm. A drop structure wye is to be used as per OPSD 1003.020 when the drop exceeds 1200 mm.

4.13. Sanitary service connections to rigid main sewer pipe to be as per City of Ottawa Detail S11. Connections to flexible main sewer pipe to be as per City of Ottawa Detail S11.1.

4.14. When a minimum cover of 1.8 meters is not reached, frost protection is required.

4.15. Benching is required inside the concrete bottom of sanitary manholes as per OPSD 701.021.

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C
2	AUG. 31, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:

LICENSED PROFESSIONAL ENGINEER
22-11-21
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100200100
PROVINCE OF ONTARIO
DESIGNED BY

LICENSED PROFESSIONAL ENGINEER
2022-11-21
A. CHAUMONT
90409194
PROVINCE OF ONTARIO
APPROVED BY

ENGINEER:
CIMA+

CLIENT:
DREAM UNLIMITED
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613-219-2722
ZIBI (Project Address)
310 Miwate Private
OTTAWA, ONTARIO
K1R 0E1

PROJECT NAME:
ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:
NOTES PLAN

DISCIPLINE:
CIVIL

DRAFTER: S.C.POGGIOLI	SCALE:
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C002
SHEET No: 2 of 11	

D07-12-22-0071

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PRINT DATE: 2022/11/21 / PAPER SIZE: ---
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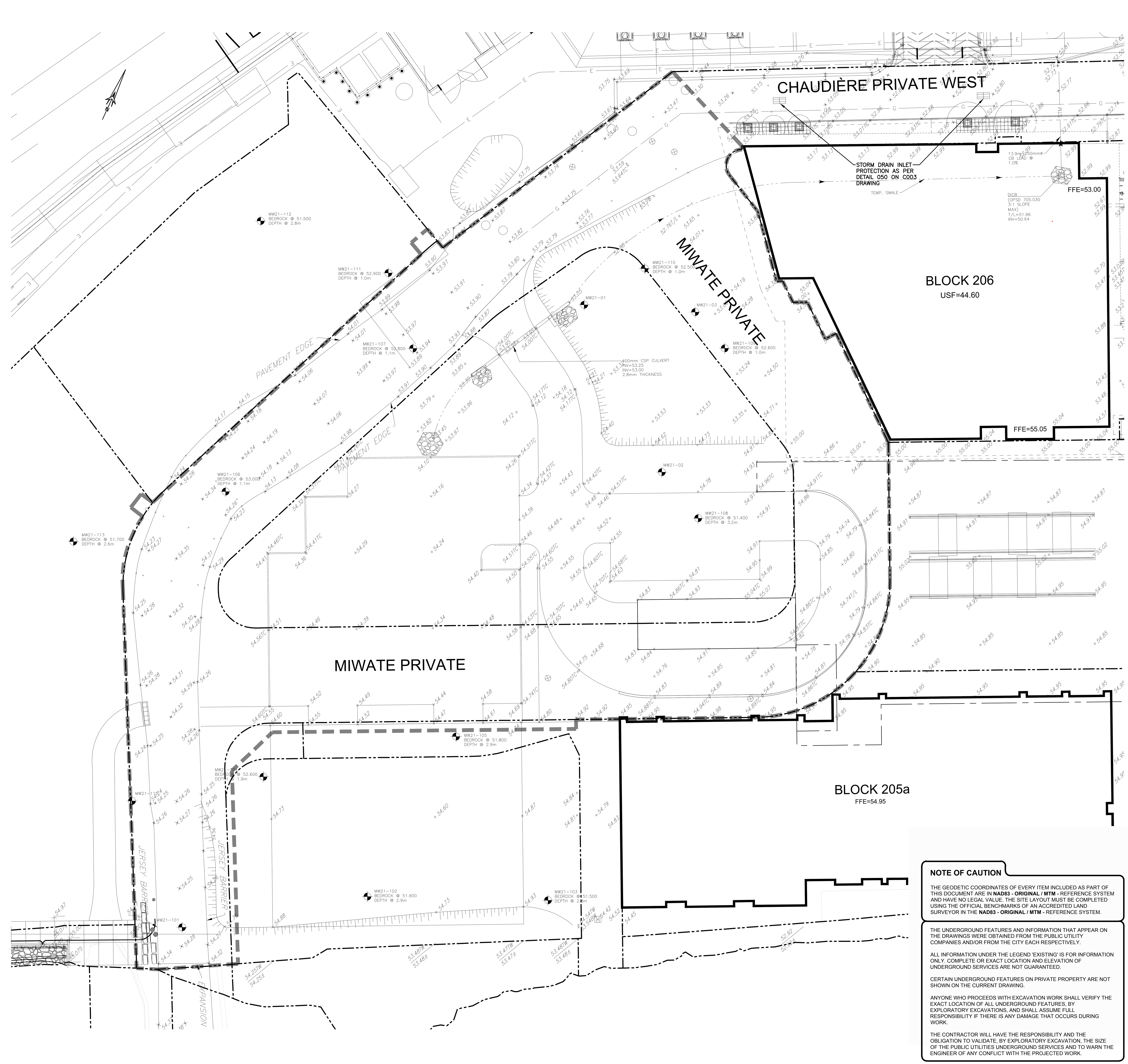
TITLEBLOCK 24x36 VERT ENG 3.0



1. SEDIMENT AND EROSION CONTROL

1.1. The contractor shall implement best management practices to provide for protection of the area drainage system and the receiving watercourse. During construction activities the contractor acknowledges that failure to implement appropriate erosion and sediment control measures may be subject to penalties imposed by any applicable regulatory agency.

1.2. Unless otherwise indicated, all materials and construction methods to be in accordance with the requirements of the latest edition of the Ontario Provincial Standard Specifications and Drawings (OPSS and OPSD), the Ontario Ministry of Environment, Conservation and Parks (MECP), applicable Conservation authorities, the municipal standard specifications and drawings, and all other governing authorities as they apply.

1.3. Wherever standards, laws and/or regulations are mentioned they refer to their current versions, modifications included.

1.4. Specifically, sediment and erosion control measures to be constructed as per OPSS.MUNI 805.

1.5. The Contractor must implement best management practices and provide adequate sediment and erosion control measures during construction:

- Prevent soil erosion which can result from stormwater runoff or wind erosion during construction;
- Prevent sediment deposits in the storm sewer and/or collecting streams and;
- Prevent air pollution from dust and particulate matter.

1.6. Provisions must be made for sediment and erosion control measures prior to stripping the site of vegetation and other deleterious materials. Measures such as phase stripping, vegetation buffer zones, silt fences, straw bales, sediment traps/basins, rock checks, etc. must be constructed and maintained in order to control sediment, as required by the provincial and municipal governing authorities.

1.7. The Contractor must set up the measures shown on the plan, inspect them frequently and clean and repair or replace the deteriorated structures.

1.8. When the sediment and erosion control measures have to be removed in order to complete a portion of the work, these same measures must be reinstated.

1.9. When storing soil on site in piles the Contractor must cover each pile with tarps, straw or a geotextile fabric to avoid fine particle transport by wind and/or streaming rain water.

1.10. During the construction period, sediment capture silt sacks or filter cloths must be installed and maintained between the frame and cover of all catchbasins and catchbasin/manholes to minimize sediments entering the storm sewer system. All landscaping areas must be completed prior to the removal of the silt sacks or filter cloths.

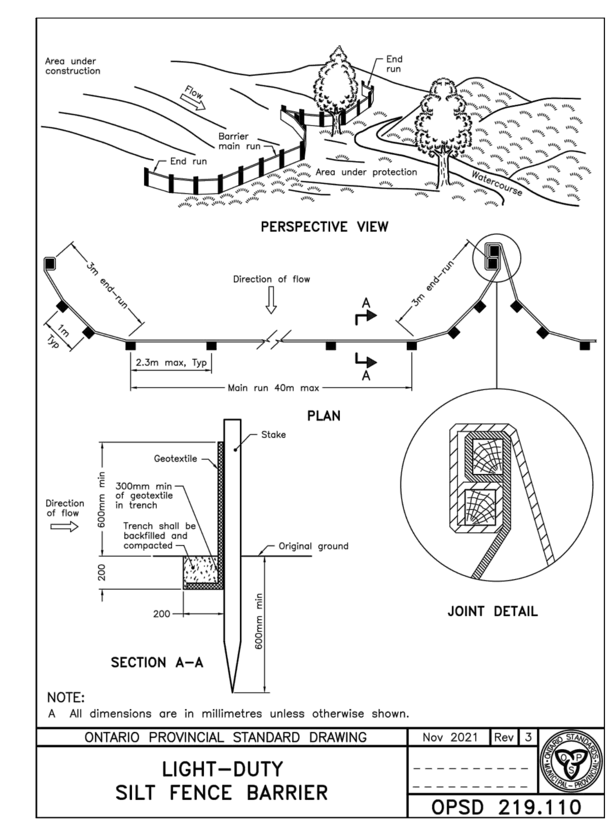
1.11. The light duty silt fence barrier must be installed as per OPSD 219.110.

1.12. At all times the Contractor must maintain the municipal access roads clean and free of sediments. When cleaning the access roads, the Contractor must take the necessary precautions to clear the surfaces covered with sediment prior to cleaning with water.

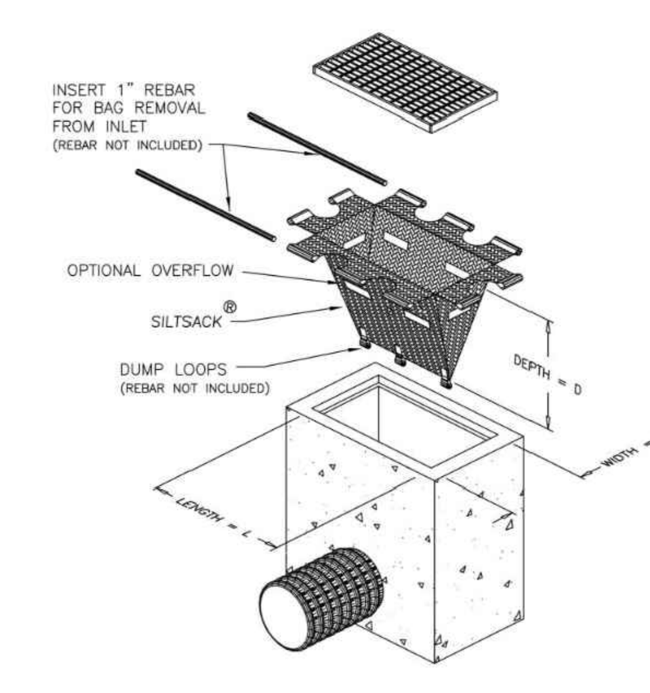
1.13. For dust control, Contractor to apply calcium chloride (Type I - OPSS 2501 and CAN/CGSB-15-1) and water with equipment approved by the Owner's representative at rate in accordance to OPSS.MUNI 506 when directed by Owner's representative.

1.14. At the end of the construction period, the Contractor is responsible for removal of the temporary sediment and erosion control measures and reconditioning the affected areas.

1.15. This plan is a “Living Document” which may be revised in the event that the control measures are not sufficient.



STORM DRAIN INLET PROTECTION



050 STORM DRAIN INLET PROTECTION
SCALE: NTS

NOTE OF CAUTION

THE GEODETIC COORDINATES OF EVERY ITEM INCLUDED AS PART OF THIS DOCUMENT ARE IN **NAD83 - ORIGINAL / MTM -** REFERENCE SYSTEM AND HAVE NO LEGAL VALUE. THE SITE LAYOUT MUST BE COMPLETED USING THE OFFICIAL BENCHMARKS OF AN ACCREDITED LAND SURVEYOR IN THE **NAD83 - ORIGINAL / MTM -** REFERENCE SYSTEM.

THE UNDERGROUND FEATURES AND INFORMATION THAT APPEAR ON THE DRAWINGS WERE OBTAINED FROM THE PUBLIC UTILITY COMPANIES AND/OR FROM THE CITY EACH RESPECTIVELY.

ALL INFORMATION UNDER THE LEGEND 'EXISTING' IS FOR INFORMATION ONLY. COMPLETE OR EXACT LOCATION AND ELEVATION OF UNDERGROUND SERVICES ARE NOT GUARANTEED.

CERTAIN UNDERGROUND FEATURES ON PRIVATE PROPERTY ARE NOT SHOWN ON THE CURRENT DRAWING.

ANYONE WHO PROCEEDS WITH EXCAVATION WORK SHALL VERIFY THE EXACT LOCATION OF ALL UNDERGROUND FEATURES, BY EXPLORATORY EXCAVATIONS, AND SHALL ASSUME FULL RESPONSIBILITY IF THERE IS ANY DAMAGE THAT OCCURS DURING WORK.

THE CONTRACTOR WILL HAVE THE RESPONSIBILITY AND THE OBLIGATION TO VALIDATE, BY EXPLORATORY EXCAVATION, THE SIZE OF THE PUBLIC UTILITIES UNDERGROUND SERVICES AND TO WARN THE ENGINEER OF ANY CONFLICT WITH THE PROJECTED WORK.

EXISTING / PROPOSED

- WM — WATERMAIN
- SAN — SANITARY SEWER
- STM — STORM SEWER
- D — DRAIN
- G — GAS LINE (APPROX. LOC.)
- T — UNDERGROUND TELEPHONE (APPROX. LOC.)
- CA — UNDERGROUND TAFFIC CABLE (APPROX. LOC.)
- X — FENCE
- E — UNDERGROUND ELECTRICITY (APPROX. LOC.)
- OVERHEAD WIRES
- LOT LINE
- RIGHT-OF-WAY LIMITS
- EASEMENT
- TOP OF SLOPE
- DITCH CENTER
- BOTTOM OF SLOPE
- CATCHBASIN
- MANHOLE/CATCHBASIN
- MANHOLE
- FIRE HYDRANT
- VALVE
- REDUCER
- TEE
- VALVE CHAMBER
- PRIVATE UTILITIES (WATERMAIN)
- NATURAL GAS VALVE
- SIGN
- STOP SIGN
- TRAFFIC LIGHT
- E — ELECTRICITY POLE
- T — TELEPHONE POLE
- E,T — ELECT.-TEL.-STREET LIGHT POLE
- E,T — ELECT.-TEL.-TRANSFORMER POLE
- PRIVATE STREET LIGHT
- E — ELECTICITY MANHOLE
- T — TELEPHONE MANHOLE
- PK — SURVEY STATION
- ×136,000 — ELEVATION
- MW21-01 — BOREHOLE (LOC. APPROX.)
- WORK LIMIT

ABBREVIATIONS

STM	→	STORM
SAN	→	SANITARY
WM	→	WATERMAIN
WTR	→	WATER
INV	→	INVERT
MH	→	MANHOLE
CB	→	CATCHBASIN
T/L	→	TOP OF LID
OBV	→	OBVERT
FFE	→	FINISHED FLOOR ELEVATION
BLDG	→	BUILDING
SERV	→	SERVICE

1:250
0 2.5 5 10 15m

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
2	AUG. 31, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:

DESIGNED BY / APPROVED BY

ENGINEER:

CIMA+

CLIENT:
DREAM UNLIMITED
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON, M5C 3H1
613-219-2722
ZIBI (Project Address)
310 Miwate Private
OTTAWA, ONTARIO
K1R 0E1

PROJECT NAME:
ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:
SEDIMENT & EROSION CONTROL PLAN

DISCIPLINE:
CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: 1:250
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C003
SHEET No: 3 of 11	

D07-12-22-0071

18749

PRINT DATE: 2022/11/21 / PAPER SIZE: ---
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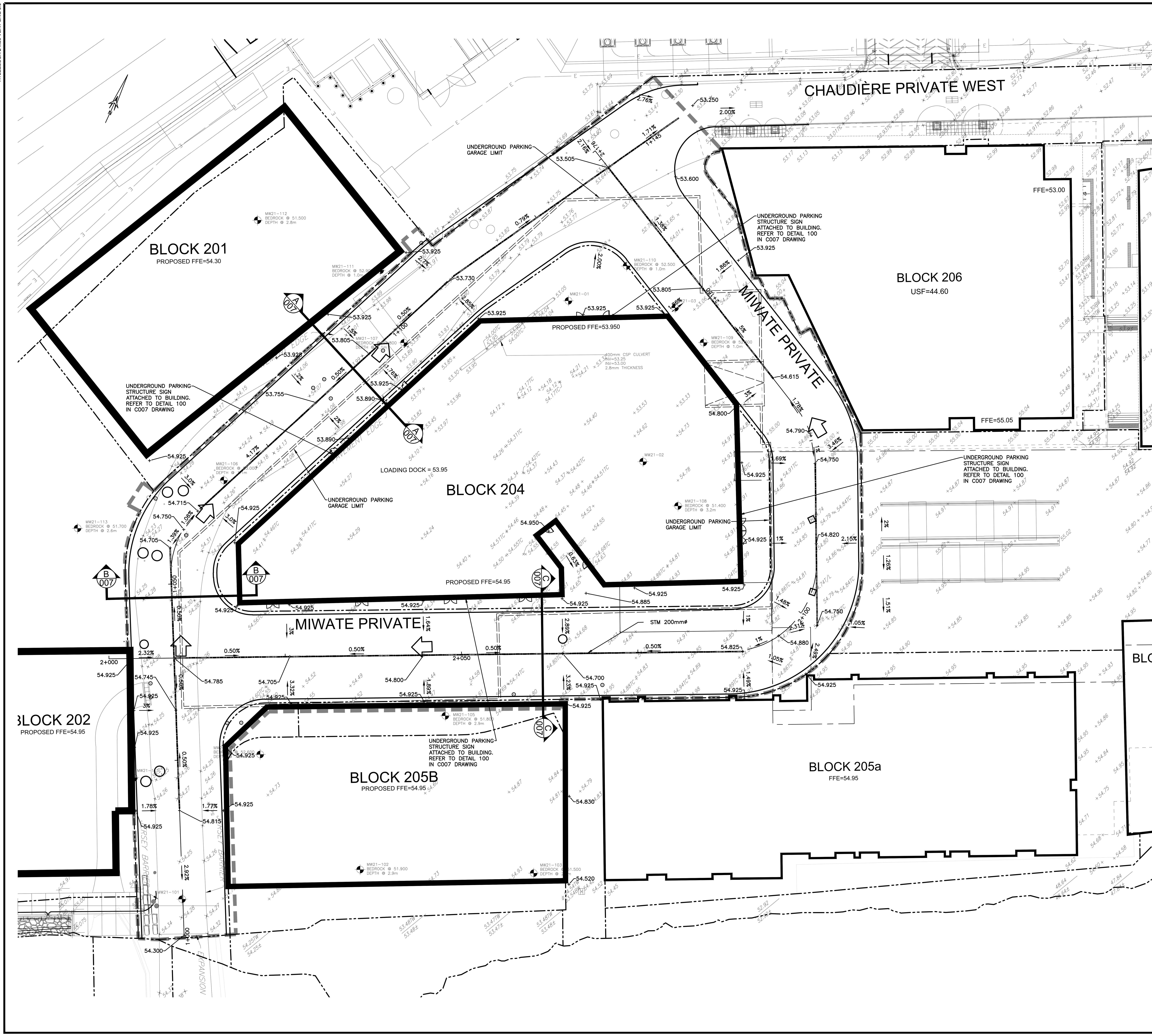


EXISTING		PROPOSED
	WATERMAIN	
	SANITARY SEWER	
	STORM SEWER	
	DRAIN	
	GAS LINE (APPROX. LOC.)	
	UNDERGROUND TELEPHONE (APPROX. LOC.)	
	UNDERGROUND TAFFIC CABLE (APPROX. LOC.)	
	FENCE	
	UNDERGROUND ELECTRICITY (APPROX. LOC.)	
	OVERHEAD WIRES	
	LOT LINE	
	RIGHT-OF-WAY LIMITS	
	EASEMENT	
	TOP OF SLOPE	
	DITCH CENTER	
	BOTTOM OF SLOPE	
	CATCHBASIN	
	MANHOLE/CATCHBASIN	
	MANHOLE	
	FIRE HYDRANT	
	VALVE	
	REDUCER	
	TEE	
	VALVE CHAMBER	
	PRIVATE UTILITIES (WATERMAIN)	
	NATURAL GAS VALVE	
	SIGN	
	STOP SIGN	
	TRAFFIC LIGHT	
	ELECTRICITY POLE	
	TELEPHONE POLE	
	ELECT.-TEL.-STREET LIGHT POLE	
	ELECT.-TEL.-TRANSFORMER POLE	
	PRIVATE STREET LIGHT	
	ELECTICITY MANHOLE	
	TELEPHONE MANHOLE	
	SURVEY STATION	
	ELEVATION	+ 99,000
MW21-01	BOREHOLE (LOC. APPROX.)	
	OVERLAND FLOW	
	TRENCH DRAIN	
	WORK LIMIT	
	UNDERGROUND PARKING GARAGE LIMIT	

ABBREVIATIONS

STM	→	STORM
SAN	→	SANITARY
WM	→	WATERMAIN
WTR	→	WATER
INV	→	INVERT
MH	→	MANHOLE
CB	→	CATCHBASIN
T/L	→	TOP OF LID
OBV	→	OBVERT
FFE	→	FINISHED FLOOR ELEVATION
BLDG	→	BUILDING
SERV	→	SERVICE

1:250
0 2.5 5 10 15m

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
2	AUG. 31, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:

LICENSED PROFESSIONAL ENGINEER 22-11-21 J. A. SAUVE 100200100 PROVINCE OF ONTARIO
DESIGNED BY

LICENSED PROFESSIONAL ENGINEER 2022-11-21 A. CHAUMONT 90409194 PROVINCE OF ONTARIO
APPROVED BY

ENGINEER:

CIMA+

CLIENT:
DREAM UNLIMITED
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON, M5C 3H1
613-219-2722

ZIBI (Project Address)
310 Miwate Private
OTTAWA, ONTARIO
K1R 0E1

PROJECT NAME:
ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:
GRADE CONTROL AND DRAINAGE PLAN

DISCIPLINE:
CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: 1:250
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C004
SHEET No: 5 of 11	

NOTE OF CAUTION

THE GEODETIC COORDINATES OF EVERY ITEM INCLUDED AS PART OF THIS DOCUMENT ARE IN **NAD83 - ORIGINAL / MTM** - REFERENCE SYSTEM AND HAVE NO LEGAL VALUE. THE SITE LAYOUT MUST BE COMPLETED USING THE OFFICIAL BENCHMARKS OF AN ACCREDITED LAND SURVEYOR IN THE **NAD83 - ORIGINAL / MTM** - REFERENCE SYSTEM.

THE UNDERGROUND FEATURES AND INFORMATION THAT APPEAR ON THE DRAWINGS WERE OBTAINED FROM THE PUBLIC UTILITY COMPANIES AND/OR FROM THE CITY EACH RESPECTIVELY.

ALL INFORMATION UNDER THE LEGEND 'EXISTING' IS FOR INFORMATION ONLY. COMPLETE OR EXACT LOCATION AND ELEVATION OF UNDERGROUND SERVICES ARE NOT GUARANTEED.

CERTAIN UNDERGROUND FEATURES ON PRIVATE PROPERTY ARE NOT SHOWN ON THE CURRENT DRAWING.

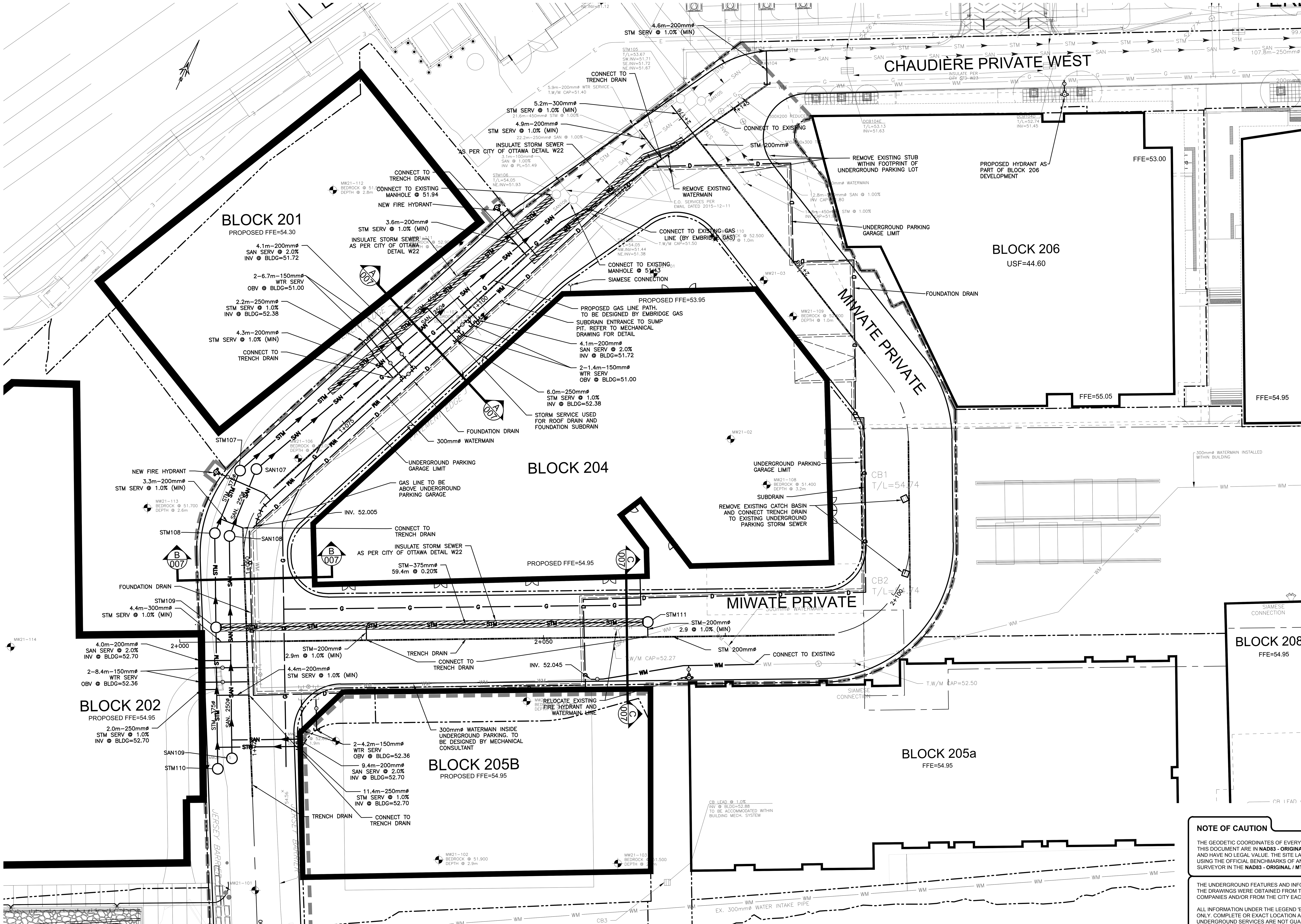
ANYONE WHO PROCEEDS WITH EXCAVATION WORK SHALL VERIFY THE EXACT LOCATION OF ALL UNDERGROUND FEATURES, BY EXPLORATORY EXCAVATIONS, AND SHALL ASSUME FULL RESPONSIBILITY IF THERE IS ANY DAMAGE THAT OCCURS DURING WORK.

THE CONTRACTOR WILL HAVE THE RESPONSIBILITY AND THE OBLIGATION TO VALIDATE, BY EXPLORATORY EXCAVATION, THE SIZE OF THE PUBLIC UTILITIES UNDERGROUND SERVICES AND TO WARN THE ENGINEER OF ANY CONFLICT WITH THE PROJECTED WORK.

D07-12-22-0071

18749

TITLEBLOCK 24x36 VERT ENG 3.0



NOTE :

ALL PHASES OF ZIBI ONTARIO SERVICED AND BILLED BY METER CHAMBER PER CITY STANDARD W32. INDIVIDUAL SUB-METERING PROVIDED BASED ON FUTURE CONDOMINIUM REQUIREMENTS.

BENCH MARK

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
10	5031271	365915.9320	54.3480	CP
85591	5031480	366018.9270	51.8200	BOLT
86037	5031454	366008.0430	52.0910	PKN
1000010	5031523	365993.0550	51.2040	MON 2018-007

NOTE OF CAUTION

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THE CONTRACTOR WILL HAVE THE RESPONSIBILITY AND THE OBLIGATION TO VALIDATE, BY EXPLORATORY EXCAVATION, THE SIZE OF THE PUBLIC UTILITIES UNDERGROUND FEATURES AND TO WARN THE ENGINEER OF ANY CONFLICT WITH THE PROJECTED WORK.

EXISTING / PROPOSED

- WATERMAIN
- SANITARY SEWER
- STORM SEWER
- DRAIN
- GAS LINE (APPROX. LOC.)
- UNDERGROUND TELEPHONE (APPROX. LOC.)
- UNDERGROUND TAFFIC CABLE (APPROX. LOC.)
- FENCE
- UNDERGROUND ELECTRICITY (APPROX. LOC.)
- OVERHEAD WIRES
- LOT LINE
- RIGHT-OF-WAY LIMITS
- EASEMENT
- TOP OF SLOPE
- DITCH CENTER
- BOTTOM OF SLOPE
- CATCHBASIN
- MANHOLE/CATCHBASIN
- MANHOLE
- FIRE HYDRANT
- VALVE
- REDUCER
- TEE
- VALVE CHAMBER
- PRIVATE UTILITIES (WATERMAIN)
- NATURAL GAS VALVE
- TRENCH DRAIN
- SIGN
- STOP SIGN
- TRAFFIC LIGHT
- ELECTRICITY POLE
- TELEPHONE POLE
- ELECT.-TEL.-STREET LIGHT POLE
- ELECT.-TEL.-TRANSFORMER POLE
- PRIVATE STREET LIGHT
- ELECTRICITY MANHOLE
- TELEPHONE MANHOLE
- SURVEY STATION
- WATERMAIN INSULATION
- UNDERGROUND PARKING GARAGE OUTLINE
- BOREHOLE (LOC. APPROX.)
- WORK LIMIT

ABBREVIATIONS

STM	→	STORM
SAN	→	SANITARY
WM	→	WATERMAIN
WTR	→	WATER
INV	→	INVERT
MH	→	MANHOLE
CB	→	CATCHBASIN
T/L	→	TOP OF LID
OBV	→	OBVERT
FFE	→	FINISHED FLOOR ELEVATION
BLDG	→	BUILDING
SERV	→	SERVICE

1:250 0 2.5 5 10 15m

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C
2	AUG. 31, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:

LICENSED PROFESSIONAL ENGINEER 22-11-21 J. A. SAUVE 100200100 PROVINCE OF ONTARIO
DESIGNED BY

LICENSED PROFESSIONAL ENGINEER 2022-11-21 A. CHAUMONT 90409194 PROVINCE OF ONTARIO
APPROVED BY

ENGINEER:

CIMA+

CLIENT:
DREAM UNLIMITED
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON, M5C 3H1
613-219-2722
ZIBI (Project Address)
310 Miwate Private
OTTAWA, ONTARIO
K1R 0E1

PROJECT NAME:
ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:
SITE SERVICING LAYOUT

DISCIPLINE:
CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: 1:250
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C005
SHEET No: 7 of 11	

D07-12-22-0071

18749

PRINT DATE: 2022/11/21 / PAPER SIZE: --
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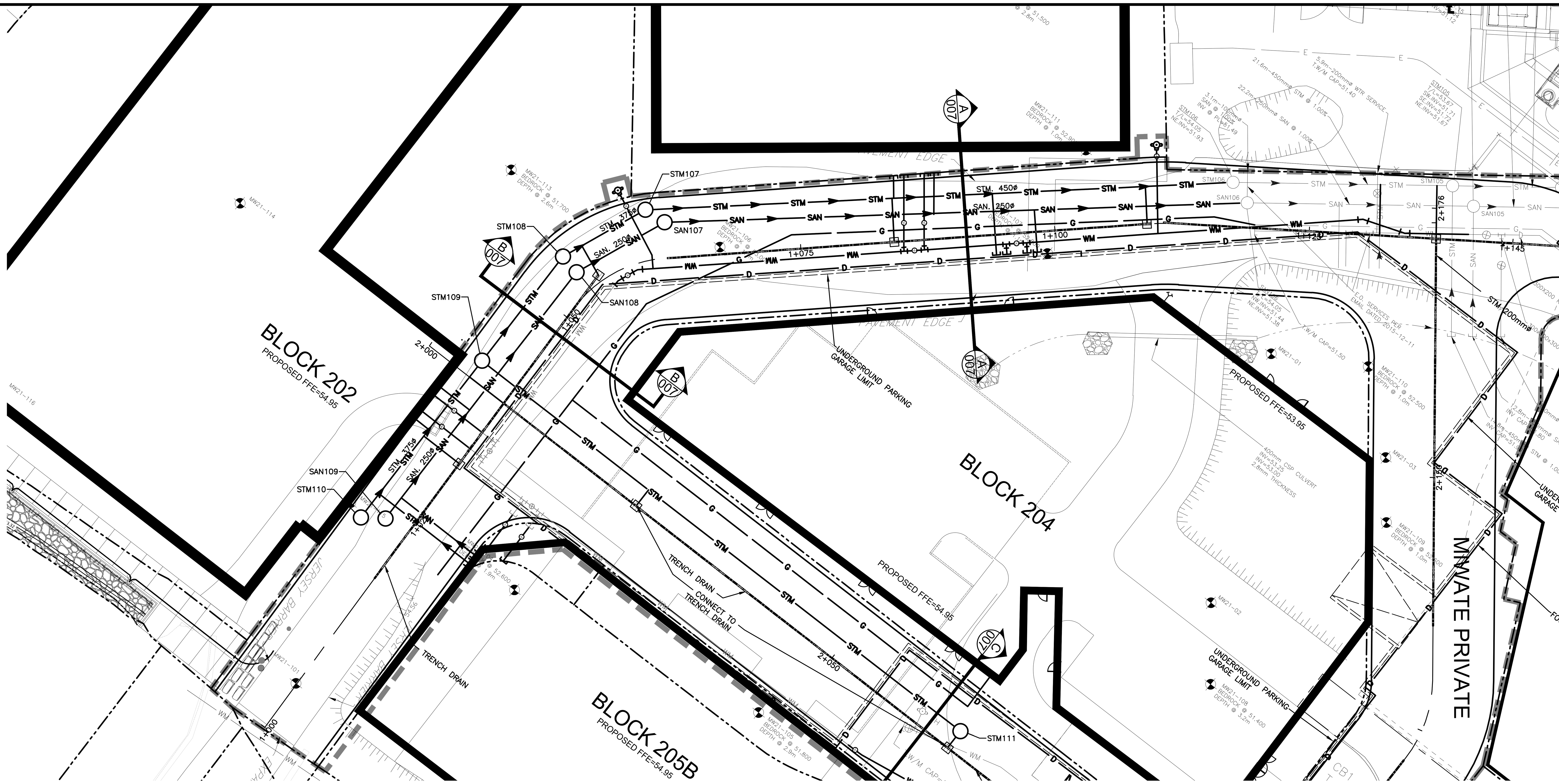

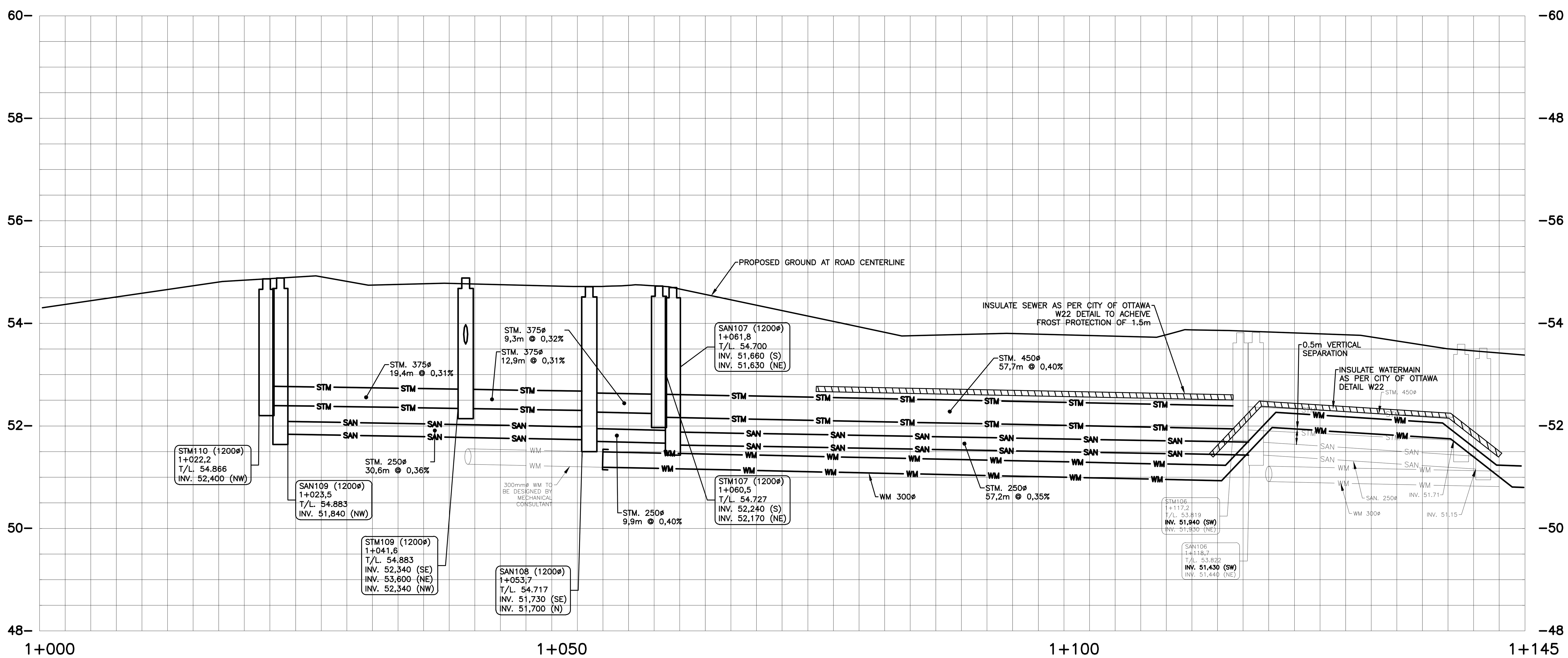

EXISTING / PROPOSED

WATERMAIN
SANITARY SEWER
STORM SEWER
DRAIN
GAS LINE (APPROX. LOC.)
UNDERGROUND TELEPHONE (APPROX. LOC.)
UNDERGROUND TAFFIC CABLE (APPROX. LOC.)
FENCE
UNDERGROUND ELECTRICITY (APPROX. LOC.)
OVERHEAD WIRES
LOT LINE
RIGHT-OF-WAY LIMITS
EASEMENT
TOP OF SLOPE
DITCH CENTER
BOTTOM OF SLOPE
CATCHBASIN
MANHOLE/CATCHBASIN
MANHOLE
FIRE HYDRANT
VALVE
REDUCER
TEE
VALVE CHAMBER
PRIVATE UTILITIES (WATERMAIN)
NATURAL GAS VALVE
TRENCH DRAIN
SIGN
STOP SIGN
TRAFFIC LIGHT
ELECTRICITY POLE
TELEPHONE POLE
ELECT.-TEL.-STREET LIGHT POLE
ELECT.-TEL.-TRANSFORMER POLE
PRIVATE STREET LIGHT
ELECTRICITY MANHOLE
TELEPHONE MANHOLE
SURVEY STATION
WATERMAIN INSULATION
UNDERGROUND PARKING GARAGE OUTLINE
BOREHOLE (LOC. APPROX.)
WORK LIMIT

ABBREVIATIONS

STM	→	STORM
SAN	→	SANITARY
WM	→	WATERMAIN
WTR	→	WATER
INV	→	INVERT
MH	→	MANHOLE
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T/L	→	TOP OF LID
OBV	→	OBVERT
FFE	→	FINISHED FLOOR ELEVATION
BLDG	→	BUILDING
SERV	→	SERVICE

1:250 0 2.5 5 10 15m

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
2	AUG. 31, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:

LICENSED PROFESSIONAL ENGINEER 22-11-21 J. A. SAUVE 100200100 PROVINCE OF ONTARIO — DESIGNED BY

LICENSED PROFESSIONAL ENGINEER 2022-11-21 A. CHAUMONT 90409194 PROVINCE OF ONTARIO — APPROVED BY

ENGINEER:

CIMA+

CLIENT:

DREAM UNLIMITED
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON, M5C 3H1
613-219-2722

ZIBI (Project Address)
310 Miwate Private
OTTAWA, ONTARIO
K1R 0E1

PROJECT NAME:

ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:

PLAN AND PROFILE
STA. 1+000 TO 1+145

DISCIPLINE:

CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: H=1:250 V=1:50
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C006A
SHEET No: 8 of 11	

D07-12-22-0071

18749

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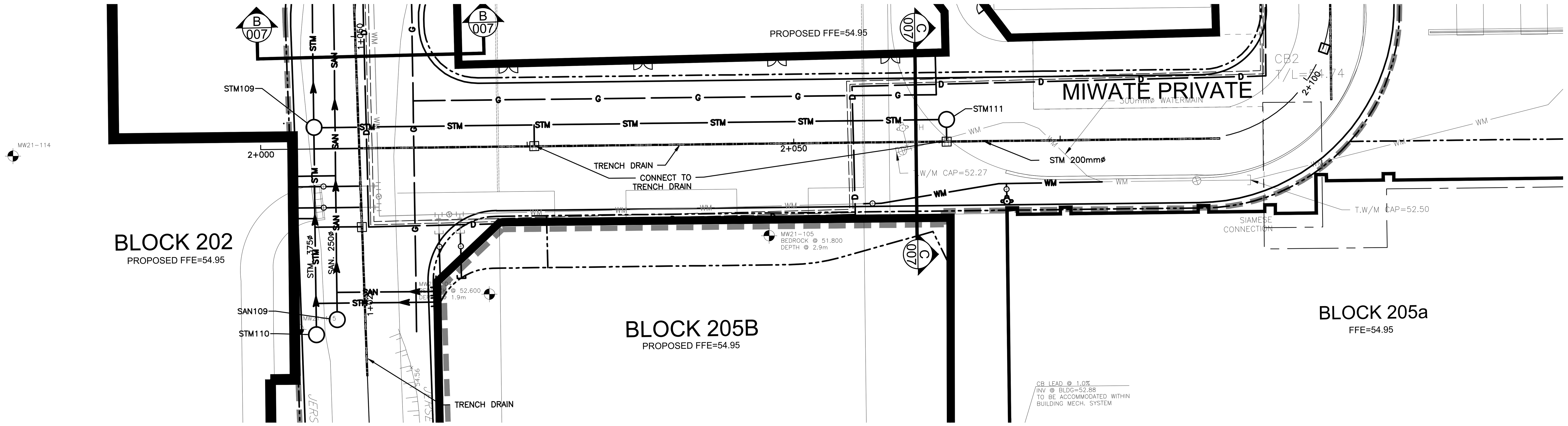

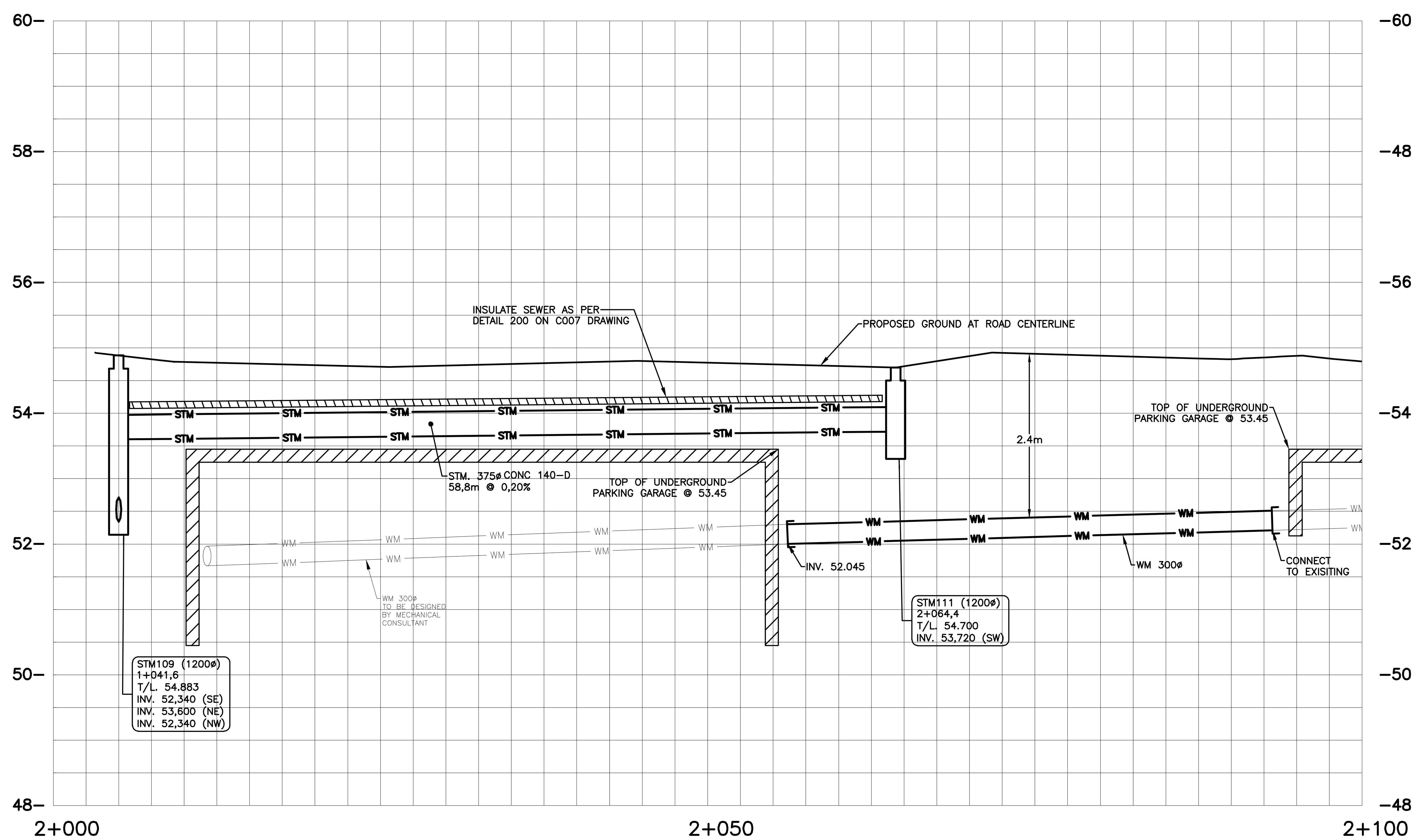

EXISTING / PROPOSED

WATERMAIN
SANITARY SEWER
STORM SEWER
DRAIN
GAS LINE (APPROX. LOC.)
UNDERGROUND TELEPHONE (APPROX. LOC.)
UNDERGROUND TAFFIC CABLE (APPROX. LOC.)
FENCE
UNDERGROUND ELECTRICITY (APPROX. LOC.)
OVERHEAD WIRES
LOT LINE
RIGHT-OF-WAY LIMITS
EASEMENT
TOP OF SLOPE
DITCH CENTER
BOTTOM OF SLOPE
CATCHBASIN
MANHOLE/CATCHBASIN
MANHOLE
FIRE HYDRANT
VALVE
REDUCER
TEE
VALVE CHAMBER
PRIVATE UTILITIES (WATERMAIN)
NATURAL GAS VALVE
TRENCH DRAIN
SIGN
STOP SIGN
TRAFFIC LIGHT
ELECTRICITY POLE
TELEPHONE POLE
ELECT.-TEL.-STREET LIGHT POLE
ELECT.-TEL.-TRANSFORMER POLE
PRIVATE STREET LIGHT
ELECTRICITY MANHOLE
TELEPHONE MANHOLE
SURVEY STATION
WATERMAIN INSULATION
UNDERGROUND PARKING GARAGE OUTLINE
BOREHOLE (LOC. APPROX.)
WORK LIMIT

ABBREVIATIONS

STM	→	STORM
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T/L	→	TOP OF LID
OBV	→	OBVERT
FFE	→	FINISHED FLOOR ELEVATION
BLDG	→	BUILDING
SERV	→	SERVICE

1:250 0 2.5 5 10 15m

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
2	AUG. 31, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:

LICENSED PROFESSIONAL ENGINEER 22-11-21 J. A. SAUVE 100200100 PROVINCE OF ONTARIO — DESIGNED BY

LICENSED PROFESSIONAL ENGINEER 2022-11-21 A. CHAUMONT 90409194 PROVINCE OF ONTARIO — APPROVED BY

ENGINEER:

CIMA+

CLIENT:
DREAM UNLIMITED
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON, M5C 3H1
613-219-2722
ZIBI (Project Address)
310 Miwate Private
OTTAWA, ONTARIO
K1R 0E1

PROJECT NAME:
ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:
PLAN AND PROFILE
STA. 2+000 TO 2+100

DISCIPLINE:
CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: H=1:250 V=1:50
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C006B
SHEET No: 9 of 11	

TITLEBLOCK 24x36 VERT ENG 3.0

PRINT DATE: 2022/11/21 | PAPER SIZE: --
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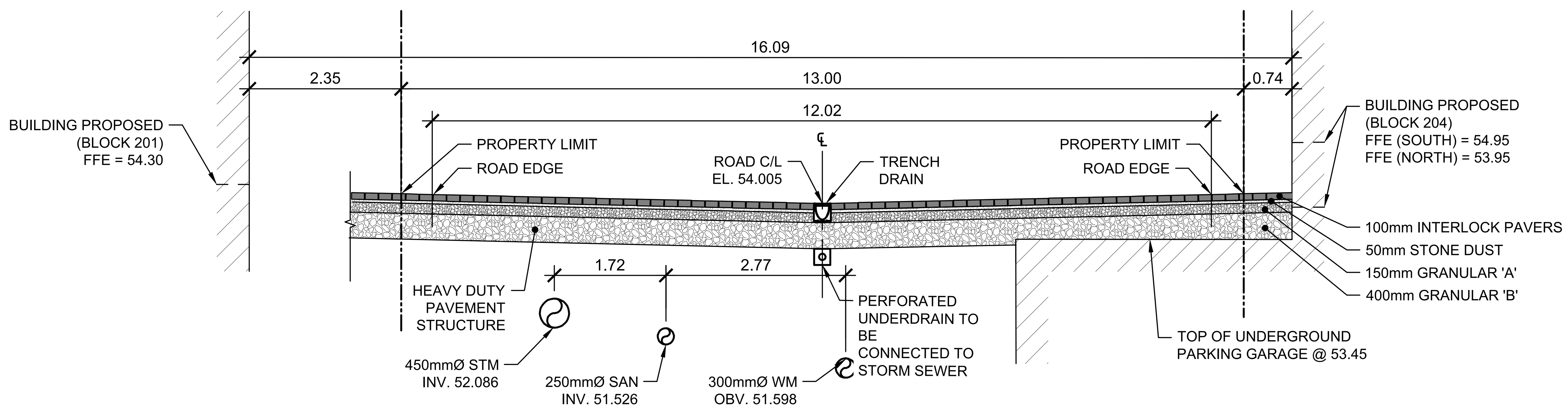
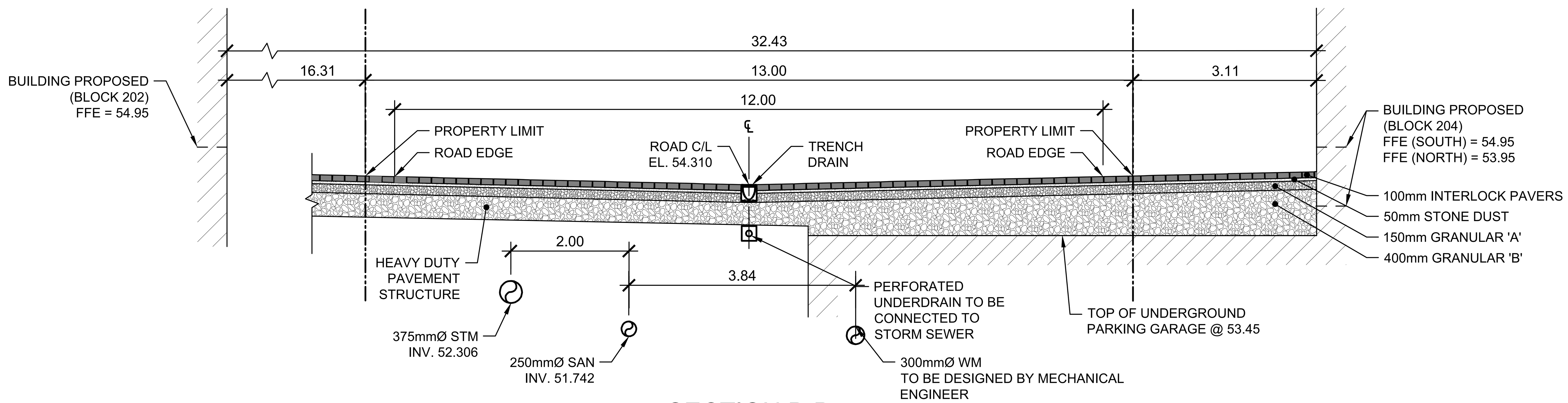
D07-12-22-0071

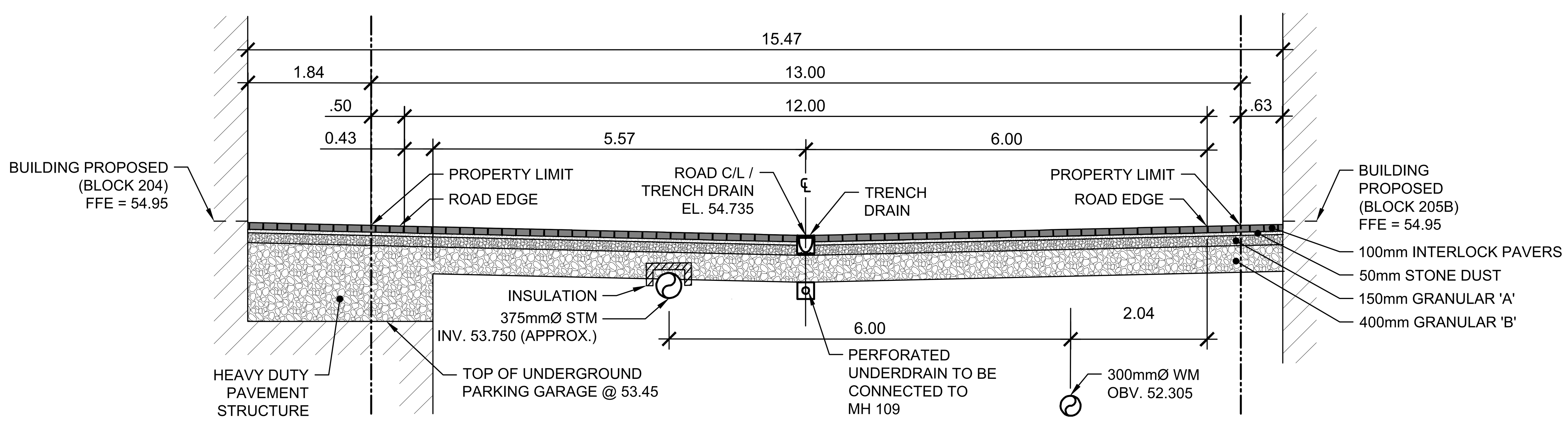
18749



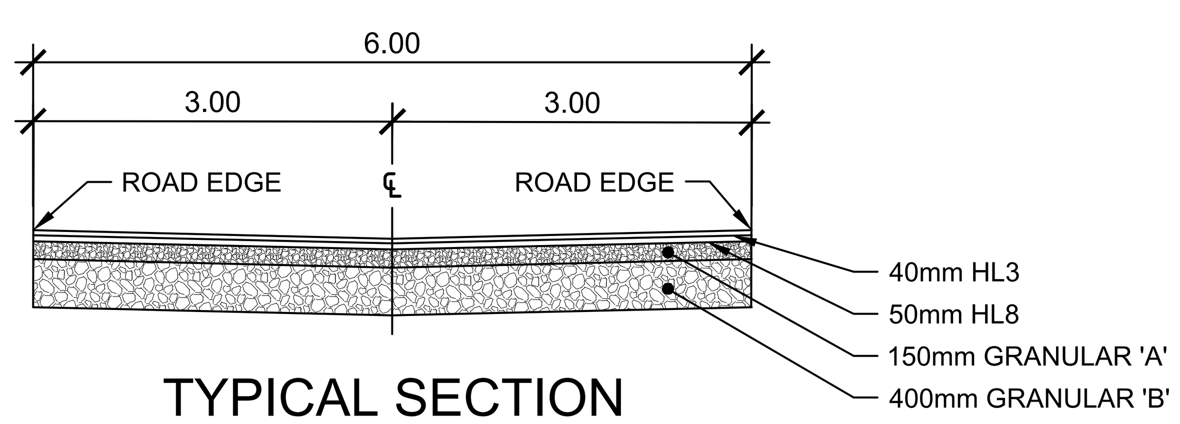
SECTION A-A
STA 1+091.31



SECTION B-B
STA 1+048.15



SECTION C-C
STA 2+056.38



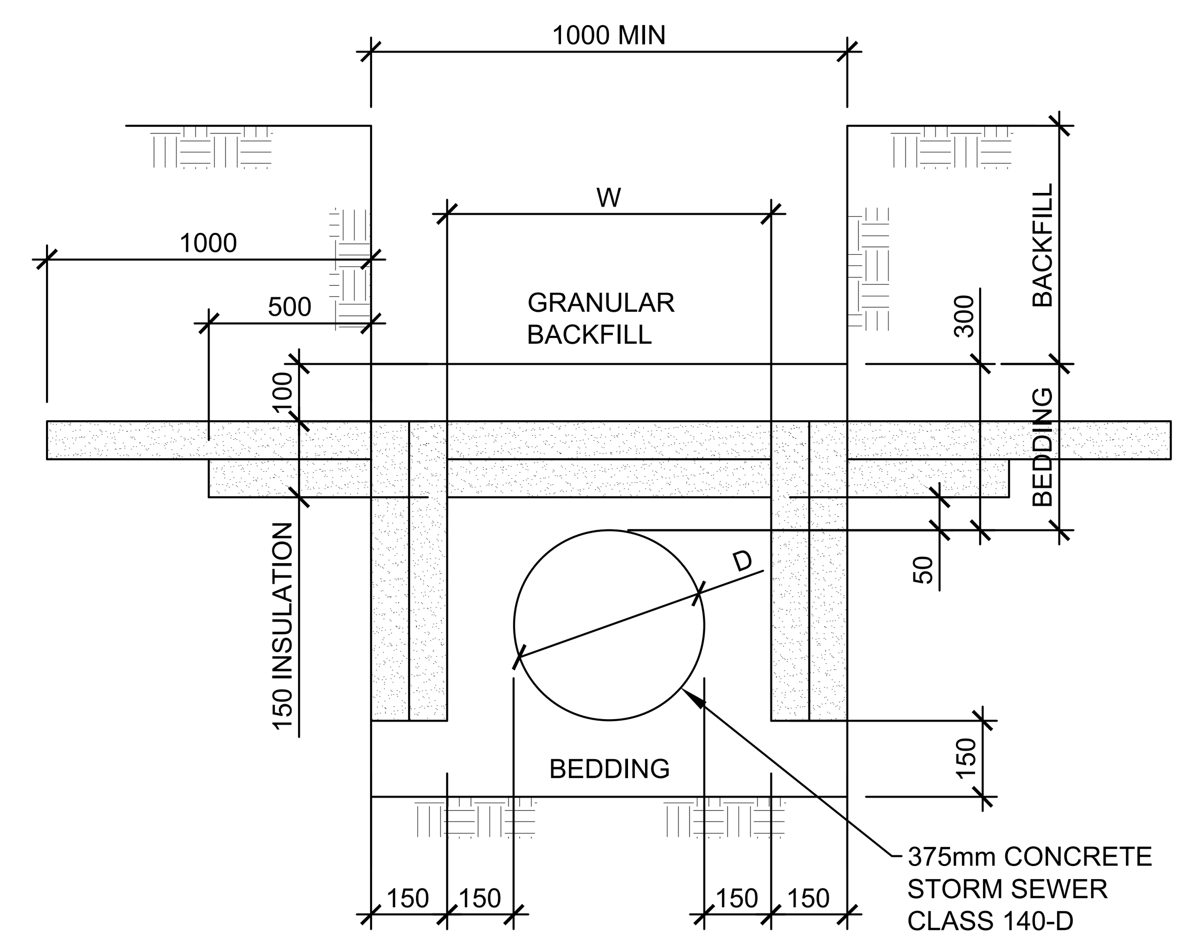
TYPICAL SECTION
INTERIM ASPHALT

APPROX. 16"W x 24"H

NOTE:
SIGNS TO BE MANUFACTURED OF METAL OR PLASTIC LAMICOID WITH APPROXIMATE DIMENSION SHOWN IN DETAIL. SIGNS TO BE INSTALLED ON EXTERIOR BUILDING WALL. SIGNS TO BE VISIBLE AND INSTALLED AT A HEIGHT OF 60"- 96" FROM THE GROUND.

APPROX. 16"W x 6"H

100 UNDERGROUND PARKING STRUCTURE SIGN
SCALE: NTS



INSULATION TO BE HI-60 (414 KPa)

200 SEWER INSULATION
SCALE: NTS

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
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1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:
LICENSED PROFESSIONAL ENGINEER 22-11-21 J. A. SAUVE 100200100 PROVINCE OF ONTARIO
LICENSED PROFESSIONAL ENGINEER 2022-11-21 A. CHAUMONT 90409194 PROVINCE OF ONTARIO
DESIGNED BY
APPROVED BY

ENGINEER:
CIMA+

CLIENT:
DREAM UNLIMITED
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON, M5C 3H1
613-219-2722
ZIBI (Project Address)
310 Miwate Private
OTTAWA, ONTARIO
K1R 0E1

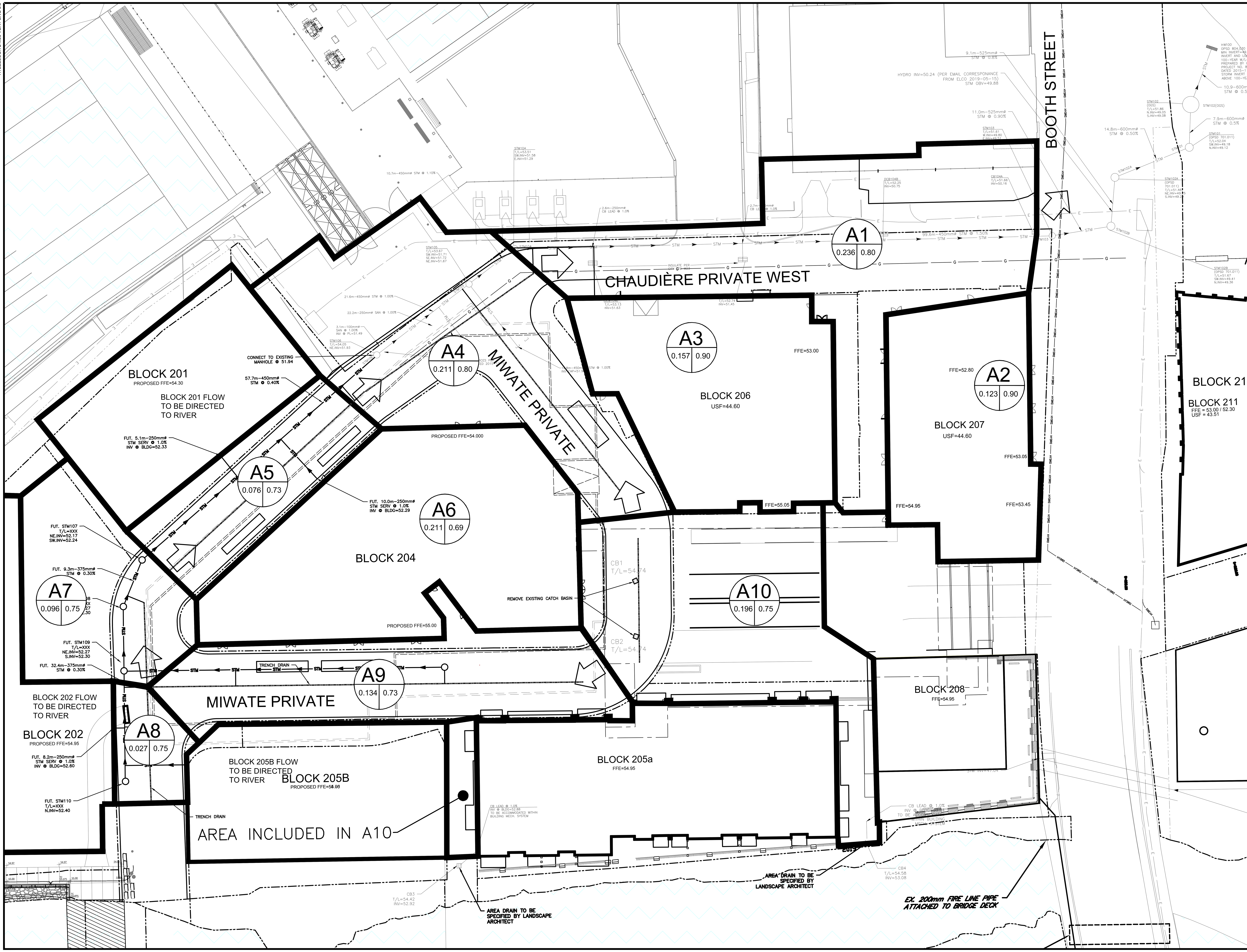
PROJECT NAME:
ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:
TYPICAL CROSS SECTIONS AND DETAILS

DISCIPLINE:
CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: 1:50
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C007
SHEET No: 10 of 11	

D07-12-22-0071
18749



LEGEND

EXISTING		PROPOSED
—WM—	WATERMAIN	
—SAN—	SANITARY SEWER	
—STM—	STORM SEWER	
—D—	DRAIN	
—G—	GAS LINE (APPROX. LOC.)	
—T—	UNDERGROUND TELEPHONE (APPROX. LOC.)	
—CA—	UNDERGROUND TAFFIC CABLE (APPROX. LOC.)	
—X—X—	FENCE	
—E—	UNDERGROUND ELECTRICITY (APPROX. LOC.)	
	OVERHEAD WIRES	
	LOT LINE	
	RIGHT-OF-WAY LIMITS	
	EASEMENT	
	TOP OF SLOPE	
	DITCH CENTER	
	BOTTOM OF SLOPE	
	CATCHBASIN	
	MANHOLE/CATCHBASIN	
	MANHOLE	
	FIRE HYDRANT	
	VALVE	
	REDUCER	
	TEE	
	VALVE CHAMBER	
	PRIVATE UTILITIES (WATERMAIN)	
	ELEVATION	+ 99,000
	BOREHOLE (LOC. APPROX.)	
	OVERLAND FLOW	
	TRENCH DRAIN	
	WORK LIMIT	
	UNDERGROUND PARKING GARAGE LIMIT	

SUB-CATCHMENT — A4
AREA IN HECTARES — 0.305
COEFFICIENT DE RUISSELLEMENT — 0.69
OVERLAND FLOW
CATCHMENT AREA LIMIT

No.	Date	Description	By
3	NOV 21, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
2	AUG. 31, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.
1	APR. 18, 2022	ISSUED FOR SITE PLAN APPLICATION	A.C.

STAMPS:
LICENSED PROFESSIONAL ENGINEER 22-11-21 J. A. SAUVE 100200100 PROVINCE OF ONTARIO
DESIGNED BY
LICENSED PROFESSIONAL ENGINEER 2022-11-21 A. CHAUMONT 90409194 PROVINCE OF ONTARIO
APPROVED BY

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CIMA+

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DREAM UNLIMITED
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PROJECT NAME:
ZIBI ONTARIO
BLOCK 204
315 PRIVE MIWATE PRIVATE,
CHAUDIERE ISLAND
OTTAWA, ONTARIO

SHEET TITLE:
STORMWATER MANAGEMENT PLAN

DISCIPLINE:
CIVIL

DRAFTER: S.C.POGGIOLI	SCALE: 1:300
DESIGNER: J.SAUVÉ	DATE: 2022/03/14
APPROVER: A.CHAUMONT	APPROVER: A.CHAUMONT
PROJECT No: A000931	DRAWING No: C008
SHEET No: 11 of 11	

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Appendix F
ECA Application

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 1505-B96UCV
Issue Date: February 26, 2019

Windmill Dream ON Holdings LP Inc., as general partner
for and on behalf of Windmill Dream ON Holdings LP
6 Booth Street
Ottawa, Ontario
K1R 6K8

Site Location: Zibi Ontario Phase 1 (Domtar Lands Redevelopment, Phase 1)
Chaudiere Island
3 and 4 Booth Street
City of Ottawa
K1R 7W1

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

establishment of Storm and Sanitary sewage works to serve proposed Domtar Lands Redevelopment, Phase 1, located on Chaudiere Island, to serve 1.09 ha of retail, commercial and office space and approximately 71 residential units, comprising;

A. Storm Sewers and Sanitary Sewers

- storm sewers to be constructed on Zibi Ontario Phase 1, receiving the storm flow from the temporary parking lot, block 301 and private roads, to be constructed on Perley and Booth Street, having diameter varying from 450mm to 600mm, from west Chaudiere Island , ultimately discharging to Ottawa River, through a proposed Oil/Grit Separator installed at MH STM102, located in the Booth Street right of way;

- sanitary sewers to be constructed on Zibi Ontario Phase 1, receiving the sanitary sewage flow from blocks 205A, 208, existing buildings on Albert Island, and existing Power House building, to be constructed on Booth Street and Head Street, having 250mm diameter, from Parking area north of Electric Channel to a proposed interim Pumping Station at the existing building 535 Head Street;

- sanitary sewers to be constructed on Zibi Ontario Phase 1, receiving the sanitary sewage flow from future development, to be constructed on Perley Street and Booth Street, having 250mm diameter, from MH SAN 106 to MH SAN102, ultimately discharging to a proposed interim Pumping Station at the existing building 535 Head Street;

B. Pumping Station (interim) and Forcemain

- an interim pumping station located at existing building 535 Head Street, for the transmission of sanitary sewage from approximately 1.09 hectare area through sanitary sewers, located on Booth Street, Head Street and Perley Street, receiving the sewage flow from residential, retail and office units on the proposed in Zibi Ontario Phase 1 development, having a firm rated capacity of 13 L/s under a total dynamic head of 15.8m, discharging though a twin forcemain discharging ultimately to City of Ottawa Interceptor Sewer within Albert Street right of way;

- a twin forcemain located on Chaudiere Island, Booth Street, Fleet Street and Lloyd Street, receiving sanitary sewage flow from an interim pumping station, to a proposed sanitary manholes on the north side of the LRT Tunnel and ultimately to City of Ottawa Interceptor Sewer within Albert Street right of way;

C. Oil/Grit Separator

- one (1) oil/grit separator, located on the Booth Street right of way, designed for a stormwater drainage area of approximately 1.34 ha, upstream of headwall H100, having a maximum sediment storage capacity of 16,490 litres, recommended maintenance sediment volume of 3,038 Litres, an oil storage capacity of 3,360 Litres, a total holding capacity of 20,255 Litres and a maximum treatment flow rate of 50 litres per second, discharging ultimately to Ottawa River via a 600 millimetres diameter outlet pipe and a headwall;

including all other mechanical system, electrical system, instrumentation and control system, standby power system, piping, pumps, valves and appurtenances essential for the proper, safe and reliable operation of the Works in accordance with this Approval, in the context of process performance and general principles of wastewater engineering only;

all in accordance with the submitted supporting documents listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "*Approval* " means this entire document and any schedules attached to it, and the application;

2. "*BOD5* "(also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

3. "*Director* " means a person appointed by the *Minister* pursuant to section 5 of the *EPA* for the purposes of Part II.1 of the *EPA;*

4. "*District Manager* " means the *District Manager* of the appropriate local *District Office* of the *Ministry,* where the *Works* are geographically located;

5. "*E. coli"* refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

6. "*EPA* " means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

7. "*Emergency Situation* " means a structural, mechanical or electrical failure that causes a temporary reduction in the capacity of the *Sewage Pumping Station* or an unforeseen flow condition that may result in:

    1. a danger to the health or safety of any person; or

    2. injury or damage to any property, or serious risk of injury or damage to any property;

8. "*Equivalent Equipment* " means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of a named equipment;

9. "*Event* " means an action or occurrence at the *Sewage Pumping Station* that causes a *Sewage Pumping Station Overflow* . An *Event* ends when there is no recurrence of a *Sewage Pumping Station Overflow* in the 12-hour period following the last *Sewage Pumping Station Overflow* . Two *Events* are separated by at least 12 hours during which there has been no recurrence of a *Sewage Pumping Station Overflow;*

10. "*Limited Operational Flexibility* " (LOF) means any modifications that the *Owner* is permitted to make to the *Works* under this *Approval;*

11. "*Ministry* " means the ministry of the government of Ontario responsible for the *EPA* and *OWRA* and includes all officials, employees or other persons acting on its behalf;

12. "*Notice of Modifications* " means the form entitled "Notice of Modification to Sewage Works";

13. "*Owner* " means Windmill Dream ON Holdings LP, and includes its successors and assignees;

14. "*OWRA* " means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

15. "*Professional Engineer* ” means a person entitled to practice as a *Professional Engineer* in the Province of Ontario under a licence issued under the Professional Engineers Act;

16. "*Sewage Pumping Station Overflow* " means any discharge from a Sewage Pumping Station to the environment that does not undergo any treatment or only receives partial treatment before it is discharged to the environment;

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

18. "*Works* " means the sewage works described in the Owner's application, this *Approval,* and the modifications made under *Limited Operational Flexibility.*

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

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

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 *Approval* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

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 *Approval,* and the application for approval of the *Works.*

3. Where there is a conflict between a provision of any document in the schedule referred to in this *Approval* and the conditions of this *Approval,* the conditions in this *Approval* shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

4. Where there is a conflict between the documents listed in Schedule 'A' and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

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

2. EXPIRY OF APPROVAL

1. This *Approval* will cease to apply to those parts of the *Work* which have not been constructed within five (5) years of the date of this *Approval.*

2. In the event that completion and commissioning of any portion of the *Works* is anticipated to be delayed beyond the specified expiry period, the *Owner* shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of *Approval* of the *Works* are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. This Approval for the interim Works (interim sewage pumping station) shall expire and become null and void on March 31, 2024

3. CHANGE OF OWNER

1. The *Owner* shall notify the *District Manager* and the *Director,* in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of *Owner;*

    b. change of address of the *Owner;*

    c. change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager;* or

    d. change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager.*

2. In the event of any change in ownership of the *Works,* other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Approval,* and a copy of such notice shall be forwarded to the *District Manager* and the *Director.*

3. The *Owner* shall ensure that all communications made pursuant to this condition refer to the number at the top of this *Approval.*

4. Notwithstanding any other requirements in this *Approval,* upon transfer of the ownership or assumption of the Works to a municipality if applicable, any reference to the *District Manager* shall be replaced with the *Water Supervisor.*

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

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 *Approval,* and

upon request, shall make the written statement available for inspection by *Ministry* personnel.

2. Within six (6) months 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.*

5. SEWAGE PUMPING STATION OVERFLOW

1. Any *Sewage Pumping Station Overflow* is prohibited, except:

   a. in an *Emergency Situation;* and

   b. where the *Sewage Pumping Station Overflow* is a direct and unavoidable result of a planned maintenance procedure, the *Owner* having notified the *District Manager* at least fifteen (15) days prior to the occurrence of the *Sewage Pumping Station Overflow* and the *District Manager* having given written consent of the *Sewage Pumping Station Overflow.*

2. The *Owner* shall forthwith notify the Spills Action Centre (SAC) and the Medical Officer of Health of all *Events* as soon as possible. This notice shall include, at a minimum, the following information:

   a. the date, time, and duration of the *Event;*

   b. the location of the *Sewage Pumping Station Overflow* and the receiver;

   c. the measured or estimated volume of the *Event* (unless the *Event* is ongoing); and

   d. the reason for the *Event.*

3. The *Owner* shall submit a summary report of the *Sewage Pumping Station Overflow Events* to the *District Manager* on a quarterly basis, no later than each of the following dates for each calendar year: February 14, May 15, August 14, and November 15. The summary reports shall be in a format specified by the *Ministry,* which shall include, at a minimum, the following information on any *Events* that occurred during the preceding quarter:

   a. the date of the *Event(s);*

   b. the measured or estimated volume of the *Event(s);*

   c. the duration of the *Event(s);*

   d. the location of the *Sewage Pumping Station Overflow* and the receiver;

e. the reason for the *Event(s);* and

f. the impact of the *Event(s)* on the receiver(s).

4. The *Owner* shall use best efforts to collect a representative sample consisting of a minimum of two (2) grab samples of the *Sewage Pumping Station Overflow* and have it analyzed for the parameters outlined in Condition 7 using the protocols specified in Condition 7, one at the beginning of the *Event* and the second approximately near the end of the *Event,* to best reflect the effluent quality of the *Sewage Pumping Station Overflow.*

5. The *Owner* shall maintain a logbook of all *Sewage Pumping Station Overflows,* which shall contain, at a minimum, the types of information set out in sub-conditions 2(a) to 2(d) in respect of each *Sewage Pumping Station Overflow.*

6. OPERATION AND MAINTENANCE OF PUMPING STATION AND FORCEMAINS

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 *Approval* 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 *Approval* and the *EPA* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works.*

2. The *Owner* shall prepare an operations manual prior to the commencement of operation of the Works, that includes, but is not necessarily limited to, the following information:

   a. operating and maintenance 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 to the Spills Action Centre (SAC), the Medical Officer of Health, and the *District Manager;* and

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

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.

4. The *Owner* shall provide for the overall operation of the *Works* an operator who holds a licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.

7. OPERATION AND MAINTENANCE OF STORMWATER WORKS

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.

2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public. ..

3. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

4. The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.

5. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:

   a. the name of the Works; and

   b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.

6. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:

   a. operating and maintenance 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. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and

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

7. The Owner shall maintain the operations manual current and retain a copy at the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

8. MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the *Works,* carry out the following monitoring program:

1. All samples and measurements taken for the purposes of this *Approval* are to be taken at a time and in a location characteristic of the quality and quantity of the *Sewage Pumping Station Overflow* stream over the time period being monitored.

2. Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded, seen in Schedule C.

3. The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

a. the *Ministry's* Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)”, as amended from time to time by more recently published editions;

b. the *Ministry's* publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater” (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions; and

c. the publication “Standard Methods for the Examination of Water and Wastewater” (21st edition), as amended from time to time by more recently published editions.

9. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 millimetres of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

10. REPORTING

1. One (1) week prior to the start-up of the operation of the *Works,* the *Owner* shall notify the *District Manager* (in writing) of the pending start-up date.

2. The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

3. The *Owner* shall prepare and submit a performance report to the *District Manager* on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

   a. a summary and interpretation of all monitoring data, including an overview of the success and adequacy of the *Works;*

   b. a description of any operating problems encountered and corrective actions taken;

   c. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

   d. a summary of the calibration and maintenance carried out on all monitoring equipment;

   e. a summary of any complaints received during the reporting period and any steps taken to address the complaints;

   f. a summary of all *Sewage Pumping Station Overflows,* spill or abnormal discharge events;

g. a copy of all *Notice of Modifications* submitted to the *District Manager* as a result of Schedule B, Section 1, with a status report on the implementation of each modification;

h. a report summarizing all modifications completed as a result of Schedule B, Section 3; and

i. any other information the *District Manager* requires from time to time.

4. The *Owner* shall, within thirty (30) calendar days of issuance of this *Approval,* submit a Municipal Wastewater System Profile Information Form, and shall resubmit the updated document every time a notification is provided to the *District Manager* in compliance with requirements of change of ownership under this *Approval.*

11. LIMITED OPERATIONAL FLEXIBILITY

1. The *Owner* may make modifications to the *Works* in accordance with the Terms and Conditions of this *Approval* and subject to the *Ministry's* "Limited Operational Flexibility Criteria for Modifications to Sewage Works", included under Schedule B of this *Approval,* as amended.

2. Sewage works proposed under *Limited Operational Flexibility* shall adhere to the design guidelines contained within the *Ministry's* publication "Design Guidelines for Sewage Works 2008", as amended.

3. The *Owner* shall ensure at all times, that the *Works,* related equipment and appurtenances which are installed or used to achieve compliance are operated in accordance with all Terms and Conditions of this *Approval.*

4. For greater certainty, the following are not permitted as part of *Limited Operational Flexibility:*

    a. modifications to the *Works* that result in an increase of the approved Rated Capacity of the *Works;*

    b. modifications to the *Works* that may adversely affect the approved effluent quality criteria or the location of the discharge/outfall;

    c. modifications to the treatment process technology of the *Works,* or modifications that involve construction of new reactors (tanks) or alter the treatment train process design;

    d. modifications to the *Works* approved under s.9 of the *EPA;* and

    e. modifications to the *Works* pursuant to an order issued by the *Ministry.*

5. Implementation of *Limited Operational Flexibility* is not intended to be used for piecemeal measures that result in major alterations or expansions.

6. If the implementation of *Limited Operational Flexibility* requires changes to be made to the

Emergency Response, Spill Reporting and Contingency Plan, the *Owner* shall, as deemed necessary in consultation with the *District Manager,* provide a revised copy of this plan to the local fire services authority prior to implementing *Limited Operational Flexibility.*

7. For greater certainty, any modification made under the *Limited Operational Flexibility* may only be carried out after other legal obligations have been complied with, including those arising from the Environmental Protection Act, Niagara Escarpment Planning and Development Act, Oak Ridges Moraine Conservation Act, Lake Simcoe Protection Act and Greenbelt Act.

8. Prior to implementing *Limited Operational Flexibility,* the *Owner* shall complete a *Notice of Modifications* describing any proposed modifications to the *Works* and submit it to the *District Manager.*

Schedule A

1. Application for Environmental Compliance Approval December 20, 2018 and received on December 24, 2018, including design report, final plans and specifications.

Schedule B

Limited Operational Flexibility

Protocol for Pre-Authorized Modifications to Municipal Sewage Works - Pumping Station

1. General

    1. Pre-authorized modifications are permitted only where Limited Operational Flexibility has already been granted in the Approval and only permitted to be made at the pumping stations in the Works, subject to the conditions of the Approval.

    2. Where there is a conflict between the types and scope of pre-authorized modifications listed in this document, and the Approval where Limited Operational Flexibility has been granted, the Approval shall take precedence.

    3. The Owner shall consult the District Manager on any proposed modifications that may fall within the scope and intention of the Limited Operational Flexibility but is not listed explicitly or included as an example in this document.

    4. The Owner shall ensure that any pre-authorized modifications will not:

        a. adversely affect the hydraulic profile of the sanitary sewage system;

        b. result in new Overflow locations, or any potential increase in frequency or quantity of Overflow.

2. Modifications that do not require pre-authorization:

    1. Sewage works that are exempt from Ministry approval requirements;

    2. Modifications to the electrical system, instrumentation and control system.

3. Pre-authorized modifications that do not require preparation of “Notice of Modification to Sewage Works”

    1. Normal or emergency maintenance activities, such as repairs, renovations, refurbishments and replacements with Equivalent Equipment, or other improvements to an existing approved piece of equipment of a treatment process do not require pre-authorization. Examples of these activities are:

        a. Repairing a piece of equipment and putting it back into operation, including replacement of minor components such as belts, gear boxes, seals, bearings;

   b. Repairing a piece of equipment by replacing a major component of the equipment such as motor, with the same make and model or another with the same or very close power rating but the capacity of the pump or blower will still be essentially the same as originally designed and approved;

   c. Replacing the entire piece of equipment with Equivalent Equipment.

2. Improvements to equipment efficiency or treatment do not require pre-authorization. Examples of these activities are:

   a. Adding variable frequency drive to pumps;

   b. Adding flow measurement or other control device.

4. Pre-Authorized Modifications that require preparation of "Notice of Modification to Sewage Works"

   1. Pumping Stations

      a. Replacement, realignment of existing sewers including manholes, valves, gates, weirs and associated appurtenances provided that the modifications will not add new influent source(s) or result in an increase in flow from existing sources as originally approved.

      b. Extension or partition of wetwell to increase retention time for emergency response and improve station maintenance and pump operation;

      c. Replacement or installation of inlet screens to the wetwell;

      d. Replacement or installation of flowmeters, construction of station bypass;

      e. Replacement, reconfiguration or addition of pumps and modifications to pump suctions and discharge pipings provided that the modifications will not result in a reduction in the firm pumping capacity or discharge head or an increase in the peak pumping rate of the pumping station as originally designed;

      f. Replacement, realignment of existing forcemain(s) including valves, gates, and associated appurtenances provided that the modifications will not reduce the flow capacity or increase the total dynamic head and transient in the forcemain.

   2. Chemical Systems in Pumping Stations

      a. Replacement and relocation of chemical storage tanks for existing chemical systems only, provided that the tanks are sited with effective spill containment;

b. Replacement of existing chemical dosing pumps provided that the modifications will not result in a reduction in the firm capacity that the dosing pumps are originally designed to handle.

c. Use of an alternate chemical provided that it is a non-proprietary product and is a commonly used alternative to the chemical approved in the Works, provided that the existing chemical storage tanks, chemical dosing pumps, feed pipes and controls are also upgraded, as necessary.

3. Standby Power System

   a. Replacement or installation of standby power system, including feed from alternate power grid, emergency power generator, fuel supply and storage systems, provided that the existing standby power generation capacity is not reduced.

This page contains an image of the form entitled "Notice of Modification to Sewage Works". A digital copy can be obtained from the District Manager.

Ontario

Ministry of the Environment, Conservation and Parks

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA ON-SITE PRIOR TO THE SCHEDULED IMPLEMENTATION DATE.

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number and issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:

1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:

1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Has been designed in accordance with the Limited Operational Flexibility as described in the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name (Print)	PEO License Number
Signature	Date (mm/dd/yy)
Name of Employer	

Part 4 – Declaration by Owner

I hereby declare that:

1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. This modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate

Name of Owner Representative (Print)	Owner representative's title (Print)
Owner Representative's Signature	Date (mm/dd/yy)

EAPB Form July 26, 2018

Schedule C

Table 1 - Monitoring during a Sewage Pumping Station Overflow Event

(Samples to be collected from the Sewage Pumping Station Overflow stream)

Sample Type	Grab
Frequency	One sample at the beginning of the Event and the second sample approximately near the end of the Event
Parameters	BOD5, Total Suspended Solids, Total Phosphorus, Total Ammonia Nitrogen, E. coli (Note 1 see below), and pH

Note 1: Sampling and analysis shall be performed only for Events that occur between April 1 and October 31 inclusive

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

1. Condition 1 is imposed to ensure that the *Works* are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the *Approval* and the practice that the *Approval* is based on the most current document, if several conflicting documents are submitted for review.

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 *Ministry* records are kept accurate and current with respect to approved *Works* and to ensure that subsequent owners of the *Works* are made aware of the *Approval* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the *Approval* and that record drawings of the *Works* "as constructed" are updated and maintained for future references.

5. Condition 5 is included to indicate that *Sewage Pumping Station Overflows* are prohibited, except in circumstances where the failure to overflow could result in greater injury to the public interest than the *Sewage Pumping Station Overflow* itself. The notification and documentation requirements allow the *Ministry* to take action in an informed manner and ensure that the *Owner* is aware of the extent and frequency of *Events.*

6. Condition 6 and 7 is included to ensure that the *Works* are 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. The Condition also ensures that 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 is 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, proper plant operation, and identification and planning for contingencies during abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the operation of the *Works.*

7. Condition 8 is included to provide additional details on the monitoring of *Sewage Pumping Station Overflows.*

8. Condition 9 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.

9. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Approval,* so that the *Ministry* can work with the *Owner* in resolving any problems in a

timely manner.

10. Condition 11 is included to ensure that the *Works* are operated in accordance with the application and supporting documentation submitted by the *Owner,* and not in a manner which the *Director* has not been asked to consider. These conditions are also included to ensure that a *Professional Engineer* has reviewed the proposed modifications and attests that the modifications are in line with that of *Limited Operational Flexibility,* and provide assurance that the proposed modifications comply with the *Ministry's* requirements stipulated in the terms and conditions of this *Approval, Ministry* policies, guidelines, and industry engineering standards and best management practices.

In accordance with Section 139 of the Environmental Protection Act, 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 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

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

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

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, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment,
Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 26th day of February, 2019

A. Ahmed

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

KH/
c: District Manager, MECP Ottawa
Steven Merrick, David Schaeffer Engineering Ltd.

G

Appendix G
Phase 1 (DSEL Report)

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

WINDMILL DEVELOPMENT GROUP LTD.
DOMTAR LANDS REDEVELOPMENT – PHASE 1

CITY OF OTTAWA

PROJECT NO.: 14-717

AUGUST 2018 – REV 4

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
FOR
WINDMILL DEVELOPMENT GROUP LTD.
DOMTAR LANDS REDEVELOPMENT – PHASE 1

AUGUST 2018 – REV 4

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FOR
WINDMILL DEVELOPMENT GROUP LTD.
DOMTAR LANDS REDEVELOPMENT – PHASE 1

CITY OF OTTAWA

AUGUST 2018 – REV 4

PROJECT NO.: 14-717

1.0 INTRODUCTION

David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare a Functional Servicing and Stormwater Management Report (FSR) for the proposed Domtar Lands Redevelopment, henceforth referred to as Zibi Ontario, in support of Windmill Development Group's application for Site Plan Control (SPC) for Phase 1 of the development.

The subject property consists of lands within the City of Ottawa urban boundary. The applicant also owns lands within Gatineau, Quebec that are planned to be designed and constructed concurrently with the proposed development within Ottawa, Ontario. The Ontario and Quebec developments will be serviced independently, the following FSR is solely in support of the Phase 1 of the Ontario Site.

As illustrated in ***Figure 1***, the subject property is located on parts of Chaudière and Albert Islands within the Ottawa River, and it is accessible via Booth Street and the Chaudière Bridge. The following FSR is to support the development of Phase 1 only, as indicated in ***Figure 1,*** which measures approximately ***1.09 ha.*** Phase 1 is generally bounded by Booth Street to the east, Albert Island to the south and Energy Ottawa owned lands on Chaudière Island to the north, see site plan in ***Drawings/Figures*** for limits of Phase 1.

The subject site is currently comprised of thirteen parcels of land with two civic addresses, 3 & 4 Booth Street, herein referred to as the site.

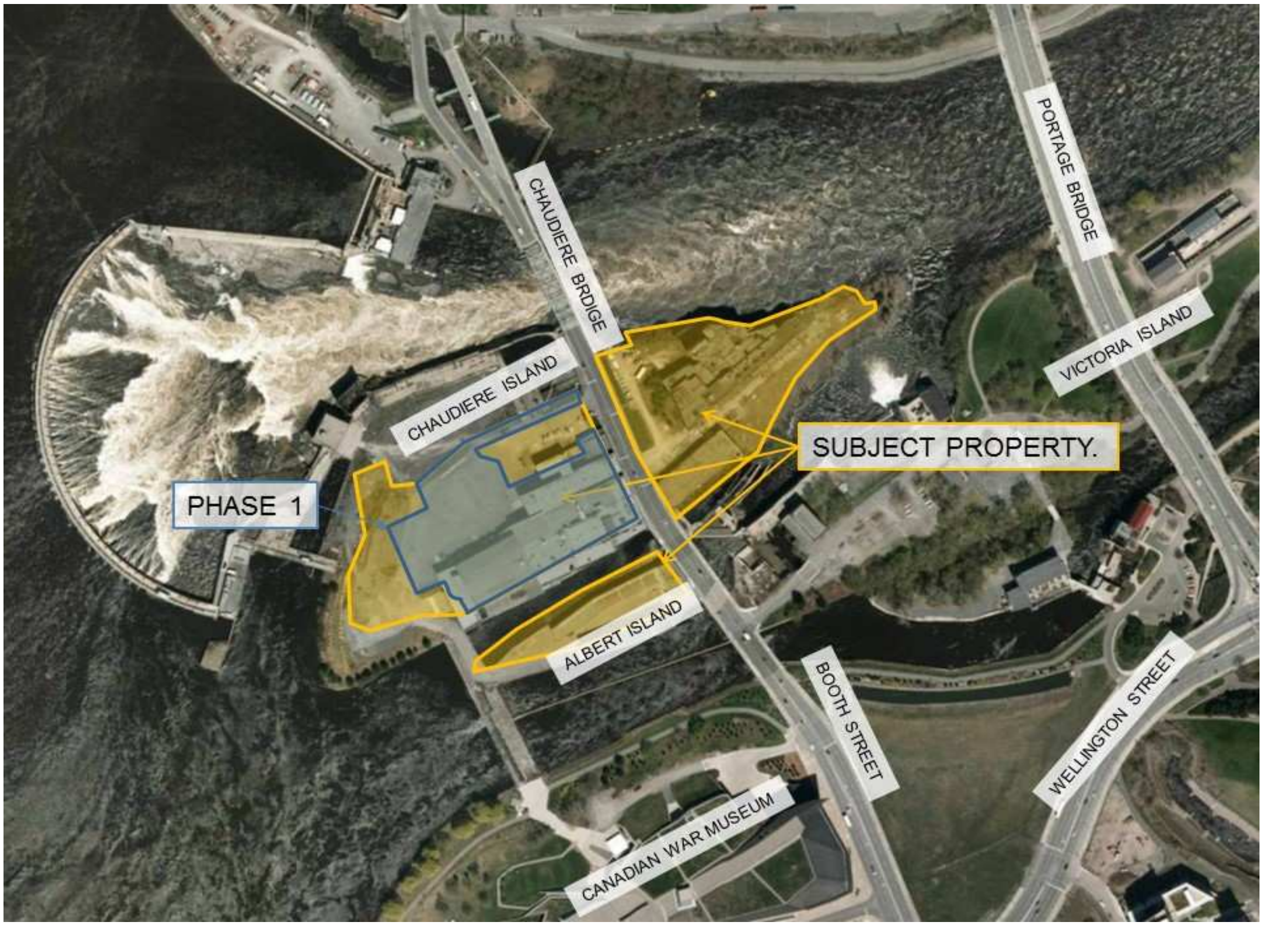


Figure 1: Site Location

The proposed development of Phase 1 involves the construction of a total of ***5990m²*** of retail, commercial and office space, approximately ***71*** residential units and all associated roadways, surface and underground parking.

The objective of this report is to support the application for Site Plan Control by providing sufficient detail to demonstrate that the development is supported by existing municipal servicing infrastructure and that the contemplated site design conforms to current City of Ottawa design standards, in addition to, state of the art design strategies to meet the client's "One Planet" strategy.

Servicing and grading presented in the detailed design of Phase 1 is consistent with the *Master Servicing Plan – Domtar Redevelopment Lands*, prepared by DSEL (May 2018), noting that servicing and grading will be updated to reflect any future changes to the Master Servicing Plan.

1.1 Existing Conditions

A detailed survey of Chaudière and Albert Islands was completed by Fairhall Moffat & Woodland Limited on December 11, 2014. As per the topographic survey, elevations vary from ***46.20m*** at the east edge of the Chaudière Island to ***54.85m*** to the west. Stantec Geomatics Ltd., completed topographical surveys of Booth Street, Fleet Street, Lloyd Street and Albert Street and compiled their results on April 20, 2018 topographical sketch.

The subject site currently consists of several vacant industrial facilities, historically part of a paper mill that was in operation until 2007.

The site is made up of existing building footprint and gravel covered vacant lands. A portion of the Chaudière Island lands west of Booth Street consist of grassed and landscaped area.

Sewer and watermain mapping, along with as-recorded drawings collected from the City of Ottawa, indicate that the following services exist across the property frontages within the adjacent municipal right-of-ways:

Booth Street:

- 203mm diameter ductile iron watermain (North of Middle Street);
- 305mm diameter PVC watermain (South of Middle Street);
- 250mm diameter sanitary sewer;
- 1200mm diameter storm sewer.

Middle Street:

- 203mm diameter ductile iron watermain;
- 250mm diameter sanitary sewer;
- 300mm diameter storm sewer;
- Sanitary pumping station northwest corner of the Portage Bridge and Middle Street.

Portage Bridge:

- 100mm diameter sanitary forcemain;
- Sanitary pumping station, northwest of the Portage Bridge and Wellington Street intersection;
- 450mm diameter storm sewer.

1.2 Required Permits / Approvals

Development of the site is subject to the City of Ottawa Planning and Development Approvals process. The City of Ottawa must approve detailed engineering design drawings and reports, prepared to support the proposed development plan.

The culverts draining the Buchanan Channel, the Electric Channel Span and Bronson Channel Span are all owned by Public Services and Procurement Canada (PSPC). Any works impacting the existing structures are to be coordinated with PSPC.

The proposed infrastructure is subject to the Ontario Water Resources Act and requires approval under Section 53. Two Environmental Compliance Approval applications are required. One for the new stormwater outlets to the Ottawa River to be submitted directly to the Ministry of Environment and Climate Change. The second application will be prepared under the City of Ottawa Transfer of Review project for the remaining infrastructure.

Furthermore, approval under Section 28 of the Conservation Authorities Act is required for the new outlets to the Ottawa River. The application will be prepared and submitted to the Rideau Valley Conservation Authority.

1.3 Pre-consultation

Pre-Consultation was conducted with the City of Ottawa and Rideau Valley Conservation Authority via email, along with a formal pre-consultation meeting held between the client and City staff on December 20, 2013. Correspondence and a servicing guidelines checklist are included in ***Appendix A***.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

- **Ottawa Sewer Design Guidelines**,
  City of Ottawa, *SDG002,* October 2012.
  (City Standards)

    - Technical Bulletin ISDTB-2014-01
      City of Ottawa, February 5, 2014.
      (ITSB-2014-01)

    - Technical Bulletin PIEDTB-2016-01
      City of Ottawa, September 6, 2016.
      (PIEDTB-2016-01)

    - Technical Bulletin ISTB-2018-01
      City of Ottawa, March 21, 2018.
      (ISTB-2018-01)

- **Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, October 2012.
  (Water Supply Guidelines)

    - Technical Bulletin ISD-2010-2
      City of Ottawa, December 15, 2010.
      *(*ISD-2010-2*)*

    - Technical Bulletin ISDTD-2014-2
      City of Ottawa, May 27, 2014.
      *(*ISDTD-2014-2*)*

    - Technical Bulletin ISDTB-2018-02
      City of Ottawa, March 21, 2018.
      (ISDTB-2018-02)

- **Stormwater Planning and Design Manual**,
  Ministry of the Environment, March 2003.
  (SWMP Design Manual)

- **Ontario Building Code Compendium**
  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010 Update.
  (OBC)

- **Low Impact Development Stormwater Management Planning and Design Guide**
  Toronto Region Conservation Authority (TRCA) & Credit Valley Conservation Authority (CVC), 2010,
  (LID Manual)

- **Master Servicing Study – Domtar Redevelopment Lands**
  DSEL, June, 2018.
  (MSS – Domtar Redevelopment)

- **Drainage Management Manual**
  Ministry of Transportation of Ontario (MTO), 1997.
  (MTO Drainage Manual)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 1W pressure zone. A 300mm diameter watermains exist within the Booth Street crossing the Bronson Channel to connect to a 203mm watermain within Middle Street. The subject site is fed by 203mm watermains within Middle Street and Booth Street (North of the Bronson Channel). Drawing ***EX-1,*** included with this report***,*** illustrates the existing water distribution network.

Historically, the site would have been serviced via several 203mm diameter service laterals connecting to the 203mm diameter watermain within Booth Street. As discussed previously, the historical conditions of the site up until 2007 were entirely industrial.

Table 1 summarizes the ***Water Supply Guidelines*** employed in the preparation of the historical and proposed water demand estimate.

Table 1
Water Supply Design Criteria

Design Parameter	Value
Industrial – Heavy	55,000 L/gross ha/d
Restaurant Demand	125 L/seat/d
Residential Average Apartment	1.8 person/unit
Residential Daily Average	280 L/person/d
Residential Maximum Daily Demand*	4.9 x avg. day *
Residential Maximum Hourly*	7.4 x avg day *
Commercial-Floor space	2.5 $L/m^2/d$
Commercial-Industrial Maximum Daily Demand	1.5 x avg. day L/gross ha/d
Commercial-Industrial Maximum Hour Demand	1.8 x max. day L/gross ha/d
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350kPa and 480kPa
During normal operating conditions pressure must not drop below	275kPa
During normal operating conditions pressure shall not exceed	552kPa
During fire flow operating pressure must not drop below	140kPa
** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3, see calculations in Appendix B for peaking factors for Phase 1* **** Table updated to reflect ISD-2018-2*	

Table 2 Summarizes the historical water demand based on the current City of Ottawa ***Water Supply Guidelines***.

Table 2
Water Demand - Historical Site Conditions

Design Parameter	Historical Water Demand[1] (L/min)
Average Daily Demand	216.6
Max Day	324.8
Peak Hour	584.7

1) Water demand calculations per ***Water Supply Guidelines***. Refer to ***Appendix B*** for detailed calculations.

3.2 Water Supply Servicing Design

The proposed water servicing will consist of new 200mm and 300mm watermains from the subject site, traveling south down Booth Street and across the Electric and Bronson Channels. A pipe bridge is proposed on the west side of the channel to house the watermains. The 300mm watermain is proposed to connect to the existing 300mm watermain within Booth Street and the 200mm watermain is proposed to connect to the existing 400mm watermain at the intersection of Booth Street and Wellington Street. The proposed 200mm watermain is required to connect to the east side of the butterfly valve at the east side of the intersection of Wellington Street and Booth Street. Internal 200mm and 300mm watermains are proposed to service Phase 1.

Each building will be serviced independently via connections to the private watermain network. Fire hydrants will be provided internally to provide adequate fire protection coverage, as per the ***Water Supply Guidelines***. Fire flow for the proposed and re-purposed building was estimated per ***ISTB-2018-02***. Block 205-A resulted in the highest fire flow of ***10,000 L/min***, see ***Appendix B*** for detailed calculations. The pipes have been sufficient sized to provide fire flow for all buildings in the ultimate condition.

Table 3 summarize the anticipated water demand and boundary conditions for the proposed development, calculated using the ***Water Supply Guidelines***.

Table 3
Water Demand – Proposed Site Conditions

Design Parameter	Anticipated Demand[1] Phase 1 (L/min)	Boundary Condition[2] ($m\ H_2O$ / kPa) Connection @ Booth Street		Boundary Condition[2] ($m\ H_2O$ / kPa) Connection @ Wellington Street	
Average Daily Demand	32.8	61.7	605.3	58.6	574.9
Max Day + Fire Flow	128.7 + 10,000 = 10,128.7	50.3	493.4	52.5	515.0
Peak Hour	198.5	54.7	536.6	51.6	506.2

1) Water demand calculation per ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.
2) Boundary conditions supplied by the City of Ottawa for demands as indicated in correspondence. Assumed ground elevation @ Booth Street ***53.4m***, @ Wellington Street ***56.5m***, See ***Appendix B.***

The boundary conditions summarized in ***Table 3*** are based water demands for Phase 1 development. After further information was received on commercial, retail, office and community space, the resulting water demands decreased.

3.3 Water Modeling

EPANet was utilized to determine the availability of pressures throughout the system during average day demand, max day plus fire flow, and peak hour demands. Additionally, the model was used to assess maximum pressure for the future conditions. This static model determines pressures based on the available head provided by the City of Ottawa boundary conditions. The model utilizes the Hazen-Williams equation to determine pressure drop, while the pipe properties have been selected in accordance with ***Water Supply Guidelines***. The model was prepared to assess the available pressure at the finished first floor of each building.

Two hydrants are proposed to service the site for Phase 1 of the development; labeled hydrant 7 and hydrant 5 in the EPAnet figures provided in ***Appendix B***. Fire flow scenario through Hydrant 5 causes the lowest pressure through the system. However, both of these nodes are capable of sustaining ***10,000 L/min,*** as per the ***ISTB-2018-02*** estimated fire demand for this phase, while also maintaining the standards outlined in ***Table 1***.

Table 4 summarizes the pressures in each scenario, including the fire flow scenario yielding the lowest pressure. ***Appendix B*** contains output reports and model schematics for each scenario.

Table 4
Model Simulation Output Summary – Phase 1

Location	**Average Day (kPa)**	**Max Day + Fire Flow (kPa)**	**Peak Hour (kPa)**
Block 208	601.0	452.3	532.3
Block 205A	596.1	435.6	527.3
EX1	624.9	504.2	556.2
FH 7 (Node 3)	598.4	463.4	529.7
FH 5 (Node 30)	599.0	421.6	530.2
Note: FH5 & FH7 modelled assuming a fire flow of ***10,000 L/min*** demand run through FH5 for max. day plus fire flow scenario.			

As demonstrated in ***Table 4***, the anticipated pressures during the average day simulations and nodes at the north end of the system during peak hour simulation are higher than allowable pressures in ***Table 1***. Pressure reducing valves are recommended. The recommended pressures from the ***Water Supply Guidelines*** are respected during max day + fire flow scenarios.

The model predicted that water will flow in all areas of the system and no ‘dead’ zones were found.

It should be noted that the pressures in ***Table 4*** represent the available pressure at the building meter. The mechanical designer must ensure that the internal distribution system is designed in accordance with the OBC.

3.4 Water Supply Conclusion

The site will be serviced by a 300mm and 200mm watermain within Booth Street; one to connect to the existing 300mm watermain within Booth Street a second connection to the existing 400mm watermain within Wellington Street.

An EPANet model was prepared based on boundary conditions received from the City of Ottawa. Pressures in average day and peak hour scenario exceed the recommended pressures, as per the ***Water Supply Guidelines,*** therefore pressure reducing valves are recommended. The proposed system is sufficiently sized to provide fire flow at minimum pressures.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject site, based on City of Ottawa's infrastructure maps & utility plans, is connected to the 250mm sanitary sewer within Middle Street. To accomplish this connection, a series of pumps stations direct flow to a single private pump station within the subject lands, east of Booth Street (Building 535). This existing private pump station discharges via a forcemain to the Middle Street sanitary sewer. A figure, prepared by Greenough Environmental Consulting Inc. for Domtar Inc., showing the location of on-site pump stations and forcemains can be found in ***Drawings/Figures*****.** The Middle Street sanitary sewer discharges via gravity flow to an existing pump station northwest of the intersection of Middle Street and The Portage Bridge. A 100mm forcemain directs sanitary flow to a second pump station to the south, across the Bronson Channel. The south pump station discharges via a 100mm forcemain to the 1830mm diameter interceptor sewer (IS) north of Sparks Street. Both pump stations are owned and operated by the NCC and service commercial and recreational development on Victoria Island.

Refer to drawings ***EX-1*** and ***EX-2,*** included with this report***,*** for existing wastewater services.

A field investigation of the existing main pump station on Chaudière Island was completed by DSEL on June 30, 2015. The field investigation was to determine the existing condition of the pump station including: wet well size; start and stop elevations; pump type and model; and existing pump discharge. A flow rate of ***6.7 L/s*** was observed during operation of the pump through the existing flow meter connected to the forcemain. The pump curve based on the existing pumps was obtained from the manufacturer. The pump curve suggests that the observed flow rate would result in the pump operating in an overloaded condition. See existing pump curve information in a technical memo by Hatch, provided in ***Appendix C***.

Table 5 summarizes the ***City Standards*** employed in the estimate of available capacity within the municipal wastewater sewer systems, as well as, in the calculation of wastewater flow rates for the historical and proposed development.

Table 5
Wastewater Design Criteria

Design Parameter	Value
Industrial-Heavy	55,000 L/gross ha/d
Restaurant Demand	125 L/seat/d
Industrial Peaking Factor*	4.75
Residential 1 Bedroom Apartment Demand	1.4 person/unit
Residential 2 Bedroom Apartment Demand	2.1 person/unit
Residential Average Apartment Demand	1.8 person/unit
Residential Daily Average	280 L/person/d
Commercial Floor Space	5 L/m²/d
Peaking Factor	Harmon's Peaking Factor. Max 3.8, Min 2.0 Correction Factor = 0.8
Infiltration and Inflow Allowance	0.33L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Minimum Sanitary Sewer Lateral	135mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s

** Industrial Peaking Factor determined as per MOE Guidelines for the Design of Sanitary Sewers, Typical Industrial Sewage Flow Peaking Factors Graph.*
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.

4.2 Wastewater Design

The ultimate design proposes a new sanitary pump station on the east edge of Chaudiere Island. The proposed internal sanitary system, consisting of 250mm diameter sanitary sewers, will collect the sanitary flow from the site and will flow to the proposed pump station. The proposed twin 200mm diameter forcemains will convey flow from the pump station south down Booth Street. A pipe bridge is proposed to allow the twin forcemains to cross the Electric and Bronson Channel spans. The forcemains are proposed to travel further south along Booth, east on Fleet Street and south down Lloyd Street. The forcemains are proposed to cross the existing aquaduct and discharge to a proposed sanitary manholes on the north side of the LRT Tunnel. Gravity sewers convey flow across the LRT tunnel prior to discharging to the existing 450mm sanitary sewer within Albert Street and eventually the Interceptor Sewer, in accordance with the ***MSS – Domtar Redevelopment***.

The proposed forcemains from the pump station to the new sanitary structure north of the LTR will remain in private ownership. A license to occupy will be required within the municipal ROW and future park. The gravity portion of sanitary sewer over the LRT and manholes north and south of the LRT will be conveyed to the City.

It is proposed in the interim to construct the off-site forcemain as described above and retrofit the existing private pump station with Building 535. A design brief for the retrofitted pump station is submitted under separate cover by Hatch.

Individual buildings within the proposed development will be serviced internally via gravity draining sanitary sewer network; detailed layout and sizing is shown by drawing ***SSP-1*** included with this report.

Table 6 below summarizes the anticipated wastewater discharge from the proposed development based on criteria found in ***Table 5***.

Table 6
Summary of Anticipated Wastewater Discharge

Design Parameter	Phase 1 Flow (L/s)
Average Dry Weather Flow Rate	0.7
Peak Dry Weather Flow Rate	1.8
Peak Wet Weather Flow Rate	2.2

The estimated proposed sanitary flow for Phase 1 based on the architectural site plan is ***2.2 L/s***.

City of Ottawa ***Technical Bulletin ISTB-2018-01,*** was employed to generate an estimate of the proposed wastewater flow conditions.

In the event of service interruption, mobile pumper trucks will be employed until the service is restored.

4.3 Wastewater Servicing Conclusion

Ultimate servicing is provided by a centralized pump station on the east edge of Chaudiere Island. Twin forcemains are proposed to convey flow south, crossing the LRT tunnel and discharging to a gravity sewer within Albert Street, eventually discharging to the Interceptor Sewer.

An interim pump station is proposed within Building 535. The pump station is proposed to discharge to the ultimate forcemains proposed within Booth Street.

The proposed wastewater design conforms to all relevant ***City Standards***.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

Stormwater runoff from the existing subject property is directed uncontrolled to the Ottawa River. The major and minor flow is directed to the Ottawa River overland with a small portion of flow directed by catch basins along Booth Street. The site currently consists of varying sloped topography (0.5% to >5%) and mostly impervious building footprint or associated parking area.

The existing site contains no stormwater management quality controls or controls for flow attenuation.

Runoff from the site is directed to the Ottawa River directly downstream of the Chaudière Falls which has a drop and breadth of 15 and 60m, respectively. The dam is used by Hydro Ottawa and Hydro-Quebec to produce electricity. The dam is also monitored and controlled by the Ottawa River Regulation and Planning Board for flood control.

5.2 Post-development Stormwater Management Targets

Stormwater management requirements for the proposed development are based on relevant ***City Standards*** and pre-consultation with City of Ottawa and Rideau Valley Conservation Authority staff. It has been established that the following criteria apply:

- Increase to flood risk and flood levels in the Ottawa River will not be impacted by the proposed development and therefore stormwater quantity controls are not required;
- Based on the consultation with the City & RVCA, stormwater quality controls will be required to achieve an "enhanced" level of quality control as per the ***SWMP Design Manual***, 80% reduction in Total Suspended Solids (TSS) prior to release to the Ottawa River.

5.3 Stormwater Management System

The stormwater management system will consist of a private storm sewer system, outlasting at the north edge of Chaudière Island, east of Booth Street.

The private stormwater sewer system has been sized to convey an uncontrolled 5-year storm runoff rate in accordance with the ***City Standards***. Detailed layout and sizing is illustrated by ***SSP-1*** which is included with this report.

The Rational Method was utilized to calculate the runoff from the storm sewer catchment areas; Rational Method "C" values for the catchment areas were derived using "*Table 5.7 Runoff Coefficients for Various Soil Conditions"* from the ***City Standards***.

To meet the specified stormwater quality criteria, an end of pipe oil/grit separator (OGS) unit will be designed to provide a TSS reduction of at least 80% achieving an “enhanced” level of quality control, as per the ***SWMP Design Manual***. Rooftop runoff is considered clean, therefore, buildings adjacent to the shoreline will have roof leaders discharge directly the Ottawa River, as per pre-consultation with the RVCA. It is proposed to provide a Stormceptor ***STC4000*** (or approved equivalent) prior to discharge to the Ottawa River. A hydrodynamic separator is also contemplated within the parking garage of the building to treat any surface water entering the internal mechanical system from the access road or courtyard area to 80% TSS Removal. Refer to the internal mechanical plans for details of the internal quality control.

5.4 Minor and Major System Flow

Stormwater conveyance is achieved through a minor system comprised of catch basins and storm sewers and a major system comprised of overland flow within the 6.0m asphalt access road. Inlet control devices are not proposed for the catch basins, CB capture has been analyzed to ensure that a minimum of the 2-year storm event is captured by the minor system. During storm events larger than the 2-year storm event, the access road is used to convey flow to Booth Street and north to the Ottawa River.

Two minor system outlets are proposed in Phase 1. The first outlet is proposed to capture the future flow form the west edge of the Island and the majority of flow from the temporary parking area, refer to area ***FUT*** and ***104B*** on drawing ***SWM-1*** included with this report. Minor system flow is conveyed by storm sewers to the proposed HW100, outleting to the Ottawa River, east of Booth Street. A second outlet is proposed to convey flow from the internal courtyard, noted drainage area ***104A*** on drawing ***SWM-1,*** through the building mechanical system to an outlet east of Booth and south of Building 535.

Major system flow from both drainage areas is directed overland via access lanes or the courtyard to Booth Street where it is conveyed north overland and eventually discharges to the Ottawa River.

A dynamic stormwater management model was prepared to analyze the flow to the minor and major system for Phase 1. The model contemplates the future flow from construction of Phase 2 and all future phases west of Booth Street on Chaudière Island in accordance with the ***MSS – Domtar Redevelopment***. Drainage areas in the dynamic model are consistent with those shown in drawing ***SWM-1***.

5.4.1 Model Summary

The hydrology and hydraulics of the proposed stormwater management system were analyzed in EPASWMM using the Dynamic Wave Routing Model.

The following assumptions were made in the preparation for the EPASWMM model:

Hydrology:

- Initial abstraction parameters per City of Ottawa standards;
- Horton's infiltration for soil loss, per City guidelines;
- Calculated % impervious area;
- Sub-catchment width measured as perpendicular area to catch basins for longest distance of travel;
- A 4 Hour Chicago Distribution resulted in the high peak flow and was used in the analysis.

Hydraulics:

- Storage Nodes represent both surface and subsurface components. Each node is assigned an invert elevation that corresponds with the tributary catch basin;
- "Regular" Node represent either connections to the sewer main or strategic maintenance structure locations. Not all structures have been included in model;
- All conduits have been assigned a Mannings n = 0.013;
- CB capture along a continuous slope analyzed with an "bottom draw" orifice represented by a square orifice opening of a CB (0.125m^2) multiplied by the number of CB within the catchment. Assumes top of lid for CB on a continuous sag is 3cm below grade and a discharge coefficient of 0.61;
- CB capture within a sag calculated using Table 4.19 from the ***MTO Drainage Manual*** for CB Capture and the Orifice Equation (per the ***City Standards)*** to calculate CB Lead Capture. The lower of the CB Capture or CB Lead Capture was used to determine the capture at incremental heads, refer to ***Appendix D*** for the stage-discharge curve for single and twin CB and a 250mm lead used in the analysis;
- Trench Drain capture equal to 5.9 L/s per manufacturer specification, refer to ***Appendix D*** for specification.

5.4.2 Model Results

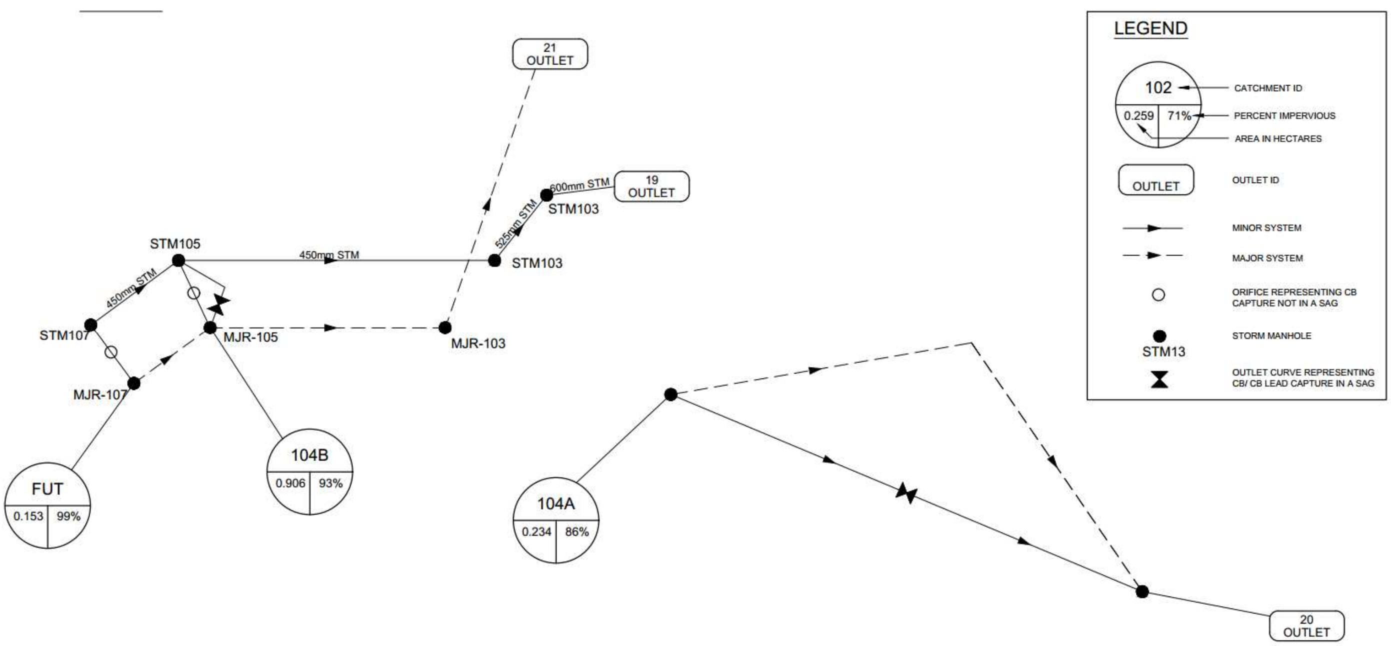
As previously discussed, the minor system has been designed to capture the 2-year storm event. Larger storm events are proposed to use the access road as a major flow route. ***Table 7*** below, summarizes the minor system flow, major system flow and major system depth of flow during various storm events.

Table 7
Summary of Minor and Major System Flow, 4 Hour Chicago Storm Distribution

	Minor / Major System Flow from Area Fut & 104B (1.059 Ha)			Minor / Major System Flow from Area 104A (0.234 Ha)		
Storm Event	**Minor Flow to HW100 (L/s)**	**Major Flow to Booth (L/s)**	**On-Site Max Flow Depth (m)**	**Minor Flow to Outlet South of 535 (L/s)**	**Major Flow to Booth (L/s)**	**On-Site Max Flow Depth (m)**
2-Year	183.5	0.28	0.0	15.8	0	0
5-Year	246.6	18.2	0.02	22.3	0	0
100-Year	344.5	121.3	0.10	60.0	0	0

As shown in the table above, the minor system is capable of capturing the 2-year storm event. A 0.28 L/s flow does result in the 2-year event within Perley Street, the flow is minor and does not result in measurable overland flow depth. The major system flow is limited to a flow depth of 0.02m and 0.10m in the 5-year and 100-year storm event respectively within Perley Street. The minor system within the courtyard is capable of capturing up to the 100-year storm event. Refer to ***Appendix D*** for model results for each storm event and model schematic. Refer to ***Figure 2*** below, for the node diagram representing the model.

Figure 2: Minor and Major EPASWMM Node Diagram



5.5 Stormwater Servicing Conclusions

Stormwater runoff will be captured by a private storm sewer system conveyed to an outlet to the Ottawa River, located east of Booth Street.

Private storm sewer is designed to convey the uncontrolled 5-year runoff rate, in accordance with the ***City Standards.***

To achieve the runoff quality criteria identified through consultation, an end of pipe oil/grit separator will provide an "enhanced" level of treatment, as per the ***SWMP Design Manual***.

A dynamic stormwater management model was completed to analyze the minor system and major system capture on-site. Based on the model the 2-year storm event is fully captured within the minor system and overland flow is limited to 0.10m in the 100-year storm event.

The design of the proposed storm sewer system conforms to all relevant ***City Standards***.

6.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. The extent of erosion losses is exaggerated during construction where vegetation has been removed and the top layer of soil becomes agitated.

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

Silt fence will be installed around the perimeter of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated.

Catchbasins will have a *Siltsack* or approved equivalent installed under the grate during construction to protect silt from entering the storm sewer system. Inlet catchbasins will have *Inletsoxx* or approved equivalent installed during construction to protect silt from entering the storm sewer system

A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.

- Erosion and sediment controls must be in place during construction, See ***EC-1***, included with this report, for detailed erosion and sediment control measures. The following recommendations to the contractor will be included in contract documents:
- Limit extent of exposed soils at any given time;
- Re-vegetate exposed areas as soon as possible;
- Minimize the area to be cleared and grubbed;
- Protect exposed slopes with plastic or synthetic mulches;
- Install silt fence to prevent sediment from entering existing ditches;
- No refueling or cleaning of equipment near existing watercourses;
- Provide sediment traps during dewatering;
- Install appropriate catch basins inlet protection;
- Plan construction at proper time to avoid flooding;
- Establish material stockpiles away from watercourses, so that barriers and filters may be installed.
- The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:
- Verification that water is not flowing under silt barriers;

- Clean and replace Siltsack, as needed, at catch basins.

In addition to the above-mentioned erosion and sediment controls, the storm sewer system and OGS shall be installed prior to extensive site works. All runoff will be directed to the OGS prior to discharge to the Ottawa River. Daily inspection of the OGS and pumping, if required, shall be implemented during the entire duration of the site works.

7.0 UTILITIES

Utility services will need to be coordinated with utility companies prior to development.

Existing gas mains are located within the Booth Street right-of-way

Existing Bell cable are located within the Booth Street right-of-way and the Portage Bridge.

8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare a Functional Servicing and Stormwater Management Report to support the proposed development of Domtar Lands Redevelopment in support of Windmill Development Group's application for Site Plan Control (SPC). The following are the conclusions and recommendations generated by this report:

- An internal water distribution model was completed that verified pressures during average day and peak hour scenarios, pressure reducing control are recommended based on the resulting pressures;

- Fire hydrants are proposed to provide adequate fire protection at each building in Phase 1;

- Sanitary servicing is to be provided by a temporary pump station within Building 525, conveying flow to the forcemains

- A minimum TSS removal of 80% will be required for post-development stormwater runoff from the site, provided by an end of pipe oil/grit separator;

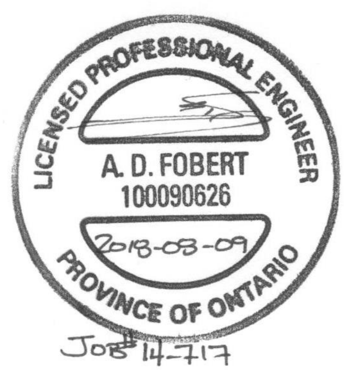
- Utility services will need to be coordinated with utility companies prior to development;

Based on the preceding report, adequate servicing capacity exists to support the proposed development.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Steven L. Merrick, P.Eng.

Reviewed by,
David Schaeffer Engineering Ltd.



Per: Adam D. Fobert, P.Eng

z:\projects\14-717_windmill-the_isles\b_design\b3_reports\b3-2_servicing (dsel)\2018-08_phase1-subm4\fsr_2018-08-08_717_slm_ontario.docx

APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

14-717 17/04/2014

	4.1 General Content	
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Report Cover Sheet
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
☒	Plan showing the site and location of all existing services.	Figure 1
☒	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.0
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Section 2.1
☒	Statement of objectives and servicing criteria.	Section 1.0
☒	Identification of existing and proposed infrastructure available in the immediate area.	Sections 3.1, 4.1, 5.1
☒	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Section 5.0
☒	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	GP-1
☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.4
☒	All preliminary and formal site plan submissions should have the following information: -Metric scale -North arrow (including construction North) -Key plan -Name and contact information of applicant and property owner -Property limits including bearings and dimensions -Existing and proposed structures and parking areas -Easements, road widening and rights-of-way -Adjacent street names	SSP-1

	4.2 Development Servicing Report: Water	
☐	Confirm consistency with Master Servicing Study, if available	N/A
☒	Availability of public infrastructure to service proposed development	Section 3.1
☒	Identification of system constraints	Section 3.1
☒	Identify boundary conditions	Section 3.1, 3.2
☒	Confirmation of adequate domestic supply and pressure	Section 3.3

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Section 3.2
☒	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Section 3.2
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐	Address reliability requirements such as appropriate location of shut-off valves	N/A
☐	Check on the necessity of a pressure zone boundary modification	N/A
☒	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Section 3.2, 3.3
☒	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Section 3.2
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2
☐	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

☒	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 4.2
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.1
☒	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 4.2
☒	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Section 4.2, Appendix C
☒	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 4.2
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	Section 4.0
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

☒	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 5.1
☒	Analysis of available capacity in existing public infrastructure.	Section 5.1, Appendix D
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	EX-1
☒	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 5.2
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 5.2
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3
☐	Set-back from private sewage disposal systems.	N/A
☒	Watercourse and hazard lands setbacks.	GP-1
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Appendix A
☒	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Section 5.2
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 5.3
☒	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Section 6.0
☒	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 5.1, 5.3
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☒	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Appendix D
☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
☐	Identification of potential impacts to receiving watercourses	N/A
☐	Identification of municipal drains and related approval requirements.	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3
☒	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	SWM-1
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0
☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

☒	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement ct. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Section 1.2
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

☒	Clearly stated conclusions and recommendations	Section 9.0
☒	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	Attached Response Letter
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

Steve Merrick

Subject: RE: Watermain testing Booth Street

From: Dover, Steve [mailto:Steve.Dover@ottawa.ca]
Sent: June 16, 2015 1:19 PM
To: 'Adam Fobert'
Cc: Buchanan, Richard; Smadella, Karin
Subject: RE: Watermain testing Booth Street

Hi Adam,

Should the City require that a leakage test is undertaken on Booth Street under the water channel for 305 mm PVC watermain installed in 1995, the City's Water Distribution staff would undertake the test since the test would require operation of valves as well as notification of water service disruption.

Based on the age and watermain material installed I see no reason to undertake a leakage test of this section of watermain.

Regards,

Steve Dover
Project Manager
Environmental Engineering, City of Ottawa
951 Clyde Avenue, Ottawa, ON K1Z 5A6
Tel: (613) 580-2424 Ext.13613
Cell: (613) 266-3809
Fax: (613) 728-4183
e-mail: steve.dover@ottawa.ca

From: Adam Fobert [mailto:afobert@dsel.ca]
Sent: Tuesday, June 16, 2015 11:12 AM
To: Dover, Steve
Cc: Buchanan, Richard
Subject: Watermain testing

Hello Steve,

It was nice to finally meet you face to face on Friday regarding the Windmill project.

You had mentioned a couple of names of companies that could perform a leakage test of that existing 300mm PVC main crossing the river. Could you pass those names on?

Also, I'm assuming that we'd have to shut the main down to do this test. Is there a protocol for informing users of the shut down? Are there specifications that I need to pass onto the contractor performing the leakage test? And lastly, I'm assuming that we'll need a City watermain inspector present since they'll be touching a piece of municipal infrastructure. Correct?

Thanks for your help.

******* PLEASE NOTE THE CHANGES TO THE PHONE NUMBER AND UNIT NUMBER *******

Adam Fobert, P.Eng.
Manager of Site Plan Design

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

direct: (613) 836-0626
cell: (613) 222-9493
email: afobert@DSEL.ca

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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Steve Merrick

To: Mottalib, Abdul
Subject: RE: 717: Windmill Zibi - Preliminary responses to City comments

---

From: Mottalib, Abdul [mailto:Abdul.Mottalib@ottawa.ca]
Sent: January-12-16 4:16 PM
To: 'Steve Merrick' <smerrick@dsel.ca>
Cc: 'Dan Clement' <dan@windmilldevelopments.com>; Scott Bentley <scottbentley@windmilldevelopments.com>; 'Kristen Jorgensen' <kristen@windmilldevelopments.com>; 'Miguel Tremblay' <tremblay@fotenn.com>; Paul Black <black@fotenn.com>; Nitsche, Kersten <Kersten.Nitsche@ottawa.ca>; Buchanan, Richard <Richard.Buchanan@ottawa.ca>; Adam Fobert <afobert@dsel.ca>; Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: RE: 717: Windmill Zibi - Preliminary responses to City comments

Hi Steve,

We have reviewed the sketch and we are okay with the fire hydrant locations as shown on the sketch. We are also fine with the maximum fire flow rate shown on the sketch provided the shown flow is available during firefighting. The consultant has to discuss this issue in detail with respect to their water model created for the site in the related section of the revised study.

Regarding item 3:

We are still reviewing this concern and will get back to you as soon as possible.

Thanks,

Abdul Mottalib, P. Eng.

From: Steve Merrick [mailto:smerrick@dsel.ca]
Sent: January 07, 2016 2:31 PM
To: Mottalib, Abdul
Cc: 'Dan Clement'; Scott Bentley; 'Kristen Jorgensen'; 'Miguel Tremblay'; Paul Black; Nitsche, Kersten; Buchanan, Richard; Adam Fobert
Subject: RE: 717: Windmill Zibi - Preliminary responses to City comments

Hi Abdul,

To follow up on our meeting yesterday, please find attached sketch showing hydrant locations and proximity of the buildings to be serviced. The sketch also indicates the maximum flow rate proposed at each hydrant.

Feel free to call to discuss if you have any questions or concerns.

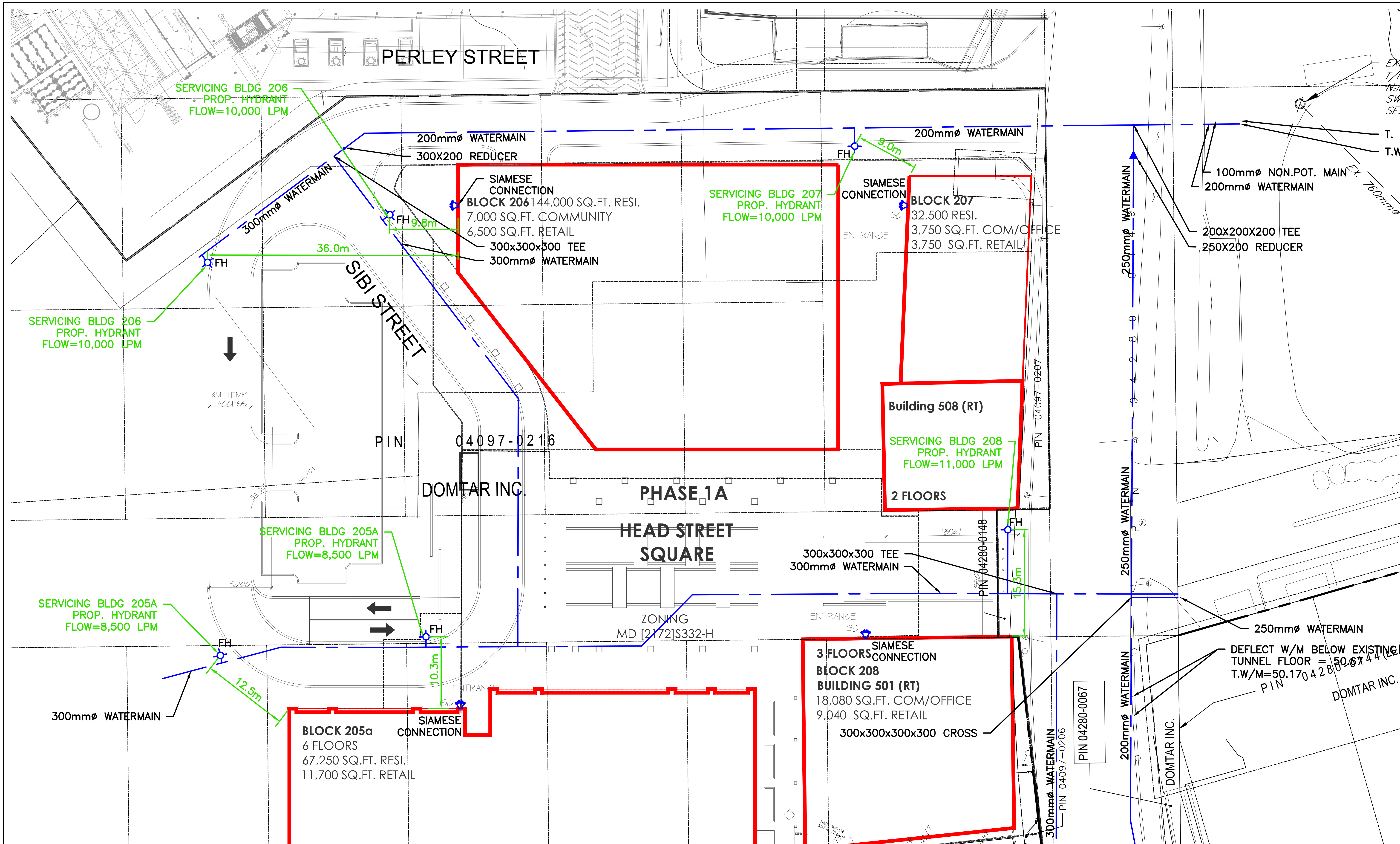
Steve Merrick, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103

Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca



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Fax. (613) 836-7183
www.DSEL.ca

HYDRANT PROXIMITY TO PROPOSED BUIL.DINGS

PROJ NO.:	14-717
DRAWN BY:	SLM
DATE:	2015-01-07
SCALE:	1:500
FIGURE NO.:	HYD-1

z:\projects\14-717_windmill-the_isles\b_design\b2_drawings\b2-5_sketches and figures\2015-01-07_hydrant-distance\2016-01-07_717_slm.dwg

APPENDIX B

Water Supply

Windmill
Zibi - Ontario
Phase 1A

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Phase	Block	Type	Unit	Rate	No. of Units	Avg Day L/min	Max Day L/min	Peak Hour L/min
1A	208	Office	75	L/9.3m^2/d	975	5.5	8.2	14.8
1A	208	Retail	2.5	L/m^2/d	736	1.3	1.9	3.5
1	208	Restaurant	125	L/seat/d	8	0.7	1.0	1.9
1A	205A	Res	474.6	L/unit/d	71	23.4	114.7	173.2
1A	205A	Retail	2.5	L/m^2/d	754	1.3	2.0	3.5
EO	1	Office	75	L/p/d	12	0.6	0.9	1.7
					Total	**32.8**	**128.7**	**198.5**

Notes:
* Development stats per Windmill schedule dated 2016-02-01 and additional information received via email 2016-02-08.
* Office unit rate per Ontario Building Code 8.2.1.3.B. Assuming 1 employee per 9.3m^2 of floor space.
* Residential Unit rate assuming 65% one bedroom (1.4p/unit), 30% two bedroom (2.1 p/unit), 5% three bedroom (3.0p/unit)
* Number of Residential units estimated as 850gfa / unit per Windmill development stats dated 2016-02-01.
* Windmill estimated maximum number of employees occupying Albert Island
* Energy Ottawa maximum employees to work at Chaudiere Office provided by EO via letter dated March 1, 2016

		Max Day PF	Peak Hour PF
Estimated Total Residential Population	128	4.9	7.4

Windmill
Zibi - Ontario
FUS Calculations - Building 205A

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Ordinary Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	6575.1	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow 17839.1 L/min
18000.0 L/min *rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible -15%

Fire Flow **15300.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered -30%

Reduction **-4590 L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Ordinary - Unprotected Openings	>45m	72	0	0	0%
S	Ordinary - Unprotected Openings	20.1m-30m	72	0	0	6%
E	Ordinary - Unprotected Openings	3.1m-10m	26	0	0	15%
W	Ordinary - Unprotected Openings	3.1m-10m	26	0	0	15%
		% Increase				**36%** *value not to exceed 75%*

Increase **5508.0 L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow 16218.0 L/min *fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
16000.0 L/min *rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Windmill
Zibi - Ontario
FUS Calculations - Building 208

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Ordinary Construction

C 1 *Type of Construction Coefficient per FUS Part II, Section 1*
A 1711.8 m^2 *Total floor area based on FUS Part II section 1*

Fire Flow 9102.3 L/min
9000.0 L/min *rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible -15%

Fire Flow **7650.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered -30%

Reduction **-2295 L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Ordinary - Unprotected Openings	20.1m-30m	30	0	0	6%
S	Ordinary - Unprotected Openings	20.1m-30m	30	0	0	6%
E	Ordinary - Unprotected Openings	10.1m-20m	28	0	0	10%
W	Ordinary - Unprotected Openings	3.1m-10m	30	3	90	18%
		% Increase				**40%** *value not to exceed 75%*

Increase **3060.0 L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow 8415.0 L/min *fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
8000.0 L/min *rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Steve Merrick

Subject: RE: Chaudiere/Albert Island Development - Water Boundary Condition Request

From: Bazinet, Kristin [mailto:Kristin.Bazinet@ottawa.ca]
Sent: August-04-15 7:30 AM
To: Steve Merrick <smerrick@dsel.ca>; 'Adam Fobert' <afobert@DSEL.ca>
Cc: Buchanan, Richard <Richard.Buchanan@ottawa.ca>; Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: FW: Chaudiere/Albert Island Development - Water Boundary Condition Request

Hi Steve – find attached the boundary conditions as requested.

Thanks,
Kristin

Kristin Bazinet. P.Eng
Development Review
Examen des demandes d'aménagement

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 12180
ottawa.ca/planning / ottawa.ca/urbanisme

The following are boundary conditions, HGL, for hydraulic analysis at the Chaudière/Albert Islands Phase 1(Pressure Zone 1W), assumed to be connected to (see attached PDF for location):

1) 406mm on Wellington
2) 305mm on Booth

Minimum HGL = 108.0m (same at both locations)

Maximum HGL = 115.1m (same at both locations), the maximum pressure is estimated to be greater than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

Fire Flow*	Connection 1 (Wellington)
150 L/s	110.7m
217 L/s	110.1m
250 L/s	109.8m

300 L/s	109.2m
367 L/s	108.3m

*Includes Max Day demands of 2.49 L/s distributed evenly between both connection points (i.e. 1.75L/s at each connection point)

Fire Flow*	Connection 2 (Booth)
150 L/s	109.4m
217 L/s	107.4m
250 L/s	106.3m
300 L/s	104.2m
367 L/s	101.1m

*Includes Max Day demands of 2.49 L/s distributed evenly between both connection points (i.e. 1.75 L/s at each connection point)

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.

From: Buchanan, Richard
Sent: July 28, 2015 2:46 PM
To: Bazinet, Kristin
Subject: FW: Chaudiere/Albert Island Development - Water Boundary Condition Request

Can you send this in for the boundary conditions and forward to DSEL?

Richard Buchanan, CET
Program Manager, Development Review
(Urban Services) Outer
Gestionaire de programme
(Secteur urbain) Exterieur

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27801

ottawa.ca/planning / ottawa.ca/urbanisme

From: Steve Merrick [mailto:smerrick@dsel.ca]
Sent: July-28-15 1:17 PM
To: Abdul <Abdul.Mottalib@ottawa.ca>
Cc: Adam Fobert <afobert@dsel.ca>
Subject: RE: Chaudiere/Albert Island Development - Water Boundary Condition Request

Hi Abdul,

We require updated boundary conditions for Phase 1 of the above noted development. The connection locations are consistent with previous requests. Anticipated demands are as follows:

	L/min	L/s
Avg. Daily	69.6	1.16
Max Day	149.4	2.49
Peak Hour	228.7	3.81

Max Day + Fire Flow = 149.4 + 20,000 L/min

I hope you can expedite this process we are looking to submit as soon as possible.

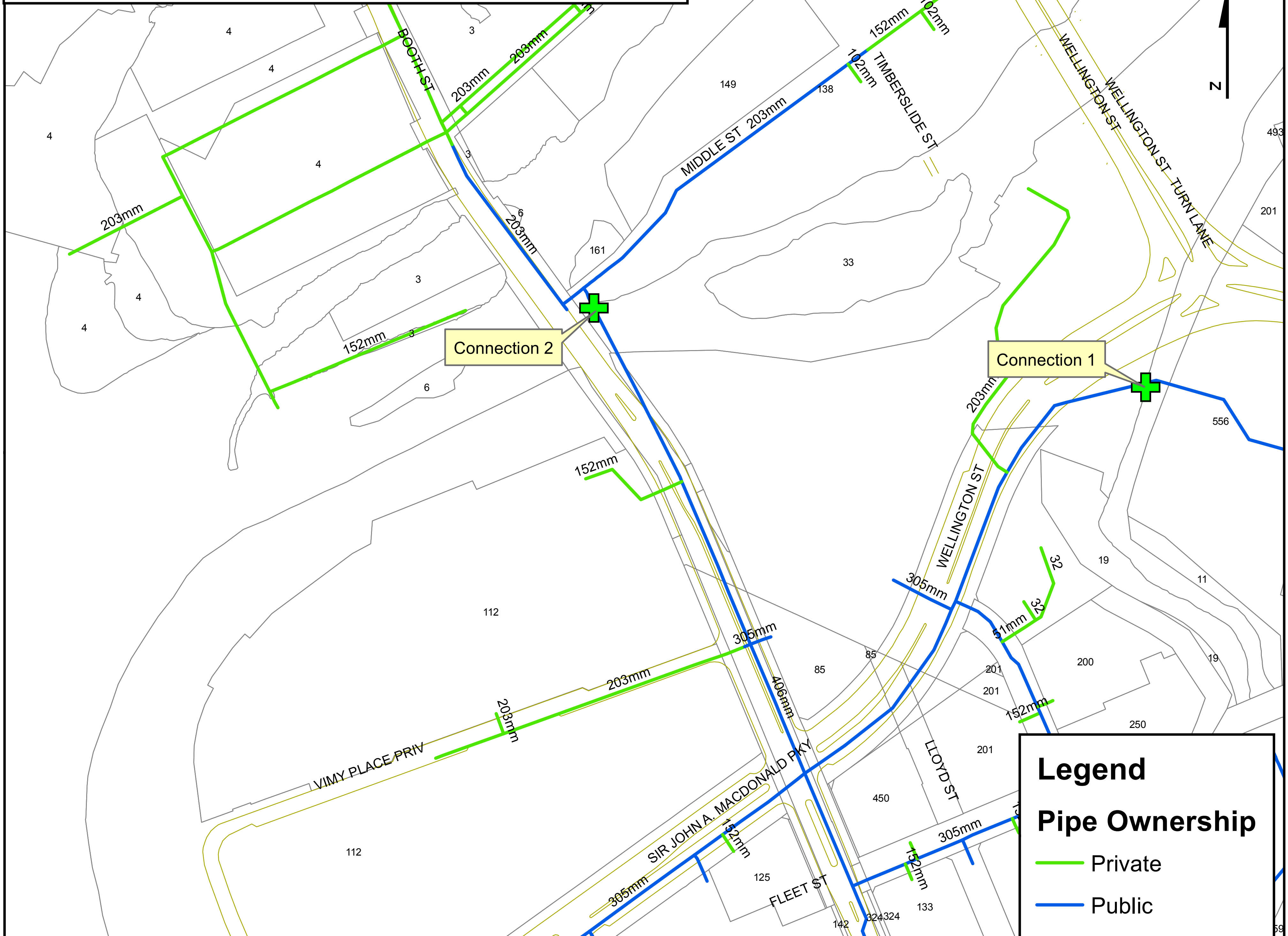
Steve Merrick, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

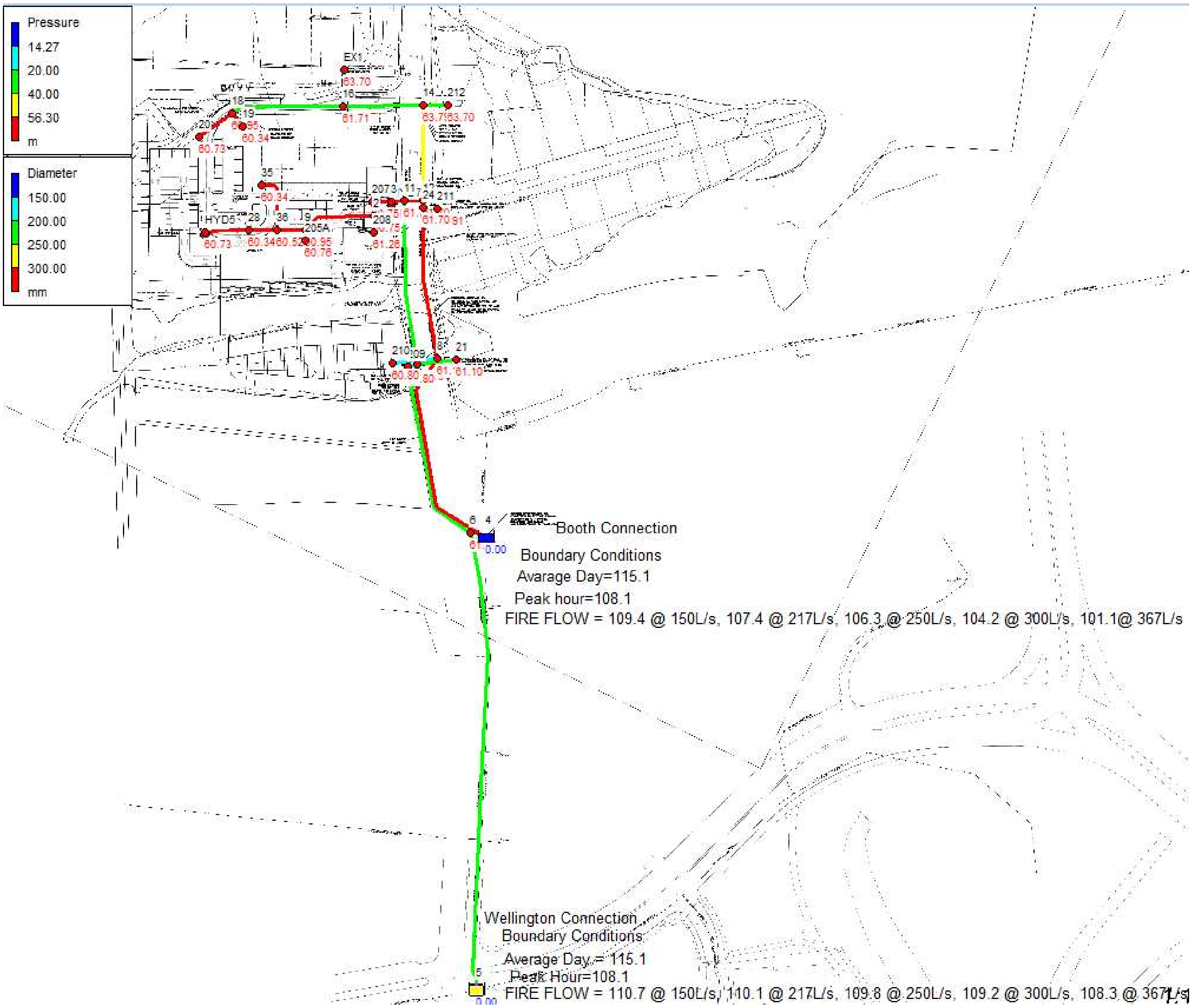
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
fax: (613) 836-7183
email: smerrick@DSEL.ca

Boundary Condition for Chaudiere/Albert Islands



Average Daily Demand



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*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
**********************************************************************
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Input File: 2018-05-24_717_ggm.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	5	6	270	200
2	6	7	130	200
3	4	8	130	300
4	7	209	15	150
5	7	11	190	200
6	8	24	98	300
7	12	11	17	300
8	11	3	17	300
9	HYD7	3	3	150
10	207	3	39	300
11	12	14	76	250
12	14	212	28	200
13	14	16	48.45	200
14	16	EX1	8.57	150
17	18	19	10	300
18	20	18	24.2	300
19	21	7	1.5	200
20	8	210	1.5	150
21	16	18	67.72	200
22	211	24	8.9	250
23	24	12	4.2	300
26	205B	30	1.9	300
27	30	HYD5	0.65	150
28	30	28	27.55	300
29	28	36	16.4	300
30	36	35	35.2	300
31	36	9	17.8	300
32	9	2	42.7	300
33	2	207	9.5	300
39	9	205A	15	150
40	2	208	15	150

Page 2
Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
HYD7	0.00	115.10	60.95	0.00	
3	0.00	115.10	61.00	0.00	
6	0.00	115.10	61.20	0.00	
7	0.00	115.10	61.10	0.00	
8	0.00	115.10	61.10	0.00	
209	0.00	115.10	60.80	0.00	
11	0.00	115.10	61.70	0.00	
12	0.00	115.10	61.70	0.00	
207	0.00	115.10	60.75	0.00	
14	0.00	115.10	63.79	0.00	
212	0.00	115.10	63.70	0.00	
16	0.00	115.10	61.71	0.00	
EX1	0.60	115.10	63.70	0.00	
18	0.00	115.10	60.95	0.00	
19	0.00	115.10	60.34	0.00	
20	0.00	115.10	60.73	0.00	
21	0.00	115.10	61.10	0.00	
210	0.00	115.10	60.80	0.00	
211	0.00	115.10	61.91	0.00	
24	0.00	115.10	61.70	0.00	
28	0.00	115.10	60.34	0.00	
205B	0.00	115.10	61.06	0.00	
30	0.00	115.10	61.06	0.00	
HYD5	0.00	115.10	60.73	0.00	
9	0.00	115.10	60.95	0.00	
2	0.00	115.10	60.75	0.00	
35	0.00	115.10	60.34	0.00	
36	0.00	115.10	60.52	0.00	
205A	24.70	115.10	60.76	0.00	
208	7.40	115.10	61.26	0.00	
4	-27.86	115.10	0.00	0.00	Reservoir
5	-4.86	115.10	0.00	0.00	Reservoir

Link Results:

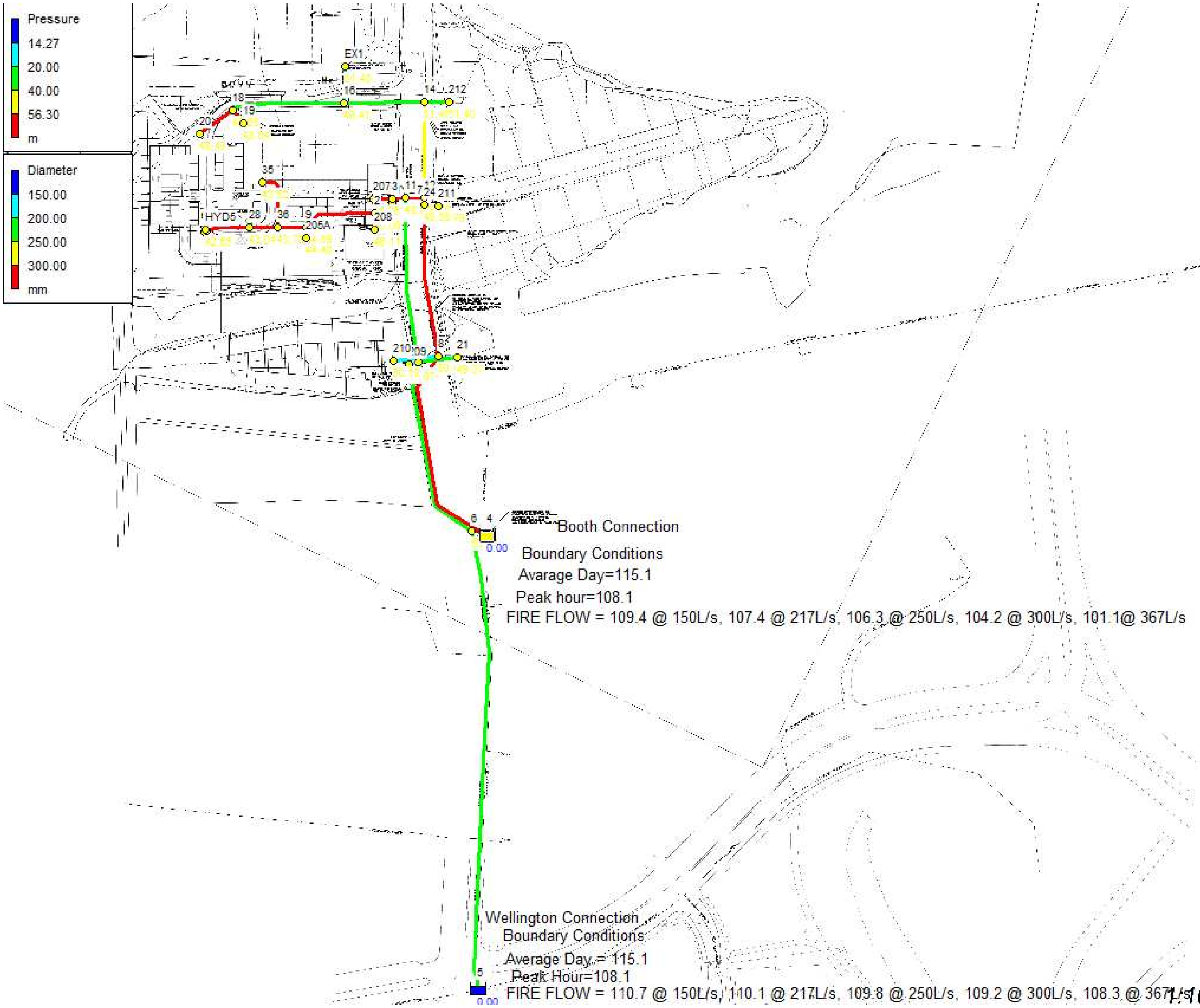
Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	4.86	0.00	0.00	Open

2	4.86	0.00	0.00	Open
3	27.86	0.01	0.00	Open
4	0.00	0.00	0.00	Open
5	4.86	0.00	0.00	Open
6	27.86	0.01	0.00	Open
7	27.25	0.01	0.00	Open
8	32.11	0.01	0.00	Open
9	0.00	0.00	0.00	Open

Page 3
Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
10	-32.11	0.01	0.00	Open
11	0.60	0.00	0.00	Open
12	0.00	0.00	0.00	Open
13	0.60	0.00	0.00	Open
14	0.60	0.00	0.00	Open
17	0.00	0.00	0.00	Open
18	0.00	0.00	0.00	Open
19	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	0.00	0.00	0.00	Open
22	0.00	0.00	0.00	Open
23	27.85	0.01	0.00	Open
26	0.00	0.00	0.00	Open
27	0.00	0.00	0.00	Open
28	0.00	0.00	0.00	Open
29	0.00	0.00	0.00	Open
30	0.00	0.00	0.00	Open
31	-0.01	0.00	0.00	Open
32	-24.71	0.01	0.00	Open
33	-32.11	0.01	0.00	Open
39	24.70	0.02	0.02	Open
40	7.40	0.01	0.00	Open

Max. Day + Fire Flow



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*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
**********************************************************************
```

Input File: 2018-05-24_717_ggm.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	5	6	270	200
2	6	7	130	200
3	4	8	130	300
4	7	209	15	150
5	7	11	190	200
6	8	24	98	300
7	12	11	17	300
8	11	3	17	300
9	HYD7	3	3	150
10	207	3	39	300
11	12	14	76	250
12	14	212	28	200
13	14	16	48.45	200
14	16	EX1	8.57	150
17	18	19	10	300
18	20	18	24.2	300
19	21	7	1.5	200
20	8	210	1.5	150
21	16	18	67.72	200
22	211	24	8.9	250
23	24	12	4.2	300
26	205B	30	1.9	300
27	30	HYD5	0.65	150
28	30	28	27.55	300
29	28	36	16.4	300
30	36	35	35.2	300
31	36	9	17.8	300
32	9	2	42.7	300
33	2	207	9.5	300
39	9	205A	15	150
40	2	208	15	150

Page 2
Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
HYD7	0.00	101.34	47.19	0.00	
3	0.00	101.34	47.24	0.00	
6	0.00	104.37	50.47	0.00	
7	0.00	103.37	49.37	0.00	
8	0.00	104.48	50.48	0.00	
209	0.00	103.37	49.07	0.00	
11	0.00	102.20	48.80	0.00	
12	0.00	102.80	49.40	0.00	
207	0.00	100.40	46.05	0.00	
14	0.00	102.80	51.49	0.00	
212	0.00	102.80	51.40	0.00	
16	0.00	102.80	49.41	0.00	
EX1	0.90	102.80	51.40	0.00	
18	0.00	102.80	48.65	0.00	
19	0.00	102.80	48.04	0.00	
20	0.00	102.80	48.43	0.00	
21	0.00	103.37	49.37	0.00	
210	0.00	104.48	50.18	0.00	
211	0.00	102.98	49.79	0.00	
24	0.00	102.98	49.58	0.00	
28	0.00	97.80	43.04	0.00	
205B	0.00	97.02	42.98	0.00	
30	10000.00	97.02	42.98	0.00	
HYD5	0.00	97.02	42.65	0.00	
9	0.00	98.74	44.59	0.00	
2	0.00	99.95	45.60	0.00	
35	0.00	98.28	43.52	0.00	
36	0.00	98.28	43.70	0.00	
205A	116.60	98.74	44.40	0.00	
208	11.20	99.95	46.11	0.00	
4	-8449.85	107.40	0.00	0.00	Reservoir
5	-1678.86	110.10	0.00	0.00	Reservoir

Link Results:

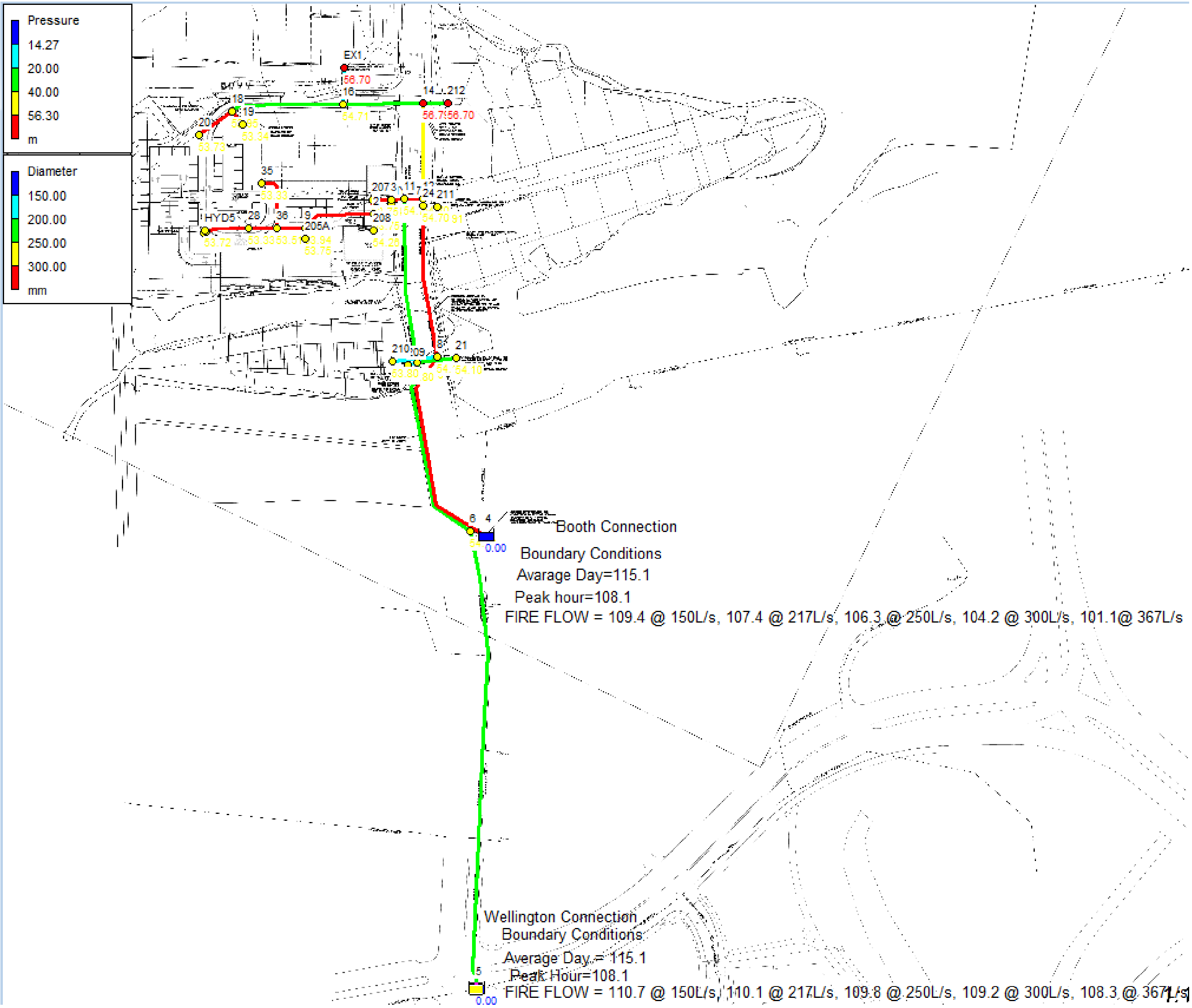
Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	1678.86	0.89	21.23	Open

2	1678.86	0.89	7.64	Open
3	8449.85	1.99	22.45	Open
4	0.00	0.00	0.00	Open
5	1678.86	0.89	6.18	Open
6	8449.85	1.99	15.29	Open
7	8448.94	1.99	35.45	Open
8	10127.80	2.39	50.41	Open
9	0.00	0.00	0.00	Open

Page 3
Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
10	-10127.80	2.39	24.12	Open
11	0.90	0.00	0.00	Open
12	0.00	0.00	0.00	Open
13	0.90	0.00	0.00	Open
14	0.90	0.00	0.00	Open
17	0.00	0.00	0.00	Open
18	0.00	0.00	0.00	Open
19	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	0.00	0.00	0.00	Open
22	0.00	0.00	0.00	Open
23	8449.85	1.99	42.94	Open
26	0.00	0.00	0.00	Open
27	0.00	0.00	0.00	Open
28	-10000.00	2.36	28.45	Open
29	-10000.00	2.36	29.56	Open
30	0.00	0.00	0.00	Open
31	-10000.00	2.36	25.56	Open
32	-10116.60	2.39	28.44	Open
33	-10127.80	2.39	47.17	Open
39	116.60	0.11	0.29	Open
40	11.20	0.01	0.00	Open

Peak Hour Demand



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**********************************************************************
*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
**********************************************************************
```

Input File: 2018-05-24_717_ggm.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	5	6	270	200
2	6	7	130	200
3	4	8	130	300
4	7	209	15	150
5	7	11	190	200
6	8	24	98	300
7	12	11	17	300
8	11	3	17	300
9	HYD7	3	3	150
10	207	3	39	300
11	12	14	76	250
12	14	212	28	200
13	14	16	48.45	200
14	16	EX1	8.57	150
17	18	19	10	300
18	20	18	24.2	300
19	21	7	1.5	200
20	8	210	1.5	150
21	16	18	67.72	200
22	211	24	8.9	250
23	24	12	4.2	300
26	205B	30	1.9	300
27	30	HYD5	0.65	150
28	30	28	27.55	300
29	28	36	16.4	300
30	36	35	35.2	300
31	36	9	17.8	300
32	9	2	42.7	300
33	2	207	9.5	300
39	9	205A	15	150
40	2	208	15	150

Page 2
Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
HYD7	0.00	108.10	53.95	0.00	
3	0.00	108.10	54.00	0.00	
6	0.00	108.10	54.20	0.00	
7	0.00	108.10	54.10	0.00	
8	0.00	108.10	54.10	0.00	
209	0.00	108.10	53.80	0.00	
11	0.00	108.10	54.70	0.00	
12	0.00	108.10	54.70	0.00	
207	0.00	108.10	53.75	0.00	
14	0.00	108.10	56.79	0.00	
212	0.00	108.10	56.70	0.00	
16	0.00	108.10	54.71	0.00	
EX1	1.70	108.10	56.70	0.00	
18	0.00	108.10	53.95	0.00	
19	0.00	108.10	53.34	0.00	
20	0.00	108.10	53.73	0.00	
21	0.00	108.10	54.10	0.00	
210	0.00	108.10	53.80	0.00	
211	0.00	108.10	54.91	0.00	
24	0.00	108.10	54.70	0.00	
28	0.00	108.09	53.33	0.00	
205B	0.00	108.09	54.05	0.00	
30	0.00	108.09	54.05	0.00	
HYD5	0.00	108.09	53.72	0.00	
9	0.00	108.09	53.94	0.00	
2	0.00	108.10	53.75	0.00	
35	0.00	108.09	53.33	0.00	
36	0.00	108.09	53.51	0.00	
205A	176.70	108.09	53.75	0.00	
208	20.10	108.10	54.26	0.00	
4	-169.63	108.10	0.00	0.00	Reservoir
5	-28.87	108.10	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	28.87	0.02	0.01	Open

2	28.87	0.02	0.00	Open
3	169.63	0.04	0.01	Open
4	0.00	0.00	0.00	Open
5	28.87	0.02	0.00	Open
6	169.63	0.04	0.01	Open
7	167.93	0.04	0.02	Open
8	196.80	0.05	0.03	Open
9	0.00	0.00	0.00	Open

Page 3
Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
10	-196.80	0.05	0.02	Open
11	1.70	0.00	0.00	Open
12	0.00	0.00	0.00	Open
13	1.70	0.00	0.00	Open
14	1.70	0.00	0.00	Open
17	0.00	0.00	0.00	Open
18	0.00	0.00	0.00	Open
19	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	0.00	0.00	0.00	Open
22	0.00	0.00	0.00	Open
23	169.63	0.04	0.02	Open
26	0.00	0.00	0.00	Open
27	0.00	0.00	0.00	Open
28	0.00	0.00	0.00	Open
29	0.00	0.00	0.00	Open
30	0.00	0.00	0.00	Open
31	0.00	0.00	0.00	Open
32	-176.70	0.04	0.01	Open
33	-196.80	0.05	0.02	Open
39	176.70	0.17	0.64	Open
40	20.10	0.02	0.01	Open

APPENDIX C

Wastewater Collection

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2012

Site Area	1.09 **ha**	**Extraneous Flow Allowances**	**Peak Flow** 0.4

Phase	Block	Type	Unit Rate		No. of Units	Average Flow (L/s)	Peaking Factor (-)	Peak Flow (L/s)
1	208	Office	75	L/p/d	105	0.1	1.5	0.1
1	208	Retail	5	$L/m^2/d$	736	0.1	1.5	0.1
1	205A	Res	474.6	L/unit/d	71	0.4	3.6	1.4
1	205A	Retail	5	$L/m^2/d$	754	0.1	1.5	0.1
1	EX1	Office	75	L/p/d	12	0.01	1.50	0.02
					Total	**0.7**		**1.8**
					Total Wetweather Flow Estimate			**2.2**

Notes:
* Development stats per Windmill schedule dated 2016-02-01 and additional information received via email 2016-02-08.
* Office unit rate per Ontario Building Code 8.2.1.3.B. assuming $9.3m^2/p$
* Residential Unit rate assuming 70% one bedroom (1.4p/unit), 30% two bedroom (2.1 p/unit)
* Number of residential units from Site Plan by Hobin Architecture dated May 29,2018
* Retail unit rate per City of Ottawa sewer design guidelines and assumes a 12 hour commercial operation
* Special Event area washrooms only per Windmill email 2016-02-08.

		P.F.
Estimated Total Residential Population	128	3.6

SANITARY SEWER CALCULATION SHEET

PROJECT: **Zibi Ontario**
LOCATION: **4 Booth Street**
FILE REF: **717**
DATE: **1-Aug-18**

DESIGN PARAMETERS

Avg. Daily Flow Res.	280 L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =3.8		Infiltration / Inflow	0.33	L/s/ha
Avg. Daily Flow Comn	28,000 L/ha/d	Peak Fact. Comm.	1.5	Min. Pipe Velocity	0.60	m/s full flowing
Avg. Daily Flow Instit.	28,000 L/ha/d	Peak Fact. Instit.	1.5	Max. Pipe Velocity	3.00	m/s full flowing
Avg. Daily Flow Indust	55,000 L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013	

Location			Residential Area and Population						Commercial		Institutional		Industrial			Infiltration				Pipe Data							
Area ID	Up	Down	Area	Pop.	Cumulative Area	Cumulative Pop.	Peak. Fact.	Q_{res}	Area	Accu. Area	Area	Accu. Area	Area	Accu. Area	Q_{C+I+I}	Total Area	Accu. Area	Infiltration Flow	Total Flow	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
			(ha)		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(-)
From Perley Street																											
	SAN106	SAN105	0.000	0.0	0.000	0.0	3.80	0.00		0.00		0.00		0.00	0.0	0.000	0.000	0.000	0.00	250	1.00	22.2	0.049	0.063	1.21	59.5	0.00
	SAN105	SAN104	0.000	0.0	0.000	0.0	3.80	0.00		0.00		0.00		0.00	0.0	0.000	0.000	0.000	0.00	250	1.10	9.2	0.049	0.063	1.27	62.4	0.00
EO OFFICE	SAN104	SAN103	0.000	0.0	0.000	0.0	3.80	0.00		0.00		0.00		0.00	0.0	0.000	0.000	0.000	0.02	250	1.50	107.8	0.049	0.063	1.48	72.8	0.00
	SAN103	SAN102	0.000	0.0	0.000	0.0	3.80	0.00		0.00		0.00		0.00	0.0	0.000	0.000	0.000	0.02	250	0.42	67.3	0.049	0.063	0.79	38.5	0.00
From Albert Island																											
	SAN303	SAN302	0.000	0.0	0.000	0.0	3.80	0.00		0.00		0.00		0.00	0.0	0.000	0.000	0.000	0.00	250	0.35	15.7	0.049	0.063	0.72	35.2	0.00
	SAN302	SAN301	0.000	0.0	0.000	0.0	3.80	0.00		0.00		0.00		0.00	0.0	0.000	0.000	0.000	0.00	250	0.35	57.3	0.049	0.063	0.72	35.2	0.00
	SAN301	SAN102	0.000	0.0	0.000	0.0	3.80	0.00		0.00		0.00		0.00	0.0	0.000	0.000	0.000	0.00	250	2.00	37.0	0.049	0.063	1.71	84.1	0.00
205A, 208	SAN102	SAN101	1.090	71.0	1.090	71.0	3.63	1.39		0.00		0.00		0.00	0.4	1.090	1.090	0.360	2.16	250	0.45	12.4	0.049	0.063	0.81	39.9	0.05
	SAN101	PS	0.000	0.0	1.090	71.0	3.63	1.39		0.00		0.00		0.00	0.4	0.000	1.090	0.360	2.16	250	0.32	6.9	0.049	0.063	0.69	33.6	0.06
LRT Crossing																											
	SANMH1001	SANMH1002	0.000	0.0	1.090	71.0	3.63	1.39		0.00		0.00		0.00	0.4	1.090	1.090	0.360	2.16	300	0.65	16.6	0.071	0.075	1.10	78.0	0.03
	SANMH1002	SANMH1003	0.000	0.0	1.090	71.0	3.63	1.39		0.00		0.00		0.00	0.4	1.090	1.090	0.360	2.16	300	0.65	16.5	0.071	0.075	1.10	78.0	0.03
	SANMH 1003	SANMH 1004	0.000	0.0	1.090	71.0	3.63	1.39		0.00		0.00		0.00	0.4	1.090	1.090	0.360	2.16	300	0.55	47.3	0.071	0.075	1.01	71.7	0.03
	SANMH1004	EX SANMH	0.000	0.0	1.090	71.0	3.63	1.39		0.00		0.00		0.00	0.4	1.090	1.090	0.360	2.16	300	0.55	3.7	0.071	0.075	1.01	71.7	0.03
NOTE: FLOW RATES FROM PHASE 1A SANITARY WASTEWATER DISCHARGE																											

Hatch Mott MacDonald

TECHNICAL MEMO

To:	**David Schaeffer Engineering Limited (DSEL)**
Attn:	Adam Fobert, P.Eng
From:	Peter Rüsch, P.Eng
Date:	August 13, 2015
Project #:	282834
Page(s):	4
CC:	
Subject:	**Windmill Pumping Station Capacity Assessment**

Dear Mr. Fobert:

HMM was retained to evaluate the capacity of an existing pumping station, located in an old paper mill building on Chaudiere Island, in Ottawa, Ontario. HMM staff visited the Pumping Station on June 30, 2015, in the presence of Steve Merrick from DSEL and Kristen Jorgensen from WINDMILL Development Group Ltd. For the purpose of this Technical Memorandum (TM) the pumping station will be called the Windmill Sanitary Pumping Station (WSPS). This analysis is based on the information gathered during the site visit and from additional sources as indicated in this TM. The pumping station is located in an old building, on the south side of Chaudiere Crossing.

In a pumping station evaluation HMM aims to confirm the duty point, and thus capacity, using more than one method, to ensure that errors / inconsistencies in the often unreliable data are discovered and discussed. These methods are:

- Confirming the flow utilizing a flow meter, if installed;
- Confirming the duty point by superimposing the pump curve onto the system curve. In this case the intersection of the pump and system curve defines the duty point and thus flow rate; and
- Confirming the duty point by measuring the power uptake of the electrical motor. It has to be noted that the power uptake of the electric motor in itself does not define the duty, however gives an indication of the duty point as it relates to the original pump curve.

Under ideal conditions, the duty points derived as noted above for the pumping station under consideration should provide for similar or very similar capacities, increasing the overall confidence in the assessment.

For the WSPS, HMM utilized the first two of the three methods noted above, and the purpose of this TM to detail the findings of both of the methods.

Confirming the flow utilizing the flow meter

The WSPS has a Endress and Hauser ProMag F flow meter with a diameter of 50mm. It appears to have been installed a considerable time ago. Photo 1 below shows the flow meter as installed and the corrosion of the flange bolts. The flow meter has more than the required 5 diameters of straight pipe upstream and downstream. The WSPS ran only once during the site visit, and during this period a flow rate of ~88 to 90 gpm was indicated by the meter. However, it was also noted that the Flow meter readout showed a "System Error Amplifier". HMM was not able to confirm if the flow rate indicated was measured in US or UK/Canadian gallons.

Photo 1: Flow meter: Endress + Hauser ProMag F

If the flows were measured in US gpm, the flow rate would be 5.55 L/s, however in case the flow rate is measured in UK/ Canadian gallons, the corresponding flow rate would be 6.67 L/s. Assuming that the flow meter measures the flow with reasonable accuracy given it's age it may be concluded that the flow is likely between 5.5 L/s and 6.7 L/s.

Confirming the duty point by superimposing the pump curve onto the system curve

HMM staff obtained a survey (attached to the TM) providing an approximate length of the forcemain, as well as elevation of the wet well (top of lid) and the elevation of the discharge location. From this survey the following core parameters are available for the forcemain:

- Wet Well Top of Lid Elevation – 48.6 m
- Centerline of Discharge Elevation – 51.7 m
- Length of the forcemain ~ 177 m

No material information has been noted on the survey drawing, however HMM staff noted during the site visit that the forcemain material in the building was galvanized steel, diameter 75 mm. HMM has not confirmed the material of the remainder of the forcemain, as it was not accessible. During the site visit the operating levels of the pumps were measured from the PS lid, these were recorded as follows:

- Lead Pump On – 2.6m from Lid, or 46.0 m
- Lead Pump Off – 3.0 m from Lid, or 45.6 m

This would result in a live wet well depth of 0.4 m. HMM notes that the “Lead Pump On” level was recorded based on the concrete being wet at a certain level, and therefore may not be accurate. In the PS electrical panel there are hand written notes referring to the following (see also Photo 2 below):

- Start @ .77
- Stop @ .28

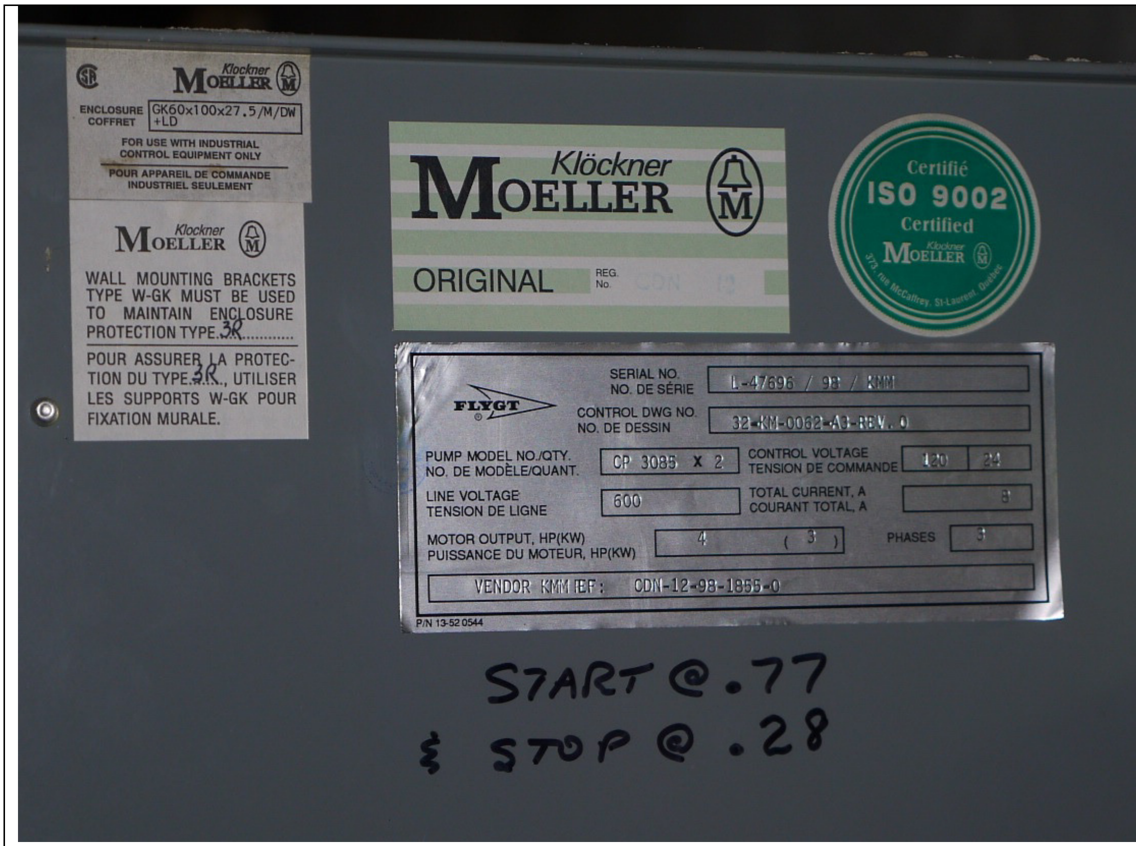


Photo 2: Panel, showing Start/ Stop and pump models

No units are noted. If in m, the resulting live wet well depth would be 0.5 m. HMM calculated the required wet well volume (based on the measured wet well dimensions), and for a flow of 6.7 L/s, this would require a live well depth of 0.5 m, disregarding volume taken by equipment.

As result in the system curve HMM used a “Lead Pump On” elevation of 46.1m.

The following parameters were used in the preparation of the system curve:

- Hazen Williams C (HWC) -factor of 90, 100 and 110: since the HWC is diameter and material dependent, and we expect the material to have some corrosion;

- Local loss factor (k) = 15, to account for fittings;
- Pipe ID is taken as 75 mm.

HMM staff has obtained a pump curve from Flygt for the pump. The pump curve was superimposed on the system curve, and extended past the posted limit. We believe that this may be valid (see also below for additional discussion on the pump) as the hydraulic efficiency was not at its maximum at the cut-off point of the curve.

The system curve with the superimposed pump curve is attached hereto. From the system curve the following observations are made:

- The 2 flow observations based on the flow meter, at 5.5 L/s and 6.7 L/s are marked as a green and black triangle respectively;
- The pump curve intersects the system curve above the black triangle;

In review of the available information, HMM noted that the Flygt panel in the PS (see Photo 2 above) notes that the pump models are CP 3085, these pumps have standard impellors. However Flygt has noted that, based on the data provided from the Flygt Tag that the pumps are DP 3085, with vortex impellors. These are less efficient than standard impellors. Based on the curve provided by Flygt it appears as if the pumps are running well past their power limitation (marked by P on the attached curve). However, in the event that the pumps are actually CP 3085 models as opposed to DP 3085, we would expect the pumps may not be overloaded. In case of the pumps running well past the power limits, HMM notes that the running times appear to be low, and that cool operation may have played a role in keeping the pumps functional.

HMM provides the following recommendations based on the currently available data:

- The flow meter should be repaired / replaced and the units confirmed to confirm the flow rate from the flow meter;
- The pumps should be lifted from the station to confirm if they are CP or DP models;
- If the pumps are CP models it is strongly suggested that the power uptake be measured under various operating condition to confirm if the pump is operating past the power limit if any.

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

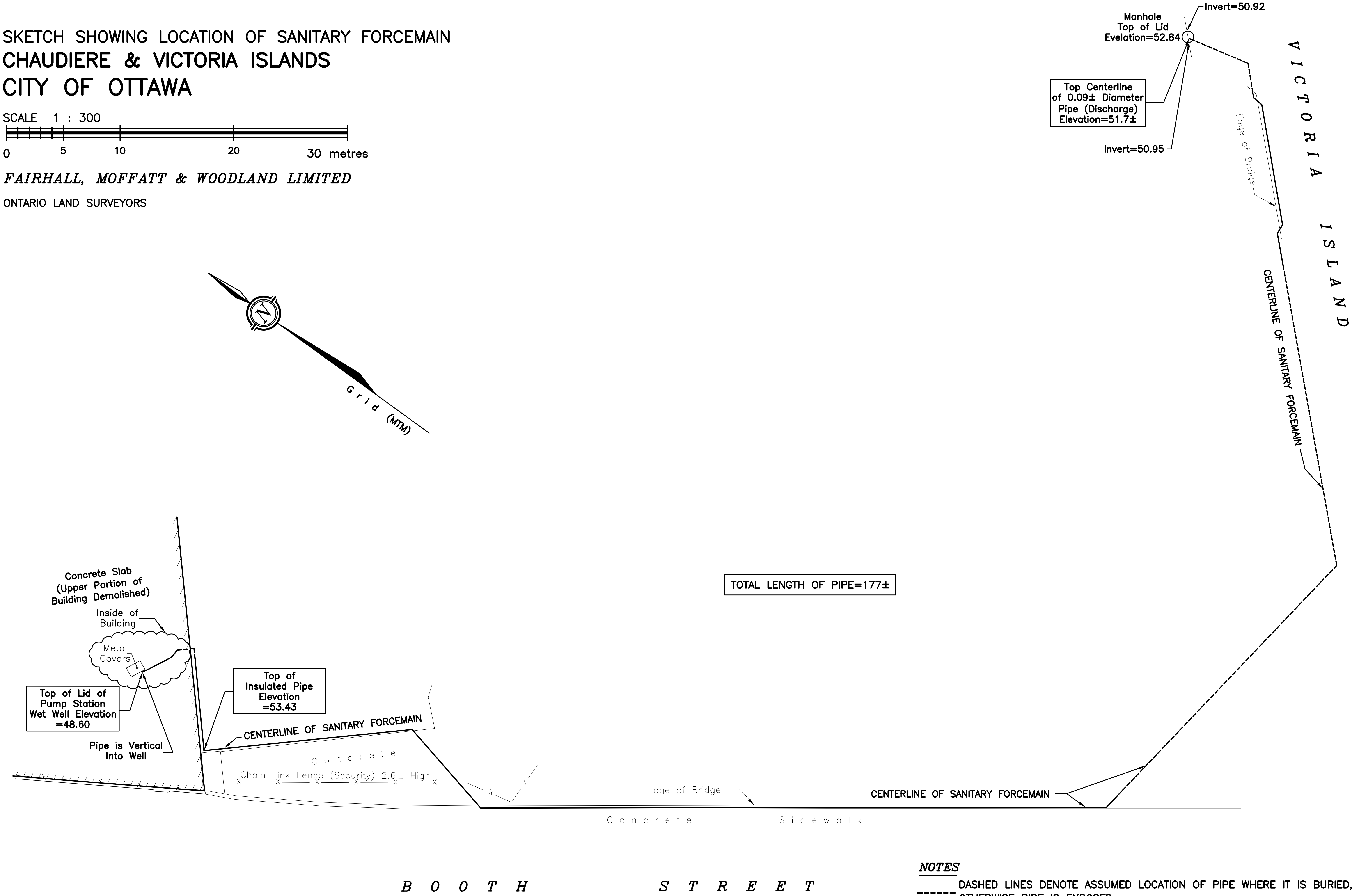
SKETCH SHOWING LOCATION OF SANITARY FORCEMAIN
CHAUDIERE & VICTORIA ISLANDS
CITY OF OTTAWA

SCALE 1 : 300

0 5 10 20 30 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED

ONTARIO LAND SURVEYORS



NOTES

DASHED LINES DENOTE ASSUMED LOCATION OF PIPE WHERE IT IS BURIED, OTHERWISE PIPE IS EXPOSED.

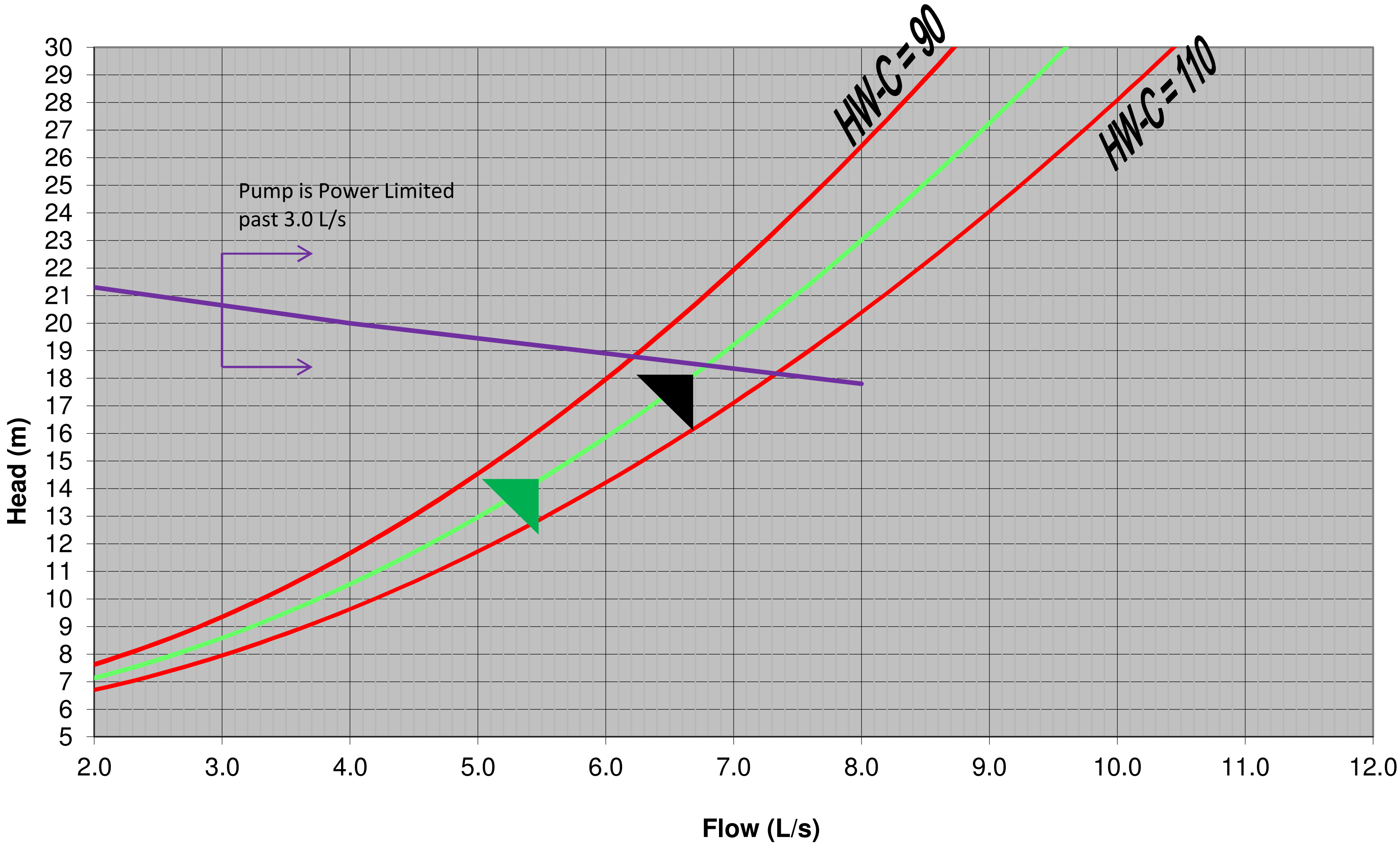
Fairhall Moffatt & Woodland LIMITED OTTAWA
ONTARIO LAND SURVEYORS
Surveying and Land Information Services
100-600 TERRY FOX DRIVE, KANATA, ONTARIO K2L 4B6
TEL: (613) 591-2580 FAX: (613) 591-1495
www.fmw.on.ca

JOB No. V18300

Date of Survey JULY 21, 2015

S:\JOBS\V18300\DWGS 2015-07-23
sk183v.dwg (kb)

Windmill Existing Sanitary Pumping Station System Curve with Pump Curve
(FM= 75 mm Nominal)



Performance Curve

FLYGT

Product	Type
DP3085.182	HT

Date	Project	Curve No	Issue
2015-07-07		63-280-00-1570	3

	1/1-Load	3/4-Load	1/2-Load
Power Factor	0.93	0.91	0.86
Efficiency	80.5 %	82.0 %	81.5 %
Motor Data	---	---	---

Rated Power ...	4 (2.98 kW)	hp
Starting Current ...	23	A
Rated Current ...	3.8	A
Rated Speed ...	3415	rpm
Tot. Mom. of Inertia ...	0.0030	kgm2
No. of Blades	1	

Impeller Diameter: 114 mm

Motor #	Stator	Rev
15-09-2AL	51Y	11

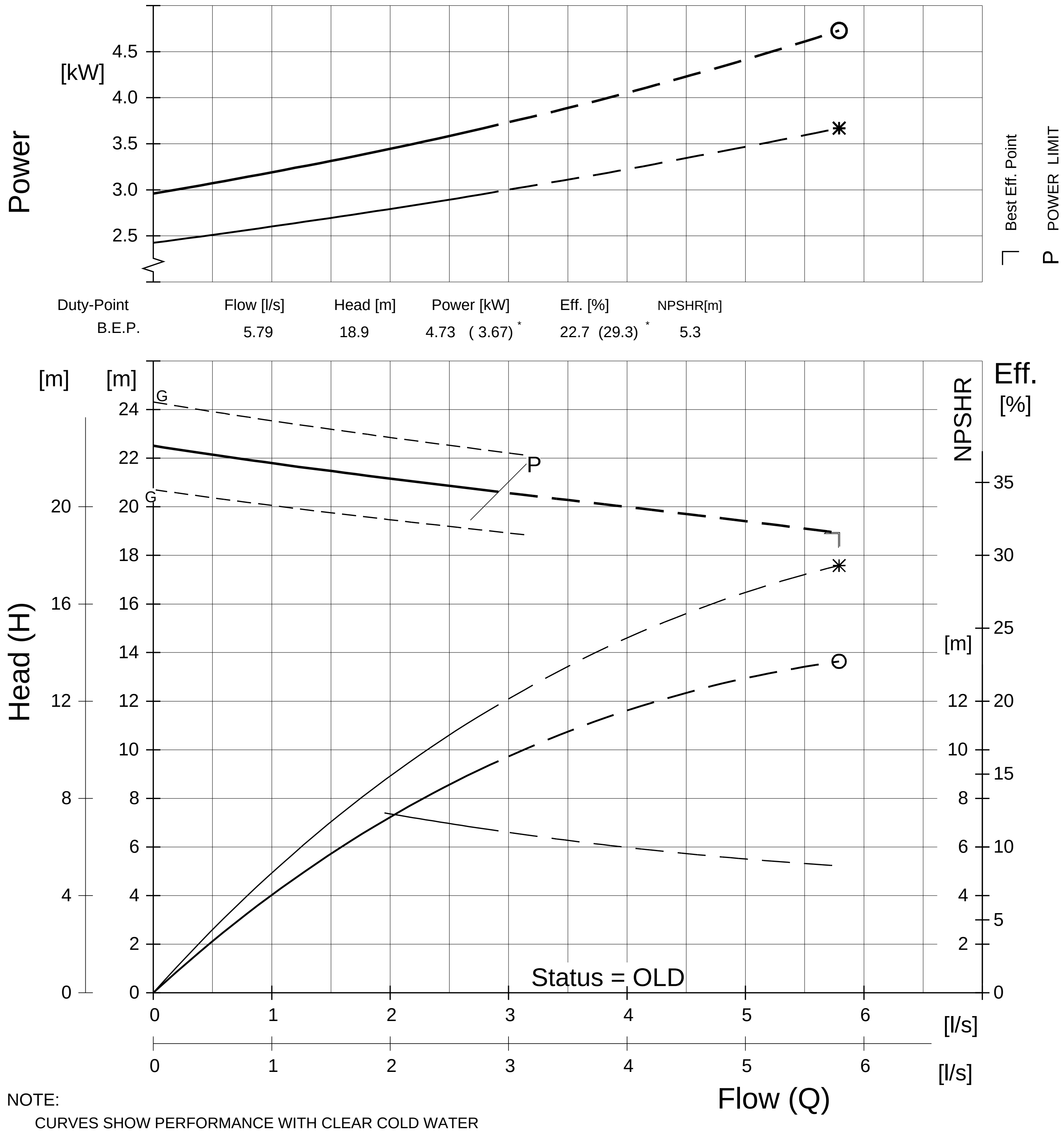
Freq.	Phases	Voltage	Poles
60 Hz	3	600 V	2

Geartype	Ratio
---	---

Comments: IMP DIAM 114 MM

Inlet/Outlet: -/ 80 mm

Imp. Throughlet: 52 mm



Duty-Point	Flow [l/s]	Head [m]	Power [kW]	Eff. [%]	NPSHR[m]
B.E.P.	5.79	18.9	4.73 (3.67) *	22.7 (29.3) *	5.3

NOTE:

CURVES SHOW PERFORMANCE WITH CLEAR COLD WATER

* : Pump EFFICIENCY/Shaft POWER

O : Overall EFFICIENCY/Input POWER

NPSHR = NPSH3 + min. operational margin

Guarantee between limits (G) acc. to

ISO 9906:2012 & ANSI/HI 11.6:2012 / <10kW

unix AUTHOR: MAXIMED SACU (rev:8.1)

APPENDIX D

Stormwater Management

										Sewer Data								
Area ID	**Up**	**Down**	**Area**	**C**	**Indiv AxC**	**Acc AxC**	**T_C**	**I**	**Q**	**DIA**	**Slope**	**Length**	**$A_{hydraulic}$**	**R**	**Velocity**	**Qcap**	**Time Flow**	**Q / Q full**
			(ha)	**(-)**			**(min)**	**(mm/hr)**	**(L/s)**	**(mm)**	**(%)**	**(m)**	**(m^2)**	**(m)**	**(m/s)**	**(L/s)**	**(min)**	**(-)**
104B			0.846	0.85	0.72	0.72												
207			0.033	0.90	0.03	0.03												
104A	BLDG	STM104	0.257	0.80	0.21	0.95	10.0	104.2	276.2	525	1.00	48.9	0.216	0.131	1.99	430.1	0.4	0.64
FUT.			0.099	0.90	0.09	0.09												
104C	STM104	STM103	0.032	0.85	0.03	1.07	10.4	102.1	303.6	525	1.50	26.8	0.216	0.131	2.43	526.7	0.2	0.58
	STM103	STM102	0.000	0.00	0.00	1.07	10.6	101.2	300.9	525	1.00	26.7	0.216	0.131	1.99	430.1	0.2	0.70
	STM102	STM101	0.000	0.00	0.00	1.07	10.8	100.1	297.6	600	0.50	7.0	0.283	0.150	1.54	434.2	0.1	0.69
	STM101	HW100	0.000	0.00	0.00	1.07	10.9	99.7	296.5	600	0.50	33.6	0.283	0.150	1.54	434.2	0.4	0.68

Stormceptor Sizing Detailed Report

PCSWMM for Stormceptor

Project Information

Date	27/04/2016
Project Name	Zibi Ontario
Project Number	717
Location	N/A

Stormwater Quality Objective

This report outlines how Stormceptor System can achieve a defined water quality objective through the removal of total suspended solids (TSS). Attached to this report is the Stormceptor Sizing Summary.

Stormceptor System Recommendation

The Stormceptor System model STC 4000 achieves the water quality objective removing 80% TSS for a City of Toronto (clay, silt and sand) particle size distribution.

The Stormceptor System

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for all rainfall events, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Stormceptor is the only oil and sediment separator on the market sized to remove TSS for a wide range of particle sizes, including fine sediments (clays and silts), that are often overlooked in the design of other stormwater treatment devices.

Small storms dominate hydrologic activity, US EPA reports

"*Early efforts in stormwater management focused on flood events ranging from the 2-yr to the 100-yr storm. Increasingly stormwater professionals have come to realize that small storms (i.e. < 1 in. rainfall) dominate watershed hydrologic parameters typically associated with water quality management issues and BMP design. These small storms are responsible for most annual urban runoff and groundwater recharge. Likewise, with the exception of eroded sediment, they are responsible for most pollutant washoff from urban surfaces. Therefore, the small storms are of most concern for the stormwater management objectives of ground water recharge, water quality resource protection and thermal impacts control.*"

"*Most rainfall events are much smaller than design storms used for urban drainage models. In any given area, most frequently recurrent rainfall events are small (less than 1 in. of daily rainfall).*"

"Continuous simulation offers possibilities for designing and managing BMPs on an individual site-by-site basis that are not provided by other widely used simpler analysis methods. Therefore its application and use should be encouraged."

– US EPA Stormwater Best Management Practice Design Guide, Volume 1 – General Considerations, 2004

Design Methodology

Each Stormceptor system is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology from up-to-date local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective.

The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing (summary of analysis presented in Appendix 2):

- Site parameters
- Continuous historical rainfall, including duration, distribution, peaks (Figure 1)
- Interevent periods
- Particle size distribution
- Particle settling velocities (Stokes Law, corrected for drag)
- TSS load (Figure 2)
- Detention time of the system

The Stormceptor System maintains continuous positive TSS removal for all influent flow rates. Figure 3 illustrates the continuous treatment by Stormceptor throughout the full range of storm events analyzed. It is clear that large events do not significantly impact the average annual TSS removal. There is no decline in cumulative TSS removal, indicating scour does not occur as the flow rate increases.

Stormceptor®

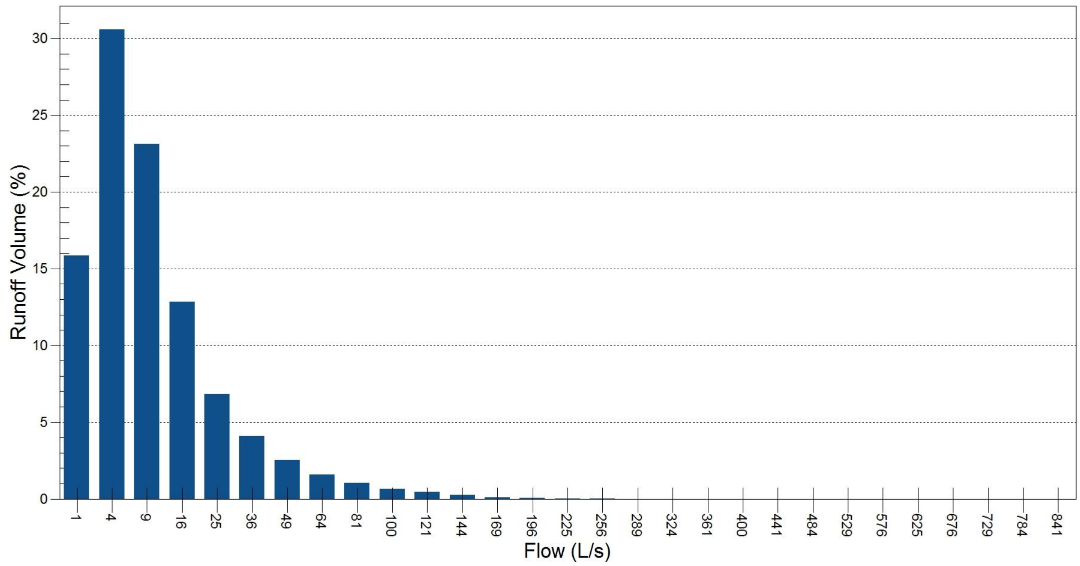


Figure 1. Runoff Volume by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – ON 6000, 1967 to 2003 for 1.34 ha, 90% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

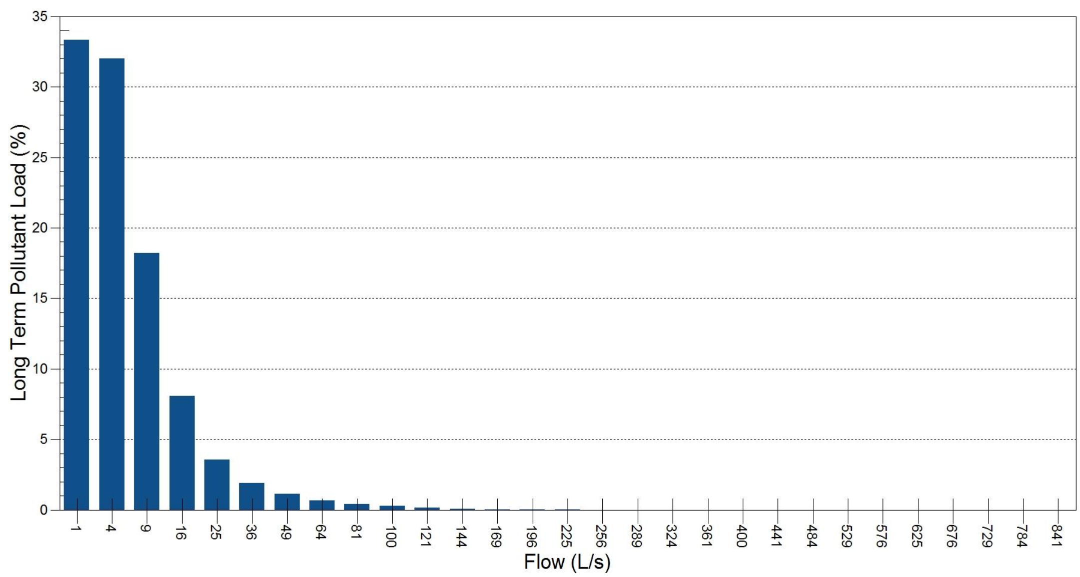
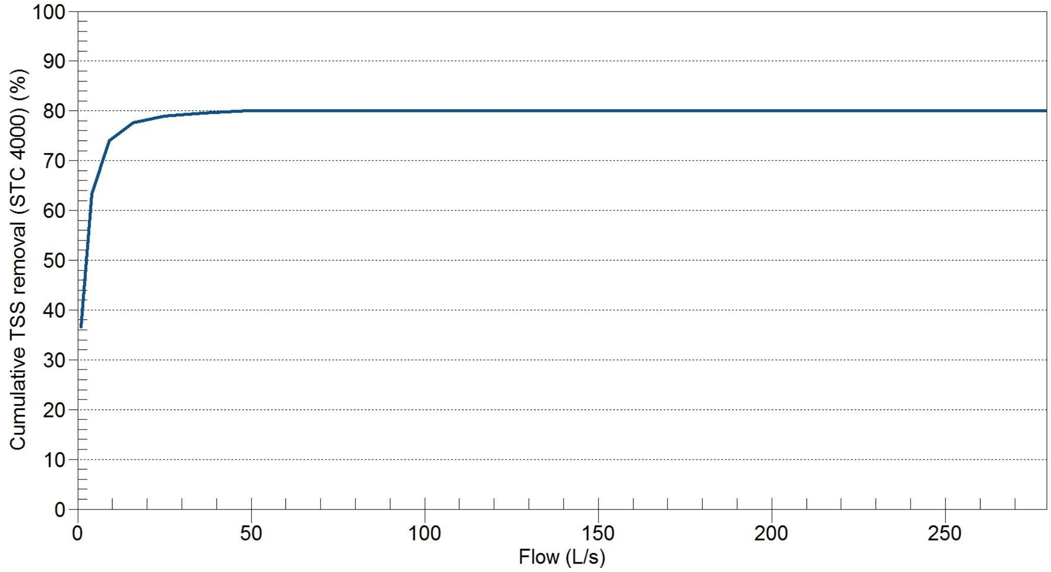


Figure 2. Long Term Pollutant Load by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003 for 1.34 ha, 90% impervious. The majority of the annual pollutant load is transported by small frequent storm events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 4000	Drainage Area (ha)	1.34
TSS Removal (%)	80	Impervious (%)	90

Figure 3. Cumulative TSS Removal by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003. Stormceptor continuously removes TSS throughout the full range of storm events analyzed. Note that large events do not significantly impact the average annual TSS removal. Therefore no decline in cumulative TSS removal indicates scour does not occur as the flow rate increases.

Appendix 1
Stormceptor Design Summary

Project Information

Date	27/04/2016
Project Name	Zibi Ontario
Project Number	717
Location	N/A

Designer Information

Company	N/A
Contact	N/A

Notes

N/A

Drainage Area

Total Area (ha)	1.34
Imperviousness (%)	90

The Stormceptor System model STC 4000 achieves the water quality objective removing 80% TSS for a City of Toronto (clay, silt and sand) particle size distribution.

Rainfall

Name	OTTAWA MACDONALD-CARTIER INT'L A
State	ON
ID	6000
Years of Records	1967 to 2003
Latitude	45°19'N
Longitude	75°40'W

Water Quality Objective

TSS Removal (%)	80

Upstream Storage

Storage (ha-m)	Discharge (L/s)
0	0

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 300	58
STC 750	69
STC 1000	69
STC 1500	70
STC 2000	75
STC 3000	76
STC 4000	**80**
STC 5000	81
STC 6000	83
STC 9000	87
STC 10000	87
STC 14000	89

Stormceptor®

Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

City of Toronto (clay, silt and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
10	20	2.65	0.0004					
30	10	2.65	0.0008					
50	10	2.65	0.0022					
95	20	2.65	0.0063					
265	20	2.65	0.0366					
1000	20	2.65	0.1691					

Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor version 1.0
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 300 is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 750 to STC 6000 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 300	STC 750 to STC 6000	STC 9000 to STC 14000
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Imbrium Systems Inc., 1-800-565-4801.

Stormceptor®

Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ha)	1.34	Imperviousness (%)	90

Surface Characteristics

Width (m)	232
Slope (%)	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/h)	61.98
Min. Infiltration Rate (mm/h)	10.16
Decay Rate (s^{-1})	0.00055
Regeneration Rate (s^{-1})	0.01

Maintenance Frequency

Sediment build-up reduces the storage volume for sedimentation. Frequency of maintenance is assumed for TSS removal calculations.

Maintenance Frequency (months)	12

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (L/s)	No

Upstream Attenuation

Stage-storage and stage-discharge relationship used to model attenuation upstream of the Stormceptor System is identified in the table below.

Storage ha-m	Discharge L/s
0	0

PARTICLE SIZE DISTRIBUTION

Particle Size Distribution

Removing fine particles from runoff ensures the majority of pollutants, such as heavy metals, hydrocarbons, free oils and nutrients are not discharged into natural water resources. The table below identifies the particle size distribution selected to define TSS removal for the design of the Stormceptor System.

City of Toronto (clay, silt and sand)								
Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
10	20	2.65	0.0004					
30	10	2.65	0.0008					
50	10	2.65	0.0022					
95	20	2.65	0.0063					
265	20	2.65	0.0366					
1000	20	2.65	0.1691					

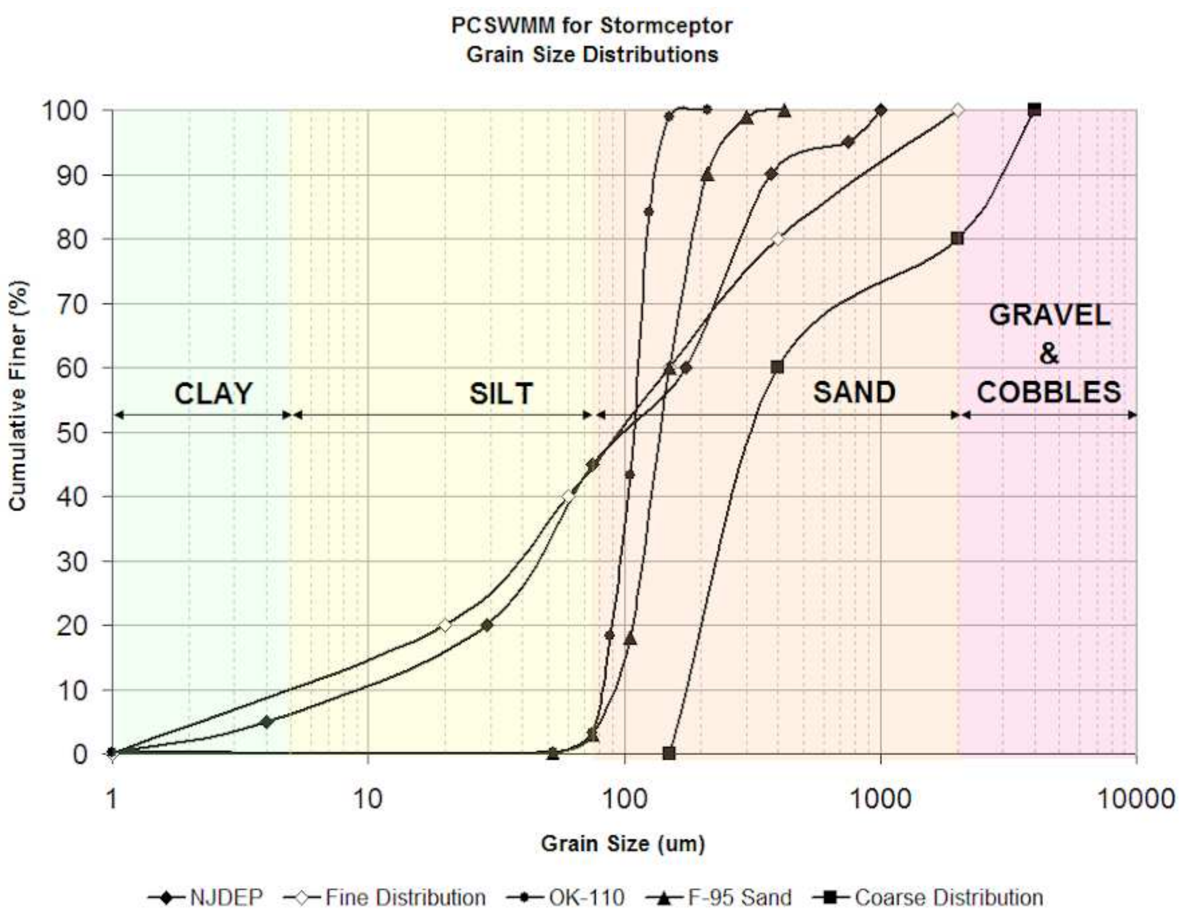


Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

TSS LOADING

TSS Loading Parameters

TSS Loading Function	Buildup / Washoff

Parameters

Target Event Mean Concentration (EMC) (mg/L)	125
Exponential Buildup Power	0.4
Exponential Washoff Exponential	0.2

HYDROLOGY ANALYSIS

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of the Stormceptor System are based on the average annual removal of TSS for the selected site parameters. The Stormceptor System is engineered to capture fine particles (silts and sands) by focusing on average annual runoff volume ensuring positive removal efficiency is maintained during all rainfall events, while preventing the opportunity for negative removal efficiency (scour).

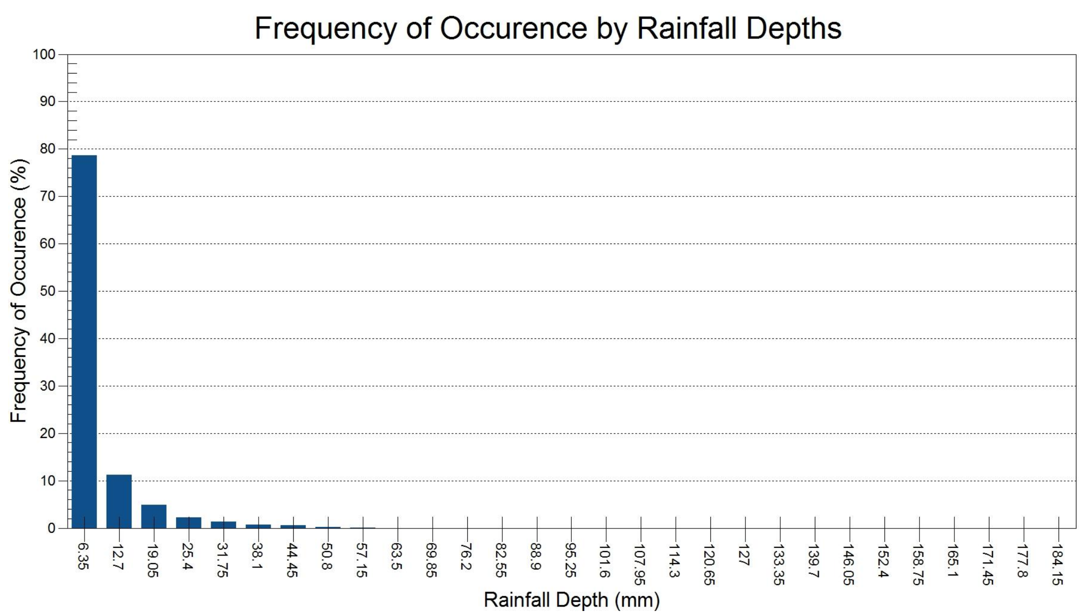
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A		
Rainfall File Name	ON6000.NDC	Total Number of Events	4537
Latitude	45°19'N	Total Rainfall (mm)	20978.1
Longitude	75°40'W	Average Annual Rainfall (mm)	567.0
Elevation (m)	371	Total Evaporation (mm)	1821.2
Rainfall Period of Record (y)	37	Total Infiltration (mm)	2089.3
Total Rainfall Period (y)	37	Percentage of Rainfall that is Runoff (%)	81.8

Rainfall Event Analysis

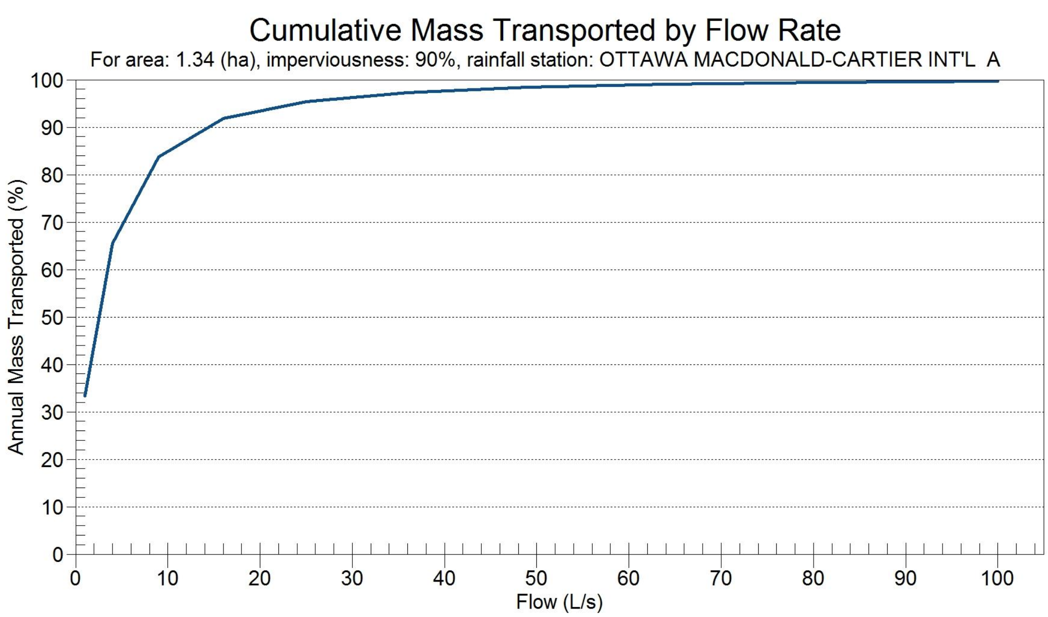
Rainfall Depth mm	No. of Events	Percentage of Total Events %	Total Volume mm	Percentage of Annual Volume %
6.35	3564	78.6	5671	27.0
12.70	508	11.2	4533	21.6
19.05	223	4.9	3434	16.4
25.40	102	2.2	2244	10.7
31.75	60	1.3	1704	8.1
38.10	33	0.7	1145	5.5
44.45	28	0.6	1165	5.6
50.80	9	0.2	416	2.0
57.15	5	0.1	272	1.3
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	1	0.0	109	0.5
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0
133.35	0	0.0	0	0.0
139.70	0	0.0	0	0.0
146.05	0	0.0	0	0.0
152.40	0	0.0	0	0.0
158.75	0	0.0	0	0.0
165.10	0	0.0	0	0.0
171.45	0	0.0	0	0.0
177.80	0	0.0	0	0.0
184.15	0	0.0	0	0.0
190.50	0	0.0	0	0.0
196.85	0	0.0	0	0.0
203.20	0	0.0	0	0.0
209.55	0	0.0	0	0.0
>209.55	0	0.0	0	0.0



Stormceptor®

Pollutograph

Flow Rate L/s	Cumulative Mass %
1	33.4
4	65.5
9	83.7
16	91.8
25	95.4
36	97.3
49	98.4
64	99.0
81	99.4
100	99.7
121	99.9
144	99.9
169	100.0
196	100.0
225	100.0
256	100.0
289	100.0
324	100.0
361	100.0
400	100.0
441	100.0
484	100.0
529	100.0
576	100.0
625	100.0
676	100.0
729	100.0
784	100.0
841	100.0
900	100.0



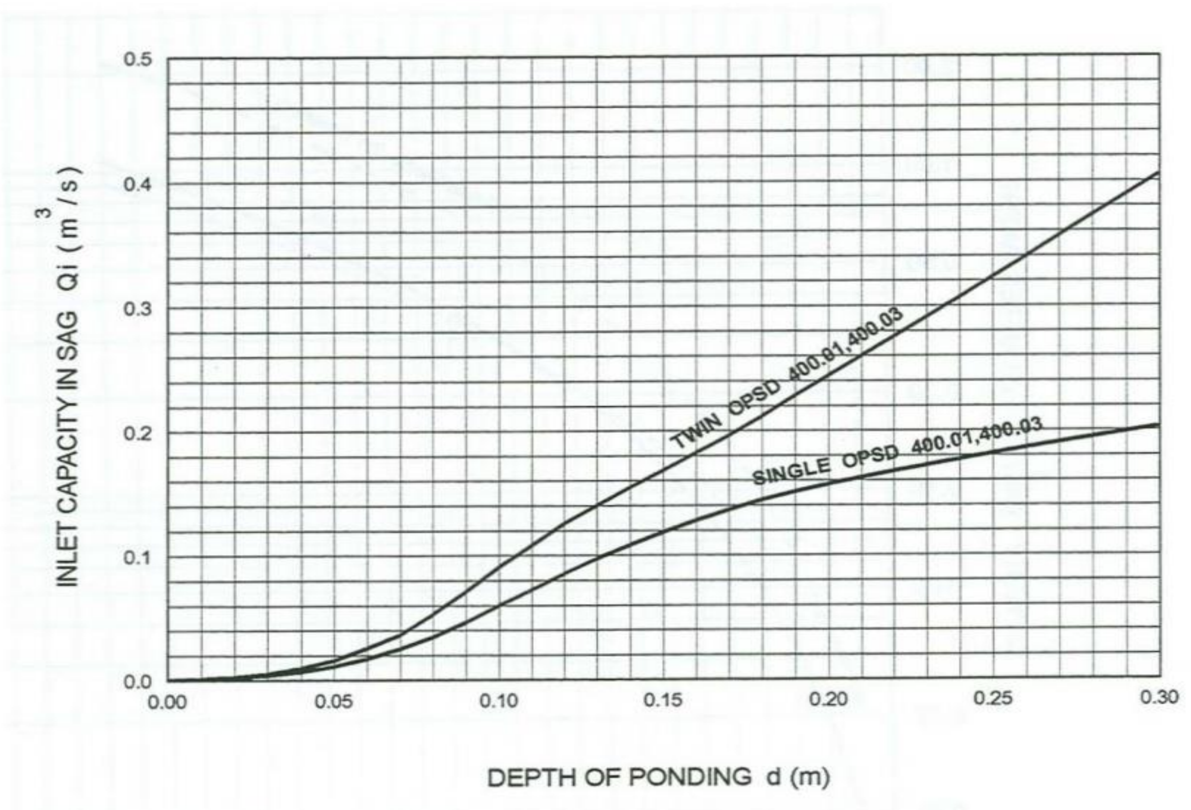
CB Grate CB Lead Capture at Sag

Depth of Flow (m)	Single CB Flow* (L/s)	Twin CB Flow* (L/s)	CB Lead Head (m)	250mm CB Lead Flow (L/s)**		Single CB Discharge (L/s)	Twin CB Discharge (L/s)
0	0	0	1.5	162		0	0
0.01	1	1	1.51	163		1	1
0.02	2	3	1.52	164		2	3
0.03	4	5	1.53	164		4	5
0.04	7	9	1.54	165		7	9
0.05	12	16	1.55	165		12	16
0.06	18	27	1.56	166		18	27
0.07	23	36	1.57	166		23	36
0.08	36	54	1.58	167		36	54
0.09	42	71	1.59	167		42	71
0.1	61	91	1.6	168		61	91
0.11	73	109	1.61	168		73	109
0.12	85	127	1.62	169		85	127
0.13	99	140	1.63	169		99	140
0.14	109	155	1.64	170		109	155
0.15	120	169	1.65	170		120	169
0.16	129	183	1.66	171		129	171
0.17	136	196	1.67	171		136	171
0.18	145	211	1.68	172		145	172
0.19	150	228	1.69	172		150	172
0.2	156	243	1.7	173		156	173
0.21	161	259	1.71	173		161	173
0.22	167	275	1.72	174		167	174
0.23	172	291	1.73	174		172	174
0.24	176	307	1.74	175		175	175
0.25	181	322	1.75	175		175	175
0.26	186	337	1.76	176		176	176
0.27	189	354	1.77	176		176	176
0.28	194	371	1.78	177		177	177
0.29	199	387	1.79	177		177	177
0.3	202	403	1.8	178		178	178

* CB Grate Flow calculated using Table 4.19 of the MTO Drainage Management Manual, 1997

**CB Lead Flow calculated per the orifice equation Q = C * A * sqrt(2 * g * H)

Design Chart 4.19: Inlet Capacity at Road Sag



Area 104A Stage-Discharge Curve

Depth (m)	Single CB Discharge (L/s)
0	0
0.01	1
0.02	2
0.03	4
0.04	7
0.05	12
0.06	18
0.07	23
0.08	36
0.09	42
0.1	61
0.11	73
0.12	85
0.13	99
0.14	109
0.15	120
0.16	129
0.17	136
0.18	145
0.19	150
0.2	156
0.21	161
0.22	167
0.23	172
0.24	175
0.25	175
0.26	176
0.27	176
0.28	177
0.29	177
0.3	178

Stage	Depth AD (m)	Flow AD (L/s)	Depth Trench Drain (m)	Trench Drain Flow (L/s)	Total Flow (L/s)
54.72	0	0	0	0	0.0
54.77	0.05	24.0	0	5.9	29.9
54.86	0.14	218.0	0.09	5.9	223.9
54.96	0.24	349.9	0.19	5.9	355.8

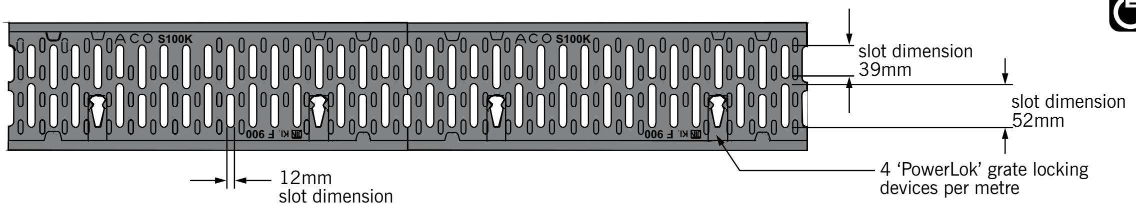
Area 104B Stage-Discharge Curve

Depth (m)	Twin CB Discharge (L/s)
0	0
0.01	1
0.02	3
0.03	5
0.04	9
0.05	16
0.06	27
0.07	36
0.08	54
0.09	71
0.1	91
0.11	109
0.12	127
0.13	140
0.14	155
0.15	169
0.16	171
0.17	171
0.18	172
0.19	172
0.2	173
0.21	173
0.22	174
0.23	174
0.24	175
0.25	175
0.26	176
0.27	176
0.28	177
0.29	177
0.3	178

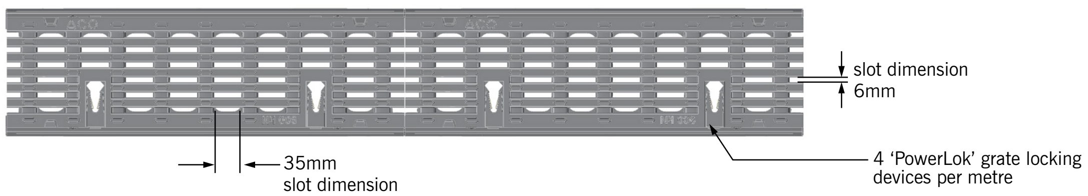
Stage	Depth DCB104D (m)	Flow DCB104D (L/s)
52.74	0	0.0
52.84	0.1	91.0
52.98	0.24	175.0

SlabDrain - H100SK Iron edge rail channel system

Iron Slotted grate

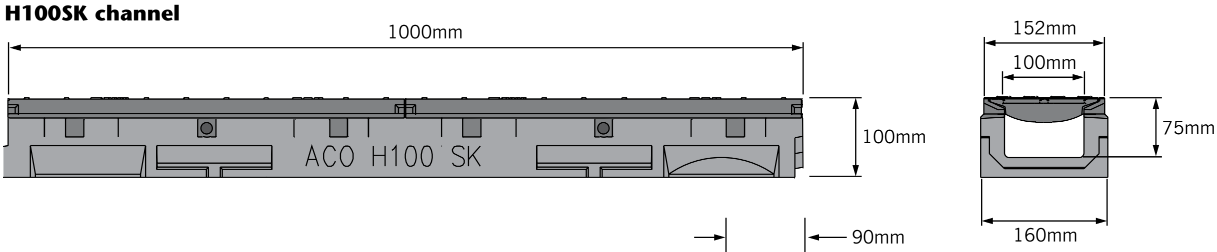


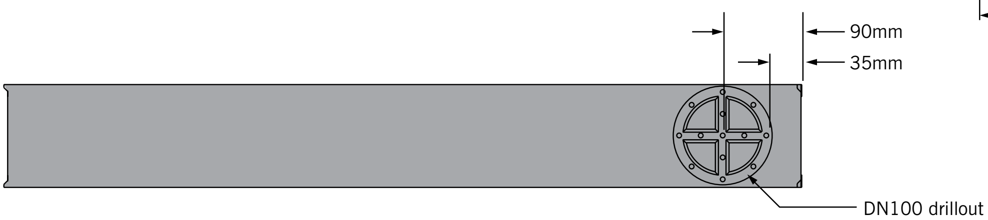
Iron Intercept Heelsafe® *Anti-Slip* grate



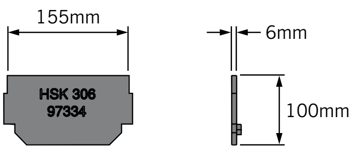
This grate is part of ACO's **Heelsafe®** *Anti-Slip* range. For more information visit www.heelsafe.com.au

H100SK channel





End Cap



Outlet flow rates

Product	Outlet size	Invert Depth (mm)	L/s
H100SK	100mm round	75	5.9

Note: These are the pipe flow rates at the specified outlet, **NOT** channel flow rates.

ACO Specification Information

ACO DRAIN®

SlabDrain - H100SK Iron edge rail channel system

Description	Part No.	Invert[2] (mm)	Weight (kg)
H100SK Neutral channel with iron slotted grate - (1m)	141797	75	31.5
H100SK Neutral channel with iron intercept **Heelsafe®** *Anti-Slip* grate - (1m)	141798	75	33.9
End cap	97334	100[3]	0.5
Debris strainer for 100mm drillout	93488	-	0.1
Grate removal tool	01318	-	0.1
PowerLok safety clip	10443	-	-

Notes:
1. Channel and grate assembly come complete.
2. To calculate overall channel depth add 25mm to invert depth.
3. Overall depth of end cap.

Specifications

General
The surface drainage system shall be ACO's SlabDrain H100SK polymer concrete shallow channel system with ductile iron edge rails as manufactured by ACO.

Materials
H100SK channels shall be manufactured from polyester resin polymer concrete with integrally cast-in ductile iron edge rails. Properties of polymer concrete will be as follows with supporting documentation:

Compressive Strength:	98 MPa
Flexural Strength:	26 MPa
Tensile Strength:	14 MPa
Water Absorption:	0.07%
Frost Proof:	YES
Coefficient of Expansion/ Contraction:	$2.02x10^{-5}$/°C
Water Vapour Transmission:	$0.0364g/m^2$
Non Flammable:	YES
Roughness (Mannings):	n=0.011
Resistant to Weathering:	YES
Dilute Acid and Alkali Resistant:	YES
SF Sealant Groove:	YES

Channels
H100SK channel shall be 100mm nominal internal width with an overall width of 160mm. Channels shall have an overall depth of 100mm for use in areas with depth restrictions. All channels shall be interlocking with a male/female joint.

Grates
Insert specification for the selected grate. Refer to the relevant ACO Specification Information sheet, click: http://www.acodrain.com.au/resources

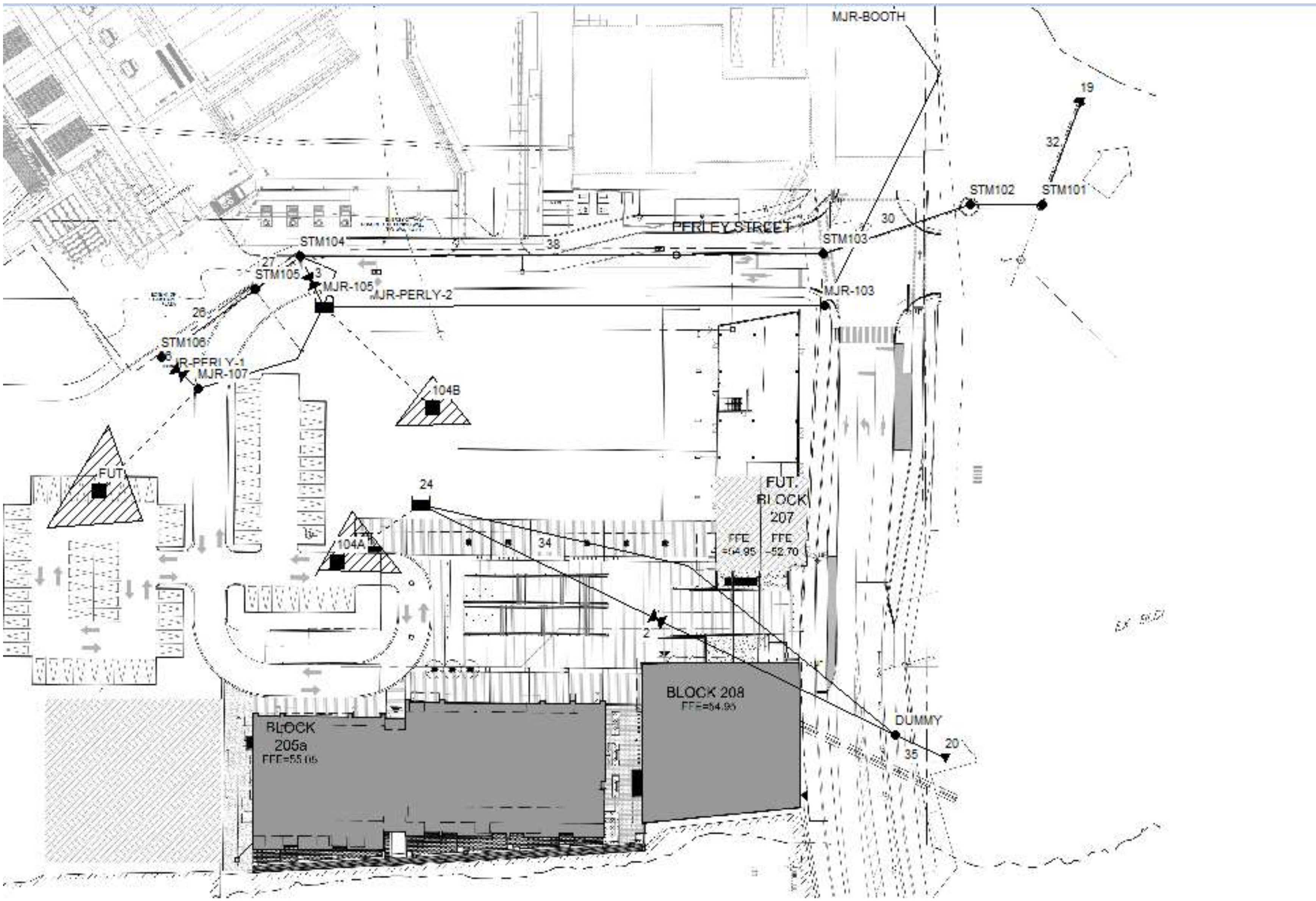
Installation
The complete drainage system shall be by ACO and to be installed for its intended purpose. Any deviation or partial use of the specified system and/or improper installation will void all warranties provided by ACO.

ACO Polycrete Pty Ltd
Australia
Ph: 1300 765 226
www.acodrain.com.au
sales@acoaus.com.au

ACO Limited
New Zealand
Ph: 0800 448 080
www.acodrain.co.nz
sales@aconz.co.nz

SPEC INFO ACO

MODEL SCHEMATIC



```
[TITLE]

[OPTIONS]
FLOW_UNITS           LPS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
START_DATE           01/01/2000
START_TIME           00:01:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:01:00
END_DATE             01/02/2000
END_TIME             00:00:00
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         0:00:02
ALLOW_PONDING        YES
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
CONSTANT     0.0
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
1                INTENSITY 0:10   1.0    TIMESERIES CH4H005

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
104B             1                MJR-105          0.906    93       51       1.5      0
104A             1                24               0.234    86       234      2        0
FUT              1                MJR-107          0.153    99       38       1.5      0
```

```
[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
104B             0.013      0.25       1.57       4.67       0          OUTLET
104A             0.013      0.25       1.57       4.67       0          OUTLET
FUT              0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
;;-------------- ---------- ---------- ---------- ---------- ----------
104B             76.2       13.2       4.14       7          0
104A             76.2       13.2       4.14       7          0
FUT              76.2       13.2       4.14       7          0

[JUNCTIONS]
;;               Invert     Max.       Init.      Surcharge  Ponded
;;Name           Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
STM104           51.29      2.22       0          0          0
STM103           49.51      2.89       0          0          0
STM102           49.21      2.79       0          0          0
STM101           49.11      3          0          0          0
STM105           51.70      1.97       0          0          0
STM106           51.95      2.1        0          0          0
MJR-107          53.49      0.17       0          0          0
DUMMY            54.35      0.46       0          0          0
MJR-103          51.61      0.16       0          0          0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
19               49.00      FIXED      48.54            NO
20               53.68      FREE                        NO
21               50.42      FREE                        NO

[STORAGE]
;;               Invert   Max.     Init.    Storage    Curve                              Ponded   Evap.
;;Name           Elev.    Depth    Depth    Curve      Params                             Area     Frac.    Infiltration Parameters
;;-------------- -------- -------- -------- ---------- -------- -------- -------- -------- -------- -----------------------
MJR-105          53.03    0.24     0        TABULAR    CB104D-SAG                         0        0
24               54.72    0.24     0        FUNCTIONAL 1000     0        0                0        0

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
26               STM106           STM105           21.6       0.013      51.95      51.73      0          0
27               STM105           STM104           10.5       0.013      51.70      51.58      0          0
30               STM103           STM102           29.1       0.013      49.51      49.24      0          0
```

```
31               STM102           STM101           13.6       0.013      49.21      49.14      0          0
32               STM101           19               21.3       0.013      49.11      49         0          0
MJR-PERLY-2      MJR-105          MJR-103          85         0.013      53.13      51.61      0          0
MJR-PERLY-1      MJR-107          MJR-105          10         0.013      53.52      53.13      0          0
34               24               DUMMY            9          0.013      54.80      54.35      0          0
35               DUMMY            20               10         0.013      54.35      53.68      0          0
MJR-BOOTH        MJR-103          21               55         0.013      51.61      50.42      0          0
38               STM104           STM103           99.6       0.013      51.289     49.795     0          0

[ORIFICES]
;;               Inlet            Outlet           Orifice      Crest      Disch.     Flap Open/Close
;;Name           Node             Node             Type         Height     Coeff.     Gate Time
;;-------------- ---------------- ---------------- ------------ ---------- ---------- ---- ----------
1                MJR-105          STM104           BOTTOM       53.10      0.61       NO   0
36               MJR-107          STM106           BOTTOM       *          0.61       NO   0

[OUTLETS]
;;               Inlet            Outlet           Outflow    Outlet          Qcoeff/                     Flap
;;Name           Node             Node             Height     Type            QTable           Qexpon     Gate
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- ----
3                MJR-105          STM104           *          TABULAR/DEPTH   104B-SAG                    NO
2                24               DUMMY            *          TABULAR/DEPTH   104A-SAG                    NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
26               CIRCULAR     0.45             0          0          0          1
27               CIRCULAR     0.450            0          0          0          1
30               CIRCULAR     0.525            0          0          0          1
31               CIRCULAR     0.600            0          0          0          1
32               CIRCULAR     0.60             0          0          0          1
MJR-PERLY-2      IRREGULAR    PerleySt-1       0          0          0          1
MJR-PERLY-1      IRREGULAR    PerleySt-1       0          0          0          1
34               IRREGULAR    104A-Major       0          0          0          1
35               RECT_OPEN    0.3              10         0          0          1
MJR-BOOTH        IRREGULAR    BoothSt          0          0          0          1
38               CIRCULAR     0.450            0          0          0          1
1                RECT_CLOSED  0.87             0.87       0          0
36               RECT_CLOSED  0.75             0.75       0          0

[TRANSECTS]

;13m
NC 0        0        0.013
X1 sect              4        0        0        0.0      0.0      0        0        0
GR 100.155  -6.5     100.085  -3.0     100      -0.15    100      0

NC 0.013    0.013    0.013
X1 104A-Major        4        0.0      0.0      0.0      0.0      0.0      0.0      0.0
GR 54.66    0        54.20    0.9      54.25    5        54.41    9.1
```

```
NC 0.013    0.013    0.013
X1 BoothSt           5        0.0      0.0      0.0      0.0      0.0      0.0      0.0
GR 51.05    0        50.95    0        51.11    6        50.95    12       51.05    12

NC 0.013    0.013    0.013
X1 PerleySt-1        5        0.0      0.0      0.0      0.0      0.0      0.0      0.0
GR 53.27    0        53.22    0        53.13    3        53.22    6        53.27    6

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------
26               0.5        0.02       0          NO
27               0.5        0.38       0          NO
30               0.5        0.38       0          NO
31               0.5        1.3        0          NO
32               0.5        0.02       0          NO
38               0.5        0.38       0          NO

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
104B-SAG         Rating     0          0
104B-SAG                    0.10       91
104B-SAG                    0.24       175

104A-SAG         Rating     0          0
104A-SAG                    0.05       29.9
104A-SAG                    0.14       223.9
104A-SAG                    0.24       355.8

CB104D-SAG       Storage    0          0
CB104D-SAG                  0.10       105
CB104D-SAG                  0.24       105

CB104A-SAG       Storage    0          0
CB104A-SAG                  0.14       157
CB104A-SAG                  0.24       157

100-YEAR         Tidal      0          94.81
100-YEAR                    6          94.81
100-YEAR                    12         0
100-YEAR                    24         0

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;2yr12hrS
2yr12hrS         FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\2yr12hrS.dat"
```

```
;5yr12hrS
5yr12hrS         FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\5yr12hrS.dat"

;10yr12hrS
10yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\10yr12hrS.dat"

;25yr12hrS
25yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\25yr12hrS.dat"

;50yr12hrS
50yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\50yr12hrS.dat"

;100yr12hrS
100yr12hrS       FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\100yr12hrS.dat"

CH4H005          FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH4H005.dat"

;100-year Storm, 4 Hour Chicago Distribution
CH4H100          FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH4H100.dat"

CH6H100          FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH6H100.dat"

CH3H100          FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH3H100.dat"

;3 hour chicago storm + 20%
CH3H100x         FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH3H100x.dat"

CH4H002          FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH4H002.dat"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -2500.000 0.000 12500.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
STM104           3232.323           6911.977
STM103           8831.169           6940.837
STM102           10404.040          7460.317
STM101           11168.831          7460.317
STM105           2762.391           6559.767
```

```
STM106           1756.560           5830.904
MJR-107          2150.146           5495.627
DUMMY            9599.125           1807.580
MJR-103          8845.599           6392.496
19               11581.633          8556.851
20               10144.175          1557.093
21               9424.198           9766.764
MJR-105          3491.254           6370.262
24               4526.239           4271.137

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
MJR-PERLY-2      6275.510           6384.840
MJR-PERLY-1      3214.286           5816.327
34               7383.382           3615.160
MJR-BOOTH        10080.175          8862.974
MJR-BOOTH        9395.044           9839.650
3                3622.449           6749.271

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
104B             5056.665           5128.005
104B             4652.624           5633.056
104B             4263.014           5113.575
104A             3437.804           3568.999
104A             3437.804           3568.999
104A             3452.381           3568.999
104A             4312.439           3539.845
104A             3787.658           4195.821
104A             3394.072           3510.690
FUT              1552.478           4096.210
FUT              1188.047           5102.041
FUT              532.070            4023.324

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
1                -777.143           7405.714


[BACKDROP]
FILE       "Z:\Projects\14-717_windmill-the_isles\B_Design\B1_Analysis\B1-4_SWM\2018-06-12_overland-flow\2018-06-11_717_ph1_spa_bnc-SWM-1bmp_Page1.bmp
DIMENSIONS -2500.000 0.000 12500.000 10000.000
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link 38
WARNING 02: maximum depth increased for Node MJR-107

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

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.044        33.856
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.003         2.542
Surface Runoff ...........         0.039        29.875
Final Storage ............         0.002         1.456
Continuity Error (%) .....        -0.050


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.039         0.386
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.039         0.386
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 (%) .....        -0.024


*************************
Highest Continuity Errors
*************************
Node MJR-103 (24.48%)


***************************
Time-Step Critical Elements
***************************
```

None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	0.50 sec
Average Time Step	:	2.00 sec
Maximum Time Step	:	2.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
104B	33.86	0.00	0.00	2.36	30.04	0.27	158.90	0.887
104A	33.86	0.00	0.00	4.68	27.87	0.07	44.08	0.823
FUT	33.86	0.00	0.00	0.33	31.99	0.05	32.30	0.945

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
STM104	JUNCTION	0.01	0.24	51.53	0 01:19	0.24
STM103	JUNCTION	0.01	0.29	49.80	0 01:19	0.28
STM102	JUNCTION	0.02	0.39	49.60	0 01:20	0.39
STM101	JUNCTION	0.02	0.29	49.40	0 01:20	0.29
STM105	JUNCTION	0.01	0.11	51.81	0 01:19	0.11
STM106	JUNCTION	0.01	0.11	52.06	0 01:19	0.11
MJR-107	JUNCTION	0.00	0.03	53.52	0 01:19	0.03
DUMMY	JUNCTION	0.00	0.00	54.35	0 01:21	0.00
MJR-103	JUNCTION	0.00	0.01	51.62	0 01:20	0.01
19	OUTFALL	0.01	0.27	49.27	0 01:20	0.27
20	OUTFALL	0.00	0.00	53.68	0 01:21	0.00
21	OUTFALL	0.00	0.01	50.43	0 01:20	0.01
MJR-105	STORAGE	0.00	0.11	53.14	0 01:19	0.11
24	STORAGE	0.00	0.03	54.75	0 01:21	0.03

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
STM104	JUNCTION	0.00	185.81	0 01:19	0	0.321	0.007
STM103	JUNCTION	0.00	184.06	0 01:19	0	0.321	0.011
STM102	JUNCTION	0.00	184.15	0 01:19	0	0.321	-0.038
STM101	JUNCTION	0.00	183.38	0 01:20	0	0.321	-0.001
STM105	JUNCTION	0.00	32.22	0 01:19	0	0.0489	0.001
STM106	JUNCTION	0.00	32.25	0 01:19	0	0.0489	-0.001
MJR-107	JUNCTION	32.30	32.30	0 01:19	0.0489	0.0489	-0.003
DUMMY	JUNCTION	0.00	15.79	0 01:21	0	0.0652	0.006

MJR-103	JUNCTION	0.00	1.15	0	01:19	0	0.00016	32.407
19	OUTFALL	0.00	183.51	0	01:20	0	0.321	0.000
20	OUTFALL	0.00	15.79	0	01:21	0	0.0652	0.000
21	OUTFALL	0.00	0.28	0	01:20	0	0.000121	0.000
MJR-105	STORAGE	158.90	158.94	0	01:19	0.272	0.272	-0.023
24	STORAGE	44.08	44.08	0	01:19	0.0652	0.0652	-0.002

****
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
MJR-105	0.000	0	0	0	0.007	33	0 01:19	154.76
24	0.001	1	0	0	0.026	11	0 01:21	15.79

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
19	35.38	10.50	183.51	0.321
20	21.78	3.46	15.79	0.065
21	0.94	0.11	0.28	0.000
System	19.37	14.07	199.48	0.386

****
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
26	CONDUIT	32.22	0 01:19	1.16	0.11	0.23
27	CONDUIT	32.20	0 01:19	1.14	0.11	0.23
30	CONDUIT	184.15	0 01:19	1.32	0.44	0.62
31	CONDUIT	183.38	0 01:20	1.15	0.42	0.55
32	CONDUIT	183.51	0 01:20	1.40	0.42	0.47
MJR-PERLY-2	CHANNEL	1.15	0 01:19	0.52	0.00	0.06
MJR-PERLY-1	CHANNEL	0.04	0 01:19	0.07	0.00	0.05
34	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
35	CONDUIT	15.79	0 01:21	0.46	0.00	0.01
MJR-BOOTH	CHANNEL	0.28	0 01:20	0.23	0.00	0.04
38	CONDUIT	184.06	0 01:19	2.16	0.53	0.53
1	ORIFICE	55.30	0 01:19			
36	ORIFICE	32.25	0 01:19			
3	DUMMY	98.31	0 01:19			
2	DUMMY	15.79	0 01:21			

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
		---------- Fraction of Time in Flow Class ----------								
26	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
27	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
30	1.00	0.03	0.00	0.00	0.01	0.02	0.00	0.94	0.00	0.00
31	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
32	1.00	0.03	0.00	0.00	0.80	0.17	0.00	0.00	0.00	0.00
MJR-PERLY-2	1.00	0.05	0.94	0.00	0.00	0.00	0.00	0.00	0.94	0.00
MJR-PERLY-1	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00
34	1.00	0.77	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	1.00	0.77	0.01	0.00	0.00	0.23	0.00	0.00	0.01	0.00
MJR-BOOTH	1.00	0.05	0.00	0.00	0.81	0.14	0.00	0.00	0.89	0.00
38	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Jun 29 11:43:19 2018
Analysis ended on: Fri Jun 29 11:43:20 2018
Total elapsed time: 00:00:01

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link 38
WARNING 02: maximum depth increased for Node MJR-107

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

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.058        45.120
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.004         2.960
Surface Runoff ...........         0.053        40.731
Final Storage ............         0.002         1.456
Continuity Error (%) .....        -0.058


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.053         0.527
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.053         0.527
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 (%) .....        -0.030


*************************
Highest Continuity Errors
*************************
Node MJR-103 (6.23%)


***************************
Time-Step Critical Elements
***************************
```

None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	0.50 sec
Average Time Step	:	2.00 sec
Maximum Time Step	:	2.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
104B	45.12	0.00	0.00	2.78	40.89	0.37	227.46	0.906
104A	45.12	0.00	0.00	5.34	38.50	0.09	64.55	0.853
FUT	45.12	0.00	0.00	0.38	43.22	0.07	44.06	0.958

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
STM104	JUNCTION	0.01	0.30	51.59	0 01:19	0.30
STM103	JUNCTION	0.02	0.36	49.87	0 01:19	0.36
STM102	JUNCTION	0.02	0.48	49.69	0 01:19	0.48
STM101	JUNCTION	0.02	0.36	49.47	0 01:20	0.36
STM105	JUNCTION	0.01	0.13	51.83	0 01:19	0.13
STM106	JUNCTION	0.01	0.12	52.07	0 01:19	0.12
MJR-107	JUNCTION	0.00	0.04	53.53	0 01:19	0.04
DUMMY	JUNCTION	0.00	0.00	54.35	0 01:21	0.00
MJR-103	JUNCTION	0.00	0.03	51.64	0 01:20	0.03
19	OUTFALL	0.02	0.32	49.32	0 01:20	0.32
20	OUTFALL	0.00	0.00	53.68	0 01:21	0.00
21	OUTFALL	0.00	0.03	50.45	0 01:20	0.03
MJR-105	STORAGE	0.00	0.13	53.16	0 01:19	0.13
24	STORAGE	0.00	0.04	54.76	0 01:21	0.04

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
STM104	JUNCTION	0.00	248.70	0 01:19	0	0.432	0.006
STM103	JUNCTION	0.00	247.01	0 01:19	0	0.432	0.013
STM102	JUNCTION	0.00	246.92	0 01:19	0	0.432	-0.041
STM101	JUNCTION	0.00	246.55	0 01:19	0	0.432	-0.006
STM105	JUNCTION	0.00	42.81	0 01:19	0	0.0657	0.000
STM106	JUNCTION	0.00	42.83	0 01:19	0	0.0657	-0.001
MJR-107	JUNCTION	44.06	44.06	0 01:19	0.0661	0.0661	-0.013
DUMMY	JUNCTION	0.00	22.30	0 01:21	0	0.0901	0.004

MJR-103	JUNCTION	0.00	18.21	0 01:19	0	0.00491	6.643
19	OUTFALL	0.00	246.58	0 01:20	0	0.432	0.000
20	OUTFALL	0.00	22.30	0 01:21	0	0.0901	0.000
21	OUTFALL	0.00	14.54	0 01:20	0	0.0046	0.000
MJR-105	STORAGE	227.46	228.69	0 01:19	0.37	0.371	-0.088
24	STORAGE	64.55	64.55	0 01:19	0.0901	0.0901	-0.001

****
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
MJR-105	0.000	1	0	0	0.009	43	0 01:19	224.08
24	0.002	1	0	0	0.037	16	0 01:21	22.30

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
19	36.16	13.83	246.58	0.432
20	22.74	4.59	22.30	0.090
21	1.83	2.90	14.54	0.005
System	20.24	21.31	283.26	0.527

****
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
26	CONDUIT	42.81	0 01:19	1.25	0.15	0.27
27	CONDUIT	42.81	0 01:19	1.22	0.14	0.27
30	CONDUIT	246.92	0 01:19	1.38	0.60	0.77
31	CONDUIT	246.55	0 01:19	1.22	0.56	0.67
32	CONDUIT	246.58	0 01:20	1.50	0.56	0.56
MJR-PERLY-2	CHANNEL	18.21	0 01:19	0.72	0.02	0.20
MJR-PERLY-1	CHANNEL	1.23	0 01:19	0.36	0.00	0.14
34	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
35	CONDUIT	22.30	0 01:21	0.52	0.00	0.01
MJR-BOOTH	CHANNEL	14.54	0 01:20	0.60	0.01	0.16
38	CONDUIT	247.01	0 01:19	2.30	0.71	0.64
1	ORIFICE	96.27	0 01:19			
36	ORIFICE	42.83	0 01:19			
3	DUMMY	109.63	0 01:19			
2	DUMMY	22.30	0 01:21			

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
26	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
27	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
30	1.00	0.02	0.00	0.00	0.02	0.03	0.00	0.94	0.00	0.00
31	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
32	1.00	0.02	0.00	0.00	0.80	0.17	0.00	0.00	0.00	0.00
MJR-PERLY-2	1.00	0.05	0.94	0.00	0.00	0.01	0.00	0.00	0.94	0.00
MJR-PERLY-1	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00
34	1.00	0.76	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	1.00	0.76	0.01	0.00	0.00	0.24	0.00	0.00	0.01	0.00
MJR-BOOTH	1.00	0.05	0.00	0.00	0.80	0.15	0.00	0.00	0.90	0.00
38	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Jun 29 11:44:15 2018
Analysis ended on: Fri Jun 29 11:44:16 2018
Total elapsed time: 00:00:01

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link 38
WARNING 02: maximum depth increased for Node MJR-107

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

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.098        75.998
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.005         3.622
Surface Runoff ...........         0.092        70.973
Final Storage ............         0.002         1.456
Continuity Error (%) .....        -0.070


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.092         0.918
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.092         0.918
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 (%) .....         0.004


*************************
Highest Continuity Errors
*************************
Node MJR-103 (1.43%)


***************************
Time-Step Critical Elements
***************************
```

None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****

Minimum Time Step	:	0.81 sec
Average Time Step	:	2.00 sec
Maximum Time Step	:	2.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
104B	76.00	0.00	0.00	3.39	71.18	0.64	419.43	0.937
104A	76.00	0.00	0.00	6.60	68.18	0.16	113.94	0.897
FUT	76.00	0.00	0.00	0.47	74.04	0.11	75.76	0.974

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
STM104	JUNCTION	0.02	0.61	51.90	0 01:29	0.61
STM103	JUNCTION	0.02	0.62	50.13	0 01:30	0.62
STM102	JUNCTION	0.03	0.62	49.83	0 01:30	0.62
STM101	JUNCTION	0.02	0.44	49.55	0 01:30	0.44
STM105	JUNCTION	0.01	0.20	51.90	0 01:30	0.20
STM106	JUNCTION	0.01	0.15	52.10	0 01:29	0.15
MJR-107	JUNCTION	0.00	0.05	53.54	0 01:29	0.05
DUMMY	JUNCTION	0.00	0.01	54.36	0 01:29	0.01
MJR-103	JUNCTION	0.00	0.06	51.67	0 01:29	0.06
19	OUTFALL	0.02	0.38	49.38	0 01:30	0.38
20	OUTFALL	0.00	0.01	53.69	0 01:29	0.01
21	OUTFALL	0.00	0.06	50.48	0 01:29	0.05
MJR-105	STORAGE	0.01	0.16	53.19	0 01:29	0.16
24	STORAGE	0.00	0.06	54.78	0 01:29	0.06

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
STM104	JUNCTION	0.00	367.43	0 01:28	0	0.705	-0.005
STM103	JUNCTION	0.00	344.53	0 01:29	0	0.705	0.007
STM102	JUNCTION	0.00	344.43	0 01:30	0	0.705	-0.009
STM101	JUNCTION	0.00	344.44	0 01:30	0	0.705	-0.003
STM105	JUNCTION	0.00	64.31	0 01:28	0	0.108	-0.026
STM106	JUNCTION	0.00	64.33	0 01:29	0	0.108	0.172
MJR-107	JUNCTION	75.76	75.76	0 01:29	0.113	0.113	-0.028
DUMMY	JUNCTION	0.00	59.95	0 01:29	0	0.16	0.002

MJR-103	JUNCTION	0.00	121.25	0	01:29	0	0.0542	1.452
19	OUTFALL	0.00	344.51	0	01:30	0	0.705	0.000
20	OUTFALL	0.00	59.94	0	01:29	0	0.16	0.000
21	OUTFALL	0.00	117.23	0	01:29	0	0.0534	0.000
MJR-105	STORAGE	419.43	430.86	0	01:29	0.645	0.65	-0.121
24	STORAGE	113.94	113.94	0	01:29	0.16	0.16	-0.001

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
STM102	JUNCTION	0.11	0.020	2.170

****
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
MJR-105	0.000	1	0	0	0.012	59	0 01:29	426.36
24	0.003	1	0	0	0.064	27	0 01:29	59.95

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
19	37.43	21.80	344.51	0.705
20	24.38	7.58	59.94	0.160
21	2.49	24.85	117.23	0.053
System	21.43	54.23	518.39	0.918

****
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
26	CONDUIT	64.31	0 01:28	1.40	0.22	0.35
27	CONDUIT	64.36	0 01:28	1.35	0.21	0.58
30	CONDUIT	344.43	0 01:30	1.59	0.83	1.00
31	CONDUIT	344.44	0 01:30	1.35	0.78	0.84
32	CONDUIT	344.51	0 01:30	1.66	0.78	0.69
MJR-PERLY-2	CHANNEL	121.25	0 01:29	1.07	0.10	0.42
MJR-PERLY-1	CHANNEL	11.43	0 01:29	0.58	0.01	0.30
34	CHANNEL	0.00	0 00:00	0.00	0.00	0.01
35	CONDUIT	59.94	0 01:29	0.78	0.00	0.03
MJR-BOOTH	CHANNEL	117.23	0 01:29	1.02	0.06	0.35
38	CONDUIT	344.53	0 01:29	2.42	0.99	0.90

1	ORIFICE	177.15	0	01:29
36	ORIFICE	64.33	0	01:29
3	DUMMY	128.00	0	01:29
2	DUMMY	59.95	0	01:29

****
Flow Classification Summary
****

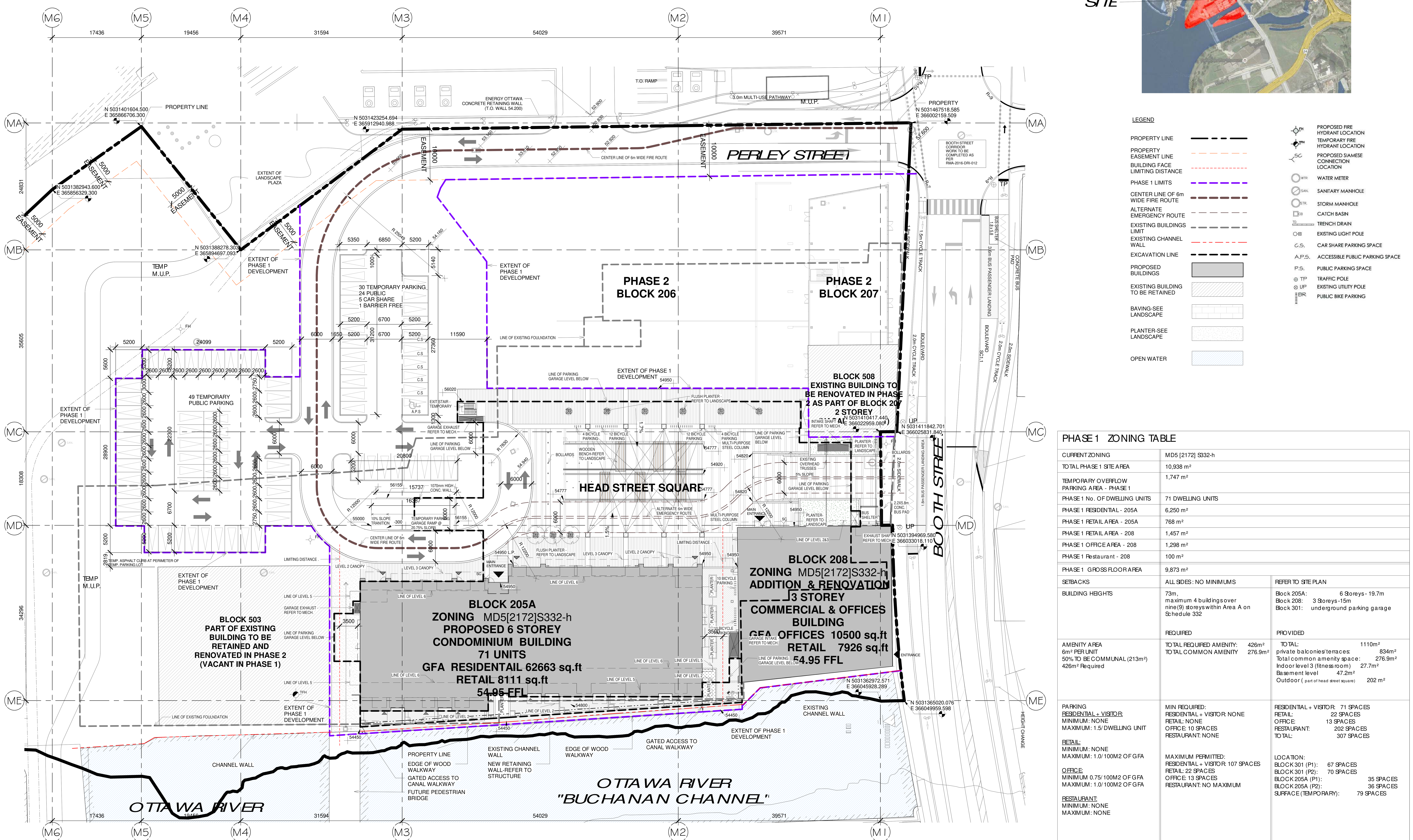
Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
26	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
27	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
30	1.00	0.02	0.00	0.00	0.03	0.04	0.00	0.91	0.00	0.00
31	1.00	0.02	0.00	0.00	0.01	0.00	0.00	0.97	0.00	0.00
32	1.00	0.02	0.00	0.00	0.78	0.19	0.00	0.00	0.00	0.00
MJR-PERLY-2	1.00	0.06	0.93	0.00	0.00	0.01	0.00	0.00	0.94	0.00
MJR-PERLY-1	1.00	0.98	0.01	0.00	0.01	0.00	0.00	0.00	0.94	0.00
34	1.00	0.75	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	1.00	0.74	0.01	0.00	0.00	0.25	0.00	0.00	0.01	0.00
MJR-BOOTH	1.00	0.06	0.00	0.00	0.79	0.16	0.00	0.00	0.89	0.00
38	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
30	0.13	0.13	0.15	0.01	0.13
31	0.01	0.11	0.01	0.01	0.01
38	0.01	0.08	0.01	0.01	0.01

Analysis begun on: Fri Jun 29 11:33:52 2018
Analysis ended on: Fri Jun 29 11:33:53 2018
Total elapsed time: 00:00:01

DRAWINGS / FIGURES



PHASE 1 ZONING TABLE

CURRENT ZONING	MD5 [2172] S332-h	
TOTAL PHASE 1 SITE AREA	10,938 m²	
TEMPORARY OVERFLOW PARKING AREA - PHASE 1	1,747 m²	
PHASE 1 No. OF DWELLING UNITS	71 DWELLING UNITS	
PHASE 1 RESIDENTIAL - 205A	6,250 m²	
PHASE 1 RETAIL AREA - 205A	768 m²	
PHASE 1 RETAIL AREA - 208	1,457 m²	
PHASE 1 OFFICE AREA - 208	1,298 m²	
PHASE 1 Restaurant - 208	100 m²	
PHASE 1 GROSS FLOOR AREA	9,873 m²	
SETBACKS	ALL SIDES: NO MINIMUMS	REFER TO SITE PLAN
BUILDING HEIGHTS	73m, maximum 4 buildings over nine(9) storeys within Area A on Schedule 332 REQUIRED	Block 205A: 6 Storeys - 19.7m Block 208: 3 Storeys -15m Block 301: underground parking garage PROVIDED
AMENITY AREA 6m² PER UNIT 50% TO BE COMMUNAL (213m²) 426m² Required	TOTAL REQUIRED AMENITY: 426m² TOTAL COMMON AMENITY 276.9m²	TOTAL: 1110m² private balconies/terraces: 834m² Total common amenity space: 276.9m² Indoor level 3 (fitness room) 27.7m² Basement level 47.2m² Outdoor (part of head street square) 202 m²
PARKING RESIDENTIAL + VISITOR: MINIMUM: NONE MAXIMUM: 1.5/DWELLING UNIT RETAIL: MINIMUM: NONE MAXIMUM: 1.0/100M2 OF GFA OFFICE: MINIMUM 0.75/100M2 OF GFA MAXIMUM: 1.0/100M2 OF GFA RESTAURANT: MINIMUM: NONE MAXIMUM: NONE	MIN REQUIRED: RESIDENTIAL + VISITOR: NONE RETAIL: NONE OFFICE: 10 SPACES RESTAURANT: NONE MAXIMUM PERMITTED: RESIDENTIAL + VISITOR: 107 SPACES RETAIL: 22 SPACES OFFICE: 13 SPACES RESTAURANT: NO MAXIMUM	RESIDENTIAL + VISITOR: 71 SPACES RETAIL: 22 SPACES OFFICE: 13 SPACES RESTAURANT: 202 SPACES TOTAL: 307 SPACES LOCATION: BLOCK 301 (P1): 67 SPACES BLOCK 301 (P2): 70 SPACES BLOCK 205A (P1): 35 SPACES BLOCK 205A (P2): 36 SPACES SURFACE (TEMPORARY): 79 SPACES
BICYCLE PARKING RESIDENTIAL:1/DWELLING UNIT RETAIL/OFFICE:1/250M2 OF GFA RESTAURANT:1/1,500M2 OF GFA 50% CAN BE VERTICAL	TOTAL REQUIREMENT:81 SPACES RESIDENTIAL: 71 SPACES RETAIL: 4 SPACES OFFICE: 6 SPACES	TOTAL RESIDENTIAL PROPOSED: 71 SPACES RESIDENTIAL INTERIOR: 71 SPACES Interior vertical: 30 spaces interior horizontal: 41 spaces PUBLIC EXTERIOR SPACES: 112 SPACES

1 A.003 000-SITE PLAN -PHASE 1 -Scale 1 300
SCALE: 1 : 300

PROJECT TEAM

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TRANSPORTATION
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DUANE WAITE
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SITE WIDE MECHANICAL
GOODKEY WEEDMARK & ASSOCIATES LIMITED.
ROBERT LEFEBVRE
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GEOTECHNICAL
PATERSONS GROUP
CARLOS DASILVA
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LAND SURVEYOR
STANTEC GEOMATICS LTD.
CHARLES TAILLEFER / BRIAN WEBSTER
T 613.722.4420

APPROVED ☐ REFUSED ☐

THIS DAY OF ,20

DOUGLAS JAMES, MCIP, RPP, MANAGER, DEVELOPMENT REVIEW CENTRAL PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

no.	date	revision
A	18.05.08	ISSUED FOR COORDINATION

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the engineer.

All contractors must comply with all

Do not scale drawings.

This drawing may not be used for construction until signed.

zibi
Windmill | dream

Hobin Architecture Incorporated
63 Pamilla Street
Ottawa, Ontario
Canada K1S 3K7
T: 613-238-7200
F: 613-235-2005
E: mail@hobinarc.com
hobinarc.com
HOBIN ARCHITECTURE

PROJECT
Chaudiere Island West - Phase 1
4 BOOTH ST. Ottawa, Ontario

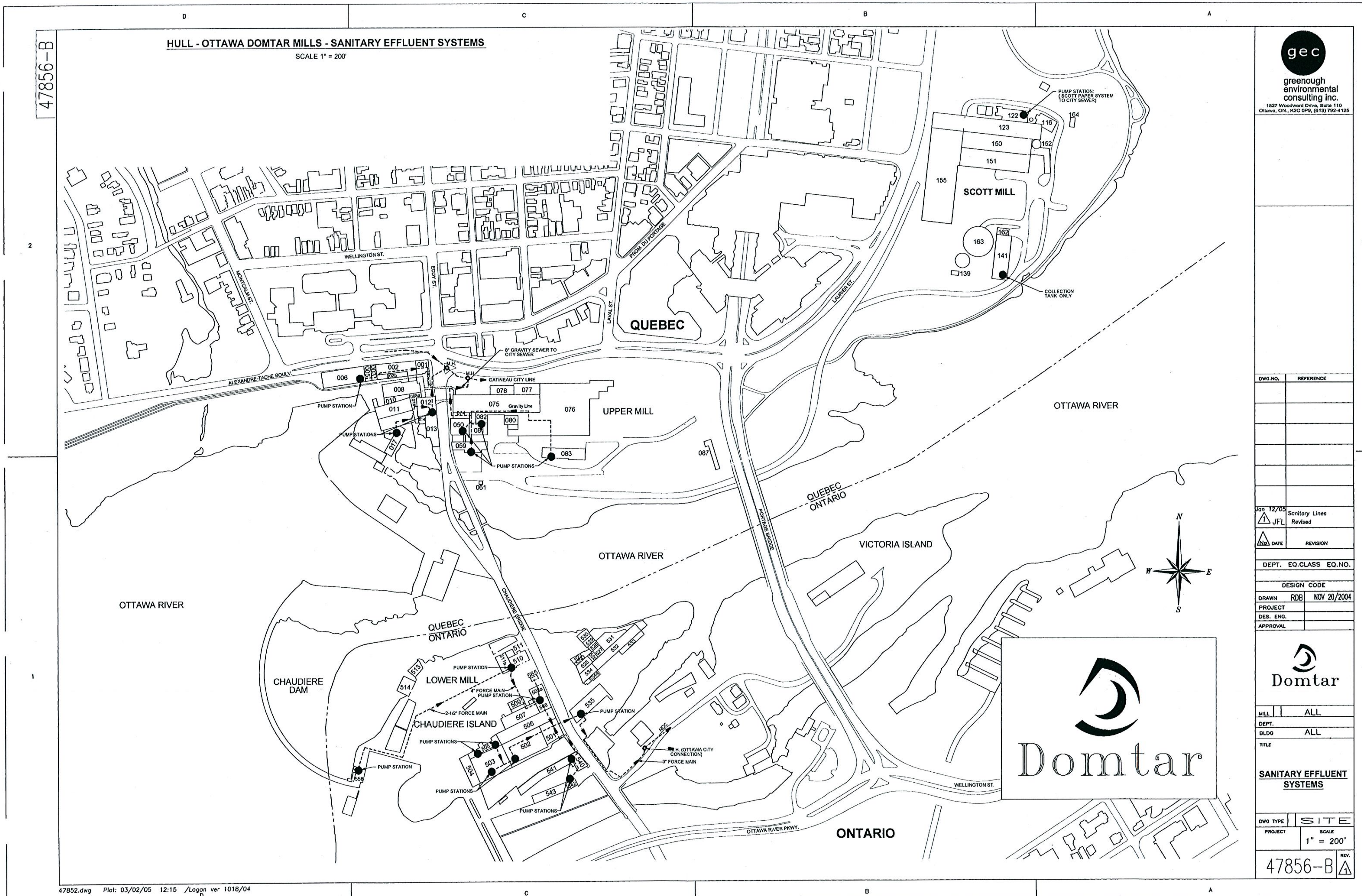
DRAWING TITLE
PHASE 1 SITE PLAN

DRAWN	DATE	SCALE
Author	05/08/18	As indicated

PROJECT 1508.00

DRAWING NO. A.003

REVISION NO. A



47856-B
HULL - OTTAWA DOMTAR MILLS - SANITARY EFFLUENT SYSTEMS
SCALE 1" = 200'
gec
greenough environmental consulting inc.
1827 Woodward Drive, Suite 110
Ottawa, ON., K2C 0P9, (613) 792-4125
PUMP STATION (SCOTT PAPER SYSTEM TO CITY SEWER)
SCOTT MILL
COLLECTION TANK ONLY
WELLINGTON ST.
MONTCALM ST.
EDDY ST.
LAVAL ST.
PROM. DU PORTAGE
LAURIER ST.
QUEBEC
ALEXANDRE-TACHE BOULV.
8" GRAVITY SEWER TO CITY SEWER
M.H.
GATINEAU CITY LINE
Gravity Line
UPPER MILL
PUMP STATION
PUMP STATIONS
OTTAWA RIVER
QUEBEC
ONTARIO
VICTORIA ISLAND
PORTAGE BRIDGE
CHAUDIERE BRIDGE
CHAUDIERE DAM
LOWER MILL
4" FORCE MAIN
2-1/2" FORCE MAIN
CHAUDIERE ISLAND
M.H. (OTTAWA CITY CONNECTION)
3" FORCE MAIN
WELLINGTON ST.
OTTAWA RIVER PKWY.
ONTARIO
N
W
E
S
Domtar
DWG.NO.
REFERENCE
Jan 12/05
JFL
Sanitary Lines Revised
No.
DATE
REVISION
DEPT.
EQ.CLASS
EQ.NO.
DESIGN CODE
DRAWN RDB NOV 20/2004
PROJECT
DES. ENG.
APPROVAL
Domtar
MILL ALL
DEPT.
BLDG ALL
TITLE
SANITARY EFFLUENT SYSTEMS
DWG TYPE SITE
PROJECT
SCALE 1" = 200'
REV.
47856-B
47852.dwg Plot: 03/02/05 12:15 /Logan ver 1018/04

H

Appendix H
Master Servicing Report (DSEL)

MASTER SERVICING STUDY
STAGE 1 – SITE PLAN APPROVAL

FOR

WINDMILL DEVELOPMENT GROUP LTD.
DOMTAR LANDS
REDEVELOPMENT

CITY OF OTTAWA

PROJECT NO.: 14-717

JUNE 2018 – REV 7

MASTER SERVICING STUDY
STAGE 1 – SITE PLAN APPROVAL
FOR
WINDMILL DEVELOPMENT GROUP LTD.
DOMTAR LANDS REDEVELOPMENT

JUNE 2018 – REV 7

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MASTER SERVICING STUDY
STAGE 1 – SITE PLAN APPROVAL
FOR
WINDMILL DEVELOPMENT GROUP LTD.
DOMTAR LANDS REDEVELOPMENT

CITY OF OTTAWA

JUNE 2018 – REV 7

PROJECT NO.: 14-717

1.0 INTRODUCTION

David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare a Master Servicing Study (MSS) for the proposed Domtar Lands Redevelopment in support of Windmill Development Group's application for Stage 1 - Site Plan Approval (SPA).

The following is an update to the previously approved Master Servicing Study / Stage 1 – Site Plan Approval for the Domtar Lands Redevelopment ***(2016 MSS)***, now referred to as Zibi Ontario. Updates to the Master Servicing Study include an updated water and sanitary forcemain routing which has been coordinated with all stakeholders, including the City of Ottawa and NCC, which is further described in ***Section 3 & 4*** of this report.

The subject property consists of lands within the City of Ottawa urban boundary. The applicant also owns lands within Gatineau, Quebec that are planned to be designed and constructed concurrently with the proposed development within Ottawa. The Ontario and Quebec developments will be serviced independently, therefore the following MSS is solely in support of the Ontario site of the development.

As illustrated in ***Figure 1***, the subject property is located on parts of Chaudière and Albert Islands within the Ottawa River and he site is accessible via Booth Street and the Chaudière Bridge. The site is generally bounded by Victoria Island to the southeast, The Canadian War Museum to the south and Energy Ottawa owned lands on Chaudière Island to the north. The subject property measures approximately 5.67ha.

The subject site is currently comprised of thirteen parcels of land with two civic addresses, 3 & 4 Booth Street.

3 Booth Street is made up of nine parcels west of Booth Street on Albert Island and East of Booth Street on Chaudière Island. 4 Booth Street is comprised of four parcels, located west of Booth Street on Chaudière Island. According to the current City of Ottawa Zoning By-law both 3 & 4 Booth Street are designated Parks and Open Space (O1L[329]-h), as shown by the City of Ottawa Zoning By-law emap included in ***Drawings/Figures***. The applicant is proposing to change the current zoning to a Mixed-Use Downtown (MD) zoning.

Figure 1: Site Location

The proposed development involves the construction of approximately ***83,672m²*** of retail and office space, ***1091*** residential units and associated roadway and parking as outlined by the preliminary site plan. Refer to the reduced Concept Plan prepared by Barry J. Hobin & Associates Architects Inc. in ***Drawings/Figures***.

The objective of this report is to support the application for Stage 1 – Site Plan Approval by providing sufficient detail to demonstrate that the development is supported by existing municipal servicing infrastructure and that the contemplated site design conforms to current City of Ottawa design standards, in addition to, state of the art design strategies to meet the client's "One Planet" strategy. The study will inform detailed design for site plan control.

1.1 Existing Conditions

A detailed survey was completed by Fairhall Moffat & Woodland Limited on December 11, 2014. As per the topographic survey, elevations vary from ***46.20m*** at the east edge of the Chaudière Island to ***54.85m*** to the west.

The subject site currently consists of several vacant industrial facilities, which were historically part of a paper mill that was in operation until 2007.

The site is made up of existing building footprint and gravel covered vacant lands. A portion of the Chaudière Island lands west of Booth Street consist of grassed and landscaped area.

Sewer and watermain mapping, along with as-recorded drawings, collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal right-of-ways:

Booth Street

- 203mm diameter ductile iron watermain (North of Middle Street) – Circa 1875
- 305mm diameter PVC watermain (South of Middle Street) – Circa 1990
- 250mm diameter sanitary sewer
- 1200mm diameter storm sewer

Middle Street

- 203mm diameter ductile iron watermain
- 250mm diameter sanitary sewer
- 300mm diameter storm sewer
- Sanitary pumping station northwest corner of the Portage Bridge and Middle Street

Portage Bridge

- 100mm diameter sanitary forcemain
- Sanitary pumping station, northwest of the Portage Bridge and Wellington Street intersection
- 450mm diameter storm sewer

1.2 Required Permits / Approvals

Development of the site is subject to the City of Ottawa Planning and Development Approvals process. The City of Ottawa must approve detailed engineering design drawings and reports, prepared to support the proposed development plan.

The development will include 2 minor stormwater outlets to the Ottawa River and 3 low points allowing for major flow outlet. The major overland flow route for Booth Street will continue to discharge north to the Ottawa River, as existing. Two proposed low points will convey discharge overland flow to the north and east edges of Chaudière Island. All new outlets will require an application and approval for "Development, Interference with

Wetlands and Alterations to Shorelines and Watercourses", Ont. Reg 174/06, to be submitted to the Rideau Valley Conservation Authority (RVCA) and Ministry of the Environment (MOE) approval for the creation of a new outlet. This application follows the City of Ottawa 2 Stage SPA Process. This Study is submitted in support of stage 1 where proof of concept servicing is demonstrated.

The subject property contains existing trees. Development, which may require removal of existing trees, may be subject to the City of Ottawa Urban Tree Conservation By-law No. 2009-200.

1.3 Pre-consultation

Pre-Consultation was conducted with the City of Ottawa and Rideau Valley Conservation Authority via email, along with a formal pre-consultation meeting held between the client and City staff on December 20, 2013. Correspondence and a servicing guidelines checklist are included in ***Appendix A***.

Multiple meetings and email consultation have taken place with City Staff after the publication of the ***2016 MSS***. Stakeholders including those from the City of Ottawa's Water Resources Group, City Structural Engineers, City Heritage and Design Services, City Infrastructure Planning and Right of Way Approvals Group were in attendance. All of the listed stakeholders provided input on the proposed sanitary forcemain routing. The selected forcemain routing, agreed to by DSEL and City Staff is further discussed in ***Section 4*** of this report.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

- **Ottawa Sewer Design Guidelines**,
  City of Ottawa, *SDG002,* October 2012.
  (City Standards)

  - **Technical Bulletin ISDTB-2018-01**
    City of Ottawa, March 21, 2018.
    (ISTB-2018-01)

- **Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, October 2012.
  (Water Supply Guidelines)

-
  - **Technical Bulletin ISD-2010-2**
    City of Ottawa, December 15, 2010.
    (*ISD-2010-2*)

  - **Technical Bulletin ISDTD-2014-2**
    City of Ottawa, May 27, 2014.
    (*ISDTD-2014-2*)

  - **Technical Bulletin ISDTB-2018-02**
    City of Ottawa, March 21, 2018.
    (ISDTB-2018-02)

- **Stormwater Planning and Design Manual,**
  Ministry of the Environment, March 2003.
  (SWMP Design Manual)

- **Ontario Building Code Compendium**
  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010 Update.
  (OBC)

- **Low Impact Development Stormwater Management Planning and Design Guide**
  Toronto Region Conservation Authority (TRCA) & Credit Valley Conservation Authority (CVC), 2010.
  (LID Manual)

- **LeBreton Flats Infrastructure and Remediation Project Master Servicing Report**
  Dessau Soprin Inc.,
  February 2004, Revision 5.
  (LeBreton MSS)

- **LeBreton Flats Sanitary Pumping Station; Operations and Maintenance Manual**
  City of Ottawa; Public Works and Services Department Utility Services Branch; Wastewater and Drainage Services Division
  March 2010.
  (LeBreton PS O&M)

- **Water Supply for Public Fire Protection**
  Fire Underwriters Survey, 1999.
  (FUS)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 1W pressure zone. A 203mm and a 305mm diameter watermain exist within Booth Street and a 203mm watermain exists within Middle Street. Potable water is supplied to the site by the 406mm watermain within Wellington Street. Drawing ***EX-1,*** in ***Drawings/Figures,*** illustrates the existing water distribution network.

Historically, the site would have been serviced via several 203mm diameter service laterals connecting to the 203mm diameter watermain within Booth Street. As discussed previously, the historical conditions of the site up until 2007 were entirely industrial.

Table 1 summarizes the ***Water Supply Guidelines*** employed in the preparation of the historical and proposed water demand estimate.

Table 1
Water Supply Design Criteria

Design Parameter	Value
Industrial – Heavy	55,000 L/gross ha/d
Residential Average Apartment Demand	1.8 person/unit
Residential Daily Average	280 L/person/d
Residential Maximum Daily Demand*	2.5 x Average Daily
Residential Maximum Hourly*	5.5 x Average Daily
Commercial-Floor space	2.5 L/m^2/d
Commercial-Industrial Maximum Daily Demand	1.5 x avg. day L/gross ha/d
Commercial-Industrial Maximum Hour Demand	1.8 x max.day L/gross ha/d
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350kPa and 480kPa
During normal operating conditions pressure must not drop below	275kPa
During normal operating conditions pressure shall not exceed	552kPa
During fire flow operating pressure must not drop below	140kPa

** Residential Max. Daily and Max. Hourly peaking factors per the City of Ottawa Water Design Guidelines*
**** Table updated to reflect ISD-2010-2*

Table 2 Summarizes the historical water demand based on the current City of Ottawa ***Water Supply Guidelines***.

Table 2
Water Demand - Historical Site Conditions

Design Parameter	Historical Water Demand[1] (L/min)
Average Daily Demand	216.6
Max Day	324.8
Peak Hour	584.7

1) Water demand calculations per ***Water Supply Guidelines***. Refer to ***Appendix B*** for detailed calculations.

3.2 Water Supply Servicing Design

Several watermain servicing options were contemplated and coordinated with the National Capital Commission (NCC) and City of Ottawa, see ***Drawings/Figures*** for sketches of the servicing options. All options contemplated a connection to the 300mm watermain within Middle Street at the intersection of Booth Street and a 2nd watermain connection, at various locations, to the 406mm watermain within Wellington Street. Two other options were contemplated and are described below.

Option 1 contemplated a 2nd watermain connection through the pedestrian bridge to the west of Chaudière Island. The watermain would continue south, parallel with the existing watermain within Booth Street and connecting to the 406mm watermain within Wellington. This option takes advantage of an existing bulkhead to cross the Bronson Channel from the subject site and has limited length within externally owned NCC lands. Due to its proximity to the Booth Street watermain and 1st connection point the connection is vulnerable.

Option 2 contemplated a 2nd connection along the west pedestrian bridge and travelling east, connecting to the 406mm watermain east of the intersection of Booth and Wellington Street. This option provides a connection with enough separation from the Booth Street watermain to provide adequate redundancy. The connection has the majority of its length contained within NCC lands.

Option 3 contemplated a new 203mm watermain connection from Middle Street, across the Portage Bridge to the watermain within Wellington Street. This option includes the longest length of new watermain and must travel approximately 100m across the existing Portage Bridge. A majority of the new pipe will be within externally owned lands.

A 4th water servicing options was considered based on consultation with the City of Ottawa and Ville du Gatineau. The 4th option included water servicing from existing watermains within the Ville du Gatineau. It was contemplated to service the site by 2 – 300mm watermains crossing the Union Bridge span. Further coordination with Public Works and Government Services Canada (PWGSC) indicated that the anticipated loading from the watermains would not be able to be accommodated without substantial upgrades to the bridge structure. The Ville du Gatineau also indicated that existing city watermains would not have sufficient pressure to provide the fire flows estimated for the Zibi Ontario site. Through consultation with PWGSC and Ville du Gatineau it was determined that the 4th water servicing option is not feasible.

A 5th water servicing option has been reviewed with City Staff after the publication of the ***2016 MSS***. Through consultation with City Staff, it was determined that the preferred watermain routing is to provide a 200mm and 300mm watermain crossing the Electrical and Bronson Channels. The 300mm is proposed to connect to the existing 300mm watermain within Booth Street and the 200mm watermain will extend down Booth Street to connect to the existing 400mm watermain within Wellington Street. Refer to Drawings ***SSP-1***, ***SSP-2*** and ***SSP-3,*** located in ***Drawings/Figures,*** for proposed watermain routing.

Each building on-site will be serviced independently via connections to the internal watermain network in accordance with the ***Ontario Building Code,*** fire hydrants will be provided within the site to provide adequate fire protection coverage and adequate demand as per ***FUS*** and ***ISTB-2018-02***, and will be connected to the potable distribution system. Detailed layout and sizing is shown by drawing ***SSP-1***, in ***Drawings/Figures***.

Dead end connections will be designed in accordance with section 4.3.1 of the ***Water Supply Guidelines***. According to infrastructure maps received from the City, the watermain within Booth at the subject site was installed in 1874 and will therefore be replaced.

Table 3 summarizes the anticipated water demand and boundary conditions for the proposed development and was calculated using the ***Water Supply Guidelines***. Boundary conditions for the preferred watermain connections are included in ***Table 3***.

Table 3
Water Demand – Proposed Site Conditions

Design Parameter	Anticipated Demand (L/min)	Boundary Condition[1] ($m\ H_2O$ / kPa) Connection @ Booth Street		Boundary Condition[1] ($m\ H_2O$ / kPa) Connection @ Wellington Street	
Average Daily Demand	858.9	61.7	605.3	58.6	574.9
Max Day + Fire Flow	1754.6 + 22,000 = 23,754.6	47.0	461.1	51.5	505.2
Peak Hour	3624.5	54.8	536.6	51.6	506.2

1) Boundary conditions supplied by the City of Ottawa for demands as indicated in correspondence. Assumed ground elevation @ Booth Street ***53.4m***, @ Wellington Street ***56.5m***, See ***Appendix B.***

Due to changes in the residential, retail and office use compared to the ***2016 MSS,*** water demand in the average day has increased by approximately ***20%*** since the original boundary condition request.

The ***FUS*** was utilized to estimate fire demand at each block. Construction type, occupancy type and sprinkler systems were confirmed with Windmill Development Group & the site architect, resulting in a maximum fire flow of ***22,000 L/min*** at Block 204-A. ***Table 4*** summarizes the fire flow estimated, as per the ***FUS*** for each proposed block, see ***Appendix B*** for ***FUS*** calculated fire demands.

Table 4
Model Simulation Output Summary

Building ID	GFA (m^2)	Construction Type	Fire Protection	Fire Demand (L/min)
201	12449	Non-Combustible Construction	Sprinklered	15,000
202	6856	Ordinary Construction	Sprinklered	16,000
203	14446	Non-Combustible Construction	Sprinklered	16,000
204-A	11613	Composite	Sprinklered	22,000
204-B	11613	Non-Combustible Construction	Sprinklered	19,000
205-A	8150	Composite	Sprinklered	19,000
205-B	8083	Composite	Sprinklered	19,000
206	18275	Non-Combustible Construction	Sprinklered	22,000
207	4267	Non-Combustible Construction	Sprinklered	10,000
208	3181	Composite	Sprinklered	12,000
209	10684	Composite	Sprinklered	15,000
210-A	883	Composite	Sprinklered	4,000
210-B	4599	Composite	Sprinklered	10,000
211	9290	Non-Combustible Construction	Sprinklered	12,000
212-A	7022	Non-Combustible Construction	Sprinklered	15,000
212-B	6020	Composite	Sprinklered	18,000
212-C	7022	Composite	Sprinklered	21,000
213	13239	Non-Combustible Construction	Sprinklered	13,000
214	6503	Ordinary Construction	Sprinklered	13,000
215	6503	Ordinary Construction	Sprinklered	14,000

* GFA based on Zibi Master Plan prepared by Fotenn Planning + Design dated 2016-12 13

** GFA for Block 214 & 215 per email correspondence from Windmill 2018-02-22

† See detailed calculation sheet in ***Appendix B*** for composite construction type

EPANet was utilized to determine the availability of pressures throughout the system during average day demand, max day plus fire flow, and peak hour demands. This static model determines pressures based on the available head provided by the City of Ottawa boundary conditions. The model utilizes the Hazen-Williams equation to determine pressure drop, while the pipe properties have been selected in accordance with ***Water Supply Guidelines***. The model was prepared to assess the available pressure at the finished first floor of each building.

To ensure that adequate pressure is available during the fire flow scenario, additional hydrants have been proposed to provide fire protection. During the fire flow scenario the fire flow is split between a maximum of 3 hydrants. The City has confirmed that the anticipated fire flow drawn from each hydrant is acceptable, see ***Appendix A*** for correspondence.

Table 5 summarizes the pressures in each scenario including the fire flow scenario yielding the lowest pressure. ***Appendix B*** contains output reports and model schematics for each scenario.

Table 5
Model Simulation Output Summary

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
201	588.3	145.3	513.3
202	588.3	145.3	513.6
203	586.1	141.9	511.1
204	595.6	164.5	520.0
205-A	595.7	174.1	520.4
205-B	595.7	161.9	520.8
206	595.1	187.5	520.5
207	600.6	247.9	526.5
208	600.6	247.9	526.5
209	596.2	327.7	522.8
210	596.2	320.9	523.8
211	607.3	266.0	532.9
212	624.5	278.0	550.4
213	602.9	261.5	528.9
214	633.2	291.9	559.1
215	633.2	291.9	559.1
3 (HYDRANT 1)	589.2	589.2	589.2
6 (HYDRANT 2)	593.7	152.2	518.9
8 (HYDRANT 3)	589.2	144.9	514.3
Note: Nodes 3, 6, 8 modelled assuming a fire flow of ***7,333 L/min*** demand at each hydrant to service Block 202 totaling ***22,000 L/min*** as per the ***FUS***.			

As demonstrated in ***Table 5***, the anticipated pressures during the average day simulations are higher than recommended pressures in ***Table 1***. Pressure reducing valves are recommended.

The model predicted that water will flow in all areas of the system and no 'dead' zones were found.

It should be noted that the pressures in ***Table 5*** represent the available pressure at the building meter. The mechanical designer must ensure that the internal distribution system is designed in accordance with the OBC Section 7.6.

3.3 Water Supply Conclusion

The site is contemplated to be serviced by 200mm and 300mm watermains crossing the Electrical and Bronson Channel to connect to the existing 300mm watermain within Booth Street and 400mm watermain within Wellington Street, presented as Option 5 in ***Section 3.2***.

Fire demands for each building were calculated using the ***FUS***, resulting in a maximum fire flow of ***22,000 L/min***. A maximum of 3 hydrants will be used to service a single block during a fire flow scenario.

A water distribution model confirmed that adequate pressure is available in the fire flow scenario and that recommended pressures are exceeded in the average day and peak hour scenarios. It is recommended that pressure reducing controls be implemented.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject site, based on City of Ottawa's infrastructure maps & utility plans, is connected to the 250mm sanitary sewer within Middle Street. To accomplish this connection, a series of pumps stations direct flow to a single private pump station within the subject lands, east of Booth Street. This existing private pump station discharge via a forcemain to the Middle Street sanitary sewer. A figure, prepared by Greenough Environmental Consulting Inc. for Domtar Inc., showing the location of on-site pump stations and forcemains, can be found in ***Drawings/Figures.*** The Middle Street sanitary sewer discharges via gravity flow to an existing pump station northwest of the intersection of Middle Street and The Portage Bridge. A 100mm forcemain directs sanitary flow to a second pump station to the south, across the Bronson Channel. The south pump station discharges via a 100mm forcemain to the 1830mm diameter interceptor sewer ***(IS)*** north of Sparks Street at the Garden of the Provinces. Both pump stations are owned and operated by the NCC and service commercial and recreational development on Victoria IslandRefer to drawing ***EX-1,*** in ***Drawings/Figures*** for existing wastewater services.

It is assumed that the existing sanitary sewers, pump stations and forcemains discussed above were designed with adequate capacity to service the historical industrial condition.

Table 6 summarizes the ***City Standards*** employed in the estimate of available capacity within the municipal wastewater sewer systems, and in the calculation of wastewater flow rates for the historical and proposed development.

Table 6
Wastewater Design Criteria

Design Parameter	Value
Industrial-Heavy	55,000 L/gross ha/d
Industrial Peaking Factor*	4.75
Residential 1 Bedroom Apartment Demand	1.4 person/unit
Residential 2 Bedroom Apartment Demand	2.1 person/unit
Residential Average Apartment Demand	1.8 person/unit
Residential Daily Average	280 L/person/d
Commercial Floor Space	5 L/m²/d
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Infiltration and Inflow Allowance	0.28L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Minimum Sanitary Sewer Lateral	135mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s

** Industrial Peaking Factor determined as per MOE Guidelines for the Design of Sanitary Sewers, Typical Industrial Sewage Flow Peaking Factors Graph.*
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.

Table 7
Summary of Historical Wastewater Discharge

Design Parameter	Subject Properties Discharge (L/s)
Average Dry Weather Flow Rate	3.61
Peak Dry Weather Flow Rate	17.14
Peak Wet Weather Flow Rate	18.73

4.2 Wastewater Design

The ***2016 MSS,*** in coordination with the NCC, presented four sanitary servicing options. Each of these options proposed directing wastewater to City of Ottawa sewers, eventually discharging to the ***IS***. Subsequent meetings with the City of Ottawa and Ville du Gatineau indicated that sanitary servicing can be accommodated by the existing 900mm sanitary sewer within Rue Laurier part of the Ville du Gatineau sanitary sewer system. Based on further discussion with the City of Ottawa, the above mentioned options were not selected to service the propose development.

Based on consultation with the City of Ottawa, sanitary servicing is proposed to be provided by a sanitary pump station located on the east edge of Chaudière Island. It is proposed to provide dual forcemain traveling south within Booth Street, spanning the Electrical and Bronson Channels via a pipe bridge. The forcemains are proposed to continue south on Booth Street, east on Fleet Street and South on Lloyd Street. The forcemains are proposed to travel overtop of the existing light rail transit (LRT) tunnel via a gravity sewer and connect to an existing 450mm sanitary sewer within Albert Street. The existing 450mm sanitary sewer conveys flow west 250m until eventually discharging to the IS. Refer to drawings ***SSP-1*** and ***SSP-2,*** in ***Drawings/Figures*** for sanitary servicing and forcemain routing.

Table 8 summarizes anticipated sanitary flow from the development, refer to ***Appendix C*** for detailed calculations.

Table 8
Summary of Anticipated Wastewater Discharge

Design Parameter	Subject Properties Flow (L/s)
Average Dry Weather Flow Rate	22.6
Peak Dry Weather Flow Rate	51.7
Peak Wet Weather Flow Rate	53.6

A preliminary pump station design based on the forcemain routing and above noted wastewater flow rates is on-going. A copy of the design report was prepared under separate cover.

The sewage forcemain will require a license of Occupancy within the City right-of-way and City lands.

4.3 Wastewater Servicing Conclusion

Existing sanitary servicing is achieved through a series of pump stations and forcemains, which eventually discharge to the interceptor sewer north of Sparks Street.

Sanitary servicing is proposed to be achieved by a central pumping station on the east edge of Chaudière Island. The proposed internal sanitary system, consisting of 250mm diameter sanitary sewers, will collect the internal sanitary flow from the site and direct it to the proposed pump station. The proposed twin 250mm diameter forcemains will convey flow from the pump station south along Booth Street. A pipe bridge is proposed to allow the twin forcemains to cross the Electrical and Bronson Channel spans. The forcemains are proposed to travel further south along Booth, east on Fleet Street and south down Lloyd Street. The forcemains are proposed to cross the existing aqueduct and LRT tunnel prior to discharging to the existing 450mm sanitary sewer within Albert Street and eventually the Interceptor Sewer.

A pump station and forcemain design has been prepared by Hatch to convey the ultimate peak flow of ***53.6 L/s***.

The proposed wastewater design conforms to all relevant ***City Standards***.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

Stormwater runoff from the existing subject property is directed uncontrolled to the Ottawa River. The major and minor flow is directed to the Ottawa River overland with a small portion of flow directed by catch basins along Booth Street. The site currently consists of varying sloped topography (0.5% to >5%) and mostly impervious building footprint or associated gravel parking area.

The existing site contains no stormwater management quality controls or controls for flow attenuation.

Runoff from the site is directed to the Ottawa River directly downstream of the Chaudière Falls which has a drop and breadth of 15m and 60m, respectively. The dam is used by Hydro Ottawa and Hydro-Quebec to produce electricity. The dam is also monitored and controlled by the Ottawa River Regulation and Planning Board for flood control.

5.2 Post-development Stormwater Management Targets

Stormwater management requirements for the proposed development are based on relevant ***City Standards*** and pre-consultation with City of Ottawa staff. It has been established that the following criteria apply:

- Increase to flood risk and flood levels in the Ottawa River will not be impacted by the proposed development and therefore stormwater quantity controls are not required;
- Based on the consultation with the City and Rideau Valley Conservation Authority (RVCA), stormwater quality controls will be required to achieve 80% reduction in Total Suspended Solids (TSS) prior to release to the Ottawa River.

See correspondence with the City of Ottawa in ***Appendix A***.

5.3 Stormwater Management System

The stormwater management system will consist of a private storm sewer system with two separate outlets to the Ottawa River. The private stormwater sewer system has been sized to convey an uncontrolled 5-year storm runoff rate in accordance with the ***City Standards***. Detailed layout and sizing is illustrated by ***SSP-1*** in ***Drawings/Figures***.

The Rational Method was utilized to calculate the runoff from the storm sewer catchment areas; Rational Method "C" values for the catchment areas were derived using "*Table 5.7 Runoff Coefficients for Various Soil Conditions"* from the ***City Standards***.

To meet the specified stormwater quality criteria, a treatment train approach including bioretention areas and end of pipe oil/grit separator (OGS) units will be designed to provide a TSS reduction of at least 80%. Building runoff is considered clean, as determined through consultation with the RVCA, therefore, buildings adjacent to the shoreline will have roof leaders discharge directly to the Ottawa River.

Table 9 & Table 10 summarize the anticipated treatment train approach and the resulting TSS removal. The treatment train will consist of directing all drainage from roads, landscaped areas and roofs not adjacent to the shoreline to urban bioretention areas within the private right-of-ways, designed as per the ***LID Manual***. The bioretention areas will be sized to store the water quality storm event (25mm event) from the contributing area within the porous medium below the layer of vegetation and topsoil. The bioretention unit will allow infiltration to the native soil, overflow and an underdrain within the bioretention unit will discharge to the internal storm sewer network. Acting in series to the bioretention areas, OGS units will be designed to provide additional stormwater quality control and ensure that the target TSS removal is achieved.

Table 9
Summary of Stormwater Quality Controls and TSS Removal for West Outlet

Discharge Point	Drainage Area (ha)	Treatment Practice	TSS Removal	Cumulative TSS Removal
West Stormceptor STC 1000	1.35	Bioretention	50%	50%
Ottawa River West Outlet	1.35	West Stormceptor STC 1000	70%	**85%**

Table 10
Summary of Stormwater Quality Controls and TSS Removal for East Outlet

Discharge Point	Drainage Area (ha)	Treatment Practice	TSS Removal	Cumulative TSS Removal
East Stormceptor STC 750	1.27	Bioretention	50%	50%
Ottawa River East Outlet	1.27	East Stormceptor STC 750	71%	**86%**

Future consideration during the detailed design stage will include, but not be limited to, the use of green roofs, providing another level to the treatment train approach. Calculations of the stormwater quality control and details regarding bioretention areas and OGS units are provided in ***Appendix D***.

5.4 Stormwater Servicing Conclusions

Private storm sewer is designed to convey the uncontrolled 5-year runoff rate in accordance with the ***City Standards.***

To achieve the runoff quality criteria identified through consultation, a treatment train approach consisting of bioretention and end of pipe oil/grit separator units is proposed. The treatment train approach is designed to provide ***85%*** and ***86%*** TSS Removal, exceeding recommended quality control targets.

The design of the proposed storm sewer system conforms to all relevant ***City Standards***.

6.0 UTILITIES

Existing underground hydro ducts within Booth and Middle Street providing connection to hydro powerhouses on Victoria and Chaudière Island.

Existing gas mains are located within Booth Street right-of-way

Existing Bell cable located within Booth Street right-of-way and the Portage Bridge

Utility servicing will be coordinated with the individual utility companies prior to site development.

7.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare a Master Servicing Study (MSS) to support the proposed development of Domtar Lands Redevelopment in support of Windmill Development Group's application for Stage 1 - Site Plan Approval (SPA).

- Two new watermains will extend south on Booth, connecting south of the Bronson Channel and at the intersection of Wellington Street and Booth Street
- An internal water distribution model was completed verifying pressures higher then recommended in the average day and peak hour scenario, pressure reducing controls are recommended;
- Sanitary servicing is proposed to be achieved by a central pumping station on the east edge of Chaudiere Island;
- Twin forcemain is proposed to convey flow from the site south down Booth Street and Lloyd Street, discharging to an existing 450mm diameter sanitary sewer within Albert Street eventually discharging to the Interceptor Sewer.
- A minimum TSS removal of 80% will be required for post-development stormwater runoff from the site, this will be provided by bioretention and end of pipe oil/grit separator units;
- Utility services will need to be coordinated with utility companies prior to development;
- Based on the preceding report, adequate servicing capacity exists to support the proposed development.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Steven L. Merrick, P.Eng

Reviewed by,
David Schaeffer Engineering Ltd.

Per: Adam D. Fobert, P.Eng

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APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

14-717 17/04/2014

4.1 General Content		
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Report Cover Sheet
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
☒	Plan showing the site and location of all existing services.	Figure 1
☒	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.0
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Section 2.1
☒	Statement of objectives and servicing criteria.	Section 1.0
☒	Identification of existing and proposed infrastructure available in the immediate area.	Sections 3.1, 4.1, 5.1
☒	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Section 5.0
☒	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	GP-1
☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.4
☒	All preliminary and formal site plan submissions should have the following information: -Metric scale -North arrow (including construction North) -Key plan -Name and contact information of applicant and property owner -Property limits including bearings and dimensions -Existing and proposed structures and parking areas -Easements, road widening and rights-of-way -Adjacent street names	SSP-1

4.2 Development Servicing Report: Water		
☐	Confirm consistency with Master Servicing Study, if available	N/A
☒	Availability of public infrastructure to service proposed development	Section 3.1
☒	Identification of system constraints	Section 3.1
☒	Identify boundary conditions	Section 3.1, 3.2
☒	Confirmation of adequate domestic supply and pressure	Section 3.3

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Section 3.2
☒	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Section 3.2
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐	Address reliability requirements such as appropriate location of shut-off valves	N/A
☐	Check on the necessity of a pressure zone boundary modification	N/A
☒	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Section 3.2, 3.3
☒	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Section 3.2
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2
☐	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

☒	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 4.2
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.1
☒	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 4.2
☒	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Section 4.2, Appendix C
☒	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 4.2
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	Section 4.0
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

☒	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 5.1
☒	Analysis of available capacity in existing public infrastructure.	Section 5.1, Appendix D
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	EX-1
☒	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 5.2
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 5.2
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3
☐	Set-back from private sewage disposal systems.	N/A
☒	Watercourse and hazard lands setbacks.	GP-1
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Appendix A
☒	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Section 5.2
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 5.3
☒	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Section 6.0
☒	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 5.1, 5.3
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☒	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Appendix D
☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
☐	Identification of potential impacts to receiving watercourses	N/A
☐	Identification of municipal drains and related approval requirements.	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3
☒	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	SWM-1
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0
☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

☒	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement ct. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Section 1.2
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

☒	Clearly stated conclusions and recommendations	Section 9.0
☒	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	Attached Response Letter
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

June 26th, 2015

Ms. Lee Ann Snedden
Chief Development Review Services
City of Ottawa, Planning & Growth Management Department
110 Laurier Avenue West, 4th floor
Ottawa, ON K1P 1J1

Re: Windmill Development Group - Zibi Site Plan Application (formerly The Isles)
Municipal servicing solutions
NCC lands affected by this application: Sir John A. MacDonald Parkway at Portage Bridge West Side and Victoria Island

Dear Ms. Snedden:

The National Capital Commission (NCC) has been actively working with Windmill Development Group (WDG) in developing solutions for both sanitary sewer and domestic water supply, for an integrated solution for the Islands. The discussions leading to an agreement between WDG and NCC are positive, but not yet final. In the spirit of cooperation for pending Planning applications, the NCC wishes to provide its support, conditional upon the successful completion of the following:

1. The execution of a transfer agreement between the NCC & WDG by August 21st, 2015 (the "Transfer Agreement");
2. Approval from the City of Ottawa of the water and sanitary servicing solutions presented by WDG;
3. Federal Land Use and Design Approval; and
4. The NCC obtaining all necessary internal approvals including from its Board of Directors as well as the other required governmental approvals including from Treasury Board of Canada and Governor in Council to give effect to the Transfer Agreement and the transactions provided for therein.

A few days following the August 21st deadline mentioned above, a confirmation from the NCC shall be sent to you waiving (or not) the first condition above.

Please also accept this letter as authorization (required Declaration in Section 4) for WDG to submit a Site Plan Application that affects a portion of NCC lands. This conditional letter of support is limited to the NCC authorizing WDG to use NCC's lands to secure the sanitary and water servicing solutions for the development of the Islands.

Sincerely yours,

Stephen Willis, MCIP, RPP, PLE
Executive Director
Capital Planning

c.c. Mr. Marco Zanetti – Director, Real Estate Transactions and Development
Mr. Jonathan Westeinde – Managing Partner, Windmill Development Group

Steve Merrick

From: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Sent: January-12-16 4:16 PM
To: 'Steve Merrick'
Cc: 'Dan Clement'; Scott Bentley; 'Kristen Jorgensen'; 'Miguel Tremblay'; Paul Black; Nitsche, Kersten; Buchanan, Richard; Adam Fobert; Mottalib, Abdul
Subject: RE: 717: Windmill Zibi - Preliminary responses to City comments

Hi Steve,

We have reviewed the sketch and we are okay with the fire hydrant locations as shown on the sketch. We are also fine with the maximum fire flow rate shown on the sketch provided the shown flow is available during firefighting. The consultant has to discuss this issue in detail with respect to their water model created for the site in the related section of the revised study.

Regarding item 3:

We are still reviewing this concern and will get back to you as soon as possible.

Thanks,

Abdul Mottalib, P. Eng.

From: Steve Merrick [mailto:smerrick@dsel.ca]
Sent: January 07, 2016 2:31 PM
To: Mottalib, Abdul
Cc: 'Dan Clement'; Scott Bentley; 'Kristen Jorgensen'; 'Miguel Tremblay'; Paul Black; Nitsche, Kersten; Buchanan, Richard; Adam Fobert
Subject: RE: 717: Windmill Zibi - Preliminary responses to City comments

Hi Abdul,

To follow up on our meeting yesterday, please find attached sketch showing hydrant locations and proximity of the buildings to be serviced. The sketch also indicates the maximum flow rate proposed at each hydrant.

Feel free to call to discuss if you have any questions or concerns.

Steve Merrick, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca

From: Adam Fobert [mailto:afobert@dsel.ca]
Sent: January-05-16 5:31 PM
To: 'Mottalib, Abdul' <Abdul.Mottalib@ottawa.ca>
Cc: 'Dan Clement' <dan@windmilldevelopments.com>; 'Scott Bentley' <scottbentley@windmilldevelopments.com>; 'Kristen Jorgensen' <kristen@windmilldevelopments.com>; 'Miguel Tremblay' <tremblay@fotenn.com>; 'Paul Black' <black@fotenn.com>; 'Nitsche, Kersten' <Kersten.Nitsche@ottawa.ca>; 'Buchanan, Richard' <Richard.Buchanan@ottawa.ca>
Subject: RE: 717: Windmill Zibi - Preliminary responses to City comments

Hello Abdul,

As discussed, please find the following clarifications / actions to be taken on the points below

Item #1 – Re Maximum flow from a hydrant

We are looking to minimize the number of hydrants on the site. Can the City of Ottawa fire services branch provide a maximum permissible flow to be drawn from each hydrant.

Item #2 – Hydrant distances from buildings

DSEL will provide a drawing with dimensions for Fire Services review.

Item #3 – Floodplain, HGL, and EGL

With regards to establishing the floodplain. Can you please confirm that the City have accepted the floodplain delineation?

In regards to HGL and EGL. The Phase 1 storm outlet, located east of Booth Street on the north side of Chaudiere Island, is proposed to have an invert elevation of 49.00m, approximately 0.3m above the interpolated 100-year HGL of 48.705m (between x-secs 1354 and 1440). See attached figure from GHD. Establishing the outlet above the HGL will ensure no impact from the EGL in the Ottawa River. Please confirm that the City accepts this level of protection.

Adam Fobert, P.Eng.
Manager of Site Plan Design

DSEL
david schaeffer engineering ltd.

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direct: (613) 836-0626
cell: (613) 222-9493
email: afobert@DSEL.ca

From: Mottalib, Abdul [mailto:Abdul.Mottalib@ottawa.ca]
Sent: December-29-15 12:25 PM
To: 'Adam Fobert' <afobert@dsel.ca>
Cc: 'Dan Clement' <dan@windmilldevelopments.com>; 'Scott Bentley' <scottbentley@windmilldevelopments.com>; 'Kristen Jorgensen' <kristen@windmilldevelopments.com>; 'Miguel Tremblay' <tremblay@fotenn.com>; 'Paul Black' <black@fotenn.com>; Nitsche, Kersten <Kersten.Nitsche@ottawa.ca>; Buchanan, Richard <Richard.Buchanan@ottawa.ca>; Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: RE: 717: Windmill Zibi - Preliminary responses to City comments

Hi Adam,

I called you and left a message on your voice mailbox.

I have reviewed your email below. I need more information from you as the provided information is not adequate.

Please give me a call ASAP to discuss.

Thanks,

Abdul Mottalib, P. Eng.

From: Adam Fobert [mailto:afobert@dsel.ca]
Sent: December 24, 2015 11:24 AM
To: Buchanan, Richard; Mottalib, Abdul
Cc: 'Dan Clement'; 'Scott Bentley'; 'Kristen Jorgensen'; 'Miguel Tremblay'; 'Paul Black'; Nitsche, Kersten
Subject: 717: Windmill Zibi - Preliminary responses to City comments

Hello Richard and Abdul,

As discussed during our meetings on November 27 and December 16 please find below my preliminary responses to the City's comments on the above referenced application.

City Comments Dated November 19, 2015 – Appendix A

Comment 20: With respect to the maximum potential for fire flow from a hydrant, Table 4.10 in the City guidelines is specific to the colour coding of hydrants. Note that the reference for Class AA hydrants is for flows "1500GPM & Above," not maximum 1500GPM. Please also refer to the attached email from Sean Tracey. The email is in reference to our discussion on number of hydrants that can be used to meet the flow required by the FUS calculations. Mr. Tracey did not re-state my question is his email, however I asked during the meeting to confirm what is the maximum flow that Ottawa's fire department can pump at. Can you please confirm the flow 'limit' with City fire operations.

City Comments Dated November 24, 2015

Comment 43: Reference to NFPA 24 section 7.2.3, requirement for hydrant limiting distance from buildings. Please refer to clause, 7.2.4 *"Where hydrants cannot be located in accordance with 7.2.3, locations closer than 40 ft (12.2 m)* *from the building or wall hydrants shall be permitted to be used where approved by the authority having jurisdiction."* The City of Ottawa fire department permitted proposed hydrants to be located with 12.2m of the building at Lansdowne Park. Due to the nature of the development, there were limited opportunities to meet NFPA 7.2.3. The case at Lansdowne was reviewed by Duncan McNaughton. Please re-consider this comment.

Discussion Point During December 16 meeting

We had discussed flood protection during the meeting. The RVCA provided the City comments dated September 3, 2015. Jocelyn Chandler indicated in her letter that the subject property does not fall with the jurisdiction of Ontario Regulation 174/06, the RVCA's regulatory area and that no permits from the RVCA are required, however the standard practice has been to conduct reviews and provide 'letters of advice.' The RVCA has advised the City that the regulatory flood limit on the property be established by way of the 'hydraulic grade line (HGL).' However, since this site is surrounded by a river with fast moving water and is downstream of a dam, the 'energy grade line (EGL)' is higher than the hydraulic grade line. With this in mind, the RVCA advised that the design of the site have regard for the energy grade line. The consultant, GHD (formerly Conestogo-Rovers and Assoc), who prepared the detailed flood mapping, recommended that the outlets of the site be established above the 100-year HGL. This way, the EGL will not influence flow within the proposed storm sewer.

It is DSEL's expectation that the City acknowledge the recommendations of the RVCA and confirm that the proposed outlet configuration is acceptable.

Thank you for your time.

Adam Fobert, P.Eng.
Manager of Site Plan Design

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
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APPENDIX B

Water Supply

Les Iles / The Isles
Historical Site Conditions for The Isles
(Ottawa, Ontario)

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

DSEL

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4		0
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8	0	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	0	0.0	0.0	0.0	0.0	0.0	0.0

Institutional / Commercial / Industrial Demand

Property Type	Unit Rate		Units	Avg. Daily m^3/d	Avg. Daily L/min	Max Day m^3/d	Max Day L/min	Peak Hour m^3/d	Peak Hour L/min
Commercial floor space	2.5	$L/m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Office	75	$L/9.3m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000	L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000	L/gross ha/d	6	311.85	216.6	467.8	324.8	842.0	584.7
			Total I/CI Demand	311.9	216.6	467.8	324.8	842.0	584.7
			Total Demand	**311.9**	**216.6**	**467.8**	**324.8**	**842.0**	**584.7**

Windmill
Zibi - Ontario
Proposed Conditions

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Phase	Block	Type	Unit Rate		No. of Units	Avg Day L/min	Max Day L/min	Peak Hour L/min
1	208	Office	75	L/p/d	287	15.0	22.4	40.4
1	208	Retail	5	$L/m^2/d$	445	1.5	2.3	4.2
1	205.5A	Res	474.6	L/unit/d	71	23.4	58.5	128.7
1	205.5A	Retail	5	$L/m^2/d$	1825	6.3	9.5	17.1
1	207	Office	75	L/p/d	385	20.1	30.1	54.2
1	207	Retail	5	$L/m^2/d$	597	2.1	3.1	5.6
1	206	Res	474.6	L/unit/d	198	65.3	163.1	358.9
1	206	Office	75	L/p/d	395	20.6	30.8	55.5
1	206	Retail	5	$L/m^2/d$	612	2.1	3.2	5.7
1	204A	Office	75	L/p/d	1049	54.6	136.6	300.5
1	204A	Retail	5	$L/m^2/d$	1626	5.6	8.5	15.2
2	211	Office	75	L/p/d	839	43.7	109.3	240.4
2	211	Retail	5	$L/m^2/d$	1301	4.5	6.8	12.2
3	209	Office	75	L/p/d	965	50.3	75.4	135.7
3	209	Retail	5	$L/m^2/d$	1496	5.2	13.0	28.6
3	210A&B	Office	75	L/p/d	495	25.8	38.7	69.6
3	210A&B	Retail	5	$L/m^2/d$	767	2.7	4.0	7.2
4	205B	Res	474.6	L/unit/d	67	22.1	55.2	121.5
4	205B	Office	75	L/p/d	163	8.5	12.8	23.0
4	205B	Retail	5	$L/m^2/d$	253	0.9	1.3	2.4
4	204B	Res	474.6	L/unit/d	115	37.9	94.8	208.5
4	204B	Retail	75	L/p/d	264	13.8	20.7	37.2
4	204B	Office	5	$L/m^2/d$	410	1.4	2.1	3.8
5	201	Res	474.6	L/unit/d	170	56.0	140.1	308.2
5	201	Office	75	L/p/d	182	9.5	14.2	25.5
5	201	Retail	5	$L/m^2/d$	281	1.0	1.5	2.6
5	202	Res	474.6	L/unit/d	90	29.7	74.2	163.1
5	202	Office	75	L/p/d	107	5.6	8.4	15.1
5	202	Retail	5	$L/m^2/d$	166	0.6	0.9	1.6
5	203	Res	474.6	L/unit/d	180	59.3	148.3	326.3
5	203	Retail	75	L/p/d	306	16.0	23.9	43.1
5	203	Retail	5	$L/m^2/d$	475	1.6	2.5	4.5
6	212	Office	75	L/p/d	1804	94.0	140.9	253.7
6	212	Retail	5	$L/m^2/d$	2796	9.7	14.6	26.2
7	213	Res	474.6	L/unit/d	200	65.9	164.8	362.5
7	213	Office	75	L/p/d	150	7.8	11.7	21.1
7	213	Retail	5	$L/m^2/d$	233	0.8	1.2	2.2
8	214	Office	75	L/p/d	587	30.6	45.9	82.6
8	214	Retail	5	$L/m^2/d$	910	3.2	4.7	8.5
8	215	Office	75	L/p/d	587	30.6	45.9	82.6
8	215	Retail	5	$L/m^2/d$	910	3.2	7.9	17.4
EO	1	Office	75	L/p/d	12	0.6	0.9	1.7
					Total	**858.9**	**1754.6**	**3624.5**

Notes:
* Development stats per Windmill schedule dated 2016-02-01 and additional information received via email 2016-02-08.
* Office unit rate per Ontario Building Code 8.2.1.3.B.
* Residential Unit rate assuming 65% one bedroom (1.4p/unit), 30% two bedroom (2.1 p/unit), 5% three bedroom (3.0p/unit)
* Special Event area washrooms only per Windmill email 2016-02-08.
* Energy Ottawa maximum employees to work at Chaudiere Office provided by EO via letter dated March 1, 2016

		Max Day PF	Peak Hour PF
Estimated Total Residential Population	1844	2.5	5.5

Steve Merrick

To: Robert Freel
Subject: RE: Chaudiere/Albert Island Development - Water Boundary Condition Request

---

From: Mottalib, Abdul [mailto:Abdul.Mottalib@ottawa.ca]
Sent: April-08-15 10:30 AM
To: 'Robert Freel'
Cc: Mottalib, Abdul; 'Adam Fobert'
Subject: FW: Chaudiere/Albert Island Development - Water Boundary Condition Request

Hi Bobby,

Please see below as requested.

Thanks,

Abdul Mottalib, P. Eng.

From:
Sent: April 08, 2015 10:20 AM
To: Mottalib, Abdul
Subject: RE: Chaudiere/Albert Island Development - Water Boundary Condition Request

The following are boundary conditions, HGL, for hydraulic analysis at the Chaudière/Albert Islands (Pressure Zone 1W), assumed to be connected to (see attached PDF for location):

1) 406mm on Wellington
2) 305mm on Booth

Minimum HGL = 108.1m (same at both locations)

Maximum HGL = 115.1m (same at both locations), the maximum pressure is estimated to be greater than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

Fire Flow*	Connection 1 (Wellington)
150 L/s	110.6m
217 L/s	110.0m
250 L/s	109.6m
300 L/s	109.0m

367 L/s	108.0m

*Includes Max Day demands of 23.79 L/s distributed evenly between both connection points (i.e. 11.9 L/s at each connection point)

Fire Flow*	Connection 2 (Booth)
150 L/s	109.0m
217 L/s	107.0m
250 L/s	105.8m
300 L/s	103.7m
367 L/s	100.4m

*Includes Max Day demands of 23.79 L/s distributed evenly between both connection points (i.e. 11.9 L/s at each connection point)

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.

From: Robert Freel [mailto:rfreel@dsel.ca]
Sent: April 01, 2015 5:21 PM
To: Mottalib, Abdul
Subject: RE: Chaudiere/Albert Island Development - Water Boundary Condition Request

Good afternoon Abdul,

We would like to request updated watermain boundary conditions for the above referenced site. Please see the anticipated demands below.

1. Location of Service / Street Number: Connection 1 and 2 as shown on the previous request attached

2. Type of development and the amount of fire flow required for the proposed development:

- Proposed development is a mixed use community.
- It is anticipated that the development will be services via a connections 1 and 2 as shown by the attached map.
- Can you provide the available fire flow for the following demands as determined by the FUS:
    - 9,000L/min
    - 13,000L/min
    - 15,000L/min
    - 18,000L/min

- 22,000L/min

3. The estimated demand for the proposed conditions is summarized below:

	L/min	L/s
Avg. Daily	685.1	11.42
Max Day	1427.2	23.79
Peak Hour	2212.1	36.87

Thanks,

Bobby Freel, P.Eng.

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 203
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext.258
cell: (613) 314-7675
email: rfreel@DSEL.ca

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

FUS - Summary Table

Building ID	GFA (m^2)	Construction Type	Fire Protection	Fire Demand (L/min)
201	12449	Non-Combustible Construction	Sprinklered	15,000
202	6856	Ordinary Construction	Sprinklered	16,000
203	14446	Non-Combustible Construction	Sprinklered	16,000
204-A	11613	Composite	Sprinklered	22,000
204-B	11613	Non-Combustible Construction	Sprinklered	19,000
205-A	8150	Composite	Sprinklered	19,000
205-B	8083	Composite	Sprinklered	19,000
206	18275	Non-Combustible Construction	Sprinklered	22,000
207	4267	Non-Combustible Construction	Sprinklered	10,000
208	3181	Composite	Sprinklered	12,000
209	10684	Composite	Sprinklered	15,000
210-A	883	Composite	Sprinklered	4,000
210-B	4599	Composite	Sprinklered	10,000
211	9290	Non-Combustible Construction	Sprinklered	12,000
212-A	7022	Non-Combustible Construction	Sprinklered	15,000
212-B	6020	Composite	Sprinklered	18,000
212-C	7022	Composite	Sprinklered	21,000
213	13239	Non-Combustible Construction	Sprinklered	13,000
214	6503	Ordinary Construction	Sprinklered	13,000
215	6503	Ordinary Construction	Sprinklered	14,000

* GFA based on Zibi Master Plan prepared by Fotenn Planning + Design dated 2016-12-13

** GFA for Block 214 & 215 per email correspondance from Windmill 2018-02-22

† See detailed calculation sheet for composite construction type

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 201

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	12449.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	19637.2	L/min	
	20000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**17000.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-8500 L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	3.1m-10m	20%	
E	>45m	0%	
W	>45m	0%	
	% Increase	**40%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**6800.0 L/min**	

Total Fire Flow

Fire Flow	15300.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by ________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 202

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Ordinary Construc 75% Wood Frame 25% Non-Combustible Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	6856.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	18216.2	L/min	
	18000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**15300.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-7650 L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	3.1m-10m	20%	
E	10.1m-20m	15%	
W	>45m	0%	
	% Increase	**55%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**8415.0 L/min**	

Total Fire Flow

Fire Flow	16065.0 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	16000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 203

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	14446.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	21153.7	L/min	
	21000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**17850.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-8925 L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	3.1m-10m	20%	
E	>45m	0%	
W	>45m	0%	
	% Increase	**40%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**7140.0 L/min**	

Total Fire Flow

Fire Flow	16065.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	16000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 204-A

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite 25% Wood Frame 75% Non-Combustible Construction

C 0.975 *Type of Construction Coefficient per FUS Part II, Section 1*
A 11613.0 m^2 *Total floor area based on FUS Part II section 1*

Fire Flow	23115.3 L/min	
	23000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible -15%

Fire Flow	**19550.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered -50%

Reduction	**-9775 L/min**

4. Increase for Separation Distance

N	10.1m-20m	15%	
S	3.1m-10m	20%	
E	10.1m-20m	15%	
W	10.1m-20m	15%	
	% Increase	**65%**	*value not to exceed 75% per FUS Part II, Section 4*

Increase	**12707.5 L/min**

Total Fire Flow

Fire Flow	22482.5 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	22000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 204-B

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C 0.8 *Type of Construction Coefficient per FUS Part II, Section 1*
A 11613.0 m^2 *Total floor area based on FUS Part II section 1*

Fire Flow	18966.4 L/min	
	19000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible -15%

Fire Flow	**16150.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered -50%

Reduction	**-8075 L/min**

4. Increase for Separation Distance

N	10.1m-20m	15%	
S	20.1m-30m	10%	
E	3.1m-10m	20%	
W	3.1m-10m	20%	
	% Increase	**65%**	*value not to exceed 75% per FUS Part II, Section 4*

Increase	**10497.5 L/min**

Total Fire Flow

Fire Flow	18572.5 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	19000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 205

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite — 40% Wood Frame — 60% Non-Combustible Construction

C	1.08		*Type of Construction Coefficient per FUS Part II, Section 1*
A	8150.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	21449.9 L/min	
	21000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**17850.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-8925 L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	3.1m-10m	20%	
E	10.1m-20m	15%	
W	>45m	0%	
	% Increase	**55%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**9817.5 L/min**	

Total Fire Flow

Fire Flow	18742.5 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	19000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 205

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite 40% Wood Frame 60% Non-Combustible Construction

C	1.08		*Type of Construction Coefficient per FUS Part II, Section 1*
A	8083.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	21361.5 L/min	
	21000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**17850.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-8925 L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	3.1m-10m	20%	
E	10.1m-20m	15%	
W	>45m	0%	
	% Increase	**55%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**9817.5 L/min**	

Total Fire Flow

Fire Flow	18742.5 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	19000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey
Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 206

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	18275.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	23792.6	L/min	
	24000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**20400.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-10200 L/min**

4. Increase for Separation Distance

N	20.1m-30m	10%	
S	10.1m-20m	15%	
E	3.1m-10m	20%	
W	10.1m-20m	15%	
	% Increase	**60%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**12240.0 L/min**	

Total Fire Flow

Fire Flow	22440.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	22000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 207

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	4267.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	11496.7 L/min	
	11000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**9350.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-4675 L/min**

4. Increase for Separation Distance

N	20.1m-30m	10%	
S	10.1m-20m	15%	
E	20.1m-30m	10%	
W	3.1m-10m	20%	
	% Increase	**55%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**5142.5 L/min**	

Total Fire Flow

Fire Flow	9817.5 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	10000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey
Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 208

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite 40% Wood Frame 60% Non-Combustible Construction

C	1.08		*Type of Construction Coefficient per FUS Part II, Section 1*
A	3181.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	13400.7	L/min	
	13000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**11050.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-5525 L/min**

4. Increase for Separation Distance

N	10.1m-20m	15%	
S	20.1m-30m	10%	
E	10.1m-20m	15%	
W	3.1m-10m	20%	
	% Increase	**60%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**6630.0 L/min**	

Total Fire Flow

Fire Flow	12155.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 209

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite 20% Wood Frame 80% Non-Combustible Construction

C 0.94 *Type of Construction Coefficient per FUS Part II, Section 1*
A 10684.0 m^2 *Total floor area based on FUS Part II section 1*

Fire Flow	21375.6 L/min	
	21000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**17850.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-8925 L/min**

4. Increase for Separation Distance

N	20.1m-30m	10%	
S	>45m	0%	
E	0m-3m	25%	
W	>45m	0%	
	% Increase	**35%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**6247.5 L/min**	

Total Fire Flow

Fire Flow	15172.5 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	15000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by __________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey
Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 210-A

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite — 20% Wood Frame — 80% Non-Combustible Construction

C	0.94		*Type of Construction Coefficient per FUS Part II, Section 1*
A	883.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	6145.1 L/min	
	6000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**5100.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-2550 L/min**

4. Increase for Separation Distance

N	20.1m-30m	10%	
S	>45m	0%	
E	>45m	0%	
W	3.1m-10m	20%	
	% Increase	**30%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**1530.0 L/min**	

Total Fire Flow

Fire Flow	4080.0 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	4000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 210-B

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite 20% Wood Frame 80% Non-Combustible Construction

C	0.94		*Type of Construction Coefficient per FUS Part II, Section 1*
A	4599.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	14024.3 L/min	
	14000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**11900.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-5950 L/min**

4. Increase for Separation Distance

N	20.1m-30m	10%	
S	>45m	0%	
E	>45m	0%	
W	3.1m-10m	20%	
	% Increase	**30%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**3570.0 L/min**	

Total Fire Flow

Fire Flow	9520.0 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	10000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 211

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	9290.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	16963.7	L/min	
	17000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**14450.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-7225 L/min**

4. Increase for Separation Distance

N	>45m	0%	
S	20.1m-30m	10%	
E	10.1m-20m	15%	
W	20.1m-30m	10%	
	% Increase	**35%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**5057.5 L/min**	

Total Fire Flow

Fire Flow	12282.5	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 212-A

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	7022.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	14748.3 L/min	
	15000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**12750.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-6375 L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	20.1m-30m	10%	
E	3.1m-10m	20%	
W	10.1m-20m	15%	
	% Increase	**65%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**8287.5 L/min**	

Total Fire Flow

Fire Flow	14662.5 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	15000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by __________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 212-B

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite 75% Wood Frame 25% Non-Combustible Construction

C	1.325		*Type of Construction Coefficient per FUS Part II, Section 1*
A	6020.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	22617.1 L/min	
	23000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**19550.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-9775 L/min**

4. Increase for Separation Distance

N	>45m	0%	
S	3.1m-10m	20%	
E	>45m	0%	
W	3.1m-10m	20%	
	% Increase	**40%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**7820.0 L/min**	

Total Fire Flow

Fire Flow	17595.0 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	18000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by __________________.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 212-C

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Composite 75% Wood Frame 25% Non-Combustible Construction

C	1.325		*Type of Construction Coefficient per FUS Part II, Section 1*
A	7022.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	24426.9 L/min	
	24000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**20400.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-10200 L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	10.1m-20m	15%	
E	>45m	0%	
W	3.1m-10m	20%	
	% Increase	**55%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**11220.0 L/min**	

Total Fire Flow

Fire Flow	21420.0 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	21000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey
Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 213

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	13239.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	20250.7	L/min	
	20000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**17000.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-8500 L/min**

4. Increase for Separation Distance

N	20.1m-30m	10%	
S	>45m	0%	
E	>45m	0%	
W	10.1m-20m	15%	
	% Increase	**25%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**4250.0 L/min**	

Total Fire Flow

Fire Flow	12750.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	13000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by ________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey
Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 214

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Ordinary Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	6503.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	17741.1	L/min	
	18000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**15300.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-7650 L/min**

4. Increase for Separation Distance

N	10.1m-20m	15%	
S	>45m	0%	
E	>45m	0%	
W	3.1m-10m	20%	
	% Increase	**35%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**5355.0 L/min**	

Total Fire Flow

Fire Flow	13005.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	13000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _________________.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required - Block 214

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Ordinary Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	6503.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	17741.1	L/min	
	18000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**15300.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-7650 L/min**

4. Increase for Separation Distance

N	10.1m-20m	15%	
S	>45m	0%	
E	3.1m-10m	20%	
W	30.1m-45m	5%	
	% Increase	**40%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**6120.0 L/min**	

Total Fire Flow

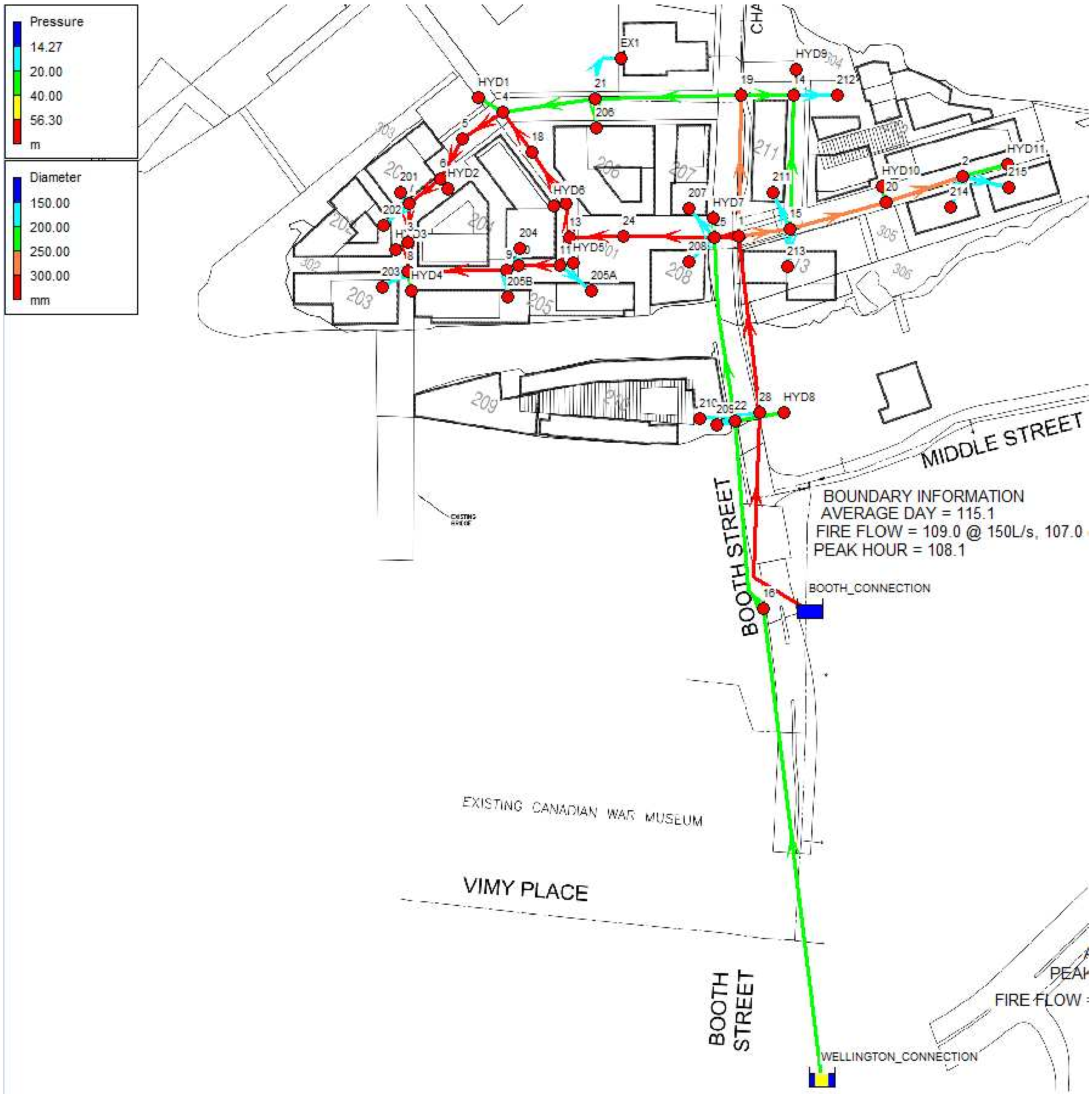
Fire Flow	13770.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	14000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by __________________.

-Calculations based on Fire Underwriters Survey - Part II

AVERAGE DAY SCENARIO



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*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
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Input File: 2018-05-09_717_slm.net

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2	13	24	39	300
3	13	12	16	300
5	4	5	20	300
6	5	6	24	300
7	6	7	21	300
8	7	3	18	300
9	8	9	52	300
10	9	10	9	300
11	10	11	22	300
12	11	13	15	300
14	25	207	15	150
15	25	208	15	150
16	9	205B	15	150
17	8	203	15	150
18	201	7	15	150
19	202	7	15	150
20	10	204	15	150
24	19	1	76	250
25	1	25	17	300
26	1	15	28	250
27	19	14	28	200
28	14	15	72	200
29	15	20	50	250
30	14	212	15	150
31	211	15	15	150
32	2	214	15	150
33	15	213	15	150
37	1	28	98	300
39	22	209	15	150
40	28	210	15	150

50	22	25	190	200
52	HYD1	4	4	200
34	11	HYD5	5	200
44	22	HYD8	1.5	200
54	HYD9	14	1.5	200
55	HYD7	25	1.5	200

Page 2

Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
56	HYD11	2	1.5	200
57	HYD6	12	5	200
4	4	21	30	200
53	19	21	104	200
58	4	18	30	300
59	18	12	30	300
61	6	HYD2	4	200
62	HYD4	8	4	200
63	3	HYD3	4	200
64	3	8	18	300
65	20	HYD10	4	200
66	20	2	55	250
60	205A	11	15	150
13	21	206	10	200
21	21	EX1	26	150
22	215	2	15	150
43	28	BOOTH_CONNECTION	130	300
35	16	22	130	200
36	WELLINGTON_CONNECTION16		270	200

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours
4	0.00	115.06	60.91	0.00
5	0.00	115.06	60.69	0.00
6	0.00	115.06	60.52	0.00
7	0.00	115.06	60.28	0.00
8	0.00	115.06	60.06	0.00
9	0.00	115.06	61.02	0.00
10	0.00	115.06	61.02	0.00
11	0.00	115.06	60.30	0.00
12	0.00	115.06	60.30	0.00

13	0.00	115.06	60.48	0.00
14	0.00	115.06	63.66	0.00
15	0.00	115.06	61.87	0.00
EX1	0.60	115.06	63.66	0.00
19	0.00	115.06	63.75	0.00
201	66.50	115.05	59.97	0.00
204	113.40	115.05	60.71	0.00
205B	31.50	115.06	60.72	0.00
203	76.90	115.05	59.75	0.00
24	0.00	115.06	60.96	0.00
25	0.00	115.06	61.52	0.00
206	87.90	115.06	60.66	0.00
207	22.10	115.06	61.22	0.00

Page 3
Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality hours
208	16.50	115.06	61.22	0.00
202	35.80	115.05	59.97	0.00
1	0.00	115.06	61.66	0.00
2	0.00	115.06	64.85	0.00
212	103.70	115.06	63.66	0.00
211	48.20	115.06	61.91	0.00
214	33.80	115.06	64.55	0.00
213	74.50	115.06	61.46	0.00
210	28.50	115.07	60.77	0.00
209	55.50	115.07	60.77	0.00
22	0.00	115.07	61.07	0.00
28	0.00	115.07	61.07	0.00
HYD1	0.00	115.06	60.91	0.00
HYD9	0.00	115.06	63.66	0.00
HYD5	0.00	115.06	60.30	0.00
HYD8	0.00	115.07	61.07	0.00
HYD7	0.00	115.06	61.52	0.00
HYD11	0.00	115.06	64.85	0.00
HYD6	0.00	115.06	60.30	0.00
18	0.00	115.06	60.30	0.00
21	0.00	115.06	61.67	0.00
HYD2	0.00	115.06	60.52	0.00
HYD4	0.00	115.06	60.56	0.00
HYD3	0.00	115.06	60.56	0.00
3	0.00	115.06	60.06	0.00
HYD10	0.00	115.06	63.06	0.00
20	0.00	115.06	63.06	0.00

205A	29.70	115.06	60.72	0.00	
215	33.80	115.06	64.55	0.00	
16	0.00	115.08	115.08	0.00	
BOOTH_CONNECTION	-699.12	115.10	0.00	1.00	Reservoir
WELLINGTON_CONNECTION	-159.78	115.10	0.00	1.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	347.28	0.08	0.05	Open
2	-347.28	0.08	0.04	Open
3	124.96	0.03	0.01	Open
5	131.48	0.03	0.01	Open
6	131.48	0.03	0.01	Open
7	131.48	0.03	0.01	Open
8	29.18	0.01	0.00	Open
9	-47.72	0.01	0.00	Open
10	-79.22	0.02	0.00	Open

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Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
11	-192.62	0.05	0.02	Open
12	-222.32	0.05	0.03	Open
14	22.10	0.02	0.01	Open
15	16.50	0.02	0.01	Open
16	31.50	0.03	0.02	Open
17	76.90	0.07	0.13	Open
18	-66.50	0.06	0.10	Open
19	-35.80	0.03	0.03	Open
20	113.40	0.11	0.27	Open
24	-159.20	0.05	0.03	Open
25	281.59	0.07	0.05	Open
26	229.83	0.08	0.07	Open
27	64.17	0.03	0.02	Open
28	-39.53	0.02	0.01	Open
29	67.60	0.02	0.01	Open
30	103.70	0.10	0.23	Open
31	-48.20	0.05	0.05	Open
32	33.80	0.03	0.03	Open
33	74.50	0.07	0.12	Open
37	-670.62	0.16	0.14	Open

39	55.50	0.05	0.07	Open
40	28.50	0.03	0.02	Open
50	104.28	0.06	0.04	Open
52	0.00	0.00	0.00	Open
34	0.00	0.00	0.00	Open
44	0.00	0.00	0.00	Open
54	0.00	0.00	0.00	Open
55	0.00	0.00	0.00	Open
56	0.00	0.00	0.00	Open
57	0.00	0.00	0.00	Open
4	-6.53	0.00	0.00	Open
53	95.03	0.05	0.03	Open
58	-124.96	0.03	0.01	Open
59	-124.96	0.03	0.01	Open
61	0.00	0.00	0.00	Open
62	0.00	0.00	0.00	Open
63	0.00	0.00	0.00	Open
64	29.18	0.01	0.00	Open
65	0.00	0.00	0.00	Open
66	67.60	0.02	0.01	Open
60	-29.70	0.03	0.02	Open
13	87.90	0.05	0.03	Open
21	0.60	0.00	0.00	Open
22	-33.80	0.03	0.03	Open
43	-699.12	0.16	0.20	Open
35	159.78	0.08	0.09	Open
36	159.78	0.08	0.08	Open

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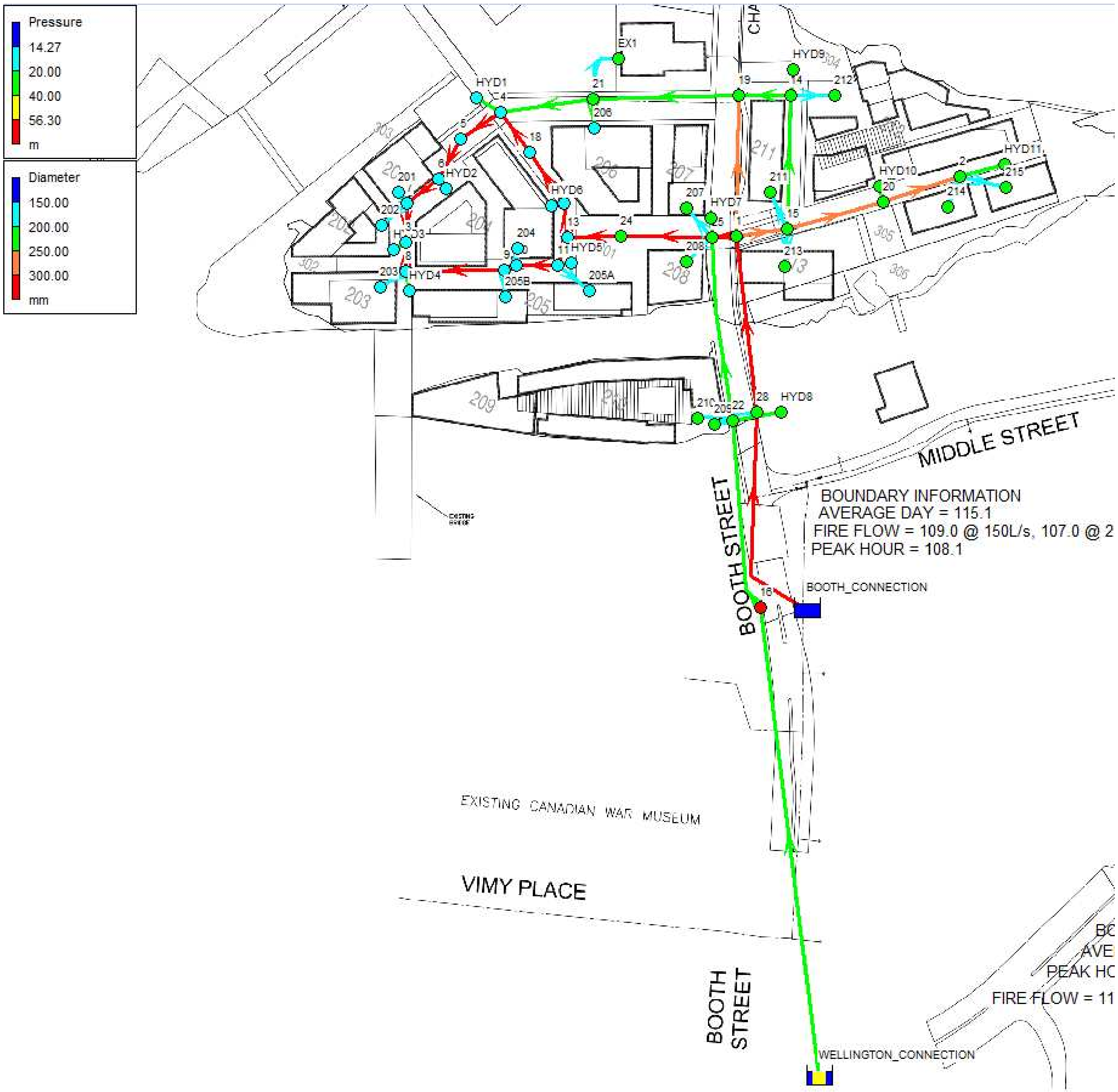
MAX DAY + FIRE FLOW SCENARIO



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**********************************************************************
*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                          Version 2.0                               *
**********************************************************************
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Input File: 2018-05-09_717_slm.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	25	24	38	300
2	13	24	39	300
3	13	12	16	300
5	4	5	20	300
6	5	6	24	300
7	6	7	21	300
8	7	3	18	300
9	8	9	52	300
10	9	10	9	300
11	10	11	22	300
12	11	13	15	300
14	25	207	15	150
15	25	208	15	150
16	9	205B	15	150
17	8	203	15	150
18	201	7	15	150
19	202	7	15	150
20	10	204	15	150
24	19	1	76	250
25	1	25	17	300
26	1	15	28	250
27	19	14	28	200
28	14	15	72	200
29	15	20	50	250
30	14	212	15	150
31	211	15	15	150
32	2	214	15	150
33	15	213	15	150
37	1	28	98	300
39	22	209	15	150
40	28	210	15	150

50	22	25	190	200
52	HYD1	4	4	200
34	11	HYD5	5	200
44	22	HYD8	1.5	200
54	HYD9	14	1.5	200
55	HYD7	25	1.5	200

Page 2
Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
56	HYD11	2	1.5	200
57	HYD6	12	5	200
4	4	21	30	200
53	19	21	104	200
58	4	18	30	300
59	18	12	30	300
61	6	HYD2	4	200
62	HYD4	8	4	200
63	3	HYD3	4	200
64	3	8	18	300
65	20	HYD10	4	200
66	20	2	55	250
60	205A	11	15	150
13	21	206	10	200
21	21	EX1	26	150
22	215	2	15	150
43	28	BOOTH_CONNECTION	130	300
35	16	22	130	200
36	WELLINGTON_CONNECTION16		270	200

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours
4	0.00	71.70	17.55	0.00
5	0.00	70.93	16.56	0.00
6	7333.00	70.05	15.51	0.00
7	0.00	69.90	15.12	0.00
8	7333.00	69.77	14.77	0.00
9	0.00	70.85	16.81	0.00
10	0.00	71.13	17.09	0.00
11	0.00	72.09	17.33	0.00
12	0.00	72.50	17.74	0.00

13	0.00	72.92	18.34	0.00
14	0.00	79.75	28.35	0.00
15	0.00	80.27	27.08	0.00
EX1	0.90	73.51	22.11	0.00
19	0.00	79.57	28.26	0.00
201	155.70	69.89	14.81	0.00
204	262.60	71.11	16.77	0.00
205B	69.30	70.84	16.50	0.00
203	174.70	69.76	14.46	0.00
24	0.00	75.53	21.43	0.00
25	0.00	79.11	25.57	0.00
206	197.20	73.51	19.11	0.00
207	33.20	79.11	25.27	0.00

Page 3
Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality hours
208	24.80	79.11	25.27	0.00
202	83.40	69.89	14.81	0.00
1	0.00	80.41	27.01	0.00
2	0.00	80.27	30.06	0.00
212	155.50	79.74	28.34	0.00
211	116.00	80.27	27.12	0.00
214	50.60	80.27	29.76	0.00
213	177.70	80.26	26.66	0.00
210	42.70	87.01	32.71	0.00
209	88.40	87.70	33.40	0.00
22	0.00	87.70	33.70	0.00
28	0.00	87.01	33.01	0.00
HYD1	0.00	71.70	17.55	0.00
HYD9	0.00	79.75	28.35	0.00
HYD5	0.00	72.09	17.33	0.00
HYD8	0.00	87.70	33.70	0.00
HYD7	0.00	79.11	25.57	0.00
HYD11	0.00	80.27	30.06	0.00
HYD6	0.00	72.50	17.74	0.00
18	0.00	72.10	17.34	0.00
21	0.00	73.51	20.12	0.00
HYD2	0.00	70.05	15.51	0.00
HYD4	0.00	69.77	15.27	0.00
HYD3	0.00	69.74	15.24	0.00
3	7333.00	69.74	14.74	0.00
HYD10	0.00	80.27	28.27	0.00
20	0.00	80.27	28.27	0.00

205A	68.00	72.09	17.75	0.00	
215	53.80	80.27	29.76	0.00	
16	0.00	95.46	95.46	0.00	
BOOTH_CONNECTION	-18762.96	100.40	0.00	1.00	Reservoir
WELLINGTON_CONNECTION	-4990.54	108.00	0.00	1.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	17404.63	4.10	94.20	Open
2	-17404.63	4.10	66.77	Open
3	7169.87	1.69	26.74	Open
5	12577.94	2.97	38.32	Open
6	12577.94	2.97	36.82	Open
7	5244.94	1.24	7.29	Open
8	5005.84	1.18	8.88	Open
9	-9834.86	2.32	20.72	Open
10	-9904.16	2.34	31.20	Open

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Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
11	-10166.76	2.40	43.74	Open
12	-10234.76	2.41	55.64	Open
14	33.20	0.03	0.03	Open
15	24.80	0.02	0.01	Open
16	69.30	0.07	0.10	Open
17	174.70	0.16	0.60	Open
18	-155.70	0.15	0.49	Open
19	-83.40	0.08	0.15	Open
20	262.60	0.25	1.31	Open
24	-4050.05	1.38	11.04	Open
25	12560.49	2.96	76.59	Open
26	2109.72	0.72	4.94	Open
27	-1556.12	0.83	6.42	Open
28	-1711.62	0.91	7.23	Open
29	104.40	0.04	0.01	Open
30	155.50	0.15	0.48	Open
31	-116.00	0.11	0.28	Open
32	50.60	0.05	0.06	Open
33	177.70	0.17	0.62	Open
37	-18720.26	4.41	67.39	Open

39	88.40	0.08	0.17	Open
40	42.70	0.04	0.04	Open
50	4902.14	2.60	45.22	Open
52	0.00	0.00	0.00	Open
34	0.00	0.00	0.00	Open
44	0.00	0.00	0.00	Open
54	0.00	0.00	0.00	Open
55	0.00	0.00	0.00	Open
56	0.00	0.00	0.00	Open
57	0.00	0.00	0.00	Open
4	-5408.07	2.87	60.45	Open
53	5606.17	2.97	58.25	Open
58	-7169.87	1.69	13.28	Open
59	-7169.87	1.69	13.28	Open
61	0.00	0.00	0.00	Open
62	0.00	0.00	0.00	Open
63	0.00	0.00	0.00	Open
64	-2327.16	0.55	1.80	Open
65	0.00	0.00	0.00	Open
66	104.40	0.04	0.01	Open
60	-68.00	0.06	0.10	Open
13	197.20	0.10	0.11	Open
21	0.90	0.00	0.00	Open
22	-53.80	0.05	0.07	Open
43	-18762.96	4.42	102.98	Open
35	4990.54	2.65	59.70	Open
36	4990.54	2.65	46.45	Open

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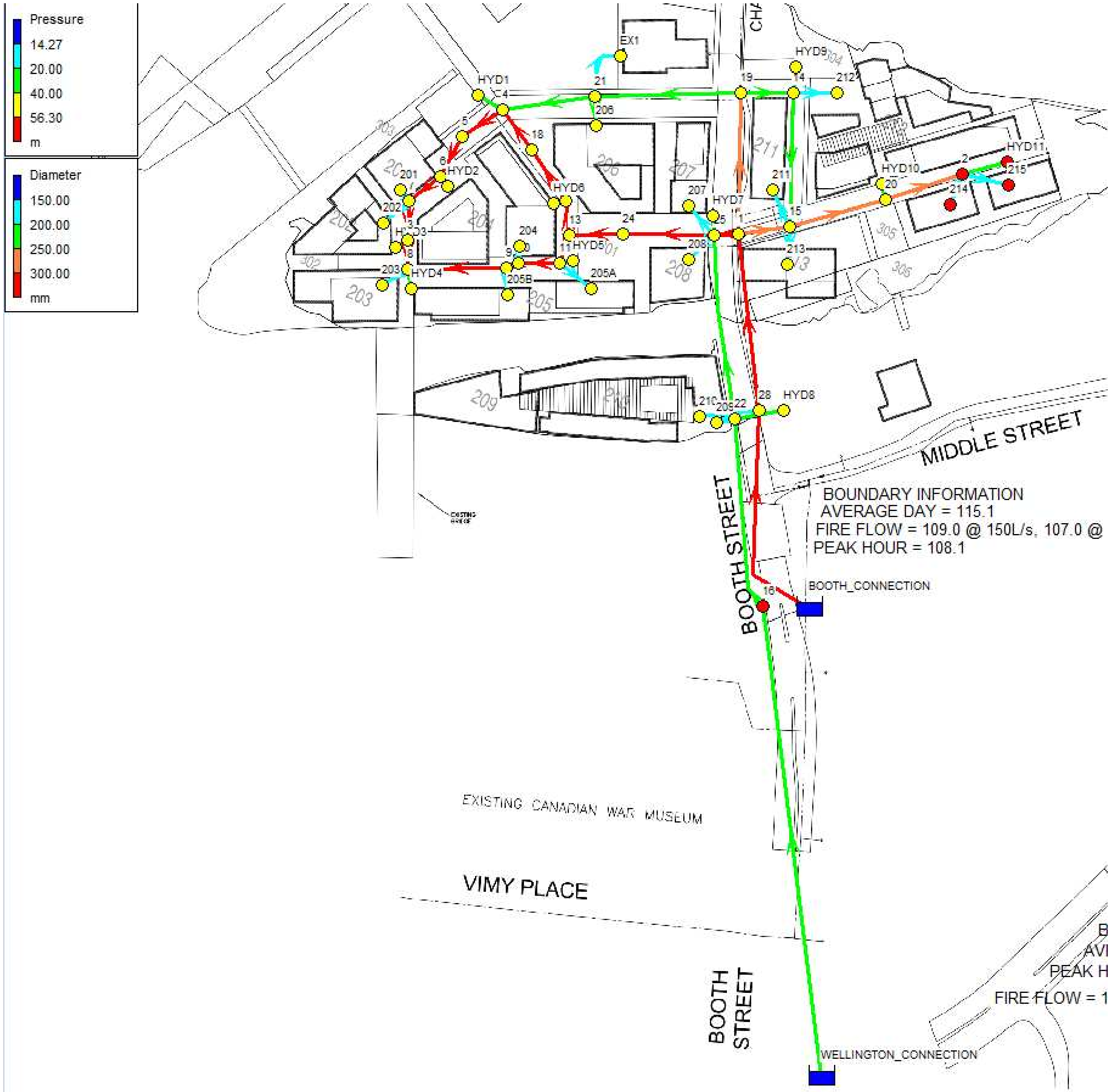
PEAK HOUR SCENARIO



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**********************************************************************
*                             E P A N E T                            *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                            Version 2.0                             *
**********************************************************************
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Input File: 2018-05-09_717_slm.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	25	24	38	300
2	13	24	39	300
3	13	12	16	300
5	4	5	20	300
6	5	6	24	300
7	6	7	21	300
8	7	3	18	300
9	8	9	52	300
10	9	10	9	300
11	10	11	22	300
12	11	13	15	300
14	25	207	15	150
15	25	208	15	150
16	9	205B	15	150
17	8	203	15	150
18	201	7	15	150
19	202	7	15	150
20	10	204	15	150
24	19	1	76	250
25	1	25	17	300
26	1	15	28	250
27	19	14	28	200
28	14	15	72	200
29	15	20	50	250
30	14	212	15	150
31	211	15	15	150
32	2	214	15	150
33	15	213	15	150
37	1	28	98	300
39	22	209	15	150
40	28	210	15	150

50	22	25	190	200
52	HYD1	4	4	200
34	11	HYD5	5	200
44	22	HYD8	1.5	200
54	HYD9	14	1.5	200
55	HYD7	25	1.5	200

Page 2
Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
56	HYD11	2	1.5	200
57	HYD6	12	5	200
4	4	21	30	200
53	19	21	104	200
58	4	18	30	300
59	18	12	30	300
61	6	HYD2	4	200
62	HYD4	8	4	200
63	3	HYD3	4	200
64	3	8	18	300
65	20	HYD10	4	200
66	20	2	55	250
60	205A	11	15	150
13	21	206	10	200
21	21	EX1	26	150
22	215	2	15	150
43	28	BOOTH_CONNECTION	130	300
35	16	22	130	200
36	WELLINGTON_CONNECTION16		270	200

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours
4	0.00	107.45	53.30	0.00
5	0.00	107.44	53.07	0.00
6	0.00	107.44	52.90	0.00
7	0.00	107.44	52.66	0.00
8	0.00	107.43	52.43	0.00
9	0.00	107.43	53.39	0.00
10	0.00	107.43	53.39	0.00
11	0.00	107.44	52.68	0.00
12	0.00	107.45	52.69	0.00

13	0.00	107.45	52.87	0.00
14	0.00	107.51	56.11	0.00
15	0.00	107.51	54.32	0.00
EX1	1.70	107.46	56.06	0.00
19	0.00	107.51	56.20	0.00
201	336.30	107.40	52.32	0.00
204	565.20	107.35	53.01	0.00
205B	59.80	107.43	53.09	0.00
203	373.80	107.40	52.10	0.00
24	0.00	107.48	53.38	0.00
25	0.00	107.52	53.98	0.00
206	44.60	107.46	53.06	0.00
207	164.30	107.51	53.67	0.00

Page 3
Node Results: (continued)

Node ID	Demand LPM	Head m	Pressure m	Quality hours
208	76.80	107.51	53.67	0.00
202	179.80	107.43	52.35	0.00
1	0.00	107.53	54.13	0.00
2	0.00	107.50	57.29	0.00
212	91.10	107.51	56.11	0.00
211	385.80	107.47	54.32	0.00
214	145.80	107.50	56.99	0.00
213	100.00	107.51	53.91	0.00
210	279.90	107.69	53.39	0.00
209	252.60	107.59	53.29	0.00
22	0.00	107.61	53.61	0.00
28	0.00	107.71	53.71	0.00
HYD1	0.00	107.45	53.30	0.00
HYD9	0.00	107.51	56.11	0.00
HYD5	0.00	107.44	52.68	0.00
HYD8	0.00	107.61	53.61	0.00
HYD7	0.00	107.52	53.98	0.00
HYD11	0.00	107.50	57.29	0.00
HYD6	0.00	107.45	52.69	0.00
18	0.00	107.45	52.69	0.00
21	0.00	107.46	54.07	0.00
HYD2	0.00	107.44	52.90	0.00
HYD4	0.00	107.43	52.93	0.00
HYD3	0.00	107.44	52.94	0.00
3	0.00	107.44	52.44	0.00
HYD10	0.00	107.51	55.51	0.00
20	0.00	107.51	55.51	0.00

205A	420.10	107.39	53.05	0.00	
215	146.80	107.50	56.99	0.00	
16	0.00	107.79	107.79	0.00	
BOOTH_CONNECTION	-2944.39	108.10	0.00	1.00	Reservoir
WELLINGTON_CONNECTION	-680.02	108.10	0.00	1.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	1545.96	0.36	0.93	Open
2	-1545.96	0.36	0.71	Open
3	385.31	0.09	0.09	Open
5	774.35	0.18	0.20	Open
6	774.35	0.18	0.20	Open
7	774.35	0.18	0.20	Open
8	258.25	0.06	0.03	Open
9	-115.55	0.03	0.01	Open
10	-175.35	0.04	0.01	Open

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Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
11	-740.55	0.17	0.28	Open
12	-1160.65	0.27	0.81	Open
14	164.30	0.15	0.54	Open
15	76.80	0.07	0.13	Open
16	59.80	0.06	0.08	Open
17	373.80	0.35	2.55	Open
18	-336.30	0.32	2.09	Open
19	-179.80	0.17	0.64	Open
20	565.20	0.53	5.58	Open
24	-533.54	0.18	0.25	Open
25	1359.64	0.32	1.03	Open
26	771.31	0.26	0.73	Open
27	98.20	0.05	0.04	Open
28	7.09	0.00	0.00	Open
29	292.60	0.10	0.09	Open
30	91.10	0.09	0.18	Open
31	-385.80	0.36	2.71	Open
32	145.80	0.14	0.43	Open
33	100.00	0.09	0.21	Open
37	-2664.49	0.63	1.78	Open

39	252.60	0.24	1.21	Open
40	279.90	0.26	1.47	Open
50	427.42	0.23	0.49	Open
52	0.00	0.00	0.00	Open
34	0.00	0.00	0.00	Open
44	0.00	0.00	0.00	Open
54	0.00	0.00	0.00	Open
55	0.00	0.00	0.00	Open
56	0.00	0.00	0.00	Open
57	0.00	0.00	0.00	Open
4	-389.05	0.21	0.44	Open
53	435.35	0.23	0.51	Open
58	-385.31	0.09	0.05	Open
59	-385.31	0.09	0.05	Open
61	0.00	0.00	0.00	Open
62	0.00	0.00	0.00	Open
63	0.00	0.00	0.00	Open
64	258.25	0.06	0.03	Open
65	0.00	0.00	0.00	Open
66	292.60	0.10	0.08	Open
60	-420.10	0.40	3.29	Open
13	44.60	0.02	0.01	Open
21	1.70	0.00	0.00	Open
22	-146.80	0.14	0.45	Open
43	-2944.39	0.69	3.01	Open
35	680.02	0.36	1.39	Open
36	680.02	0.36	1.15	Open

Page 5

APPENDIX C

Wastewater Collection

Historical Site Conditions for The Isles
(Ottawa, Ontario)

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 5.670 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**1.59**	**L/s**

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop	**0**	
Average Domestic Flow	**0.00**	**L/s**
Peaking Factor	**4.00**	
Peak Domestic Flow	**0.00**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate		No. of Units	Avg Wastewater (L/s)
Commercial floor space*	5	$L/m^2/d$		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d		0.00
Industrial - Heavy**	55,000	L/gross ha/d	5.67	3.61

Average I/C/I Flow	**3.61**
Peak Institutional / Commercial Flow	0.00
Peak Industrial Flow**	17.14
Peak I/C/I Flow	**17.14**

** assuming a 12 hour commercial operation*
*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**3.61**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**17.14**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**18.73**	**L/s**

Existing Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2012
Updated per Technical Bulletin ISTB 2018-01

Site Area 5.67 **ha**

Extraneous Flow Allowances — **Peak Flow** 1.9

Phase	Block	Type	Unit	Rate	No. of Units	Average Flow (L/s)	Peaking Factor (-)	Peak Flow (L/s)
1	208	Office	75	L/p/d	287	0.5	1.5	0.7
1	208	Retail	5	$L/m^2/d$	445	0.1	1.5	0.1
1	205.5A	Res	474.6	L/unit/d	71	0.4	3.2	1.3
1	205.5A	Retail	5	$L/m^2/d$	1825	0.2	1.5	0.3
1	207	Office	75	L/p/d	385	0.7	1.5	1.0
1	207	Retail	5	$L/m^2/d$	597	0.1	1.5	0.1
1	206	Res	474.6	L/unit/d	198	1.1	3.2	3.5
1	206	Office	75	L/p/d	395	0.7	1.5	1.0
1	206	Retail	5	$L/m^2/d$	612	0.1	1.5	0.1
1	204A	Office	75	L/p/d	1049	1.8	1.5	2.7
1	204A	Retail	5	$L/m^2/d$	1626	0.2	1.5	0.3
2	211	Office	75	L/p/d	839	1.5	1.5	2.2
2	211	Retail	5	$L/m^2/d$	1301	0.2	1.5	0.2
3	209	Office	75	L/p/d	965	1.7	1.5	2.5
3	209	Retail	5	$L/m^2/d$	1496	0.2	1.5	0.3
3	210A&B	Office	75	L/p/d	495	0.9	1.5	1.3
3	210A&B	Retail	5	$L/m^2/d$	767	0.1	1.5	0.1
4	205B	Res	474.6	L/unit/d	67	0.4	3.2	1.2
4	205B	Office	75	L/p/d	163	0.3	1.5	0.4
4	205B	Retail	5	$L/m^2/d$	253	0.0	1.5	0.0
4	204B	Res	474.6	L/unit/d	115	0.6	3.2	2.0
4	204B	Retail	75	L/p/d	264	0.5	1.5	0.7
4	204B	Office	5	$L/m^2/d$	410	0.0	1.5	0.1
5	201	Res	474.6	L/unit/d	170	0.9	3.2	3.0
5	201	Office	75	L/p/d	182	0.3	1.5	0.5
5	201	Retail	5	$L/m^2/d$	281	0.0	1.5	0.0
5	202	Res	474.6	L/unit/d	90	0.5	3.2	1.6
5	202	Office	75	L/p/d	107	0.2	1.5	0.3
5	202	Retail	5	$L/m^2/d$	166	0.0	1.5	0.0
5	203	Res	474.6	L/unit/d	180	1.0	3.2	3.2
5	203	Retail	75	L/p/d	306	0.5	1.5	0.8
5	203	Retail	5	$L/m^2/d$	475	0.1	1.5	0.1
6	212	Office	75	L/p/d	1804	3.1	1.5	4.7
6	212	Retail	5	$L/m^2/d$	2796	0.3	1.5	0.5
7	213	Res	474.6	L/unit/d	200	1.1	3.2	3.5
7	213	Office	75	L/p/d	150	0.3	1.5	0.4
7	213	Retail	5	$L/m^2/d$	233	0.0	1.5	0.0
8	214	Office	75	L/p/d	587	1.0	1.5	1.5
8	214	Retail	5	$L/m^2/d$	910	0.1	1.5	0.2
8	215	Office	75	L/p/d	587	1.0	1.5	1.5
8	215	Retail	5	$L/m^2/d$	910	0.1	1.5	0.2
EO	1	Office						7.5
					Total	**22.6**		**51.7**
					Total Wetweather Flow Estimate			**53.6**

Notes:
* Development stats per Windmill schedule dated 2016-12-13
* Office unit rate per Ontario Building Code 8.2.1.3.B. assuming $9.3m^2/p$
* Residential Unit rate assuming 65% one bedroom (1.4p/unit), 30% two bedroom (2.1 p/unit), 5% three bedroom (3.0p/unit)
*Based on email correspondanfce from Windmill dated 2018-03-13 (Non-Residential = 84% Office, 16% Retail)
* Retail/Office unit rate per City of Ottawa sewer design guidelines and assumes a 12 hour commercial operation
* ICI > 20% therefore peaking factor for ICI = 1.5

		P.F.
Estimated Total Residential Population	1091	3.2

APPENDIX D

Stormwater Management

BIORETENTION

CVC/TRCA LOW IMPACT DEVELOPMENT
PLANNING AND DESIGN GUIDE - FACT SHEET

Source: Minnesota Businesses for Clean Water

Source: City of Portland

GENERAL DESCRIPTION

As a stormwater filter and infiltration practice, bioretention temporarily stores, treats and infiltrates runoff. Depending on native soil infiltration rate and physical constraints, the system may be designed without an underdrain for full infiltration, with an underdrain for partial infiltration, or with an impermeable liner and underdrain for filtration only (i.e., a biofilter). The primary component of the practice is the filter bed which is a mixture of sand, fines and organic material. Other elements include a mulch ground cover and plants adapted to the conditions of a stormwater practice. Bioretention is designed to capture small storm events or the water quality storage requirement. An overflow or bypass is necessary to pass large storm event flows. Bioretention can be adapted to fit into many different development contexts and provide a convenient area for snow storage and treatment.

DESIGN GUIDANCE

SOIL CHARACTERISTICS

Bioretention can be constructed over any soil type, but hydrologic soil group A and B are best for achieving water balance goals. If possible, bioretention should be sited in the areas of the development with the highest native soil infiltration rates. Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Designers should verify the native soil infiltration rate at the proposed location and depth through measurement of hydraulic conductivity under field saturated conditions.

GEOMETRY & SITE LAYOUT

Key geometry and site layout factors include:

- The minimum footprint of the filter bed area is based on the drainage area. Typical drainage areas to bioretention are between 100 m2 to 0.5 hectares. The maximum recommended drainage area is 0.8 hectares. Typical ratios of impervious drainage area to treatment facility area range from 5:1 to 15:1.
- Bioretention can be configured to fit into many locations and shapes. However, cells that are narrow may concentrate flow as it spreads throughout the cell and result in erosion.
- The filter bed surface should be level to encourage stormwater to spread out evenly over the surface.

PRE-TREATMENT

Pretreatment prevents premature clogging by capturing coarse sediment particles before they reach the filter bed. Where the runoff source area produces little sediment, such as roofs, bioretention can function effectively without pretreatment. To treat parking area or road runoff, a two-cell design that incorporates a forebay is recommended. Pretreatment practices that may be feasible, depending on the method of conveyance and the availability of space include:

- *Two-cell design (channel flow):* Forebay ponding volume should account for 25% of the water quality storage requirement and be designed with a 2:1 length to width ratio.
- *Vegetated filter strip (sheet flow):* Should be a minimum of three (3) metres in width. If smaller strips are used, more frequent maintenance of the filter bed can be anticipated.
- *Gravel diaphragm (sheet flow):* A small trench filled with pea gravel, which is perpendicular to the flow path between the edge of the pavement and the bioretention practice will promote settling out of sediment and maintain sheet flow into the facility. A drop of 50-150 mm into the gravel diaphragm can be used to dissipate energy and promote settling.
- *Rip rap and/or dense vegetation (channel flow):* Suitable for small bioretention cells with drainage areas less than 100 square metres.

GRAVEL STORAGE LAYER

- DEPTH: Should be a minimum of 300 mm deep and sized to provide the required storage volume. Granular material should be 50 mm diameter clear stone.
- PEA GRAVEL CHOKING LAYER: A 100 mm deep layer of pea gravel (3 to 10 mm diameter clear stone) should be placed on top of the coarse gravel storage layer as a choking layer separating it from the overlying filter media bed.

FILTER MEDIA

- COMPOSITION: To ensure a consistent and homogeneous bed, filter media should come pre-mixed from an approved vendor.
- DEPTH: Recommended depth is between 1.0 and 1.25 m. However in constrained applications, pollutant removal benefits may be achieved in beds as shallow as 500 mm. If trees are to be included in the design, bed depth must be at least 1.0 m.
- MULCH: A 75 mm layer of mulch on the surface of the filter bed enhances plant survival, suppresses weed growth and pretreats runoff before it reaches the filter bed.

CONVEYANCE AND OVERFLOW

Bioretention can be designed to be inline or offline from the drainage system. Inline bioretention accepts all flow from a drainage area and conveys larger event flows through an overflow outlet. Overflow structures must be sized to safely convey larger storm events out of the facility. The invert of the overflow should be placed at the maximum water surface elevation of the bioretention area, which is typically 150-250 mm above the filter bed surface.

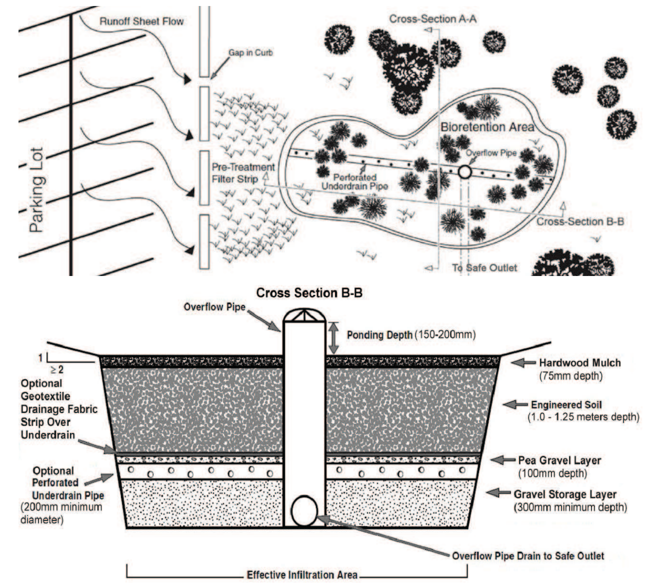
Offline bioretention practices use flow splitters or bypass channels that only allow the required water quality storage volume to enter the facility. This may be achieved with a pipe, weir, or curb opening sized for the target flow, but in conjunction, create a bypass channel so that higher flows do not pass over the surface of the filter bed. Using a weir or curb opening minimizes clogging and reduces maintenance frequency.

UNDERDRAIN

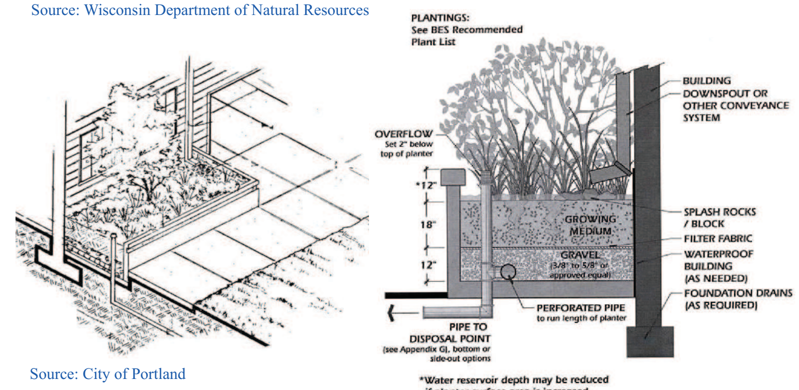
- Only needed where native soil infiltration rate is less than 15 mm/hr (hydraulic conductivity of less than 1x10-6 cm/s).
- Should consist of a perforated pipe embedded in the coarse gravel storage layer at least 100 mm above the bottom.
- A strip of geotextile filter fabric placed between the filter media and pea gravel choking layer over the perforated pipe is optional to help prevent fine soil particles from entering the underdrain.
- A vertical standpipe connected to the underdrain can be used as a cleanout and monitoring well.

MONITORING WELLS

A capped vertical stand pipe consisting of an anchored 100 to 150 mm diameter perforated pipe with a lockable cap installed to the bottom of the facility is recommended for monitoring drainage time between storms.



Source: Wisconsin Department of Natural Resources



Source: City of Portland

ABILITY TO MEET SWM OBJECTIVES

BMP	Water Balance Benefit	Water Quality Improvement	Stream Channel Erosion Control Benefits
Bioretention with no underdrain	Yes	Yes - size for water quality storage requirement	Partial - based on available storage volume and infiltration rates
Bioretention with underdrain	Partial - based on available storage volume beneath the underdrain and soil infiltration rate	Yes - size for water quality storage requirement	Partial - based on available storage volume beneath the underdrain and soil infiltration rate
Bioretention with underdrain and impermeable liner	Partial - some volume reduction through evapotranspiration	Yes - size for water quality storage requirement	Partial - some volume reduction through evapotranspiration

GENERAL SPECIFICATIONS

Material	Specification	Quantity
Filter Media Composition	Filter Media Soil Mixture to contain: • 85 to 88% sand • 8 to 12% soil fines • 3 to 5% organic matter (leaf compost) Other Criteria: • Phosphorus soil test index (P-Index) value between 10 to 30 ppm • Cationic exchange capacity (CEC) greater than 10 meq/100 g • Free of stones, stumps, roots and other large debris • pH between 5.5 to 7.5 • Infiltration rate greater than 25 mm/hr	Recommended depth is between 1.0 and 1.25 metres.
Mulch Layer	Shredded hardwood bark mulch	A 75 mm layer on the surface of the filter bed
Geotextile	Material specifications should conform to Ontario Provincial Standard Specification (OPSS) 1860 for Class II geotextile fabrics. Should be woven monofilament or non-woven needle punched fabrics. Woven slit film and non-woven heat bonded fabrics should not be used as they are prone to clogging. For further guidance see CVC/TRCA LID SWM Planning and Design Guide, Table 4.5.5.	Strip over the perforated pipe underdrain (if present) between the filter media bed and gravel storage layer (stone reservoir)
Gravel	Washed 50 mm diameter clear stone should be used to surround the underdrain and for the gravel storage layer Washed 3 to 10 mm diameter clear stone should be used for pea gravel choking layer.	Volume based on dimensions, assuming a void space ratio of 0.4.
Underdrain	Perforated HDPE or equivalent, minimum 100 mm diameter, 200 mm recommended.	• Perforated pipe for length of cell. • Non-perforated pipe as needed to connect with storm drain system. • One or more caps. • T's for underdrain configuration

CONSTRUCTION CONSIDERATIONS

Ideally, bioretention sites should remain outside the limit of disturbance until construction of the bioretention begins to prevent soil compaction by heavy equipment. Locations should not be used as sediment basins during construction, as the concentration of fines will prevent post-construction infiltration. To prevent sediment from clogging the surface of a bioretention cell, stormwater should be diverted away from the bioretention until the drainage area is fully stabilized.

For further guidance regarding key steps during construction, see the CVC/TRCA LID SWM Planning and Design Guide, Section 4.5.2 - Construction Considerations)

OPERATION AND MAINTENANCE

Bioretention requires routine inspection and maintenance of the landscaping as well as periodic inspection for less frequent maintenance needs or remedial maintenance. Generally, routine maintenance will be the same as for any other landscaped area; weeding, pruning, and litter removal. Regular watering may be required during the first two years until vegetation is established.

For the first two years following construction the facility should be inspected at least quarterly and after every major storm event (> 25 mm). Subsequently, inspections should be conducted in the spring and fall of each year and after major storm events. Inspect for vegetation density (at least 80% coverage), damage by foot or vehicular traffic, channelization, accumulation of debris, trash and sediment, and structural damage to pretreatment devices.

Trash and debris should be removed from pretreatment devices, the bioretention area surface and inlet and outlets at least twice annually. Other maintenance activities include reapplying mulch, pruning, weeding replacing dead vegetation and repairing eroded areas as needed. Remove accumulated sediment on the bioretention area surface when dry and exceeding 25 mm depth.

SITE CONSIDERATIONS

Wellhead Protection
Facilities receiving road or parking lot runoff should not be located within two (2) year time-of-travel wellhead protection areas.

Available Space
Reserve open areas of about 10 to 20% of the size of the contributing drainage area.

Site Topography
Contributing slopes should be between 1 to 5%. The surface of the filter bed should be flat to allow flow to spread out. A stepped multi-cell design can also be used.

Available Head
If an underdrain is used, then 1 to 1.5 metres elevation difference is needed between the inflow point and the downstream storm drain invert.

Water Table
A minimum of one (1) metre separating the seasonally high water table or top of bedrock elevation and the bottom of the practice is necessary.

Soils
Bioretention can be located over any soil type, but hydrologic soil group A and B soils are best for achieving water balance benefits. Facilities should be located in portions of the site with the highest native soil infiltration rates. Where infiltration rates are less than 15 mm/hr (hydraulic conductivity less than 1x10-6 cm/s) an underdrain is required. Native soil infiltration rate at the proposed facility location and depth should be confirmed through measurement of hydraulic conductivity under field saturated conditions.

Drainage Area & Runoff Volume
Typical contributing drainage areas are between 100 m2 to 0.5 hectares. The maximum recommended contributing drainage area is 0.8 hectares. Typical ratios of impervious drainage area to treatment facility area range from 5:1 to 15:1.

Pollution Hot Spot Runoff
To protect groundwater from possible contamination, runoff from pollution hot spots should not be treated by bioretention facilities designed for full or partial infiltration. Facilities designed with an impermeable liner (filtration only facilities) can be used to treat runoff from pollution hot spots.

Proximity to Underground Utilities
Designers should consult local utility design guidance for the horizontal and vertical clearances required between storm drains, ditches, and surface water bodies.

Overhead Wires
Check whether the future tree canopy height in the bioretention area will interfere with existing overhead phone and power lines.

Setback from Buildings
If an impermeable liner is used, no setback is needed. If not, a four (4) metre setback from building foundations should be applied.

TORONTO AND REGION Conservation for The Living City

CVC CREDIT VALLEY CONSERVATION

Stormceptor Sizing Detailed Report

PCSWMM for Stormceptor

Project Information

Date	30/07/2015
Project Name	Stormceptor - West
Project Number	Zibi Ontario
Location	Ottawa, ON

Stormwater Quality Objective

This report outlines how Stormceptor System can achieve a defined water quality objective through the removal of total suspended solids (TSS). Attached to this report is the Stormceptor Sizing Summary.

Stormceptor System Recommendation

The Stormceptor System model STC 1000 achieves the water quality objective removing 70% TSS for a Fine (organics, silts and sand) particle size distribution.

The Stormceptor System

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for all rainfall events, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Stormceptor is the only oil and sediment separator on the market sized to remove TSS for a wide range of particle sizes, including fine sediments (clays and silts), that are often overlooked in the design of other stormwater treatment devices.

Small storms dominate hydrologic activity, US EPA reports

"*Early efforts in stormwater management focused on flood events ranging from the 2-yr to the 100-yr storm. Increasingly stormwater professionals have come to realize that small storms (i.e. < 1 in. rainfall) dominate watershed hydrologic parameters typically associated with water quality management issues and BMP design. These small storms are responsible for most annual urban runoff and groundwater recharge. Likewise, with the exception of eroded sediment, they are responsible for most pollutant washoff from urban surfaces. Therefore, the small storms are of most concern for the stormwater management objectives of ground water recharge, water quality resource protection and thermal impacts control.*"

"*Most rainfall events are much smaller than design storms used for urban drainage models. In any given area, most frequently recurrent rainfall events are small (less than 1 in. of daily rainfall).*"

"Continuous simulation offers possibilities for designing and managing BMPs on an individual site-by-site basis that are not provided by other widely used simpler analysis methods. Therefore its application and use should be encouraged."

– US EPA Stormwater Best Management Practice Design Guide, Volume 1 – General Considerations, 2004

Design Methodology

Each Stormceptor system is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology from up-to-date local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective.

The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing (summary of analysis presented in Appendix 2):

- Site parameters
- Continuous historical rainfall, including duration, distribution, peaks (Figure 1)
- Interevent periods
- Particle size distribution
- Particle settling velocities (Stokes Law, corrected for drag)
- TSS load (Figure 2)
- Detention time of the system

The Stormceptor System maintains continuous positive TSS removal for all influent flow rates. Figure 3 illustrates the continuous treatment by Stormceptor throughout the full range of storm events analyzed. It is clear that large events do not significantly impact the average annual TSS removal. There is no decline in cumulative TSS removal, indicating scour does not occur as the flow rate increases.

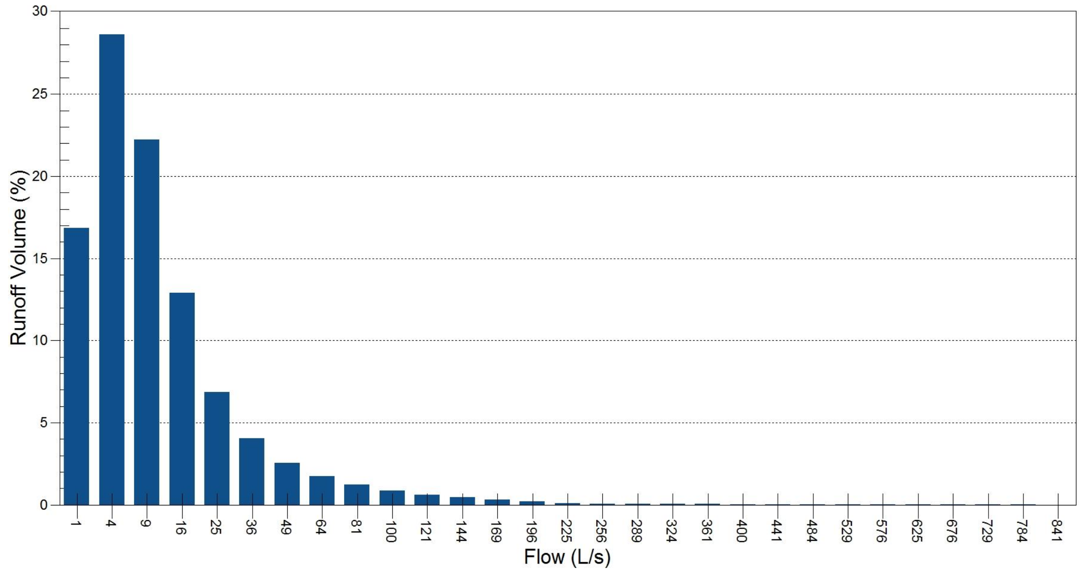


Figure 1. Runoff Volume by Flow Rate for TORONTO CENTRAL – ON 100, 1982 to 1999 for 1.35 ha, 90% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

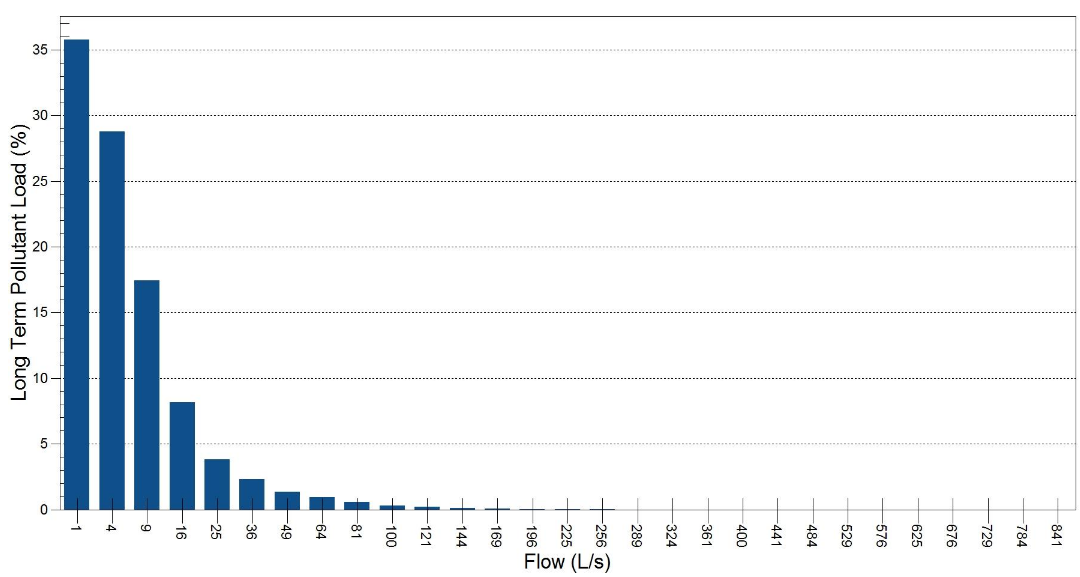
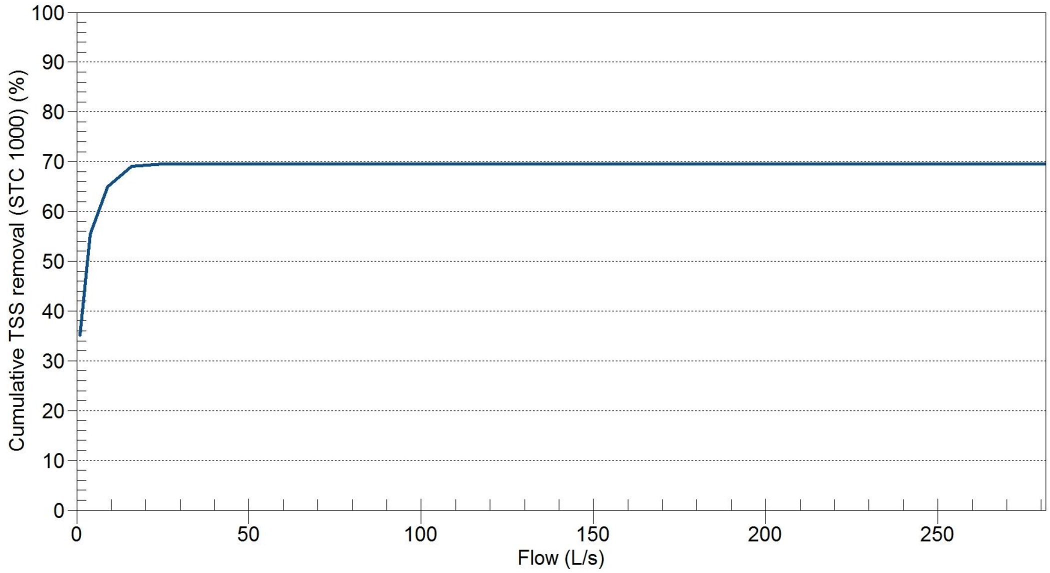


Figure 2. Long Term Pollutant Load by Flow Rate for TORONTO CENTRAL – 100, 1982 to 1999 for 1.35 ha, 90% impervious. The majority of the annual pollutant load is transported by small frequent storm events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 1000	Drainage Area (ha)	1.35
TSS Removal (%)	70	Impervious (%)	90

Figure 3. Cumulative TSS Removal by Flow Rate for TORONTO CENTRAL – 100, 1982 to 1999. Stormceptor continuously removes TSS throughout the full range of storm events analyzed. Note that large events do not significantly impact the average annual TSS removal. Therefore no decline in cumulative TSS removal indicates scour does not occur as the flow rate increases.

Stormceptor®

Appendix 1
Stormceptor Design Summary

Project Information

Date	30/07/2015
Project Name	Stormceptor - West
Project Number	Zibi Ontario
Location	Ottawa, ON

Designer Information

Company	N/A
Contact	N/A

Notes

N/A

Drainage Area

Total Area (ha)	1.35
Imperviousness (%)	90

The Stormceptor System model STC 1000 achieves the water quality objective removing 70% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	TORONTO CENTRAL
State	ON
ID	100
Years of Records	1982 to 1999
Latitude	45°30'N
Longitude	90°30'W

Water Quality Objective

TSS Removal (%)	70

Upstream Storage

Storage (ha-m)	Discharge (L/s)
0	0

Stormceptor Sizing Summary

Stormceptor Model	**TSS Removal %**
STC 300	59
STC 750	69
STC 1000	**70**
STC 1500	70
STC 2000	76
STC 3000	77
STC 4000	81
STC 5000	82
STC 6000	84
STC 9000	88
STC 10000	88
STC 14000	90

Stormceptor®

Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

Fine (organics, silts and sand)

Particle Size μm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size μm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor version 1.0
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 300 is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 750 to STC 6000 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 300	STC 750 to STC 6000	STC 9000 to STC 14000
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Imbrium Systems Inc., 1-800-565-4801.

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Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ha)	1.35	Imperviousness (%)	90

Surface Characteristics

Width (m)	232
Slope (%)	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Sediment build-up reduces the storage volume for sedimentation. Frequency of maintenance is assumed for TSS removal calculations.

Maintenance Frequency (months)	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/h)	61.98
Min. Infiltration Rate (mm/h)	10.16
Decay Rate (s^{-1})	0.00055
Regeneration Rate (s^{-1})	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (L/s)	No

Upstream Attenuation

Stage-storage and stage-discharge relationship used to model attenuation upstream of the Stormceptor System is identified in the table below.

Storage ha-m	Discharge L/s
0	0

PARTICLE SIZE DISTRIBUTION

Particle Size Distribution

Removing fine particles from runoff ensures the majority of pollutants, such as heavy metals, hydrocarbons, free oils and nutrients are not discharged into natural water resources. The table below identifies the particle size distribution selected to define TSS removal for the design of the Stormceptor System.

Fine (organics, silts and sand)								
Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

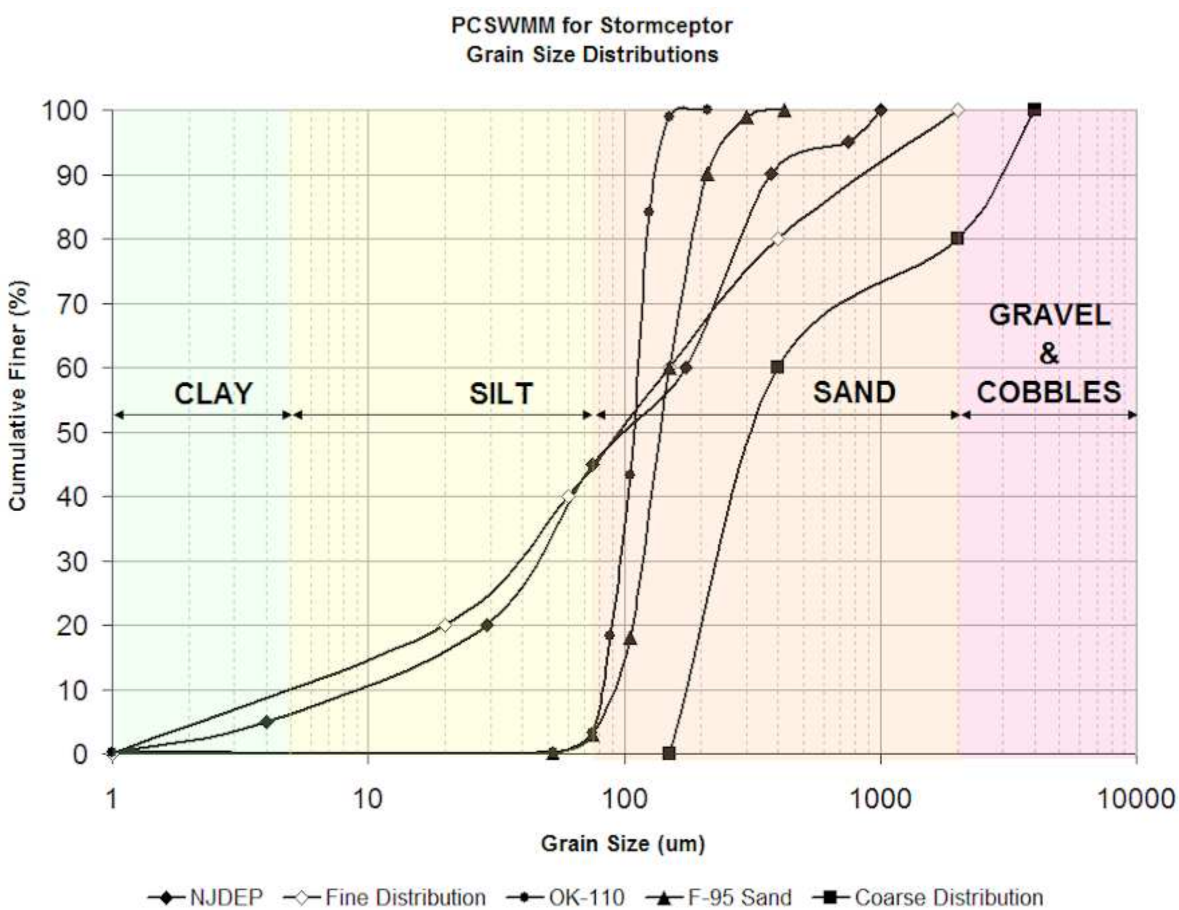

Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

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TSS LOADING

TSS Loading Parameters

TSS Loading Function	Buildup / Washoff

Parameters

Target Event Mean Concentration (EMC) (mg/L)	125
Exponential Buildup Power	0.4
Exponential Washoff Exponential	0.2

HYDROLOGY ANALYSIS

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of the Stormceptor System are based on the average annual removal of TSS for the selected site parameters. The Stormceptor System is engineered to capture fine particles (silts and sands) by focusing on average annual runoff volume ensuring positive removal efficiency is maintained during all rainfall events, while preventing the opportunity for negative removal efficiency (scour).

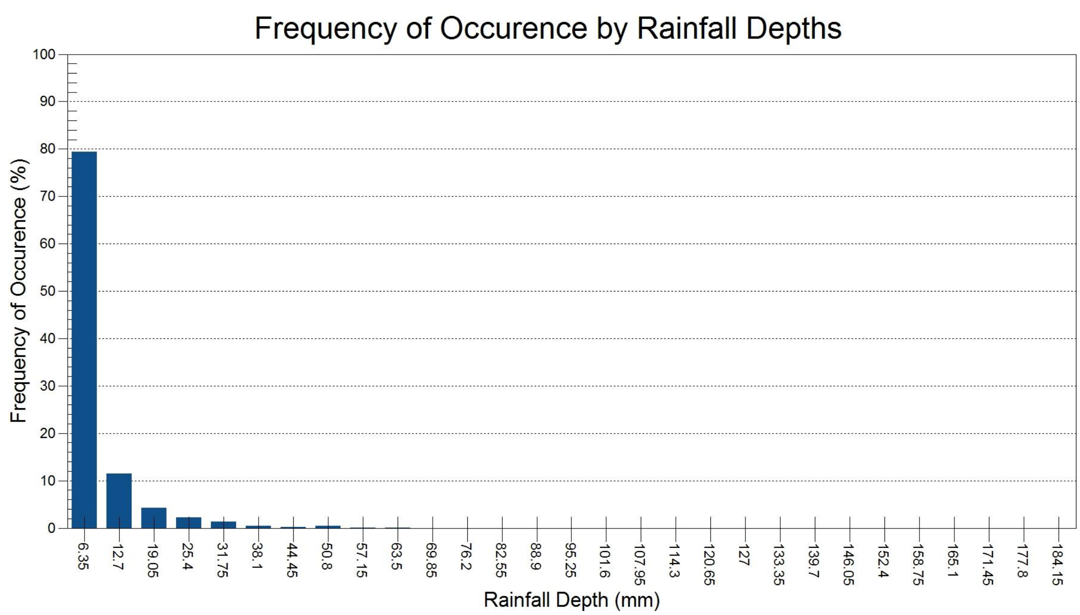
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

Rainfall Station	TORONTO CENTRAL		
Rainfall File Name	ON100.NDC	Total Number of Events	3020
Latitude	45°30'N	Total Rainfall (mm)	13190.7
Longitude	90°30'W	Average Annual Rainfall (mm)	732.8
Elevation (m)	328	Total Evaporation (mm)	1241.7
Rainfall Period of Record (y)	18	Total Infiltration (mm)	1312.3
Total Rainfall Period (y)	18	Percentage of Rainfall that is Runoff (%)	81.2

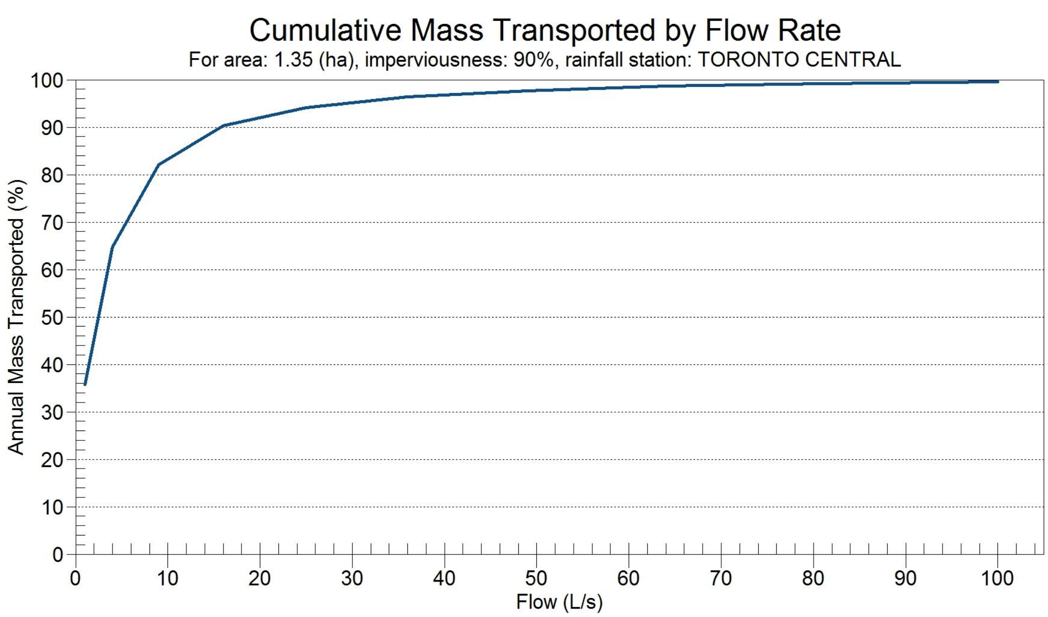
Rainfall Event Analysis

Rainfall Depth mm	No. of Events	Percentage of Total Events %	Total Volume mm	Percentage of Annual Volume %
6.35	2398	79.4	3626	27.5
12.70	346	11.5	3182	24.1
19.05	130	4.3	2037	15.4
25.40	66	2.2	1432	10.9
31.75	38	1.3	1075	8.2
38.10	16	0.5	545	4.1
44.45	7	0.2	292	2.2
50.80	13	0.4	611	4.6
57.15	2	0.1	106	0.8
63.50	2	0.1	121	0.9
69.85	0	0.0	0	0.0
76.20	0	0.0	0	0.0
82.55	1	0.0	79	0.6
88.90	1	0.0	85	0.6
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	0	0.0	0	0.0
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0
133.35	0	0.0	0	0.0
139.70	0	0.0	0	0.0
146.05	0	0.0	0	0.0
152.40	0	0.0	0	0.0
158.75	0	0.0	0	0.0
165.10	0	0.0	0	0.0
171.45	0	0.0	0	0.0
177.80	0	0.0	0	0.0
184.15	0	0.0	0	0.0
190.50	0	0.0	0	0.0
196.85	0	0.0	0	0.0
203.20	0	0.0	0	0.0
209.55	0	0.0	0	0.0
>209.55	0	0.0	0	0.0



Pollutograph

Flow Rate L/s	Cumulative Mass %
1	35.8
4	64.7
9	82.1
16	90.3
25	94.1
36	96.4
49	97.7
64	98.7
81	99.2
100	99.5
121	99.7
144	99.8
169	99.9
196	100.0
225	100.0
256	100.0
289	100.0
324	100.0
361	100.0
400	100.0
441	100.0
484	100.0
529	100.0
576	100.0
625	100.0
676	100.0
729	100.0
784	100.0
841	100.0
900	100.0



Stormceptor Sizing Detailed Report
PCSWMM for Stormceptor

Project Information

Date	30/07/2015
Project Name	Stormceptor - East
Project Number	Zibi Ontario
Location	Ottawa, ON

Stormwater Quality Objective

This report outlines how Stormceptor System can achieve a defined water quality objective through the removal of total suspended solids (TSS). Attached to this report is the Stormceptor Sizing Summary.

Stormceptor System Recommendation

The Stormceptor System model STC 750 achieves the water quality objective removing 71% TSS for a Fine (organics, silts and sand) particle size distribution.

The Stormceptor System

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for all rainfall events, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Stormceptor is the only oil and sediment separator on the market sized to remove TSS for a wide range of particle sizes, including fine sediments (clays and silts), that are often overlooked in the design of other stormwater treatment devices.

Small storms dominate hydrologic activity, US EPA reports

"*Early efforts in stormwater management focused on flood events ranging from the 2-yr to the 100-yr storm. Increasingly stormwater professionals have come to realize that small storms (i.e. < 1 in. rainfall) dominate watershed hydrologic parameters typically associated with water quality management issues and BMP design. These small storms are responsible for most annual urban runoff and groundwater recharge. Likewise, with the exception of eroded sediment, they are responsible for most pollutant washoff from urban surfaces. Therefore, the small storms are of most concern for the stormwater management objectives of ground water recharge, water quality resource protection and thermal impacts control.*"

"*Most rainfall events are much smaller than design storms used for urban drainage models. In any given area, most frequently recurrent rainfall events are small (less than 1 in. of daily rainfall).*"

"Continuous simulation offers possibilities for designing and managing BMPs on an individual site-by-site basis that are not provided by other widely used simpler analysis methods. Therefore its application and use should be encouraged."

– US EPA Stormwater Best Management Practice Design Guide, Volume 1 – General Considerations, 2004

Design Methodology

Each Stormceptor system is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology from up-to-date local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective.

The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing (summary of analysis presented in Appendix 2):

- Site parameters
- Continuous historical rainfall, including duration, distribution, peaks (Figure 1)
- Interevent periods
- Particle size distribution
- Particle settling velocities (Stokes Law, corrected for drag)
- TSS load (Figure 2)
- Detention time of the system

The Stormceptor System maintains continuous positive TSS removal for all influent flow rates. Figure 3 illustrates the continuous treatment by Stormceptor throughout the full range of storm events analyzed. It is clear that large events do not significantly impact the average annual TSS removal. There is no decline in cumulative TSS removal, indicating scour does not occur as the flow rate increases.

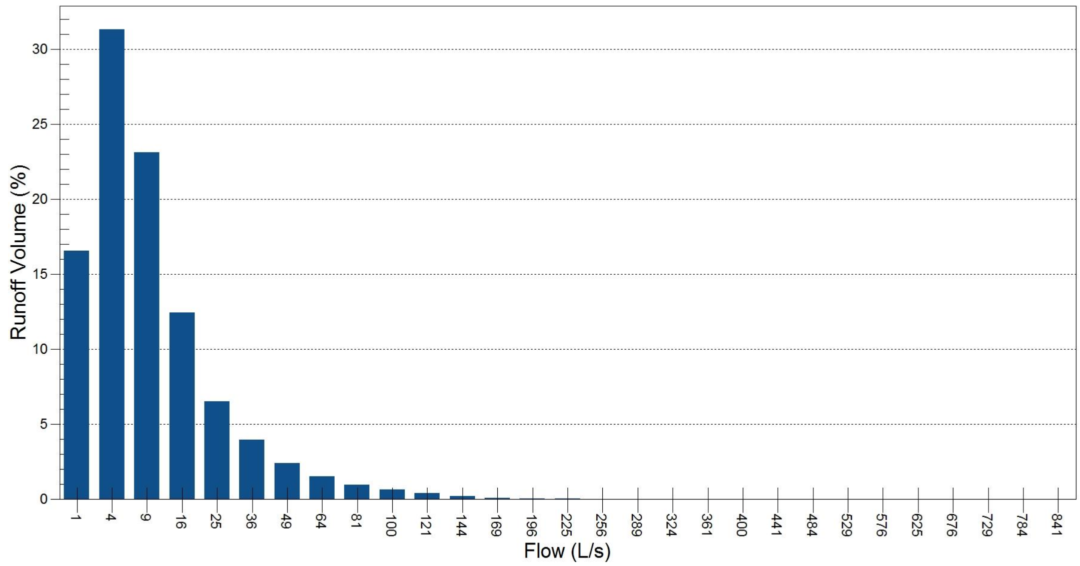


Figure 1. Runoff Volume by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – ON 6000, 1967 to 2003 for 1.27 ha, 90% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

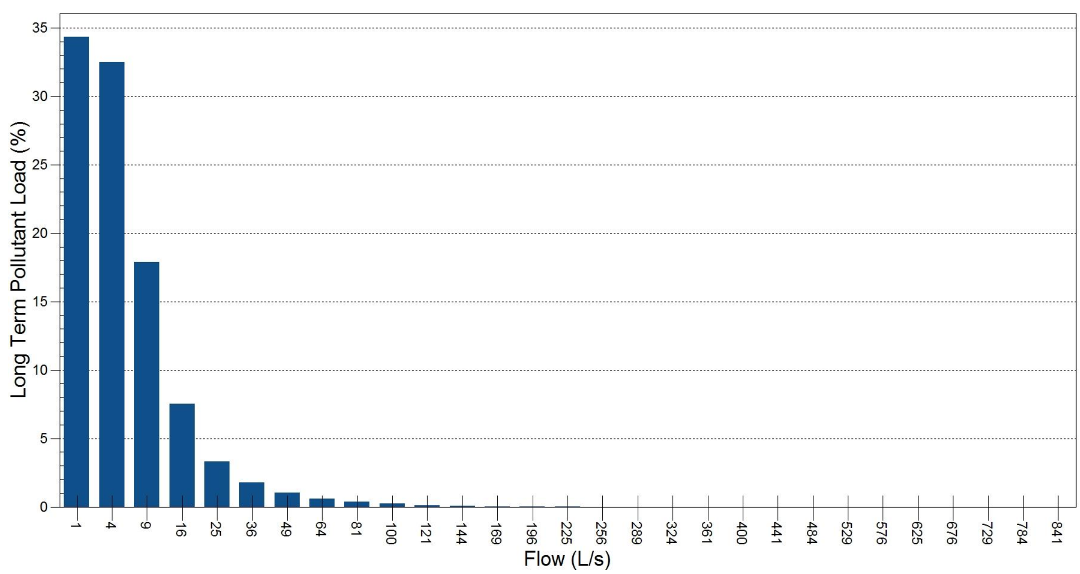
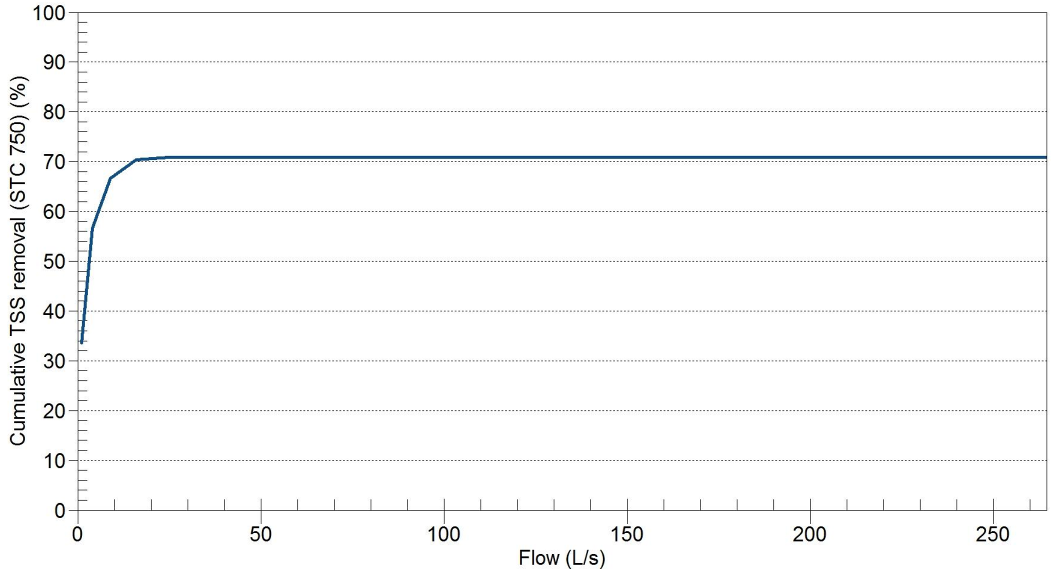


Figure 2. Long Term Pollutant Load by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003 for 1.27 ha, 90% impervious. The majority of the annual pollutant load is transported by small frequent storm events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 750	Drainage Area (ha)	1.27
TSS Removal (%)	71	Impervious (%)	90

Figure 3. Cumulative TSS Removal by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003. Stormceptor continuously removes TSS throughout the full range of storm events analyzed. Note that large events do not significantly impact the average annual TSS removal. Therefore no decline in cumulative TSS removal indicates scour does not occur as the flow rate increases.

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Appendix 1
Stormceptor Design Summary

Project Information

Date	30/07/2015
Project Name	Stormceptor - East
Project Number	Zibi Ontario
Location	Ottawa, ON

Designer Information

Company	N/A
Contact	N/A

Notes

N/A

Drainage Area

Total Area (ha)	1.27
Imperviousness (%)	90

The Stormceptor System model STC 750 achieves the water quality objective removing 71% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	OTTAWA MACDONALD-CARTIER INT'L A
State	ON
ID	6000
Years of Records	1967 to 2003
Latitude	45°19'N
Longitude	75°40'W

Water Quality Objective

TSS Removal (%)	70

Upstream Storage

Storage (ha-m)	Discharge (L/s)
0	0

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 300	60
STC 750	**71**
STC 1000	71
STC 1500	72
STC 2000	77
STC 3000	78
STC 4000	82
STC 5000	83
STC 6000	85
STC 9000	88
STC 10000	88
STC 14000	91

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Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

Fine (organics, silts and sand)								
Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor version 1.0
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 300 is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 750 to STC 6000 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 300	STC 750 to STC 6000	STC 9000 to STC 14000
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Imbrium Systems Inc., 1-800-565-4801.

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Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ha)	1.27	Imperviousness (%)	90

Surface Characteristics

Width (m)	225
Slope (%)	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Sediment build-up reduces the storage volume for sedimentation. Frequency of maintenance is assumed for TSS removal calculations.

Maintenance Frequency (months)	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/h)	61.98
Min. Infiltration Rate (mm/h)	10.16
Decay Rate (s^{-1})	0.00055
Regeneration Rate (s^{-1})	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (L/s)	No

Upstream Attenuation

Stage-storage and stage-discharge relationship used to model attenuation upstream of the Stormceptor System is identified in the table below.

Storage ha-m	Discharge L/s
0	0

PARTICLE SIZE DISTRIBUTION

Particle Size Distribution

Removing fine particles from runoff ensures the majority of pollutants, such as heavy metals, hydrocarbons, free oils and nutrients are not discharged into natural water resources. The table below identifies the particle size distribution selected to define TSS removal for the design of the Stormceptor System.

Fine (organics, silts and sand)								
Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

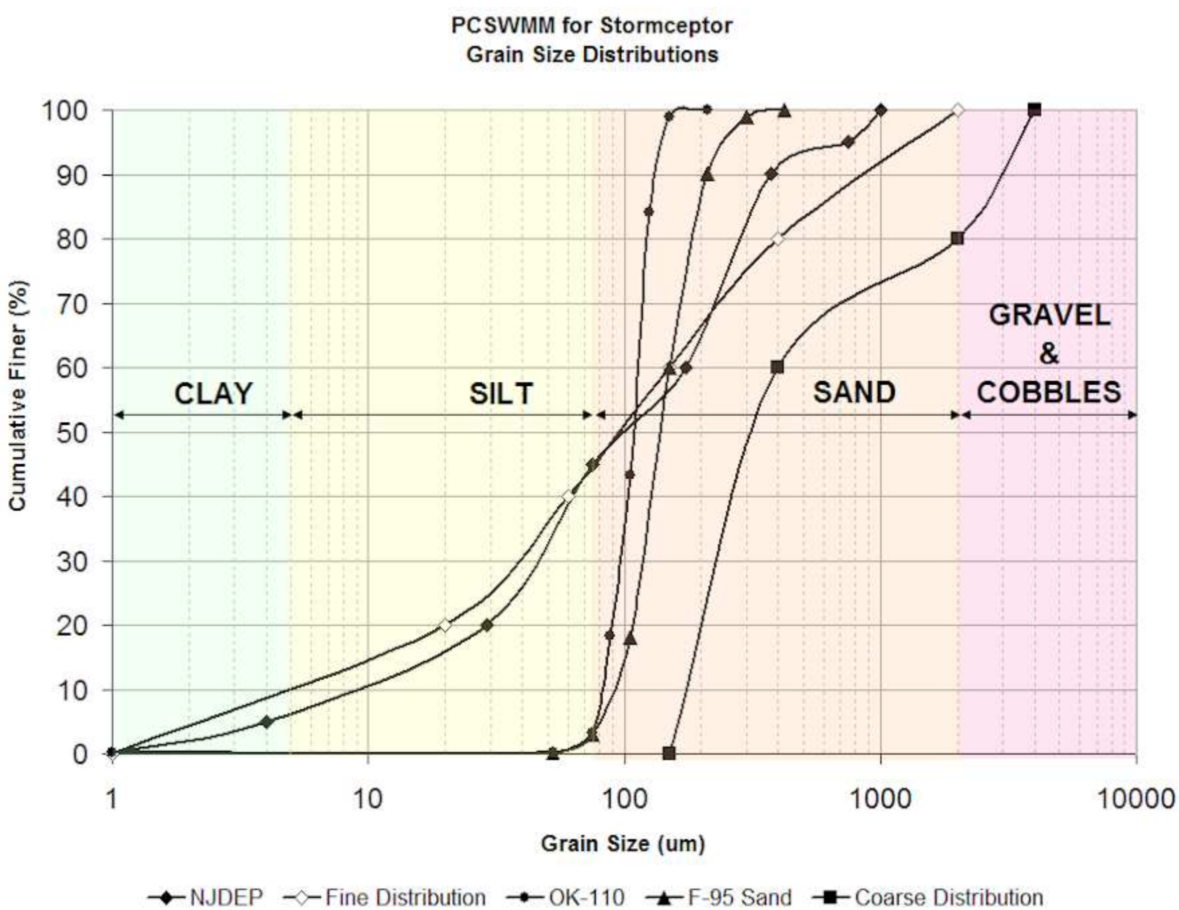

Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

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TSS LOADING

TSS Loading Parameters

TSS Loading Function	Buildup / Washoff

Parameters

Target Event Mean Concentration (EMC) (mg/L)	125
Exponential Buildup Power	0.4
Exponential Washoff Exponential	0.2

HYDROLOGY ANALYSIS

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of the Stormceptor System are based on the average annual removal of TSS for the selected site parameters. The Stormceptor System is engineered to capture fine particles (silts and sands) by focusing on average annual runoff volume ensuring positive removal efficiency is maintained during all rainfall events, while preventing the opportunity for negative removal efficiency (scour).

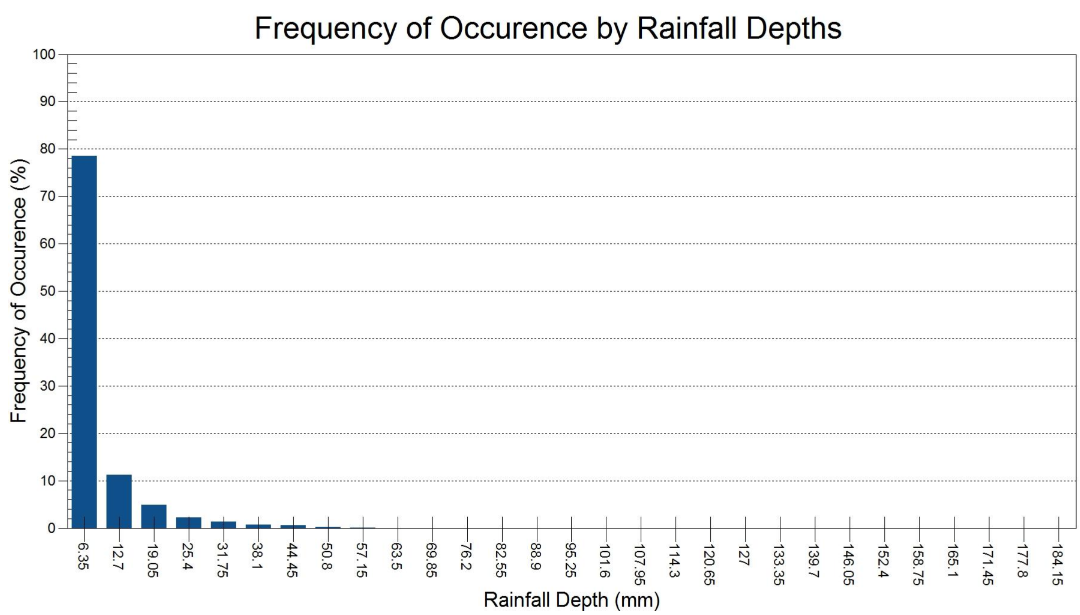
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A		
Rainfall File Name	ON6000.NDC	Total Number of Events	4536
Latitude	45°19'N	Total Rainfall (mm)	20974.3
Longitude	75°40'W	Average Annual Rainfall (mm)	566.9
Elevation (m)	371	Total Evaporation (mm)	1818.9
Rainfall Period of Record (y)	37	Total Infiltration (mm)	2092.4
Total Rainfall Period (y)	37	Percentage of Rainfall that is Runoff (%)	81.8

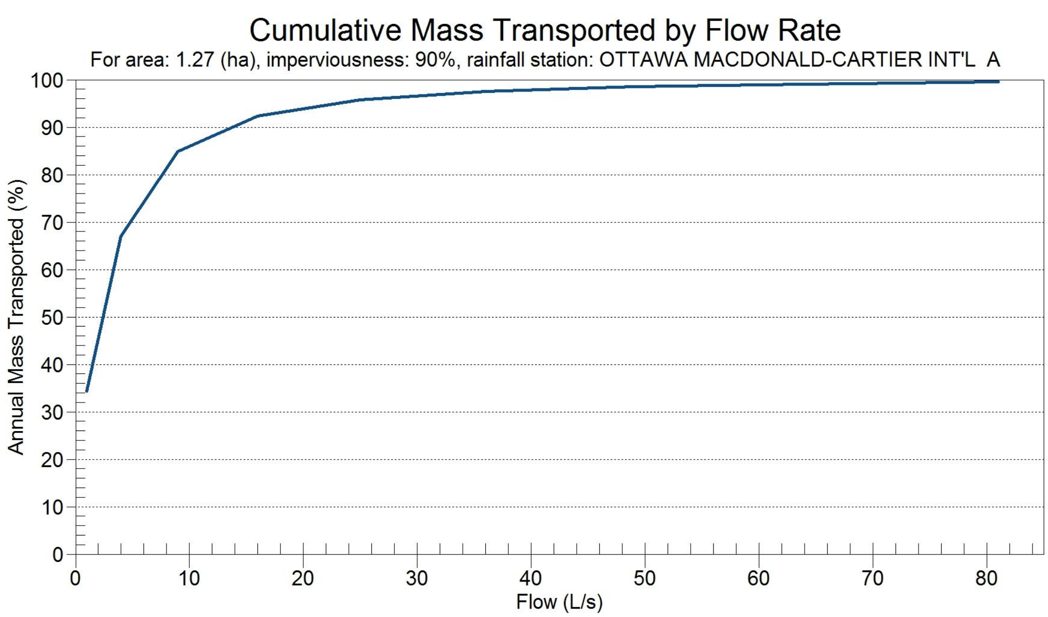
Rainfall Event Analysis

Rainfall Depth mm	No. of Events	Percentage of Total Events %	Total Volume mm	Percentage of Annual Volume %
6.35	3563	78.5	5667	27.0
12.70	508	11.2	4533	21.6
19.05	223	4.9	3434	16.4
25.40	102	2.2	2244	10.7
31.75	60	1.3	1704	8.1
38.10	33	0.7	1145	5.5
44.45	28	0.6	1165	5.6
50.80	9	0.2	416	2.0
57.15	5	0.1	272	1.3
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	1	0.0	109	0.5
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0
133.35	0	0.0	0	0.0
139.70	0	0.0	0	0.0
146.05	0	0.0	0	0.0
152.40	0	0.0	0	0.0
158.75	0	0.0	0	0.0
165.10	0	0.0	0	0.0
171.45	0	0.0	0	0.0
177.80	0	0.0	0	0.0
184.15	0	0.0	0	0.0
190.50	0	0.0	0	0.0
196.85	0	0.0	0	0.0
203.20	0	0.0	0	0.0
209.55	0	0.0	0	0.0
>209.55	0	0.0	0	0.0



Pollutograph

Flow Rate L/s	Cumulative Mass %
1	34.4
4	67.0
9	84.9
16	92.4
25	95.7
36	97.5
49	98.5
64	99.1
81	99.5
100	99.8
121	99.9
144	99.9
169	100.0
196	100.0
225	100.0
256	100.0
289	100.0
324	100.0
361	100.0
400	100.0
441	100.0
484	100.0
529	100.0
576	100.0
625	100.0
676	100.0
729	100.0
784	100.0
841	100.0
900	100.0



DRAWINGS / FIGURES

PROPERTY LINE
PROPOSED BUILDING
PARK/PUBLIC SPACE
WATER

NOTES

GATINEAU

Block	Phase	Block Area (acres)	Block GFA (ft^2)	Number of Units	Average Unit Size (ft^2)
Block 1	6	0.49	148,000	145	801
Block 2-3	1	0.78	46,929	0	0
Block 4	6	0.84	101,000	101	881
PWGSC	1		78,975	0	0
Block 5	2	0.20	11,000	0	0
Block 6	2	0.18	7,300	0	0
Block 7	3	1.06	116,000	100	792
Block 8	1	0.73	135,000	135	889
Block 9	2	0.11	15,000	15	900
Block 10	2	0.33	104,000	104	1,000
Block 11	1	0.74	74,645	82	779
Block 12	1	0.26	15,000	15	1,000
Block 13	1	0.74	73,698	70	810
Block 14	4	0.56	143,700	0	0
Block 15	4	0.64	108,800	128	813
Block 16	5	0.36	68,000	0	0
Block 17	5	0.60	171,000	0	0
Block 18	5	0.59	208,000	230	814
Block 19	4	0.30	69,800	75	816
Block 20	4	0.65	71,300	79	792
Block 21	5	0.25	59,000	73	727
Block 22	5	0.54	56,000	69	730
Block 23	5	0.41	113,000	140	726
Block 24	2	0.85	115,000	0	0
Block 25	2	0.81	87,538	0	0
Block 26	6	1.39	58,000	65	803

OTTAWA

Block	Phase	Block Area (acres)	Block GFA (ft^2)	Number of Units	Average Unit Size (ft^2)
Block 201	5	0.38	134,000	170	661
Block 202	5	0.38	73,800	90	678
Block 203	5	0.53	155,500	180	760
Block 204A	1A	0.38	125,000	0	0
Block 204B	4	0.35	125,000	115	813
Block 205A	1A	0.59	87,729	71	959
Block 205B	4	0.45	87,000	67	1,008
Block 206	1B	0.61	196,715	198	756
Block 207	1B	0.28	45,930	0	0
Block 208	1A	0.28	34,245	0	0
Block 209	3	0.53	115,000	0	0
Block 210A	3	1.13	9,500	0	0
Block 210B	3	0.24	49,500	0	0
Block 211	2	1.50	100,000	0	0
Block 212	2/6	0.95	215,000	0	0
Block 213	7	0.33	142,500	200	623
Block 214	8	-	-	-	-
Block 215	8	-	-	-	-
Block 301	1A	2.00	0	0	0

FOTENN
PLANNING+DESIGN

ZIBI MASTER PLAN, OTTAWA
WINDMILL DEVELOPMENTS

SITE PLAN

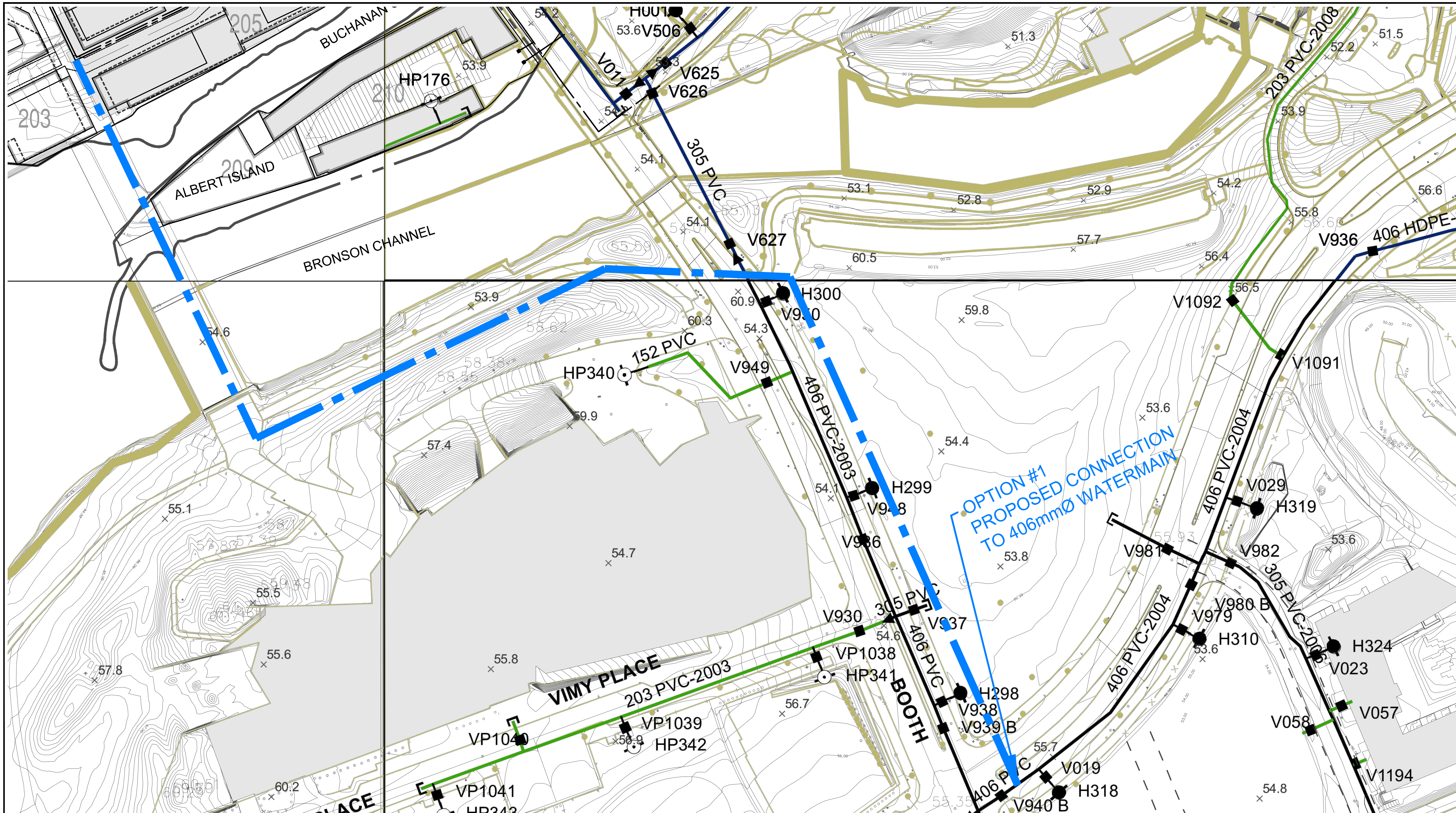
zibi
Windmill | dream

CREATED BY: MB

REVIEWED BY: PB

DATE: 13/12/2016

REVISION NO. 01

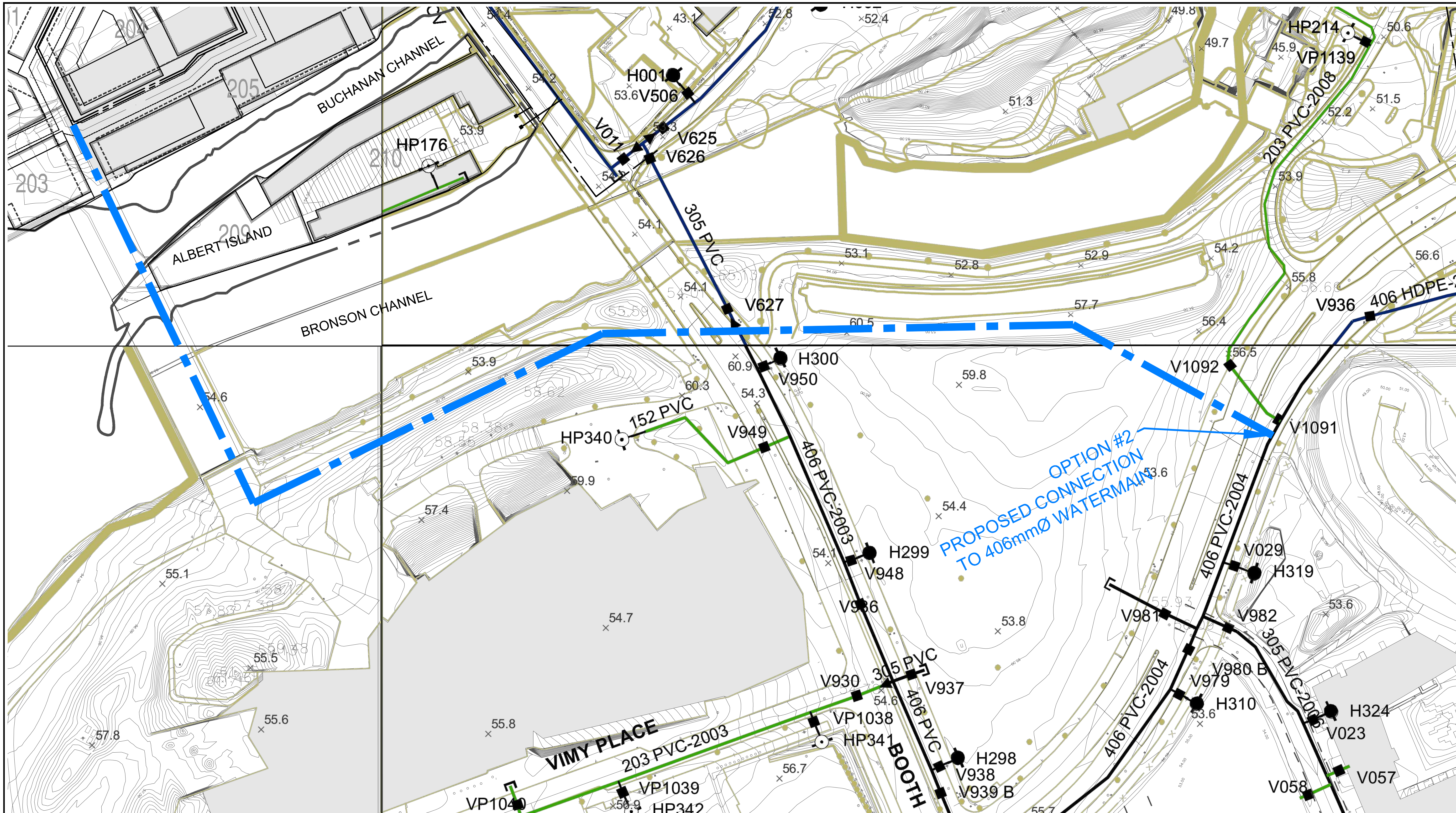


DSEL david schaeffer engineering ltd SMART SUBDIVISIONS™	120 Iber Road, Unit 203 Stittsville, ON K2S 1E9 TEL: (613) 836-0856 FAX: (613) 836-7183 www.DSEL.ca

DOMTAR LAND DEVELOPMENT - WATER SERVICING
OPTION #1

PROJECT No.:	14-717
SCALE:	1:1500
DATE:	SEPTEMBER 2014
FIGURE:	WTR-1

z:\projects\14-717_windmill-the_isles\b_design\b2_drawings\b2-5_sketches and figures\2014-09-05_water-options\2014-09-05_717_water-options.dwg

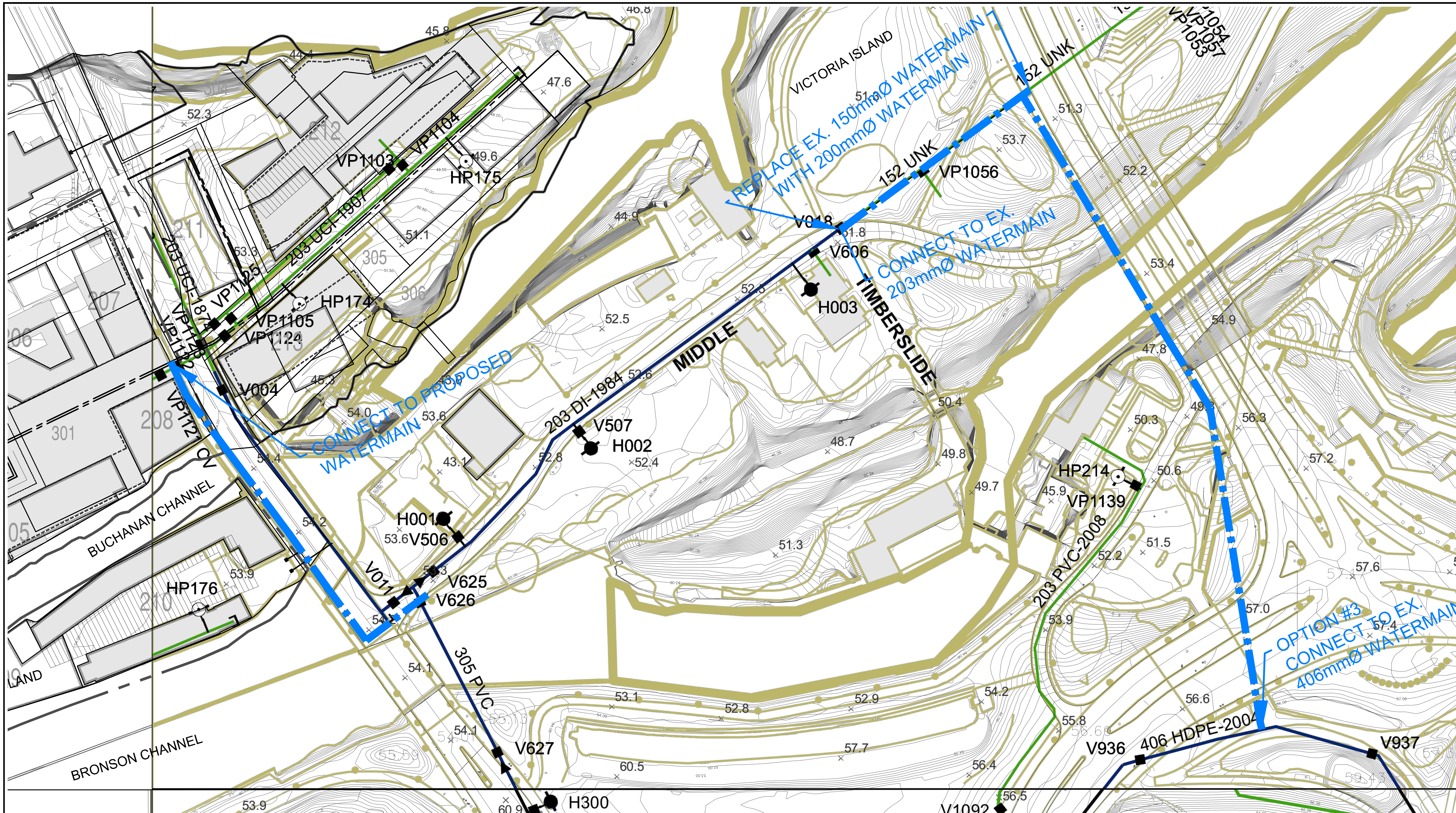


DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

DOMTAR LAND DEVELOPMENT - WATER SERVICING OPTION #2

PROJECT No.:	14-717
SCALE:	1:1500
DATE:	SEPTEMBER 2014
FIGURE:	WTR-2

z:\projects\14-717_windmill-the_isles\b_design\b2_drawings\b2-5_sketches and figures\2014-09-05_water-options\2014-09-05_717_water-options.dwg



DOMTAR LAND DEVELOPMENT - WATER SERVICING
OPTION #3

DSEL
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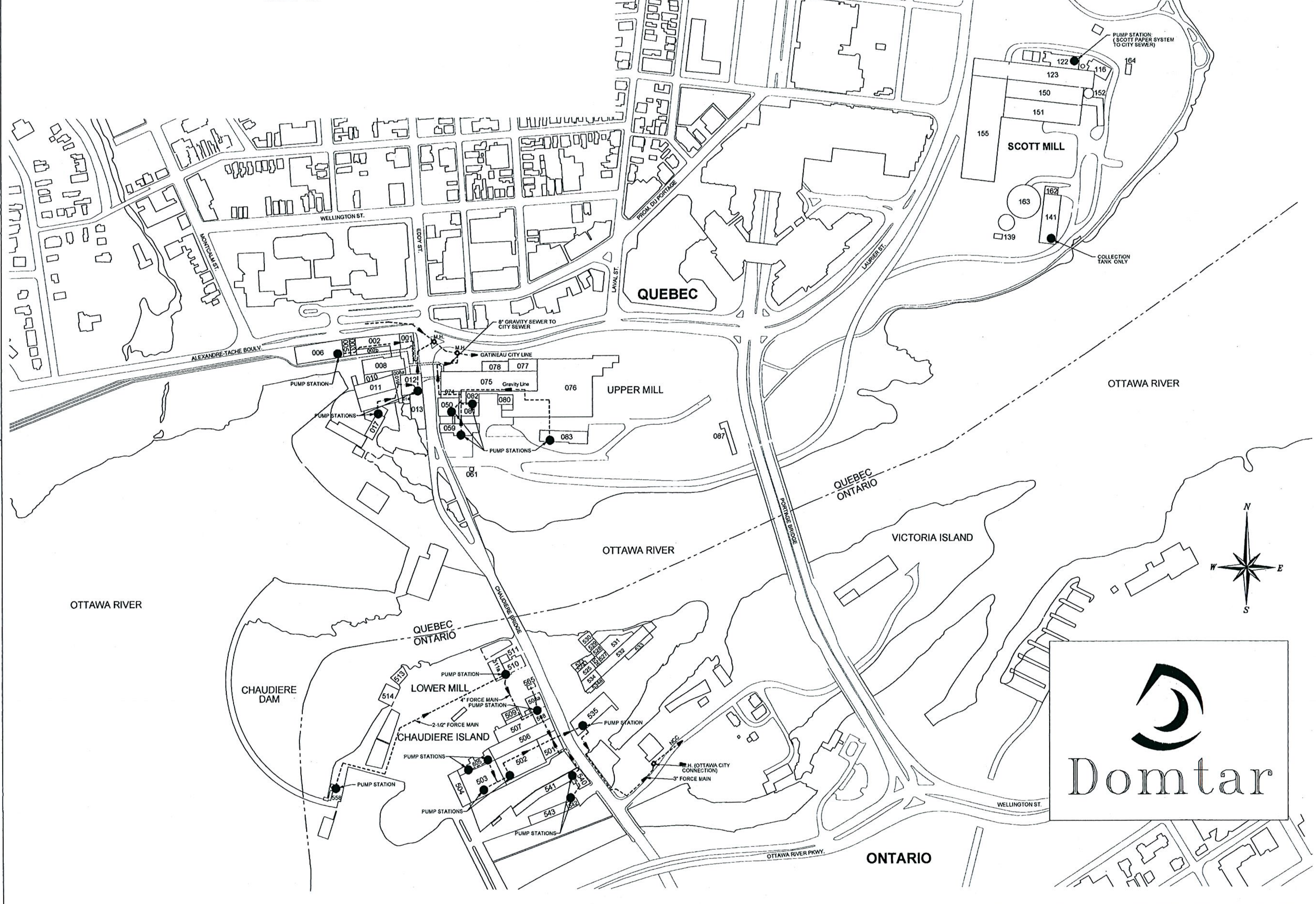
PROJECT No.:	14-717
SCALE:	1:1500
DATE:	SEPTEMBER 2014
FIGURE:	WTR-3

47856-B

HULL - OTTAWA DOMTAR MILLS - SANITARY EFFLUENT SYSTEMS

SCALE 1" = 200'



greenough environmental consulting inc.
1827 Woodward Drive, Suite 110
Ottawa, ON., K2C 0P9, (613) 792-4125

DWG.NO.	REFERENCE

No.	DATE	REVISION
1	Jan 12/05 JFL	Sanitory Lines Revised

DEPT. EQ.CLASS EQ.NO.

DESIGN CODE

DRAWN	RDB	NOV 20/2004
PROJECT		
DES. ENG.		
APPROVAL		

Domtar

MILL	ALL
DEPT.	
BLDG	ALL

TITLE

SANITARY EFFLUENT SYSTEMS

DWG TYPE: SITE
PROJECT
SCALE: 1" = 200'

47856-B REV. 1

47852.dwg Plot: 03/02/05 12:15 /Logan ver 1018/04