621 DUNDAS STREET EAST
Dundas Street East at Haig Road, City of Belleville

FUNCTIONAL SERVICING REPORT

Prepared For: 2255718 Ontario Inc.

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1.0 INTRODUCTION

This Functional Servicing Report is prepared in support of an application for Draft Plan of Subdivision and Rezoning approval for a residential subdivision in the City of Belleville.

The subject property is located at 621 Dundas Street East and the Haig Road intersection.

The property is located within Part of Lot 13, Concession 1, Part of the Road Allowance between the Broken Front Concession and Concession 1, Part of Lots 12 and 13, Broken Front Concession, Township of Thurlow, now in the City of Belleville, County of Hastings as illustrated in Figure 1- Key Plan.

The property has a frontage along Dundas Street East for access.

The site is bounded by the Bay of Quinte to the south; the Canadian Pacific Railway (CP Rail) and Dundas Street East to the north; commercial and residential developments to the east; and Parkland/Open Space to the west.

The site has approximately 16.17 hectares of developable land with a provincial significant wetland along the shore of the Bay of Quinte.

The property was the location of the former Bakelite operation and used by Union Carbide of Canada as a chemical manufacturing and resin (Bakelite) production facility. Environmental Site Assessments were completed as there were potential for impacts on the property as a result of historical activities on the property.

The residential development is proposed to consist of:

Condo Apartments	185 units
Condo Stacked Townhouses	176 units
Freehold Townhouses/Bungalofts	54 units
Freehold Detached Bungalofts	7 units
Condo Detached Bungalofts	29 units
Condo Townhouses	76 units
Condo Back-to-Back Stacked Townhouses	72 units
Total	**599 units**

With a potential of 599 various types of units, the anticipated population would be 1,552 people.

There is also a requirement to provide municipal water to four (4) existing residences located along the shore of the Bay of Quinte to the east of the subject property.

A proposed Site Plan for the development prepared by Cynthia Zahoruk Architects has been included in Appendix A.

Figure 1 - Key Plan

2.0 SITE DESCRIPTION

The previous development and use of the property defined the various services and facilities on the property.

Access was a driveway from Dundas Street East at the northeast corner of the property.

The property had its own water supply from the Bay of Quinte, there was no indication if a municipal water service and sanitary building sewer connection was provided to the property.

A 600mm diameter trunk sanitary sewer is located in an easement on the property located along the west and north sides of the property.

A 300mm diameter watermain is located on the south side of Dundas Street East and connects with the 300mm diameter watermain located on Haig Road.

The property falls gradually to the south and sheet drains into the existing wetland and Bay of Quinte. The rail spur lines and driveways previously on the property have created four separate sub-catchments as shown on the Pre-Development Overland Flow Route. Sub-catchment 100 along the east side of the property also receives the runoff conveyed from the storm sewer on Haig Road. The storm sewer on Haig Road outlets on the south side of Dundas Street East into a ditch along the east boundary of the property and discharges to the Bay of Quinte. Sub-catchment 200, located through the middle of the property was also defined by the existing rail spur bed and driveway to the pump house discharges to the Bay of Quinte via a short drainage ditch. Sub-catchment 300 drains westerly along a minor drainage course/ditch to the Bay of Quinte. Sub-catchment 400 also drains westerly onto adjacent lands into a pond before outletting through a culvert under a former railway bed, which is now used as a multi-purpose trail and a trunk sanitary sewer to the wastewater treatment plan. There are two large sub-catchments north of Dundas Street East - the Bradgate and Farley Sub-catchments that outlet into ditches on the south side of the Canadian Pacific Railway (CP Rail) and also discharges into the existing pond to the west of the property and on the north side of the multi-purpose trail.

The property has approximately 180m of frontage along Dundas Street East. Dundas Street East, formerly Highway 2, is a divided highway with two lanes in each direction. For this section, the road drainage is addressed with roadside ditches. Haig Road also connects to Dundas Street East from the north at the northeast corner of the property. The CP Rail crosses at two locations - Dundas Street East approximately 140m to the west from the Haig Road intersection, and then crosses Haig Road approximately 50m north of Dundas Street East.

The City of Belleville has developed multi-purpose trails along the Bay of Quinte which loop back around to the west property boundary. These trails consist of a 3m wide asphalt trail and a 3m wide ski/snowshoe trail with light standards installed in between the trails.

Electrical services are available with Elexicon Energy.

Natural gas can be provided by Enbridge Gas.

Communications, telephone, television and internet is available from Bell Canada and Cogeco.

3.0 SITE SERVICING

3.1 Sanitary Sewer Design

3.1.1 Existing Services

An existing 600mm diameter trunk sanitary sewer at 0.16% grade is presently located on the easement along the west side of the property with the lowest point approximately 130m south of the northwest corner of the property. The depth of the sanitary sewer is only 2.1m at this location. Any development south of this point across the property would require to be serviced with a sewage lift station.

3.1.2 Proposed Servicing

A proposed 200mm diameter PVC sanitary sewer connected into the 600mm diameter trunk sanitary sewer will be able to service all the lots/units within the proposed development.

Extending the sanitary sewer easterly at a minimum 0.4% slope will raise the invert of the pipe too high to the proposed grading at the east limit of the property. Therefore, it is proposed that the lots/units at the east end of the centre driveway also be connected to the sewage lift station with the lots/units along the southerly east-west leg of Road "A".

The sewage lift station would serve 36 lots and 71 units with a population of 286 persons. The other lands north of the centre driveway in Block "E" would serve 492 units with a population of 1,258 persons. The areas/units to be serviced with a sewage lift station are shown in green on the Gravity vs Pumped Systems, the areas/units to be serviced with a gravity sanitary is shown in magenta, drawing DUN/621-Sa2 is included in Appendix B.

Proposed throughout the development are 200mm dia. PVC sanitary sewer mains with a minimum full-flow pipe velocity of 0.6m/s.

Residential design parameters for the development include 350 L/cap/day, residential densities of 3 persons per lot, 2.5 persons per unit and extraneous flows of 0.28 L/sec/ha.

Design flow calculations and the accompanying Sanitary Drainage Area Plan are included in Appendix B.

The ultimate peak design flow for the sewage lift station would be 6.25 L/s.

The sewage lift station will consist of two submersible pumps, sized for capacity with one unit out-of-service.

The forcemain would be sized for a cleansing velocity between 0.6m/s and 1.2m/s with the maximum velocity limited to 3m/s. A 100mm dia. forcemain would maintain a velocity of 0.69m/s.

The pumping station design would be based on system-head calculation and curves using the appropriate Hasen-Williams factor "C" as follows:

(a) Low sewage level in the wet well, C = 120;
(b) Median sewage level over the normal operating range in the wet well, C = 130; and
(c) Overflow sewage level in the wet well, C = 140.

Future sanitary sewer servicing for lands to the east of this development, including the existing four (4) dwellings, cannot be provided with a gravity sanitary sewer connection, but would require a sewage lift station or individual low pressure sewer system such as an E/One.

3.2 Watermain Distribution System

3.2.1 Existing Services

There is an existing 300mm dia. watermain on Dundas Street East and Haig Road that supplies domestic water and fire flow for this area. This existing watermain on Dundas Street East will be utilized to connect the proposed development into the system.

Fire Hydrant Flow Test data was available for an existing hydrant located at 665 Dundas Street East; copy provided in Appendix C. It was calculated that the available fire flow at 20psi residual pressure ranges from 470 to 500 L/s (28,200 to 30,000 L/min).

The flows and corresponding pressure from the Hydrant Flow Test would be used to calibrate the Bentley WaterCAD V8i Watermain Model.

3.2.2 Proposed Servicing

The proposed watermain will be PVC DR 18, class 150 and range in size from 200mm to 250mm diameter.

Two (2) 250mm dia. watermains will be installed on Road “A” from Dundas Street East southerly to the first Road “A” Tee intersection. This will provide a looped water supply to the development.

A 200mm dia. watermain would be installed on the P-Crescent of Road “A”. A 200mm dia. watermain would also be installed to provide fire flows to Blocks “G” and “H”.

A 200mm dia. watermain would also be installed along the driveway through the centre of Block “E” to supply water and fire protection for the 2-storey Townhouses and Bungalofts. This watermain would either be installed in an easement for ownership and maintenance of the watermain and provide individual services to the units or be part of a Block development with a private service.

A 200mm dia. watermain is also included to supply municipal water to the four (4) existing dwellings along the bay shore immediately to the east of this development.

It was determined that the Maximum Day Demand would be 11.3 L/s.

The Required Fire Flow, based on Water Supply for Public Fire Protection – A Guide to Recommended Practice in Canada – 2020 by Fire Underwriters Survey would range from 4,000 L/min to 12,000 L/min. It is expected the building area of the townhouse blocks will be reduced so that the fire flow requirements can be limited to 7,000 L/min when provisions for firewalls are incorporated between some of the units.

The Maximum Day Demand was incorporated into the Bentley WaterCAD V8i Watermain Model. The modelling was completed with only one (1) 250mm dia. watermain supplying water from Dundas Street East. Also, a possible watermain loop connection along the internal driveway through the centre of Block “E” was not considered for the model.

The Demands applied to the various junctions in the watermain distribution system are provided in the Junction Table. A Pipe Table is also provided indicating the various pipe lengths, diameters, Hazen-Williams C Coefficients, Flows, Velocities and Head loss.

Available Fire Flows were calculated during the Maximum Day Demand. For example, the Available Fire Flow at Hydrant H-5 located at the westerly end of Block “G” was determined to be 8,340 L/min with a Residual pressure of 150kPa.

The following table summarizes available fire flows at select hydrants in the system:

Fire Hydrant No.	Location	Location Description	Available Fire Flow (L/min.)	Residual Pressure
H-5	Block “G”	Westerly end of Block “G”	8,340	150 kPa
H-6	Block “A”	Road “A”, in front of apartment block	12,420	150 kPa
H-14	Block “F”	Road “A”, in front of townhouse block	11,034	150 kPa
H-18	“4 Ex. Units”	Existing dwellings east of development	9,930	150 kPa
H-19	Block “H”	South driveway servicing bungalofts	7,110	150 kPa

Table 1 – HYDRANT TABLE MAXIMUM DAY DEMAND AND FIRE FLOW

Supporting calculations and drawings for the above have been provided in Appendix C.

3.3 Storm Sewer Design

3.3.1 Existing Services

The property grades gradually to the south and sheet drains into the existing wetland and Bay of Quinte. The rail spur lines and driveways previously on the property have created four separate sub-catchments as shown on the Pre-Development Overland Flow Route, Drawing Dun/621-St3 included in Appendix D.

Sub-catchment 100 along the east side of the property also receives the runoff conveyed from the storm sewer on Haig Road. The storm sewer on Haig Road outlets at the south side of Dundas Street East into a ditch along the east boundary of the property and discharges to the Bay of Quinte.

Sub-catchment 200, located through the middle of the property is defined by the existing rail spur bed and roadway to the pumphouse and discharges to the Bay of Quinte via a short drainage ditch.

Sub-catchment 300 drains westerly along a minor drainage course/ditch to the Bay of Quinte.

Sub-catchment 400 also drains westerly onto adjacent lands then into a pond before outletting through a culvert under a former railway bed, which now uses as a multi-purpose trail and a trunk sanitary sewer to the wastewater treatment plan.

The two large sub-catchments north of Dundas Street East, the Bradgate and Farley Sub-catchments, outlet into ditches on the south side of the Canadian Pacific Railway (CP Rail) and discharges into the existing pond to the west of the property on the north side of the multi-purpose trail.

3.3.2 Proposed Services

Stormwater will be directed into the storm sewer system in two manners; the streets are proposed to be constructed to allow stormwater to convey along the road to the sewer system, and grassed swales located in the rear yards will direct the surface flows into catchbasins or ditch inlets and into the storm sewer system. The pipe network will be designed to accommodate 1:5 year storm events.

Rainfall Intensity Duration Frequency (IDF) data for Belleville is as follows:

5-Year Storm $I = 26.4\ t^{-0.677}$

100-Year Storm $I = 45.6\ t^{-0.699}$

The weighted average of the Runoff Coefficient for the overall development was determined to be 0.67 but was rounded to 0.70.

The sections of storm sewer connecting to an Oil-Grit Separator (OGS) have a steep slope as the inlet to the OGS is constructed lower than the outlet resulting in this section of pipe being submerged. The length of pipe is short to minimize the amount of pipe submerged. The velocity of flow in the pipe would be comparable to the flow in the outlet pipe, that is, less than 6m/s.

Storms in excess in excess of a 1:5 year event would result in surcharging of the storm sewer system and conveyance during these major events will be overland along the roads and swales towards a stormwater relief system.

Detailed storm sewer calculations have been provided in Appendix D.

3.4 Storm Water Management

3.4.1 Stormwater Quantity Control

With the property being adjacent to the Bay of Quinte to discharge the stormwater runoff, no quantity controls measures will be required.

3.4.2 Stormwater Quality

Stormwater from the development will be collected and treated on site such that the final outflow will meet Ministry of Environment, Conservation Authority, Bay of Quinte Remedial Action Plan and City of Belleville approvals. Stormwater management facilities (SWM) will be constructed to provide end of pipe quality control where necessary.

Considering the Bay of Quinte Remedial Action Plan, Level 1 Enhance Quality Treatment as outlined in the Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (March 2003) will need to be provided. Treatment will be required to achieve the MECP Level 1 threshold of 80% Total Suspended Solids (TSS) removal of materials 50 microns in size.

Maintaining small sub-catchment areas will also permit Oil-Grit Separators be utilized in series with vegetated spreader berms to treat stormwater in lieu of detention ponds as the end-of-pipe treatment method. Runoff would then sheet flow over the vegetated spreader berms and disperse into the existing wetland.

Based on the 5-year storm sewer design, eight (8) separate sub-catchments ranging in area from 0.97ha. to 2.79ha. can be treated with oil grit separators, such as the DownStream Defender, to provide 80% removal of the TSS. The Downstream Defender can also be sized to provide a lower level of treatment for the 5-year storm event. The separate sub-catchments have been highlighted in colour on Drawing Bun/621-SW1, Storm Sewer Design-Stormwater Management Areas.

The existing runoff from Haig Road would not require quality treatment as a requirement for this development.

The overland flow will be directed along the streets to the midpoint of the southerly East-West section of Road “A” and sheet flow over Vegetated Spreader Berm 100. The runoff during a 100-year storm event includes the area along Haig Road north of Dundas Street East. The overland flow to Vegetated Spreader Berm **100** will be the runoff during the 100-year storm event less the 5-year storm event for the 100, 200 and 300 Series Sub-catchments, which will outlet from the storm sewer directly to the Bay of Quinte, and the 600 Series Sub-catchment which will outlet through a stormwater quality treatment unit and over Vegetated Spreader Berm 600. The overland flow to Vegetated Spreader Berm 100 was calculated to be 1.05m^3/s. The flow over the Vegetated Spreader Berm **600** would only be the 5-year storm event, that is 0.16m^3/s

Runoff from Block “G” will be directed to the wetland and Bay of Quinte through a Stormwater Quality Treatment Unit and sheet flow over Vegetated Spreader Berm **700**. The flow over this Vegetated Spreader Berm would be 0.19m^3/s and 0.4m^3/s during the 5-year and 100-year storm events respectively.

The calculations for the overland flows are included in Appendix E.

The runoff off from the driveway, the westerly units and the front half of easterly units in Block “H” is being directed westerly and over Vegetated Spreader Berm **800** to sheet flow and then disburse in the wetlands to the Bay of Quinte. The rear half of the easterly units in Block “H” would sheet flow into the wetlands. With Low Impact Development (LID), the swales and sheet flow would provide at least 50% reduction in TSS. This is being considered based on the percentage of TSS reduction during the Quality Storm Event for the other developed portion of the subdivision and was calculated to be 83.97%.

Considering the storm sewer design is based on the Rational Method, the runoff for the Storm Quality Event 25mm Intensity was determined based on equation 4.9 MECP Manual being:

$$i = 43C + 5.9$$

where, i = rainfall intensity (mm/h)
C = runoff coefficient

The average runoff coefficient (C) was rounded to 0.70 for the overall development.

The Ministry of the Environment (MOE) Quality Event Calculations are included in Appendix E.

The Downstream Defender is being considered to provide the required quality treatment. The Total Suspended Solids Removal was considered for both the quality storm event and the 5-year storm event when the storm sewer would be flowing at capacity into the quality treatment units.

The Water Quality Flow Rate Worksheets for Water Quality Flow and Peak Storm Flow are included in Appendix E for each of the Downstream Units.

The following Table 2 summarizes the levels of TSS Removal for the Water Quality Flow and Peak Storm Flow for the respective Stormwater Quality Treatment Units:

	TREATMENT UNIT SPECIFICATIONS									
SQU No	DIA	PEAK FLOW	SEDIMENT STORAGE	OIL STORAGE	AREA	QUALITY		5 YEAR		NET ANNUAL
						FLOW	TSS Removal	FLOW	TSS Removal	
			m^3	litres	hectares	L/s	%	L/s	%	%
100	2400	425	3.56	2,044	1.18	100.9	87.3%	149.4	77.7%	99.0%
200	1800	227.0	1.61	818	1.22	70.2	82.8%	150.3	45.3%	98.0%
300	2400	425.0	3.56	2044	0.97	113.2	85.1%	124.5	82.9%	99.0%
400	3000	708.0	6.65	3,975	2.79	170.6	85.7%	329.3	62.0%	99.0%
500	3000	798.0	6.65	3,975	2.41	171.1	85.7%	285.3	69.5%	99.0%
600	2400	425.0	3.56	2,044	1.29	88.0	89.6%	157.3	75.9%	99.0%
700	1800	227.0	1.61	818	0.99	73.0	81.8%	122.0	60.6%	98.0%
					10.85		85.60%			
	Subcatchment 800 (LID)				0.52		50.0%			
TOTAL					11.38		83.97%			

Table 2 - SUMMARY of TSS REMOVAL of QUALITY TREATMENT UNITS (Downstream Defender)

The Downstream Defender OGS will also be able to provide a Total Net Annual Removal Efficiency of 99.0%.

During Peak Flow in the storm sewer, the Downstream Defender OGS are still able to provide from 60% to 82% TSS Removal Efficiency depending on the flows at the respective Quality Treatment Units.

To minimize impact on the wetlands, vegetated spreader berms will also be constructed downstream of the storm sewer outlets and the overland discharge locations. The MOE Manual recommends a depth of flow of 50-100mm through the vegetation during a 10mm storm. The depth of flow is calculated based on:

$$Q = a\ L\ H^{1.5}$$

where, Q = discharge
a = coefficient
L = length of crest of weir
H = head

A coefficient of 1.67 was used to calculate the depth of flow (Head) for the respective discharge and length of crest of the weir and are summarized in the following Table 3:

Vegetated Spreader Berm Weir Flow

MOE SWM Planning & Design Manual Equation 4.4: Weir Flow

$Q = aLH^{1.5}$

Spreader Berm Filter Strip Outlet Weir (Subcatchment 100 to 600)

	5_{yr}		100_{yr}		
100-year Peak Flow			1.87		
Less 5-year Outlet to Bay (ST-A4 to Outlet)			0.67		
Less 5-year to SQU-600 to Outlet			0.16		
Q =	0.67	m^3/s	1.05	m^3/s	Flow Volume
a =	1.67		1.67		Broad Crested Weir Coefficient
L =	170	m	170	m	
H =	17.6	mm	23.9	mm	Flow Depth (max)
V =	0.22	m/s	0.26	m/s	Velocity

Spreader Berm Filter Strip Outlet Weir (Subcatchment 600 / SQU 600)

	5_{yr}		100_{yr}
Q =	0.16	m^3/s	100_{yr} Overland Flow to Spreader Berm Filter Strip 100
a =	1.67		
L =	40	m	
H =	17.7	mm	
V =	0.22	m/s	

Spreader Berm Filter Strip Outlet Weir (Subcatchment 700 / SQU 700)

	5_{yr}		100_{yr}		
Q =	0.1940	m^3/s	0.3957	m^3/s	Flow Volume
a =	1.67		1.67		Broad Crested Weir Coefficient
L =	32	m	32	m	
H =	23.6	mm	38.0	mm	Flow Height (max)
V =	0.26	m/s	0.33	m/s	Velocity

Spreader Berm Filter Strip Outlet Weir (Subcatchment 800 / Spreader Berm Filter Strip 800)

	5_{yr}		100_{yr}		
Q =	0.179	m^3/s	0.37	m^3/s	Flow Volume
a =	1.67		1.67		Broad Crested Weir Coefficient
L =	30	m	30	m	
H =	23.4	mm	37.6	mm	Flow Height (max)
V =	0.26	m/s	0.32	m/s	Velocity

Table 3 - VEGETATED SPREADER BERM WEIR FLOW (Berm Nos. 100, 600, 700 and 800)

During a major storm event, the depth of flow over the Vegetated Spreader Berm will range from only 24mm to 38mm with velocities ranging from 0.26m/s to 0.33m/s; being less than 0.5m/s which is considered acceptable for flow in a grassed swale.

The SWM facilities in conjunction with lot level controls, sedimentation and erosion control practices during construction of the roads and services, as well as the dwellings, will provide protection to the Bay of Quinte. The placement of the Vegetated Spreader Berms has also been shown on the Engineering Drawings.

3.5 Utility Servicing

3.5.1 Services

Utility services to the area have been provided to date by Elexicon Energy, Bell Canada, Cogeco and Enbridge Gas for electricity, telephone/internet communication, cable television and natural gas respectively and will be available for this development.

The utilities will be installed underground in a combined utility trench. Electricity will be supplied from pad mount transformers. The electrical design is coordinated with Elexicon Energy.

3.6 Roadwork

3.6.1 Existing

Dundas Street East, formerly Highway 2, is a divided 4-lane street along the limited frontage of the parcel land. Haig Road also connects to Dundas Steet East at this location while immediately to the west the CP Rail crosses Dundas Street East and to the immediate north crosses Haig Road.

There is also a driveway immediately to the east of the property that may cause traffic conflicts.

3.6.2 Proposed

This new development will have direct access to Dundas Street East, which is maintained on a year-round basis by the Municipality. It is proposed to provide a divided 5-lane entrance, 2 inbound and 3 outbound, for turning lane movements. The divided lane will also provide a second emergency access.

There will be a conflict with traffic movement between the proposed intersection and the existing driveway to the immediate east. This driveway should be able to be relocated further easterly. This property also has a major entrance further to the east for larger trucks to access.

A Traffic Impact Statement is being prepared by others to address the intersection requirements.

There is a multi-purpose trail to the west of the property that could also be considered for a secondary emergency access road with the closest connecting street being Herchimer Avenue. This connection may be a benefit to the City as it would be the only access to the lands south of the CP Rail from Herchimer Avenue to South Front Street without a railway crossing.

A 3m wide paved multi-use trail will also be provided to connect from the existing Bay Shore Trail to the west through the subdivision to Dundas Street East.

The street within the development will be constructed with a 20m road allowance to City of Belleville current standards for a 20m road cross-section. A sidewalk or the multi-purpose trail will be provided along one side of the street. The street will also be part of the street scape, designed using 20m wide cross sections.

4.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

A number of erosion and sediment control measures can be established during construction. These measures are as follows:

- Minimize the area of soil exposed at any time;
- Apply soil cover as soon as possible after soil is disturbed;
- Sediment will be intercepted as close to the source as possible. Proposed sediment control would include covering catchbasins and ditch inlets with a filter cloth, installing straw bale check dams or crushed stone filter berms in drainage swales, and installing sediment control fences around disturbed areas of building lots before construction begins;
- Ensure the sediment control structures are properly constructed, inspected and maintained during its use;
- Control dust during construction with application of dust suppressants to gravel roads as required, and periodic sweeping of paved roads;
- If dewatering is required, pumped water to be discharged to sediment traps to reduce the amount of sediment sent to storm sewers and ditch inlets;
- Stockpiles expected to remain for a significant length of time should be temporarily covered with a vegetative mulch,
- Inspect and remove sediment from sumps in downstream catchbasins and ditch inlets within the development as required.

5.0 SUMMARY

This design brief has been prepared to assist in municipal approvals for this development and is to be read in conjunction with Engineering Drawings prepared by van MEER limited included in Appendix F.

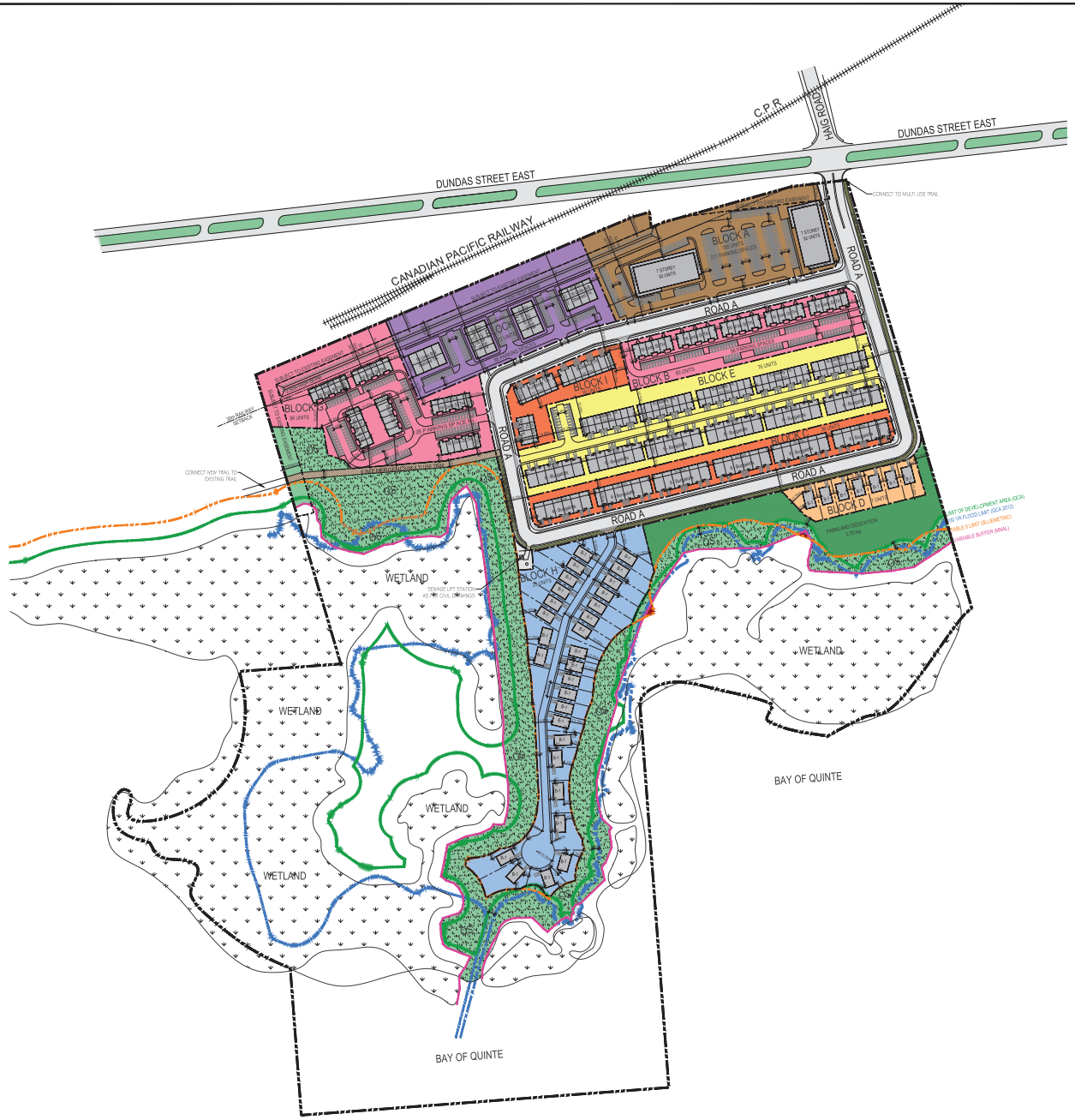
van **MEER** limited

Arnold H. Vandermeer, P.Eng.
Pres.

APPENDIX A

Conceptual Site Plan

Proposed Site Plan (Cynthia Zahoruk Architects) Drawing A0.1
January 17, 2024 – Issued for ZBA



1 PROPOSED SITE PLAN
SCALE: 1:1800

PROPOSED LAND USE LEGEND

- CONDO APARTMENTS - 185 UNITS
- CONDO STACKED TOWNHOUSES (2 1/2 STOREY) - 176 UNITS
- FREEHOLD TOWNHOUSES - 54 UNITS
- FREEHOLD DETACHED BUNGALOFTS - 7 UNITS
- CONDO DETACHED BUNGALOFTS - 29 UNITS
- CONDO TOWNHOUSES - 76 UNITS
- CONDO BACK TO BACK STACKED TOWNHOUSES - 72 UNITS
- NON-DEVELOPABLE AREA OUTSIDE OF TABLE 9 LIMIT
- PARKLAND DEDICATION
- OPEN SPACE AREA
- ZONING BY-LAW COMPLIANT PARKING SPACES

PROPERTY AREAS		
LANDS OUT OF TABLE 9 LIMIT (TOTAL) OUTSIDE MNAL VARIABLE BUFFER = 15.44 Ha INSIDE MNAL VARIABLE BUFFER = 0.01 Ha AREA OF EXISTING EASEMENT INCLUDED = 0.85 Ha		16.30 Ha
LANDS WITHIN TABLE '9' LIMIT (INCLUDING WETLAND AND BAY) AREA OF EXISTING EASEMENT INCLUDED = 0.05 Ha		21.05 Ha
TOTAL PROPERTY AREA		37.35 Ha
OPEN SPACE AREA		
OPEN SPACE WITHIN DEVELOPABLE AREA AREA OF EXISTING EASEMENT INCLUDED = 0.07 Ha		0.64Ha
OPEN SPACE OUT OF DEVELOPABLE AREA AREA OF EXISTING EASEMENT INCLUDED = 0.08 Ha		3.34 Ha
TOTAL OPEN SPACE AREA		3.98 Ha
DEVELOPABLE AREA (AS PER TABLE 9 LIMIT & QCA DEVELOPMENT LIMIT)		
MUNICIPAL ROAD ALLOWANCE (EXCLUDING TRAIL) AREA OF EXISTING EASEMENT WITHIN ROAD ALLOWANCE = 0.01 Ha AREA OF TRAIL ON ROAD ALLOWANCE = 0.10 Ha (INCLUDED IN PARKLAND)		2.20 Ha
OPEN SPACE WITHIN DEVELOPABLE AREA		0.65 Ha
BLOCK 'A'	UNIT WIDTH - N/A AREA OF EXISTING EASEMENT WITHIN BLOCK 'A' = 0.21 Ha	1.74 Ha
BLOCK 'B'	APPROXIMATE UNIT WIDTH - 6.0 M [19'-8"]	0.98 Ha
BLOCK 'C'	APPROXIMATE UNIT WIDTH - 8.30 M [27'-3"]	1.0 Ha
BLOCK 'D'	APPROXIMATE UNIT WIDTH - 9.40 M [30'-10"]	0.40 Ha
BLOCK 'E'	APPROXIMATE UNIT WIDTH - 6.30 M [20'-7"]	2.34 Ha
BLOCK 'F'	APPROXIMATE UNIT WIDTH - 7.50 M [24'-7"] AREA OF EXISTING EASEMENT WITHIN BLOCK 'F' = 0.29 Ha	1.50 Ha
BLOCK 'G'	APPROXIMATE UNIT WIDTH - 6.0 M [19'-8"] AREA OF EXISTING EASEMENT WITHIN BLOCK 'G' = 0.25 Ha	1.70 Ha
BLOCK 'H'	APPROXIMATE UNIT WIDTH - 9.40 M [30'-10"]	2.19 Ha
BLOCK 'I'	APPROXIMATE UNIT WIDTH - 6.30 M [30'-10"]	0.48 Ha
SEWAGE LIFT STATION AREA		0.03 Ha
PARKLAND DEDICATION (INCLUDING TRAIL ON ROAD A)		0.85 Ha
6.0M WIDE TRAIL AREA		0.12 Ha
TOTAL DEVELOPABLE AREA		16.17 Ha

AREA FOR E-FILE COMMENTS

CYNTHIA ZAHORUK ARCHITECTS
3077 NEW STREET,
BURLINGTON, ON. L7N1M6
905.331.4480

ONTARIO ASSOCIATION OF ARCHITECTS

NOTES:
1.THE CONTRACTOR OR PROJECT MANAGER WILL CHECK AND VERIFY ALL DIMENSIONS AND JOB CONDITIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. COORDINATION OF WORK IS THE RESPONSIBILITY OF THE CONTRACTOR OR OWNER/CONTRACTOR.
2.THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED BY THE ARCHITECT.
3.ALL DRAWINGS ARE THE PROPERTY OF THE ARCHITECT AND MAY NOT BE COPIED, REPRODUCED OR ALTERED WITHOUT WRITTEN PERMISSION FROM THE ARCHITECT.
4.DO NOT SCALE THE DRAWINGS.

mm/dd/yyyy	REVISION
09/04/2023	ISSUED FOR PRECONSULT
24/10/2023	ISSUED FOR COORDINATION
28/11/2023	ISSUED FOR COORDINATION
17/01/2024	ISSUED FOR ZBA

SCALE: AS NOTED
DRAWN BY: KR/EM
PRINT DATE: 17/01/2024

BELLEVILLE DEVELOPMENT
PROPOSED DEVELOPMENT
DUNDAS STREET EAST
BELLEVILLE, ONTARIO

PROPOSED SITE PLAN

A0.1

APPENDIX B

Sanitary Sewer Design

Sanitary Sewer Design Sheet		
Sanitary Sewer Design	Drainage Area Plan & Pipe Network	Drawing DUN/621-Sa1
Sanitary Sewer Design	Gravity vs Pumped Systems	Drawing DUN/621-Sa2

SANITARY SEWER DESIGN SHEET

P = Persons / ha 3 Persons / Lot 2.5 Persons/Unit
q = 350 l/capita/day
I = 0.28 l/sec/ha
$M = 1+(14/(4+P^{0.5}))$

LOCATION				INDIVIDUAL					CUMULATIVE					Peaking Factor	Pop. Flow (l/s)	Comm Flow (l/s)	Peak Extraneous Flow (l/s)	Peak Design Flow (l/s)	PROPOSED SEWER						
				RESIDENTIAL				COMM	RESIDENTIAL				COMM						Length	Pipe Size	Type of	Grade	Capacity (L/s)	Velocity	
STREET	AREA	FROM	TO	Lots	Units	Pop.	Areas	Areas	Lots	Units	Pop.	Areas	Areas						(m)	(mm)	Pipe	%	n= 0.013	Full Flow (m/s)	Actual (m/s)
ROAD A																									
North Leg		SA 101	SA 102		39	98	0.81			39	98	0.81		4.25	1.68		0.23	1.91	113.1	200	DR 35	0.90%	31.1	0.99	0.56
Block A			SA 102		198	495	1.94			198	495	1.94		3.98	7.97		0.54	8.52	10.0	200	DR 35	2.00%	46.4	1.48	1.13
		SA 102	SA 103		38	95	0.58			275	688	3.33		3.90	10.86		0.93	11.79	118.8	200	DR 35	0.40%	20.7	0.66	0.67
		SA 103	SA 104		13	33	0.36			288	720	3.69		3.89	11.34		1.03	12.37	98.8	200	DR 35	0.40%	20.7	0.66	0.69
Block F			SA 104		72	180	1.34			72	180	1.34		4.16	3.04		0.38	3.41	11.0	200	DR 35	2.00%	46.4	1.48	0.87
		SA 104	SA 105		6	15	0.29			366	915	5.32		3.82	14.18		1.49	15.67	68.0	200	DR 35	0.50%	23.2	0.74	0.79
MIDDLE DRIVEWAY		SA 201	SA 202		18	45	0.48			18	45	0.48		4.32	0.79		0.13	0.92	65.7	200	DR35	0.70%	27.4	0.87	0.40
West Portion		SA 202	SA 203		23	58	0.91			41	103	1.39		4.24	1.76		0.39	2.15	120.0	200	DR35	0.40%	20.7	0.66	0.43
		SA 203	SA 105							41	103	1.39		4.24	1.76		0.39	2.15	17.3	200	DR35	0.40%	20.7	0.66	0.43
MIDDLE DRIVEWAY		SA 301	SA 303		21	53	0.57			21	53	0.57		4.31	0.92		0.16	1.08	79.2	200	DR35	0.70%	27.4	0.87	0.40
East Portion		SA 302	SA 303		14	35	0.55			35	88	1.12		4.26	1.51		0.31	1.82	45.4	200	DR35	0.70%	27.4	0.87	0.52
		SA 303	A 402							35	88	1.12		4.26	1.51		0.31	1.82	77.4	200	DR35	0.60%	25.4	0.81	0.48
ROAD A		SA 401	SA 402	4	6	27	0.63		36	41	115	1.75		4.23	1.96		0.49	2.45	46.1	200	DR35	0.70%	27.4	0.87	0.56
South Leg		SA 402	SA 403	3	12	39	0.78		32	53	154	2.53		4.19	2.60		0.71	3.31	120.0	200	DR35	0.40%	20.7	0.66	0.49
		SA 403	SA 404		12	30	0.54		7	65	184	3.07		4.16	3.09		0.86	3.95	94.7	200	DR35	0.40%	20.7	0.66	0.52
SOUTH DRIVEWAY		SA 501	SA 502	4		12	0.38		4	0	12	0.38		4.41	0.21		0.11	0.32	37.5	200	DR35	0.70%	27.4	0.87	0.25
		SA 502	SA 503	5		15	0.35		9	0	27	0.73		4.36	0.48		0.20	0.68	96.5	200	DR35	0.40%	20.7	0.66	0.30
		SA 503	SA 504	9		27	0.52		18	0	54	1.25		4.31	0.94		0.35	1.29	91.9	200	DR35	0.40%	20.7	0.66	0.38
		SA 504	SA 405	11		33	0.76		29	0	87	2.01		4.26	1.50		0.56	2.06	76.5	200	DR35	0.40%	20.7	0.66	0.42
		SA 505	SA 404						29	0	87	2.01		4.26	1.50		0.56	2.06	24.4	200	DR35	0.40%	20.7	0.66	0.42
ROAD A																									
South Leg		SA 404	SA 405		6	15	0.34		36	71	286	5.43		4.09	4.73		1.52	6.25	67.4	200	DR35	0.40%	20.7	0.66	0.58
LIFT STATION																									
		SA 405	SL STN						36	71	285.5	5.4261		4.09	4.73		1.52	6.25	23.3	200	DR35	0.40%	20.7	0.66	0.58
SANITARY EASEMENT		SA 105	SA 106						36	478	1,303	12.14		3.72	19.65		3.40	23.05	75.2	200	DR 35	0.40%	20.7	0.66	0.75
BLOCK G		SA 601	SA 602		32	80	0.56		0	32	80	0.56		4.27	1.38		0.16	1.54	68.6	200	DR35	0.70%	27.4	0.87	0.50
		SA 602	SA 603		16	40	0.23		0	48	120	0.78		4.22	2.05		0.22	2.27	54.5	200	DR35	0.50%	23.2	0.74	0.48
		SA 604	SA 106		32	80	0.41		0	80	200	1.19		4.15	3.36		0.33	3.69	50.2	200	DR35	0.70%	27.4	0.87	0.62
		SA 106	SA 107						36	558	1,503	13.33		3.68	22.40		3.73	26.13	57.4	200	DR35	0.40%	20.7	0.66	0.75
		SA 605	SA 107		16	40	0.22		0	16	40	0.22		4.33	0.70		0.06	0.76	51.4	200	DR35	0.70%	27.4	0.87	0.30
		SA 107	SA 108						36	574	1,543	13.54		3.67	22.94		3.79	26.74	62.0	200	DR35	0.40%	20.7	0.66	0.75

Existing works shown in Italics *SA1*
Proposed works shown with straight lettering SA1

Commercial Design Flows 1.05 l/ha.sec(includes infiltration)
Extraneous Flows 0.28 l/ha.sec

PREPARED BY: SDS
CHECKED BY:

DATE: November 8, 2023
Rev: January 10, 2024

van MEER limited

621 DUNDAS STREET EAST
CITY of BELLEVILLE


DUNDAS STREET EAST
HAIG ROAD
C.P.R.
CANADIAN PACIFIC RAILWAY
ROAD A
BLOCK E
BLOCK D
BLOCK H
198 APARTMENT UNITS 1.94 ha
72 STACKED TOWNS 1.34 ha
39 TOWNHOUSES 8136sq.m.
38 TOWNHOUSES 5760sq.m.
13 TH 3629sq.m.
6 TH 2891sq.m.
32 TH 4091sq.m.
32 TH 5559sq.m.
16 TH 2282sq.m.
16 TH 2158sq.m.
14 TOWNHOUSES 5536sq.m.
21 TOWNHOUSES 5703sq.m.
18 TOWNHOUSES 4764sq.m.
23 TOWNHOUSES 9116sq.m.
6 TOWNHOUSES 4 DETACHED RES 6269sq.m.
12 TOWNHOUSES 3 DETACHED RES 7789sq.m.
12 TOWNHOUSES 5410sq.m.
6 TOWNHOUSES 3426sq.m.
11 DET RES 7622sq.m.
9 DET RES 5211sq.m.
5 DET RES 3534sq.m.
4 DET RES 3761sq.m.
PARKLAND DEDICATION 0.75 Ha
OPEN SPACE 0.11 ha
OPEN SPACE 0.71 ha
SUBJECT TO EXISTING EASEMENT
2.50m HIGH BERM
3.0m MULTI USE TRAIL
CONNECT NEW TRAIL TO EXISTING
WETLAND
PROVINCIALLY SIGNIFICANT WETLAND
OS
BAY OF QUINTE
LIMIT OF DEVELOPMENT AREA (QCA)
100 YR FLOOD LIMIT (QCA 2012)
TABLE 9 LIMIT (BLUEMETRIC)
VARIABLE BUFFER (MNR)

VAN MEER LIMITED
LAND DEVELOPMENT • PROJECT MANAGEMENT • ENGINEERING
83 North Park Street, Belleville, Ont. K8P 2Y6 Tel. 613-969-0171

621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Chk'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

REVISIONS

SCALE: 1:1250
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

REGISTERED PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

SANITARY SEWER DESIGN
DRAINAGE AREA PLAN & PIPE NETWORK
DRAWING Dun/621-Sa1

DRAWING: 621 Dundas St. 24-01-08.dwg

REVISIONS				
Date	Description	By	Ckd	Ckd By
JUL. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.G.L.		
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.G.L.		
JUL. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.G.L.		
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.G.L.		

VAN MEER LIMITED
LAND DEVELOPMENT • PROJECT MANAGEMENT • CONSULTING
83 North Park Street, Belleville, ON, K8P 2Y6 Tel. 613-969-0171

621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

SANITARY SEWER DESIGN
GRAVITY vs PUMPED SYSTEMS
DRAWING Dun/621-S42

SCALE:	1:250
DESIGNER	A.V.V.
DATE:	JUL. 8/24
DRAWN:	S.G.L.
CHECKED	

APPENDIX C

Watermain Design

Hydrant Flow Test – Flow at 20 psi Residual Calculation

Fire Hydrant Flow Test (614 Dundas St E.)

Domestic Water Demand

Fire Flow Requirements

Junction Table – Maximum Day Demand

Pipe Table – Maximum Day Demand

Hydrant Table – Watermain Model Calibration

Hydrant Table (H-5) Maximum Day Demand and Fire Flow

Hydrant Table (H-6) Maximum Day Demand and Fire Flow

Hydrant Table (H-14) Maximum Day Demand and Fire Flow

Hydrant Table (H-18) Maximum Day Demand and Fire Flow

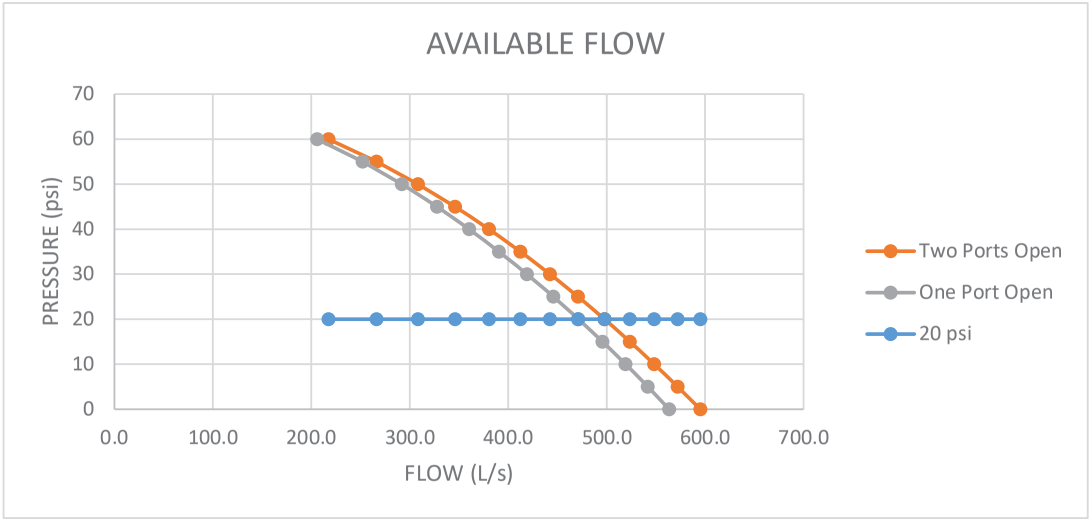
Hydrant Table (H-19) Maximum Day Demand and Fire Flow

Watermain Design – Pipe Network Drawing DUN/621-W1

HYDRANT FLOW TEST - Flow at 20 psi Residual Calculation

Hydrant 665 South side of Dundas Street, Belleville

Size of Watermain 300 mm ☐ Dead End ☒ Two Way ☐ Loop				Comments:				
Flow Hydrant Location:				South Side of Dundas Street East, No 665				
Residual Hydrant Location:				North Side of Dundas Street East, No 614				
Static Pressure: 71 psi				Date: November 19, 2019				Time:
Test No.	No. of Outlets	Orifice Size (in.)	Orifice Coef	Pitot Reading (psi)	Equivalent Flow gpm (U.S.)	Total Flow gpm (U.S.)	Residual Pressure (psi)	Comments
1	1	2.287	0.9	60	1087.7	1087.7	69	
2	2	2.287	0.9	45	942.0	1883.9	66	
3								
4								



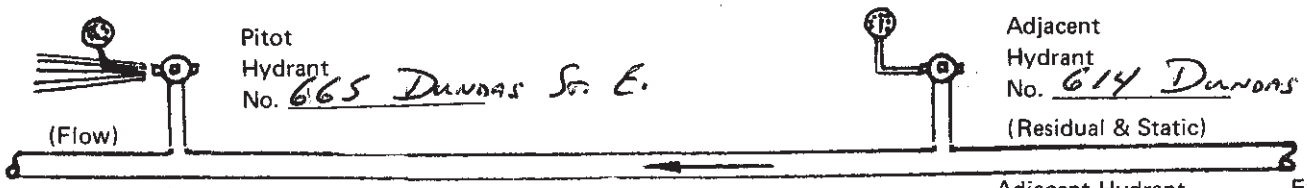
Routing

White - 1. Op. Mgr. 2. Draft. 3. FF bk.
Pink - File 842
Canary - Originator

Belleville Utilities Commission
459 SIDNEY STREET
P.O. BOX 939
BELLEVILLE, ONT., K8N 5B6
(613) 966-3651

Date: Nov. 27/19
Time: _____
Performed by TM, CM
File: 842

FIRE HYDRANT FLOW TEST



Pitot Hydrant No. 665 Dundas St. E.
(Flow)
Adjacent Hydrant No. 614 Dundas St. E.
(Residual & Static)
Adjacent Hydrant _____ Ft.
Above or Below Pitot Hydrant

Street Name 1 Dundas St. E.
Location on St. or name of Bldg. _____

Provide Four Pressure Readings:
Select outlets to give 10 psi drop at adjacent hydrant if possible

		OUTLETS					
		one - 1"	one - 1 1/8"	one - 1¼"	one - 2½"	two - 2½"	
Step One -	Adjacent Hydrant				71	71	psi (static)
Step Two -	Pitot Hydrant				60	45	psi (flow)
Step Three -	Adjacent Hydrant				69	66	psi (residual)
Step Four -	Adjacent Hydrant				71	71	psi (static check)

low with 20 psi residual at adjacent hydrant
= measured flow $\left(\frac{\text{available drop}}{\text{test drop}}\right)^{.54}$

Available drop is static less 20
Test drop is static less residual

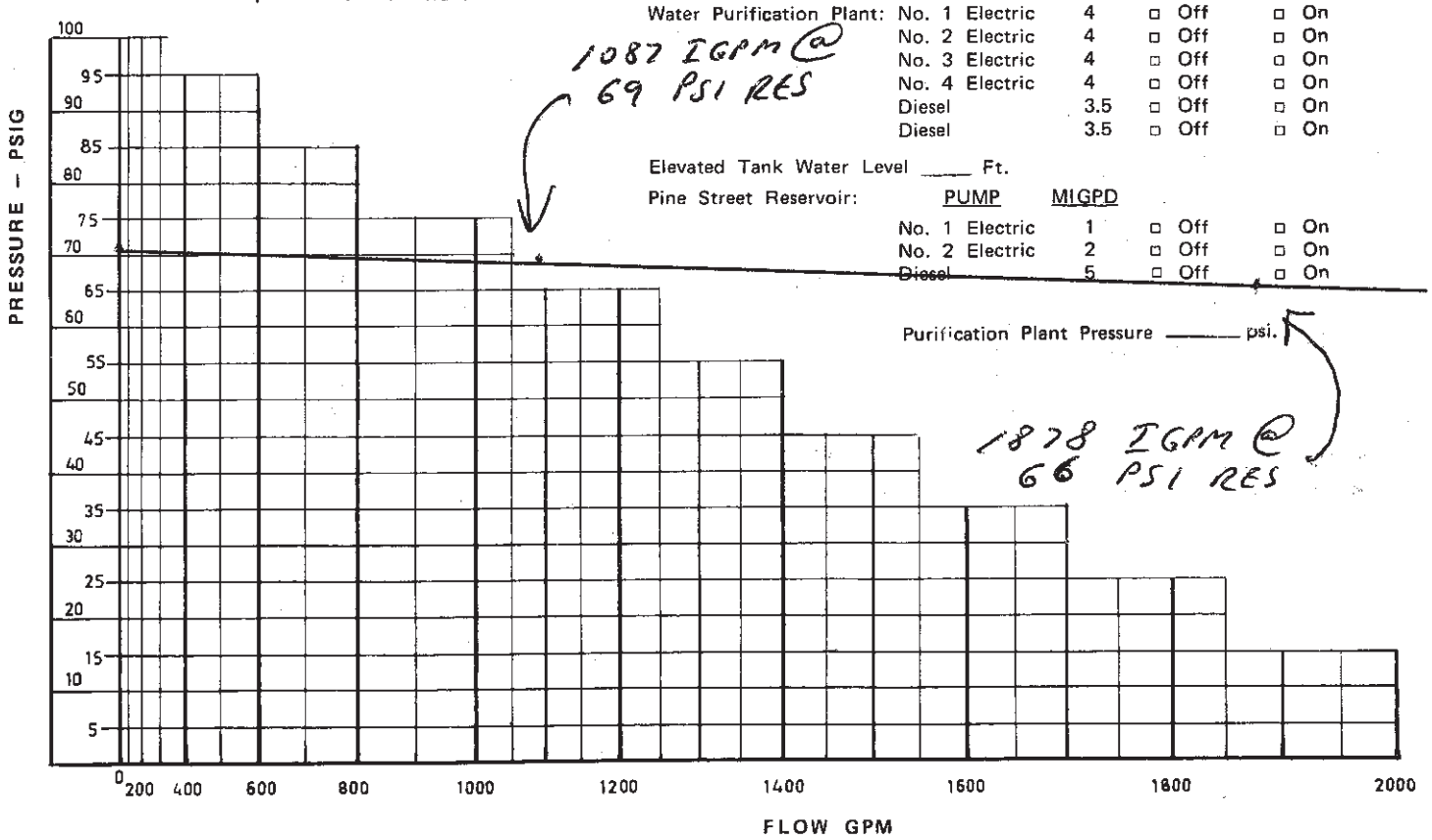
Information below can be obtained at a later date from records at Water Purification Plant.

	PUMP	MIGPD		
Water Purification Plant:	No. 1 Electric	4	☐ Off	☐ On
	No. 2 Electric	4	☐ Off	☐ On
	No. 3 Electric	4	☐ Off	☐ On
	No. 4 Electric	4	☐ Off	☐ On
	Diesel	3.5	☐ Off	☐ On
	Diesel	3.5	☐ Off	☐ On

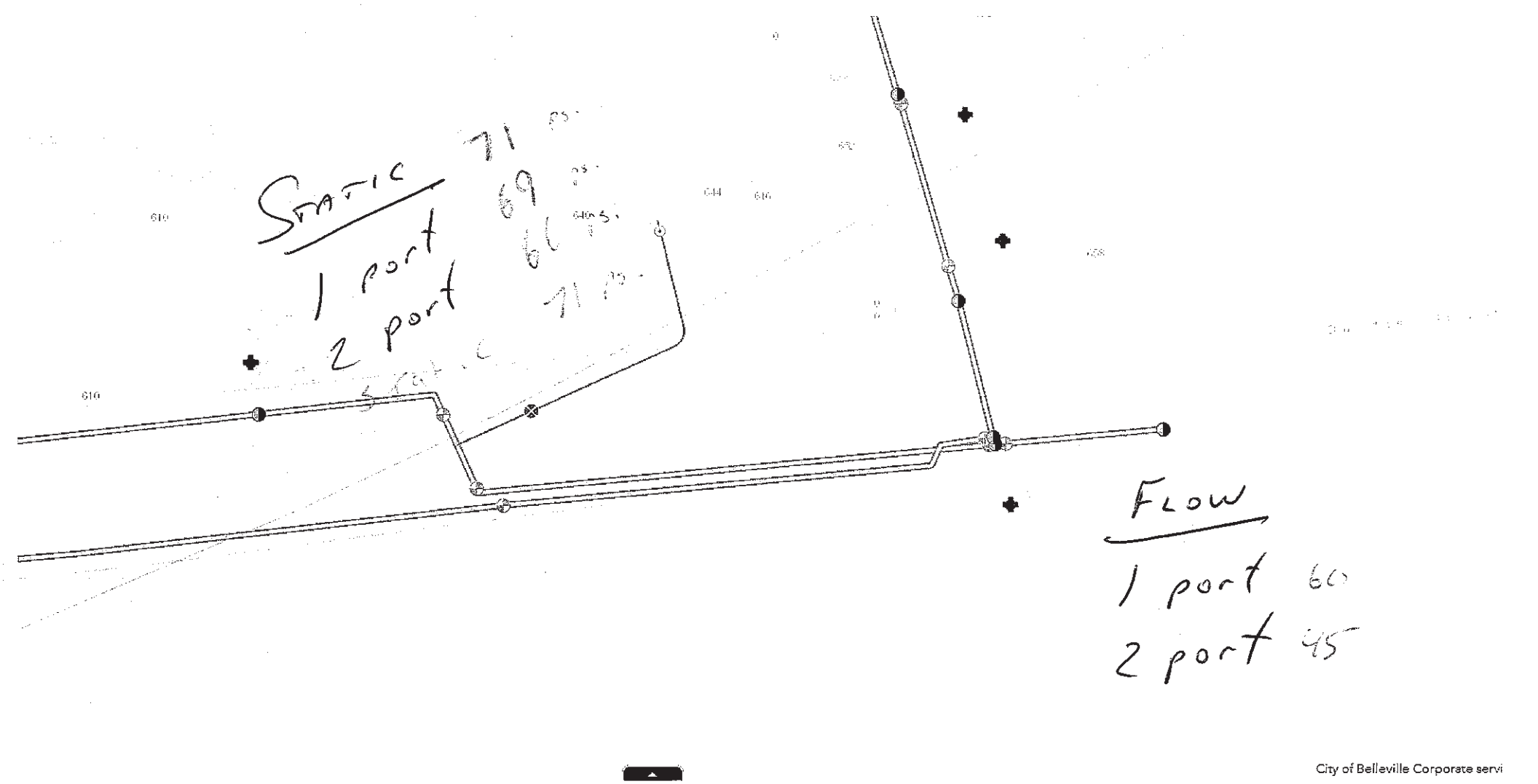
Elevated Tank Water Level ____ Ft.

	PUMP	MIGPD		
Pine Street Reservoir:	No. 1 Electric	1	☐ Off	☐ On
	No. 2 Electric	2	☐ Off	☐ On
	~~Diesel~~	5	☐ Off	☐ On

Purification Plant Pressure _____ psi.



Fm. 109A


Static
1 port
2 port
Flow
1 port
2 port

DOMESTIC WATER DEMAND

621 DUNDAS STREET EAST at Haig Road, Belleville

Number of Detached Lots		7	
Number of Persons / Lot		3	
Number of Vacant Land Condominium Units		29	
Number of Persons / Lot		3	
Number of Bungalofts		72	
Number of Persons / Unit		3	
Number of 2 Sty Townhouses		58	
Number of Persons / Unit		2.5	
Number of Stacked Townhouses		176	
Number of Persons / Unit		2.5	
Number of Stacked Townhouses B/B		72	
Number of Persons / Unit		2.5	
Number of Apartment Units		185	
Number of Persons / Unit		2.5	
Total Number of Units		**599**	
Total Number of Persons		**1551.5**	
Average Consumption	350 l/cap.day	**6.285**	l/s

Peaking Factors (Per Table 3-1)

Local Minimum Hour	0.45	2.828	l/s	1,001 - 2,000 Population
Local Maximum Day	2.50	15.713	l/s	
Local Peak Hour	3.75	23.569	l/s	
Minimum Hour	0.65	4.085	l/s	25,001 - 50,000 Population
Maximum Day	1.8	11.313	l/s	
Peak Hour	2.7	16.970	l/s	

Extended Period Simulation Demand Pattern - Residential

TIME FROM	TIME TO	MULTIPLIER	FLOW		DURATION
12:00 am	1:00 am	0.45	2.828	l/s	1
1:00 am	2:00 am	0.45	2.828	l/s	1
2:00 am	3:00 am	0.45	2.828	l/s	1
3:00 am	4:00 am	0.45	2.828	l/s	1
4:00 am	5:00 am	0.6	3.771	l/s	1
5:00 am	6:00 am	0.6	3.771	l/s	1
6:00 am	7:00 am	2.5	15.713	l/s	1
7:00 am	8:00 am	1	6.285	l/s	1
8:00 am	9:00 am	1	6.285	l/s	1
9:00 am	10:00 am	0.45	2.828	l/s	1
10:00 am	11:00 am	0.45	2.828	l/s	1
11:00 am	12:00 pm	1	6.285	l/s	1
12:00 pm	1:00 pm	1	6.285	l/s	1
1:00 pm	2:00 pm	1	6.285	l/s	1
2:00 pm	3:00 pm	1	6.285	l/s	1
3:00 pm	4:00 pm	0.6	3.771	l/s	1
4:00 pm	5:00 pm	2.5	15.713	l/s	1
5:00 pm	6:00 pm	3.75	23.569	l/s	1
6:00 pm	7:00 pm	1	6.285	l/s	1
7:00 pm	8:00 pm	1	6.285	l/s	1
8:00 pm	9:00 pm	1	6.285	l/s	1
9:00 pm	10:00 pm	0.65	4.085	l/s	1
10:00 pm	11:00 pm	0.65	4.085	l/s	1
11:00 pm	12:00 am	0.45	2.828	l/s	1
					24 hr

FIRE FLOW REQUIRED

621 DUNDAS STREET EAST at Haig Road, Belleville

REQUIRED FIRE FLOW (L/min)

(Per Fire Underwriters Survey)

$$RFF = 220\ C\ A^{1/2}$$

F = the required fire flow in litres per minute

C = Coefficient related to type of construction
- = 1.5 for wood frame construction (stucture essentialy all combustible)
- = 1.0 for ordinary construction (brick or other masonry, combustible floor and interior)
- = 0.8 for non-combustible (unprotected metal structural componets, masonry or metal walls)
- = 0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = the total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building being considered.

	Detached Residential Dwelling Two Storey	Detached Residential Dwelling One Storey	Townhome Block Two Storey	Townhouse Stack Three Storey	Apartment Block Multi Storey
Building Floor Area (A) =	300 m^2 3,200 sf	240 m^2 2,600 sf	540 m^2 5,813 sf	210 m^2 2.260 sf	1,850 m^2 19,910 sf
C =	1.5	1.5	1.5	1.5	0.6
F = $220\ C\ A^{1/2}$					
=	5,716 L/min	5,112 L/min	7,669 L/min	4,782 L/min	5,677 L/min
Rounded to	6,000 L/min	5,000 L/min	8,000 L/min	5,000 L/min	6,000 L/min
Occupancy Consideration					
Low Hazard	-15%				
	-900 L/min	-750 L/min	-1,200 L/min	-750 L/min	-900 L/min
	5,100 L/min	4,250 L/min	6,800 L/min	4,250 L/min	5,100 L/min
Automatic Sprinkler Consideration	0%				30%
	0 L/min				1,530 L/min
Exposure Consideration					
Front - Greater than 30m					0%
Front -10.1 to 20m			14%		
Front -20.1 to 30m	0%	0%		0%	
Side - 3.1 to 10m	32%	30%	32%	16%	
Side - 20.1 to 30m				2%	0%
Rear - 3.1 to 10m				15%	
Rear - 10.1 to 20m			14%		
Rear - Greater than 30m	0%	0%			0%
Shall Not Exceed 75%	32%	30%	60%	33%	0%
	1,920 L/min	1,500 L/min	4,800 L/min	1,650 L/min	0 L/min
F =	7,020 L/min	5,750 L/min	11,600 L/min	5,900 L/min	3,570 L/min
Rounded to	7,000 L/min	6,000 L/min	12,000 L/min	6,000 L/min	4,000 L/min
Standard Hydrant Distribution	13,000 m^2	14,000 m^2	11,000 m^2	14,000 m^2	15,000 m^2
Required Duration of Fire Flow	2.0 hours	2.0 hours	2.5 hours	2.0 hours	1.5 hours
Maximum Revcommended Spacing Between Hydrants (m)	143	150 m	120	150	180
Maximum Distance from Any Point on Street or Road Frontage to a Hydrant (m)	75	75	70	75	90
Minimum Number of Hydrants (total available)	2	1	3	1	1

Junction Table - Maximum Day Demand

ID	Label	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
59	J-9	87.50	0	137.30	487
60	J-10	85.00	0	137.27	512
62	J-11	85.00	0	137.26	512
64	J-12	85.00	0	137.26	512
76	J-14	82.20	0	137.25	539
84	J-18	79.80	0	136.65	556
94	J-23	79.60	69	137.12	563
99	J-25	79.60	63	136.68	559
103	J-26	82.20	0	137.25	539
107	J-27	79.25	73	136.65	562
150	J-39	85.00	0	137.26	512
165	J-41	78.20	33	136.78	573
174	J-42	85.00	0	137.26	512
178	J-44	79.10	0	137.10	568
184	J-45	82.00	188	137.24	541
187	J-46	80.10	64	136.64	553
192	J-49	79.70	73	136.65	557
202	J-53	80.52	67	136.63	549
205	J-54	80.90	214	136.62	545
208	J-55	78.50	46	136.92	572
211	J-56	78.60	53	136.77	569
216	J-57	78.20	7	137.10	576

Pipe Table - Maximum Day Demand

Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Length (User Defined) (m)	Flow (L/min)	Velocity (m/s)	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)	Headloss (m)
P-10	J-9	J-10	297.0	PVC	120.0	119.10	950	0.23	137.30	137.27	0.03
P-11	J-10	J-11	297.0	PVC	120.0	7.00	479	0.12	137.27	137.26	0.00
P-16	H-1	J-42	297.0	PVC	120.0	50.00	0	0.00	137.26	137.26	0.00
P-29	J-23	H-11	204.0	PVC	110.0	89.00	-762	0.39	137.12	137.24	0.11
P-31	J-18	J-25	204.0	PVC	110.0	56.00	-491	0.25	136.65	136.68	0.03
P-34	H-11	J-26	204.0	PVC	110.0	9.00	-762	0.39	137.24	137.25	0.01
P-36	J-26	J-14	250.0	PVC	110.0	8.00	-283	0.10	137.25	137.25	0.00
P-37	J-18	J-27	204.0	PVC	110.0	86.00	146	0.07	136.65	136.65	0.01
P-43	H-5	J-27	204.0	PVC	110.0	77.00	-32	0.02	136.65	136.65	0.00
P-47	J-25	H-7	204.0	PVC	110.0	95.00	-554	0.28	136.68	136.75	0.07
P-53	R-9	PMP-3	1,000.0	PVC	120.0	0.01	950	0.02	87.50	87.50	0.00
P-54	PMP-3	J-9	297.0	PVC	120.0	10.00	950	0.23	137.30	137.30	0.00
P-58	H-13	J-12	204.0	PVC	110.0	2.00	0	0.00	137.26	137.26	0.00
P-59	H-12	H-13	204.0	PVC	110.0	216.00	0	0.00	137.26	137.26	0.00
P-60	H-13	J-39	204.0	PVC	110.0	10.00	0	0.00	137.26	137.26	0.00
P-61	J-14	J-10	250.0	PVC	110.0	92.00	-472	0.16	137.25	137.27	0.02
P-62	J-26	J-11	250.0	PVC	110.0	90.00	-478	0.16	137.25	137.26	0.02
P-63	J-11	J-12	297.0	PVC	120.0	6.30	0	0.00	137.26	137.26	0.00
P-68	J-41	H-8	204.0	PVC	110.0	87.00	-639	0.33	136.78	136.86	0.08
P-69	H-7	J-41	204.0	PVC	110.0	40.00	-554	0.28	136.75	136.78	0.03
P-71	J-23	H-15	204.0	PVC	110.0	235.00	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
P-72	H-15	J-25	204.0	PVC	110.0	120.00	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
P-75	H-9	J-44	204.0	PVC	110.0	27.00	-685	0.35	137.07	137.10	0.03
P-76	J-44	J-23	204.0	PVC	110.0	24.00	-692	0.35	137.10	137.12	0.03
P-77	J-44	H-18	204.0	PVC	110.0	103.00	7	0.00	137.10	137.10	0.00
P-78	J-14	J-45	204.0	PVC	110.0	45.55	188	0.10	137.25	137.24	0.00
P-79	J-45	H-6	204.0	PVC	110.0	55.00	0	0.00	137.24	137.24	0.00
P-80	H-14	J-46	204.0	PVC	110.0	10.00	-281	0.14	136.64	136.64	0.00
P-81	J-46	J-18	204.0	PVC	110.0	30.00	-345	0.18	136.64	136.65	0.01
P-82	H-5	J-49	204.0	PVC	110.0	48.00	32	0.02	136.65	136.65	0.00
P-83	J-49	H-4	204.0	PVC	110.0	32.00	-40	0.02	136.65	136.65	0.00
P-89	J-53	H-14	204.0	PVC	110.0	62.00	-281	0.14	136.63	136.64	0.01
P-90	H-6	J-54	204.0	PVC	110.0	121.00	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
P-91	J-54	J-53	204.0	PVC	110.0	88.14	-214	0.11	136.62	136.63	0.01
P-92	H-8	J-55	204.0	PVC	110.0	75.00	-639	0.33	136.86	136.92	0.07
P-93	J-55	H-9	204.0	PVC	110.0	143.00	-685	0.35	136.92	137.07	0.15
P-95	J-41	H-19	204.0	PVC	110.0	265.00	53	0.03	136.78	136.77	0.00
P-96	H-19	J-56	204.0	PVC	110.0	63.00	53	0.03	136.77	136.77	0.00
P-97	J-57	H-18	204.0	PVC	110.0	32.00	-7	0.00	137.10	137.10	0.00
P-99	J-27	H-4	204.0	PVC	110.0	51.00	40	0.02	136.65	136.65	0.00
P-100	J-12	H-1	295.0	PVC	120.0	37.00	0	0.00	137.26	137.26	0.00

Hydrant Table - Watermain Model Calibration

ONE PORT OPEN

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	134.96	480
H-4	6.10	79.50	(N/A)	(N/A)	(N/A)
H-5	6.10	79.80	(N/A)	(N/A)	(N/A)
H-6	6.10	81.80	(N/A)	(N/A)	(N/A)
H-7	6.10	78.50	(N/A)	(N/A)	(N/A)
H-8	6.10	78.50	(N/A)	(N/A)	(N/A)
H-9	6.10	78.60	(N/A)	(N/A)	(N/A)
H-11	6.10	81.80	(N/A)	(N/A)	(N/A)
H-12	6.10	86.00	0	134.88	478
H-13	6.10	85.77	4,942	133.73	469
H-14	6.10	80.30	(N/A)	(N/A)	(N/A)
H-15	6.10	80.30	(N/A)	(N/A)	(N/A)
H-18	6.10	78.50	(N/A)	(N/A)	(N/A)
H-19	6.10	78.00	(N/A)	(N/A)	(N/A)

HYDRANT FLOW RESULTS

Flow Hydrant (H-13) 1087 igpm (4,942 L/m / 82.35 L/s)

Residual Hydrant (H-12) 69 psi (475 kPa)

TWO PORT OPEN

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	131.75	448
H-4	6.10	79.50	(N/A)	(N/A)	(N/A)
H-5	6.10	79.80	(N/A)	(N/A)	(N/A)
H-6	6.10	81.80	(N/A)	(N/A)	(N/A)
H-7	6.10	78.50	(N/A)	(N/A)	(N/A)
H-8	6.10	78.50	(N/A)	(N/A)	(N/A)
H-9	6.10	78.60	(N/A)	(N/A)	(N/A)
H-11	6.10	81.80	(N/A)	(N/A)	(N/A)
H-12	6.10	86.00	0	131.53	446
H-13	6.10	85.77	8,537	128.25	416
H-14	6.10	80.30	(N/A)	(N/A)	(N/A)
H-15	6.10	80.30	(N/A)	(N/A)	(N/A)
H-18	6.10	78.50	(N/A)	(N/A)	(N/A)
H-19	6.10	78.00	(N/A)	(N/A)	(N/A)

HYDRANT FLOW RESULTS

Flow Hydrant (H-13) 1878 igpm (8,537 L/m / 142.28 L/s)

Residual Hydrant (H-12) 66 psi (455 kPa)

Hydrant Table (H-5) Maximum Day Demand
kPa at 6000 L/min Fire Flow

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	133.35	464
H-4	6.10	79.50	0	115.90	356
H-5	6.10	79.80	6,000	113.27	328
H-6	6.10	81.80	0	128.60	458
H-7	6.10	78.50	0	123.75	443
H-8	6.10	78.50	0	125.59	461
H-9	6.10	78.60	0	128.87	492
H-11	6.10	81.80	0	131.06	482
H-12	6.10	86.00	0	133.35	463
H-13	6.10	85.77	0	133.35	466
H-14	6.10	80.30	0	122.49	413
H-18	6.10	78.50	0	129.28	497
H-19	6.10	78.00	0	124.31	453

Fire Flow at 150 kPa

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	131.07	442
H-4	6.10	79.50	0	100.13	202
H-5	6.10	79.80	8,340	95.23	151
H-6	6.10	81.80	0	122.93	403
H-7	6.10	78.50	0	114.36	351
H-8	6.10	78.50	0	117.62	383
H-9	6.10	78.60	0	123.36	438
H-11	6.10	81.80	0	127.16	444
H-12	6.10	86.00	0	131.07	441
H-13	6.10	85.77	0	131.07	443
H-14	6.10	80.30	0	112.12	311
H-18	6.10	78.50	0	124.08	446
H-19	6.10	78.00	0	115.35	366

Hydrant Table (H-6) Maximum Day Demand
kPa at 7000 L/min Fire Flow

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	132.42	455
H-4	6.10	79.50	0	125.28	448
H-5	6.10	79.80	0	125.28	445
H-6	6.10	81.80	7,000	121.80	391
H-7	6.10	78.50	0	126.20	467
H-8	6.10	78.50	0	127.04	475
H-9	6.10	78.60	0	128.56	489
H-11	6.10	81.80	0	129.60	468
H-12	6.10	86.00	0	132.42	454
H-13	6.10	85.77	0	132.42	457
H-14	6.10	80.30	0	125.09	438
H-18	6.10	78.50	0	128.75	492
H-19	6.10	78.00	0	126.45	474

Fire Flow at 150 kPa

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	126.29	395
H-4	6.10	79.50	0	107.84	277
H-5	6.10	79.80	0	107.84	274
H-6	6.10	81.80	12,420	97.14	150
H-7	6.10	78.50	0	110.31	311
H-8	6.10	78.50	0	112.49	333
H-9	6.10	78.60	0	116.36	370
H-11	6.10	81.80	0	118.93	363
H-12	6.10	86.00	0	126.29	394
H-13	6.10	85.77	0	126.29	397
H-14	6.10	80.30	0	107.27	264
H-18	6.10	78.50	0	116.84	375
H-19	6.10	78.00	0	110.97	323

Hydrant Table (H-14) Maximum Day Demand
kPa at 6000 L/min Fire Flow

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	133.35	464
H-4	6.10	79.50	0	122.39	420
H-5	6.10	79.80	0	122.39	417
H-6	6.10	81.80	0	128.45	457
H-7	6.10	78.50	0	124.31	448
H-8	6.10	78.50	0	126.01	465
H-9	6.10	78.60	0	129.04	494
H-11	6.10	81.80	0	131.07	482
H-12	6.10	86.00	0	133.35	463
H-13	6.10	85.77	0	133.35	466
H-14	6.10	80.30	6,000	121.96	408
H-18	6.10	78.50	0	129.42	498
H-19	6.10	78.00	0	124.82	458

Fire Flow at 150 kPa

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	128.03	412
H-4	6.10	79.50	0	96.98	171
H-5	6.10	79.80	0	96.98	168
H-6	6.10	81.80	0	114.49	320
H-7	6.10	78.50	0	102.63	236
H-8	6.10	78.50	0	107.53	284
H-9	6.10	78.60	0	116.13	367
H-11	6.10	81.80	0	121.79	391
H-12	6.10	86.00	0	128.03	411
H-13	6.10	85.77	0	128.03	414
H-14	6.10	80.30	11,034	95.61	150
H-18	6.10	78.50	0	117.20	379
H-19	6.10	78.00	0	104.14	256

Hydrant Table (H-18) Maximum Day Demand
kPa at 7000 L/min Fire Flow

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	132.42	455
H-4	6.10	79.50	0	126.21	457
H-5	6.10	79.80	0	126.21	454
H-6	6.10	81.80	0	128.67	459
H-7	6.10	78.50	0	125.40	459
H-8	6.10	78.50	0	124.77	453
H-9	6.10	78.60	0	123.77	442
H-11	6.10	81.80	0	129.23	464
H-12	6.10	86.00	0	132.42	454
H-13	6.10	85.77	0	132.42	457
H-14	6.10	80.30	0	126.49	452
H-18	6.10	78.50	7,000	113.53	343
H-19	6.10	78.00	0	125.19	462

Fire Flow at 150 kPa

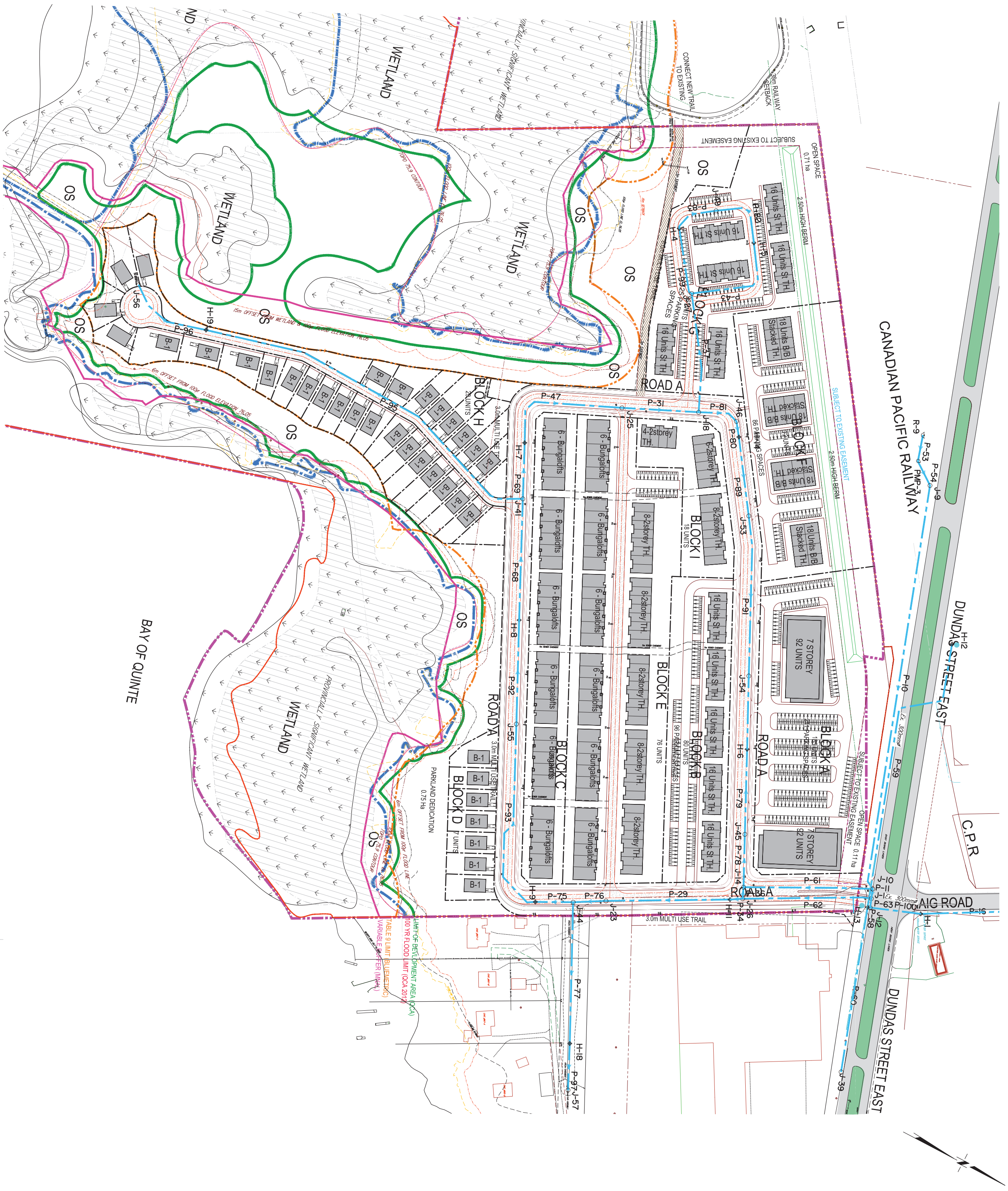
Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	129.33	425
H-4	6.10	79.50	0	118.42	381
H-5	6.10	79.80	0	118.42	378
H-6	6.10	81.80	0	122.74	401
H-7	6.10	78.50	0	116.82	375
H-8	6.10	78.50	0	115.56	363
H-9	6.10	78.60	0	113.49	341
H-11	6.10	81.80	0	123.59	409
H-12	6.10	86.00	0	129.33	424
H-13	6.10	85.77	0	129.33	426
H-14	6.10	80.30	0	118.92	378
H-18	6.10	78.50	9,930	93.83	150
H-19	6.10	78.00	0	116.41	376

Hydrant Table (H-19) Maximum Day Demand
kPa at 6000 L/min Fire Flow

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	133.35	464
H-4	6.10	79.50	0	124.16	437
H-5	6.10	79.80	0	124.16	434
H-6	6.10	81.80	0	129.25	464
H-7	6.10	78.50	0	122.22	428
H-8	6.10	78.50	0	123.49	440
H-9	6.10	78.60	0	128.01	484
H-11	6.10	81.80	0	131.01	482
H-12	6.10	86.00	0	133.35	463
H-13	6.10	85.77	0	133.35	466
H-14	6.10	80.30	0	124.75	435
H-18	6.10	78.50	0	128.57	490
H-19	6.10	78.00	6,000	104.61	260

Fire Flow at 150 kPa

Label	Lateral Length (m)	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (kPa)
H-1	6.10	85.93	0	132.31	454
H-4	6.10	79.50	0	120.15	398
H-5	6.10	79.80	0	120.15	395
H-6	6.10	81.80	0	126.94	442
H-7	6.10	78.50	0	117.47	381
H-8	6.10	78.50	0	119.16	398
H-9	6.10	78.60	0	125.22	456
H-11	6.10	81.80	0	129.24	464
H-12	6.10	86.00	0	132.31	453
H-13	6.10	85.77	0	132.31	455
H-14	6.10	80.30	0	120.95	398
H-18	6.10	78.50	0	125.98	465
H-19	6.10	78.00	7,110	93.38	151


DUNDAS STREET EAST
HAIG ROAD
C.P.R
CANADIAN PACIFIC RAILWAY
BAY OF QUINTE
ROAD A
BLOCK A
BLOCK B
BLOCK C
BLOCK D
BLOCK E
BLOCK F
BLOCK G
BLOCK H
BLOCK I
7 STOREY
92 UNITS
80 UNITS
76 UNITS
18 UNITS
7 UNITS
16 Units St TH.
18 Units B/B Stacked TH.
8-2storey TH.
4-2storey TH.
6 - Bungalofts
B-1
WETLAND
PROVINCIALLY SIGNIFICANT WETLAND
OS
OPEN SPACE 0.11 ha
OPEN SPACE 0.71 ha
SUBJECT TO EXISTING EASEMENT
2.50m HIGH BERM
3.0m MULTI USE TRAIL
PARKLAND DEDICATION 0.75 Ha
CONNECT NEW TRAIL TO EXISTING
30m RAILWAY SETBACK
LIMIT OF DEVELOPMENT AREA (QCA)
100 YR FLOOD LIMIT (QCA 2017)
TABLE 9 LIMIT (BLUETEAC)
VARIABLE BUFFER (MPA)
86 PARKING SPACES
20 PARKING SPACES
P-96
P-95
J-56
H-19

VAN MEER LIMITED
LAND DEVELOPMENT • PROJECT MANAGEMENT • ENGINEERING
83 North Park Street, Belleville, Ont. K8P 2Y6 Tel. 613-969-0171

621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Chk'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

REVISIONS

SCALE: 1:1250
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

REGISTERED PROFESSIONAL ENGINEER
A. H. VANDERMEER
Jan. 18/24
PROVINCE OF ONTARIO

WATERMAIN DESIGN
PIPE NETWORK
DRAWING Dun/621-WI

APPENDIX D

Storm Sewer Design

Storm Sewer Design Sheets – 5-Year Storm Event

Storm Sewer Design Sheets – 100-Year Storm Event

Storm Sewer Design — Drainage Area Plan & Pipe Network — Drawing DUN/621-St1

Storm Sewer Design — Haig Road Sub-catchment — Drawing DUN/621-St2

Ontario IDF Curve Look-up

STORM SEWER DESIGN SHEET

5 Year Storm Event (Q=2.78 AIR, I=26.4t$^{-0.677}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv. 2.78AR	Accum. 2.78AR	Time of Conc. min.	Rainfall Intensity I (mm/hr)	Peak Flow Q_p(l/s)	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85						DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
HAIG ROAD																					
100,101	*CB 8, CB 9*	*ST 5*	*0.44*					*0.547*	*0.547*	*15.00*	*67*	*36.9*	*300*	*1.00%*	*7.4*	*96.7*	*OK*	*0.38*	*0.94*	*1.37*	*1.29*	*0.10*
102 - 105	*ST 5*	*ST 4*	*0.47*					*0.586*	*1.133*	*15.10*	*67*	*76.2*	*375*	*0.35%*	*106.6*	*103.7*	*OK*	*0.73*	*1.09*	*0.94*	*1.02*	*1.74*
106 - 108	*ST 4*	*ST 3*	*0.47*					*0.582*	*1.715*	*16.83*	*62*	*107.1*	*375*	*0.35%*	*86.5*	*103.7*	*OK*	*1.03*	*1.14*	*0.94*	*1.07*	*1.35*
110a	*EXCB*	*MAIN*		*1.38*				*2.303*	*2.303*	*15.00*	*67*	*155.4*	*300*	*0.50%*	*50.0*	*68.4*	*Surch*	*2.27*	*1.14*	*0.97*	*1.10*	*0.76*
109, 110	*ST 3*	*ST 2*	*0.26*					*0.326*	*4.344*	*18.18*	*59*	*257.4*	*525*	*0.60%*	*47.5*	*333.1*	*OK*	*0.77*	*1.10*	*1.54*	*1.69*	*0.47*
112a, 112b	*ST 2*	*ST 1*	*0.28*					*0.345*	*4.689*	*18.64*	*58*	*273.1*	*525*	*0.80%*	*21.6*	*384.7*	*OK*	*0.71*	*1.08*	*1.78*	*1.92*	*0.19*
111 -115	*ST 1*	*Headwall*	*0.98*					*1.224*	*5.913*	*18.83*	*58*	*342.1*	*750*	*0.20%*	*58.4*	*497.9*	*OK*	*0.70*	*1.07*	*1.13*	*1.21*	*0.81*
	ST-A1	ST-A2							*5.913*	19.64	56	332.5	750	1.30%	91.9	1269.3	OK	0.26	0.86	2.87	2.47	0.62
SQU-100																					
101	CB 101	CB 102				0.11		0.210	0.210	15.00	67	14.2	300	0.50%	14.7	68.4	OK	0.21	0.79	0.97	0.76	0.32
102	CB 102	CB 103				0.13		0.245	0.455	15.32	67	30.3	375	1.00%	7.0	175.3	OK	0.17	0.76	1.59	1.21	0.10
103	CB 103	CB/MH 104				0.05		0.098	0.553	15.42	66	36.6	375	4.40%	9.7	367.8	OK	0.10	0.64	3.33	2.13	0.08
BLOCK A (East)		ST-1001				0.81		1.569	1.569	15.00	67	105.9	375	0.55%	14.3	130.0	OK	0.81	1.12	1.18	1.31	0.18
	ST-1001	CB/MH 104						0.000	1.569	15.18	67	105.0	375	0.55%	47.9	130.0	OK	0.81	1.12	1.18	1.31	0.61
104	CB/MH 104	SQU-100				0.09		0.171	2.293	15.79	65	149.4	600	14.10%	5.1	2305.6	OK	0.06	0.57	8.15	4.65	0.02
	SQU-100	ST-A2							2.293	15.81	65	149.3	600	4.00%	6.2	1228.0	OK	0.12	0.69	4.34	3.00	0.03
STREET A																					
	ST-A2	ST-A3							8.206	20.26	55	451.8	750	2.70%	86.4	1829.3	OK	0.25	0.83	4.14	3.44	0.42
SQU-200																					
201	CB 201	CB 202				0.14		0.271	0.271	15.00	67	18.3	300	0.50%	39.1	68.4	OK	0.27	0.86	0.97	0.83	0.78
202	CB 202	CB/MH 205				0.12		0.231	0.502	15.78	65	32.7	375	2.90%	27.8	298.6	OK	0.11	0.65	2.70	1.76	0.26
203	CB 203	CB 204				0.07		0.144	0.144	15.00	67	9.7	300	0.50%	9.0	68.4	OK	0.14	0.72	0.97	0.70	0.22
204		CB 204				0.09		0.178	0.178	15.00	67	12.0	375	1.40%	7.9	207.5	OK	0.06	0.53	1.88	1.00	0.13
205	CB/MH 205	CB/MH 207				0.33		0.634	1.459	16.05	64	94.0	375	1.40%	38.1	207.5	OK	0.45	0.98	1.88	1.83	0.35
206	CB 206	CB/MH 207				0.32		0.619	0.619	15.00	67	41.8	300	0.50%	43.3	68.4	OK	0.61	1.04	0.97	1.01	0.72
207	CB/MH 207	SQU-200				0.15		0.289	2.366	16.39	64	150.3	450	26.60%	3.2	1470.4	OK	0.10	0.65	9.25	6.01	0.01
	SQU-200	ST-A3							2.366	16.40	64	150.3	450	1.10%	6.2	299.0	OK	0.50	1.00	1.88	1.88	0.05

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DATE:December 12, 2023
REV: January 11, 2024

van MEER limited

621 DUNDAS STREET EAST
CITY of BELLEVILLE
2255718 Ontario Inc. - OWNER

STORM SEWER DESIGN SHEET

5 Year Storm Event (Q=2.78 AIR, I=26.4t$^{-0.677}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv.	Accum.	Time of	Rainfall	Peak	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85	2.78AR	2.78AR	Conc. min.	Intensity I (mm/hr)	Flow Q_p(l/s)	DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
STREET A																					
	ST-A3	ST-A4							10.571	20.68	54	574.0	750	1.00%	80.0	1113.3	OK	0.52	1.00	2.52	2.52	0.53
SQU-300																					
301	CB 301	CB 302				0.08		0.148	0.148	15.00	67	10.0	300	0.50%	9.2	68.4	OK	0.15	0.72	0.97	0.70	0.22
302		CB 302				0.10		0.201	0.349	15.22	67	23.3	375	3.20%	7.4	313.6	OK	0.07	0.59	2.84	1.68	0.07
303	CB 303	ST-3001				0.42		0.823	1.172	15.29	67	78.1	375	1.50%	36.5	214.7	OK	0.36	0.92	1.94	1.79	0.34
304	CB 304	CB/MH 305				0.08		0.155	0.155	15.00	67	10.5	300	0.50%	8.8	68.4	OK	0.15	0.73	0.97	0.71	0.21
305	CB/MH 305	ST-3001				0.08		0.154	0.309	15.21	67	20.7	375	0.50%	27.3	124.0	OK	0.17	0.74	1.12	0.83	0.55
306	DCB 306	ST-3001				0.09		0.177	0.177	15.00	67	12.0	375	0.50%	2.1	124.0	OK	0.10	0.64	1.12	0.72	0.05
307		DCB 307				0.12		0.238	0.238	15.00	67	16.1	375	10.00%	4.4	554.4	OK	0.03	0.34	5.02	1.71	0.04
	ST-3001	SQU-300							1.897	15.63	66	124.5	450	6.50%	10.2	726.9	OK	0.17	0.76	4.57	3.47	0.05
	SQU-300	ST-A4							1.897	15.68	65	124.2	450	0.60%	8.0	220.8	OK	0.56	1.02	1.39	1.42	0.09
STREET A																					
	ST-A4	ST-A5							12.468	21.21	53	665.6	750	0.40%	9.8	704.1	OK	0.95	1.14	1.59	1.82	0.09
	ST-A5	OUTLET							12.468	21.21	53	665.6	750	0.40%	44.2	704.1	OK	0.95	1.14	1.59	1.82	0.41

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STORM SEWER DESIGN SHEET

5 Year Storm Event (Q=2.78 AIR, I=26.4t$^{-0.677}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv.	Accum.	Time of	Rainfall	Peak	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85	2.78AR	2.78AR	Conc. min.	Intensity I (mm/hr)	Flow Q_p(l/s)	DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
SQU-400																					
401	CB 401	CB 402				0.09		0.168	0.168	15.00	67	11.3	300	0.50%	9.0	68.4	OK	0.17	0.74	0.97	0.72	0.21
402	CB 402	ST-4001				0.18		0.352	0.519	15.21	67	34.7	375	2.50%	35.6	277.2	OK	0.13	0.69	2.51	1.73	0.34
403	CB 403	CB 404				0.07		0.145	0.145	15.00	67	9.8	300	0.50%	9.1	68.4	OK	0.14	0.72	0.97	0.70	0.22
404	CB 404	ST 4001				0.15		0.298	0.443	15.22	67	29.6	375	0.50%	38.8	124.0	OK	0.24	0.82	1.12	0.92	0.70
BLOCK A (West)		ST-4001				0.68		1.331	1.331	15.00	67	89.9	375	0.50%	13.8	124.0	OK	0.72	1.08	1.12	1.21	0.19
	ST-4001	ST-4002							2.294	15.92	65	148.7	450	1.10%	36.9	299.0	OK	0.50	1.00	1.88	1.87	0.33
405	CB 405	ST-4002				0.20		0.382	0.382	15.00	67	25.8	300	0.50%	14.9	68.4	OK	0.38	0.93	0.97	0.90	0.28
406	CB 406	ST-4002				0.13		0.258	0.258	15.00	67	17.4	300	1.80%	50.2	129.7	OK	0.13	0.71	1.84	1.30	0.64
	ST-4002	CB/MH 407							2.934	16.25	64	187.6	450	0.80%	13.6	255.0	OK	0.74	1.09	1.60	1.75	0.13
407	CB/MH 407	ST-4003				0.27		0.525	3.459	16.38	64	220.0	450	3.90%	28.3	563.0	OK	0.39	0.95	3.54	3.35	0.14
	ST-4003	ST-4004							3.459	16.52	63	218.7	525	0.40%	4.6	272.0	OK	0.80	1.12	1.26	1.40	0.05
408	CB 408	ST-4004				0.22		0.437	0.437	15.00	67	29.5	300	1.00%	32.1	96.7	OK	0.30	0.88	1.37	1.20	0.44
	ST-4004	CB/MH 409							3.896	16.57	63	245.7	525	0.50%	33.7	304.1	OK	0.81	1.12	1.40	1.57	0.36
409	CB/MH 409	ST-4005				0.28		0.540	4.436	16.93	62	275.8	525	0.70%	2.5	359.8	OK	0.77	1.10	1.66	1.83	0.02
	ST-4005	ST-4006							4.436	16.96	62	275.5	525	0.50%	42.5	304.1	OK	0.91	1.14	1.40	1.59	0.44
410	CB 410	CB/MH 411				0.11		0.211	0.211	15.00	67	14.2	300	0.50%	8.8	68.4	OK	0.21	0.79	0.97	0.76	0.19
411	CB/MH 411	ST-4006				0.04		0.086	0.297	15.19	67	19.8	300	0.50%	28.9	68.4	OK	0.29	0.88	0.97	0.85	0.57
	ST-4006	CB/MH 413							4.733	17.40	61	288.8	525	0.50%	16.1	304.1	OK	0.95	1.14	1.40	1.60	0.17
412	CB 412	CB/MH 413				0.22		0.433	0.433	15.00	67	29.2	300	0.50%	8.8	68.4	OK	0.43	0.96	0.97	0.93	0.16
413	CB/MH 413	SQU-400				0.14		0.265	5.431	17.57	61	329.3	750	10.90%	7.7	3675.5	OK	0.09	0.62	8.32	5.16	0.02
	SQU-400	OUTLET							5.431	17.59	61	329.0	750	0.10%	30.0	352.0	OK	0.93	1.14	0.80	0.91	0.55

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5 Year Storm Event (Q=2.78 AIR, I=26.4t$^{-0.677}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv. 2.78AR	Accum. 2.78AR	Time of Conc. min.	Rainfall Intensity I (mm/hr)	Peak Flow Q_p(l/s)	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85						DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
SQU-500																						
BLOCK F (East)		ST-5001				0.63		1.229	1.229	15.00	67	83.0	375	0.50%	14.3	124.0	OK	0.67	1.06	1.12	1.19	0.20
501	CB 501	CB 502				0.07		0.144	0.144	15.00	67	9.7	300	0.50%	9.0	68.4	OK	0.14	0.72	0.97	0.70	0.22
502	CB 502	ST-5001				0.15		0.292	0.435	15.22	67	29.1	300	0.50%	3.3	68.4	OK	0.43	0.96	0.97	0.93	0.06
	ST-5001	CB/MH 505						0.000	1.665	15.27	67	111.0	450	0.35%	36.9	168.7	OK	0.66	1.06	1.06	1.12	0.55
503		CB 503				0.22		0.434	0.434	15.00	67	29.3	300	0.50%	7.6	68.4	OK	0.43	0.96	0.97	0.93	0.14
504		CB 504				0.09		0.165	0.165	15.00	67	11.2	300	0.50%	21.0	68.4	OK	0.16	0.74	0.97	0.72	0.49
505	CB/MH 505	CB/MH 507				0.20		0.385	2.649	15.82	65	172.4	450	0.35%	43.7	168.7	OK	1.02	1.14	1.06	1.21	0.60
506	CB 506	DCB/MH 507				0.15		0.298	0.298	15.00	67	20.1	300	1.00%	33.5	96.7	OK	0.21	0.79	1.37	1.08	0.52
507	DCB/MH 507	CB/MH 508				0.19		0.363	3.310	16.42	63	210.1	450	0.50%	33.7	201.6	OK	1.04	1.14	1.27	1.45	0.39
508	CB/MH 508	ST-5002				0.20		0.386	3.696	16.81	62	230.9	450	2.00%	2.1	403.2	OK	0.57	1.02	2.54	2.59	0.01
	ST-5002	ST-5003							3.696	16.83	62	230.7	450	0.80%	45.0	255.0	OK	0.90	1.14	1.60	1.82	0.41
509	CB 509	CB/MH 510				0.07		0.137	0.137	15.00	67	9.3	300	0.50%	9.2	68.4	OK	0.14	0.71	0.97	0.69	0.22
510	CB/MH 510	ST-5003				0.07		0.143	0.280	15.22	67	18.7	300	0.50%	30.1	68.4	OK	0.27	0.86	0.97	0.83	0.60
	ST-5003	CB/MH 512							3.975	17.24	61	244.2	525	0.35%	14.9	254.4	OK	0.96	1.14	1.18	1.34	0.19
511	CB 511	CB/MH 512				0.11		0.210	0.210	15.00	67	14.2	300	0.50%	9.2	68.4	OK	0.21	0.79	0.97	0.76	0.20
512	CB/MH 512	DCB/MH 514				0.06		0.125	4.310	17.42	61	262.8	525	0.35%	33.8	254.4	OK	1.03	1.14	1.18	1.34	0.42
513	CB 513	DCB/MH 514				0.16		0.316	0.316	15.00	67	21.3	375	0.50%	8.9	124.0	OK	0.17	0.76	1.12	0.85	0.17
514	DCB/MH 514	SQU-500				0.07		0.129	4.755	17.84	60	285.3	750	9.80%	9.4	3485.1	OK	0.08	0.62	7.89	4.89	0.03
	SQU-500	OUTLET							4.755	17.88	60	285.0	750	0.10%	14.6	352.0	OK	0.81	1.12	0.80	0.89	0.27

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HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv. 2.78AR	Accum. 2.78AR	Time of Conc. min.	Rainfall Intensity I (mm/hr)	Peak Flow Q_p(l/s)	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85						DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf	Vp	TIME of FLOW (min)
SQU-600																						
BLOCK F (West)		CB/MH 602				0.47		0.906	0.906	15.00	67	61.1	375	0.60%	22.6	135.8	OK	0.45	0.98	1.23	1.20	0.31
601	CB 601	CB/MH 602				0.13		0.249	0.249	15.00	67	16.8	300	0.50%	8.8	68.4	OK	0.25	0.83	0.97	0.80	0.18
602	CB/MH 602	CB/MH 605				0.10		0.197	1.351	15.31	67	89.9	375	0.50%	60.7	124.0	OK	0.73	1.09	1.12	1.22	0.83
603	CB 603	CB 604				0.08		0.156	0.156	15.00	67	10.5	300	0.50%	6.5	68.4	OK	0.15	0.73	0.97	0.71	0.15
604	CB 604	CB/MH 605				0.12		0.224	0.380	15.15	67	25.5	375	0.50%	8.9	124.0	OK	0.21	0.79	1.12	0.89	0.17
606		CB 606				0.17		0.336	0.336	15.00	67	22.7	300	0.50%	15.3	68.4	OK	0.33	0.90	0.97	0.87	0.29
605	CB/MH 605	CB/MH 608				0.08		0.149	2.217	16.14	64	142.4	375	1.10%	66.7	183.9	OK	0.77	1.10	1.66	1.83	0.61
607	CB 607	CB/MH 608				0.09		0.166	0.166	15.00	67	11.2	300	0.50%	9.5	68.4	OK	0.16	0.74	0.97	0.72	0.22
608	CB/MH 608	SQU-600				0.07		0.129	2.512	16.75	63	157.3	600	12.10%	5.9	2135.8	OK	0.07	0.59	7.55	4.46	0.02
	SQU-600	OUTLET							2.512	16.77	63	157.2	600	0.30%	10.0	336.3	OK	0.47	0.98	1.19	1.17	0.14

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5 Year Storm Event (Q=2.78 AIR, I=26.4t$^{-0.677}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv.	Accum.	Time of	Rainfall	Peak	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85	2.78AR	2.78AR	Conc. min.	Intensity I (mm/hr)	Flow Q_p(l/s)	DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
SQU-700																					
701	CB 701	CB/MH 702				0.18		0.343	0.343	15.00	67	23.2	300	0.50%	31.3	68.4	OK	0.34	0.90	0.97	0.87	0.60
702	CB 702	CB/MH 703				0.07		0.135	0.135	15.00	67	9.1	300	0.50%	17.5	68.4	OK	0.13	0.71	0.97	0.69	0.42
703	CB/MH 703	ST-7001				0.14		0.278	0.756	15.60	66	49.7	300	0.50%	23.2	68.4	OK	0.73	1.09	0.97	1.05	0.37
704	CB 704	ST-7001				0.18		0.348	0.348	15.00	67	23.5	300	0.50%	35.4	68.4	OK	0.34	0.91	0.97	0.88	0.67
	ST-7001	CB/MH 706						0.000	1.103	15.97	65	71.4	375	0.50%	30.3	124.0	OK	0.58	1.03	1.12	1.16	0.44
705	CB 705	CB/MH 706				0.11		0.205	0.205	15.00	67	13.8	300	0.50%	13.6	68.4	OK	0.20	0.79	0.97	0.76	0.30
706	CB/MH 706	SQU-700				0.12		0.226	1.534	16.40	64	97.4	450	2.10%	24.0	413.2	OK	0.24	0.82	2.60	2.13	0.19
707	CB 707	CB/MH 708				0.10		0.188	0.188	15.00	67	12.7	300	0.50%	43.8	68.4	OK	0.19	0.77	0.97	0.74	0.99
708	CB/MH 708	SQU-700				0.10		0.198	0.387	15.99	65	25.0	450	3.40%	14.7	525.7	OK	0.05	0.50	3.31	1.65	0.15
SQU-700		SQU-700							1.921	16.40	64	122.0									
	SQU-700	OUTLET							1.921	16.59	63	121.1	450	0.20%	24.4	127.5	OK	0.95	1.14	0.80	0.91	0.44
SOUTH DRIVEWAY																					
801	CB 801	CB 802				0.29		0.570	0.570	15.00	67	38.5	300	0.50%	26.2	68.4	OK	0.56	1.02	0.97	0.99	0.44
802	CB 802	CB/MH 805				0.08		0.160	0.730	15.44	66	48.3	300	0.50%	33.8	68.4	OK	0.71	1.08	0.97	1.04	0.54
803	CB 803	CB 804				0.30		0.585	0.585	15.00	67	39.5	300	0.50%	52.6	68.4	OK	0.58	1.03	0.97	1.00	0.88
804	CB 804	CB/MH 805				0.10		0.191	0.776	15.88	65	50.4	300	0.50%	32.2	68.4	OK	0.74	1.09	0.97	1.05	0.51
805	CB/MH 805	OUTLET				0.16		0.307	1.813	16.39	64	115.3	375	0.45%	14.8	117.6	OK	0.98	1.14	1.06	1.21	0.20

PROPOSED INFORMATION — Shown in VERTICAL TEXT
EXISTING INFORMATION — *Shown in ITALISIZED TEXT*

PREPARED BY: SDS

DATE:December 12, 2023
REV: January 11, 2024

van MEER limited

621 DUNDAS STREET EAST
CITY of BELLEVILLE
2255718 Ontario Inc. - OWNER

STORM SEWER DESIGN SHEET

100 Year Storm Event (Q=2.78 AIR, I=45.6t$^{-0.699}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv. 2.78AR	Accum. 2.78AR	Time of Conc. min.	Rainfall Intensity I (mm/hr)	Peak Flow Q_p(l/s)	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85						DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp (m/s)	TIME of FLOW (min)
HAIG ROAD																					
100,101	*CB 8, CB 9*	*ST 5*	*0.44*					*0.684*	*0.684*	*15.00*	*120*	*82.2*	*300*	*1.00%*	*7.4*	*96.7*	*OK*	*0.85*	*1.13*	*1.37*	*1.54*	*0.08*
102 - 105	*ST 5*	*ST 4*	*0.47*					*0.733*	*1.417*	*15.08*	*120*	*169.6*	*375*	*0.35%*	*106.6*	*103.7*	*Surch*	*1.64*	*1.14*	*0.94*	*1.07*	*1.66*
106 - 108	*ST 4*	*ST 3*	*0.47*					*0.727*	*2.144*	*16.74*	*111*	*238.6*	*375*	*0.35%*	*86.5*	*103.7*	*Surch*	*2.30*	*1.14*	*0.94*	*1.07*	*1.35*
110a	*EXCB*	*MAIN*		*1.38*				*2.878*	*2.878*	*15.00*	*120*	*345.9*	*300*	*0.50%*	*50.0*	*68.4*	*Surch*	*5.06*	*1.14*	*0.97*	*1.10*	*0.76*
109, 110	*ST 3*	*ST 2*	*0.26*					*0.408*	*5.430*	*18.09*	*105*	*572.6*	*525*	*0.60%*	*47.5*	*333.1*	*Surch*	*1.72*	*1.14*	*1.54*	*1.75*	*0.45*
112a, 112b	*ST 2*	*ST 1*	*0.28*					*0.431*	*5.862*	*18.54*	*104*	*607.5*	*525*	*0.80%*	*21.6*	*384.7*	*Surch*	*1.58*	*1.14*	*1.78*	*2.03*	*0.18*
111 -115	*ST 1*	*Headwall*	*0.98*					*1.530*	*7.391*	*18.71*	*103*	*760.9*	*750*	*0.20%*	*58.4*	*497.9*	*Surch*	*1.54*	*1.14*	*1.13*	*1.28*	*0.76*
	ST-A1	ST-A2							*7.391*	19.47	100	740.1	750	1.30%	91.9	1269.3	OK	0.58	1.03	2.87	2.96	0.52
SQU-100																					
101	CB 101	CB 102				0.11		0.281	0.281	15.00	120	33.8	300	0.50%	14.7	68.4	OK	0.49	1.00	0.97	0.96	0.25
102	CB 102	CB 103				0.13		0.328	0.609	15.25	119	72.3	375	1.00%	7.0	175.3	OK	0.41	0.96	1.59	1.52	0.08
103	CB 103	CB/MH 104				0.05		0.131	0.740	15.33	118	87.6	375	4.40%	9.7	367.8	OK	0.24	0.82	3.33	2.73	0.06
BLOCK A (East)		ST-1001				0.81		2.102	2.102	15.00	120	252.6	375	0.55%	14.3	130.0	Surch	1.94	1.14	1.18	1.34	0.18
	ST-1001	CB/MH 104						0.000	2.102	15.18	119	250.5	375	0.55%	47.9	130.0	Surch	1.93	1.14	1.18	1.34	0.59
104	CB/MH 104	SQU-100				0.09		0.229	3.070	15.77	116	356.3	600	14.10%	5.1	2305.6	OK	0.15	0.73	8.15	5.95	0.01
	SQU-100	ST-A2							3.070	15.79	116	356.0	600	4.00%	6.2	1228.0	OK	0.29	0.87	4.34	3.78	0.03
STREET A																					
	ST-A2	ST-A3							10.462	19.99	98	1028.6	750	2.70%	86.4	1829.3	OK	0.56	1.02	4.14	4.22	0.34
SQU-200																					
201	CB 201	CB 202				0.14		0.363	0.363	15.00	120	43.6	300	0.50%	39.1	68.4	OK	0.64	1.05	0.97	1.02	0.64
202	CB 202	CB/MH 205				0.12		0.310	0.672	15.64	117	78.4	375	2.90%	27.8	298.6	OK	0.26	0.86	2.70	2.32	0.20
203	CB 203	CB 204				0.07		0.193	0.193	15.00	120	23.2	300	0.50%	9.0	68.4	OK	0.34	0.90	0.97	0.87	0.17
204		CB 204				0.09		0.239	0.239	15.00	120	28.7	375	1.40%	7.9	207.5	OK	0.14	0.71	1.88	1.33	0.10
205	CB/MH 205	CB/MH 207				0.33		0.849	1.953	15.84	116	226.0	375	1.40%	38.1	207.5	Surch	1.09	1.14	1.88	2.14	0.30
206	CB 206	CB/MH 207				0.32		0.829	0.829	15.00	120	99.6	300	0.50%	43.3	68.4	Surch	1.46	1.14	0.97	1.10	0.65
207	CB/MH 207	SQU-200				0.15		0.387	3.169	16.14	114	361.8	450	26.60%	3.2	1470.4	OK	0.25	0.83	9.25	7.67	0.01
	SQU-200	ST-A3							3.169	16.14	114	361.7	450	1.10%	6.2	299.0	Surch	1.21	1.14	1.88	2.14	0.05

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621 DUNDAS STREET EAST
CITY of BELLEVILLE
2255718 Ontario Inc. - OWNER

STORM SEWER DESIGN SHEET

100 Year Storm Event (Q=2.78 AIR, I=45.6t$^{-0.699}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv.	Accum.	Time of	Rainfall	Peak	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85	2.78AR	2.78AR	Conc. min.	Intensity I (mm/hr)	Flow Q_p(l/s)	DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
STREET A																					
	ST-A3	ST-A4							13.630	20.33	97	1324.3	750	1.00%	80.0	1113.3	Surch	1.19	1.14	2.52	2.87	0.46
SQU-300																					
301	CB 301	CB 302				0.08		0.198	0.198	15.00	120	23.8	300	0.50%	9.2	68.4	OK	0.35	0.91	0.97	0.88	0.17
302		CB 302				0.10		0.269	0.467	15.17	119	55.6	375	3.20%	7.4	313.6	OK	0.18	0.76	2.84	2.16	0.06
303	CB 303	ST-3001				0.42		1.103	1.569	15.23	119	186.6	375	1.50%	36.5	214.7	OK	0.87	1.13	1.94	2.19	0.28
304	CB 304	CB/MH 305				0.08		0.208	0.208	15.00	120	25.0	300	0.50%	8.8	68.4	OK	0.37	0.92	0.97	0.89	0.16
305	CB/MH 305	ST-3001				0.08		0.206	0.414	15.16	119	49.4	375	0.50%	27.3	124.0	OK	0.40	0.95	1.12	1.06	0.43
306	DCB 306	ST-3001				0.09		0.238	0.238	15.00	120	28.6	375	0.50%	2.1	124.0	OK	0.23	0.82	1.12	0.92	0.04
307		DCB 307				0.12		0.319	0.319	15.00	120	38.3	375	10.00%	4.4	554.4	OK	0.07	0.57	5.02	2.86	0.03
	ST-3001	SQU-300							2.541	15.51	117	298.3	450	6.50%	10.2	726.9	OK	0.41	0.96	4.57	4.36	0.04
	SQU-300	ST-A4							2.541	15.55	117	297.7	450	0.60%	8.0	220.8	Surch	1.35	1.14	1.39	1.58	0.08
STREET A																					
	ST-A4	ST-A5							16.171	20.79	96	1546.6	750	0.40%	9.8	704.1	Surch	2.20	1.14	1.59	1.82	0.09
	ST-A5	OUTLET							16.171	20.79	96	1546.6	750	0.40%	44.2	704.1	Surch	2.20	1.14	1.59	1.82	0.41

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STORM SEWER DESIGN SHEET

100 Year Storm Event (Q=2.78 AIR, I=45.6t$^{-0.699}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv. 2.78AR	Accum. 2.78AR	Time of Conc. min.	Rainfall Intensity I (mm/hr)	Peak Flow Q_p(l/s)	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85						DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp (m/s)	TIME of FLOW (min)
SQU-400																					
401	CB 401	CB 402				0.09		0.224	0.224	15.00	120	27.0	300	0.50%	9.0	68.4	OK	0.39	0.95	0.97	0.91	0.16
402	CB 402	ST-4001				0.18		0.471	0.695	15.16	119	82.9	375	2.50%	35.6	277.2	OK	0.30	0.88	2.51	2.20	0.27
403	CB 403	CB 404				0.07		0.194	0.194	15.00	120	23.3	300	0.50%	9.1	68.4	OK	0.34	0.91	0.97	0.88	0.17
404	CB 404	ST 4001				0.15		0.400	0.593	15.17	119	70.7	375	0.50%	38.8	124.0	OK	0.57	1.02	1.12	1.14	0.56
BLOCK A (West)		ST-4001				0.68		1.783	1.783	15.00	120	214.3	375	0.50%	13.8	124.0	Surch	1.73	1.14	1.12	1.28	0.18
	ST-4001	ST-4002							3.072	15.74	116	357.0	450	1.10%	36.9	299.0	Surch	1.19	1.14	1.88	2.14	0.29
405	CB 405	ST-4002				0.20		0.512	0.512	15.00	120	61.5	300	0.50%	14.9	68.4	OK	0.90	1.13	0.97	1.09	0.23
406	CB 406	ST-4002				0.13		0.346	0.346	15.00	120	41.6	300	1.80%	50.2	129.7	OK	0.32	0.89	1.84	1.63	0.51
	ST-4002	CB/MH 407							3.930	16.02	115	450.9	450	0.80%	13.6	255.0	Surch	1.77	1.14	1.60	1.83	0.12
407	CB/MH 407	ST-4003				0.27		0.703	4.633	16.15	114	528.8	450	3.90%	28.3	563.0	OK	0.94	1.14	3.54	4.04	0.12
	ST-4003	ST-4004							4.633	16.26	114	526.1	525	0.40%	4.6	272.0	Surch	1.93	1.14	1.26	1.43	0.05
408	CB 408	ST-4004				0.22		0.585	0.585	15.00	120	70.3	300	1.00%	32.1	96.7	OK	0.73	1.09	1.37	1.49	0.36
	ST-4004	CB/MH 409							5.218	16.32	113	591.2	525	0.50%	33.7	304.1	Surch	1.94	1.14	1.40	1.60	0.35
409	CB/MH 409	ST-4005				0.28		0.723	5.941	16.67	112	663.2	525	0.70%	2.5	359.8	Surch	1.84	1.14	1.66	1.89	0.02
	ST-4005	ST-4006							5.941	16.69	112	662.6	525	0.50%	42.5	304.1	Surch	2.18	1.14	1.40	1.60	0.44
410	CB 410	CB/MH 411				0.11		0.282	0.282	15.00	120	33.9	300	0.50%	8.8	68.4	OK	0.50	1.00	0.97	0.96	0.15
411	CB/MH 411	ST-4006				0.04		0.115	0.397	15.15	119	47.4	300	0.50%	28.9	68.4	OK	0.69	1.07	0.97	1.04	0.47
	ST-4006	CB/MH 413							6.338	17.13	110	694.1	525	0.50%	16.1	304.1	Surch	2.28	1.14	1.40	1.60	0.17
412	CB 412	CB/MH 413				0.22		0.579	0.579	15.00	120	69.6	300	0.50%	8.8	68.4	OK	1.02	1.14	0.97	1.10	0.13
413	CB/MH 413	SQU-400				0.14		0.355	7.273	17.30	109	791.0	750	10.90%	7.7	3675.5	OK	0.22	0.80	8.32	6.66	0.02
	SQU-400	OUTLET							7.273	17.32	109	790.4	750	0.10%	30.0	352.0	Surch	2.25	1.14	0.80	0.91	0.55

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STORM SEWER DESIGN SHEET

100 Year Storm Event (Q=2.78 AIR, I=45.6t$^{-0.699}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv. 2.78AR	Accum. 2.78AR	Time of Conc. min.	Rainfall Intensity I (mm/hr)	Peak Flow Q_p(l/s)	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85						DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
SQU-500																						
BLOCK F (East)		ST-5001				0.63		1.646	1.646	15.00	120	197.8	375	0.50%	14.3	124.0	Surch	1.60	1.14	1.12	1.28	0.19
501	CB 501	CB 502				0.07		0.192	0.192	15.00	120	23.1	300	0.50%	9.0	68.4	OK	0.34	0.90	0.97	0.87	0.17
502	CB 502	ST-5001				0.15		0.391	0.583	15.17	119	69.5	300	0.50%	3.3	68.4	OK	1.02	1.14	0.97	1.10	0.05
	ST-5001	CB/MH 505						0.000	2.229	15.22	119	265.2	450	0.35%	36.9	168.7	Surch	1.57	1.14	1.06	1.21	0.51
503		CB 503				0.22		0.581	0.581	15.00	120	69.8	300	0.50%	7.6	68.4	OK	1.02	1.14	0.97	1.10	0.11
504		CB 504				0.09		0.222	0.222	15.00	120	26.6	300	0.50%	21.0	68.4	OK	0.39	0.94	0.97	0.91	0.38
505	CB/MH 505	CB/MH 507				0.20		0.516	3.548	15.73	116	412.4	450	0.35%	43.7	168.7	Surch	2.44	1.14	1.06	1.21	0.60
506	CB 506	DCB/MH 507				0.15		0.400	0.400	15.00	120	48.0	300	1.00%	33.5	96.7	OK	0.50	1.00	1.37	1.36	0.41
507	DCB/MH 507	CB/MH 508				0.19		0.486	4.433	16.33	113	501.9	450	0.50%	33.7	201.6	Surch	2.49	1.14	1.27	1.45	0.39
508	CB/MH 508	ST-5002				0.20		0.517	4.950	16.72	111	551.3	450	2.00%	2.1	403.2	Surch	1.37	1.14	2.54	2.89	0.01
	ST-5002	ST-5003							4.950	16.73	111	551.0	450	0.80%	45.0	255.0	Surch	2.16	1.14	1.60	1.83	0.41
509	CB 509	CB/MH 510				0.07		0.184	0.184	15.00	120	22.1	300	0.50%	9.2	68.4	OK	0.32	0.89	0.97	0.86	0.18
510	CB/MH 510	ST-5003				0.07		0.191	0.375	15.18	119	44.7	300	0.50%	30.1	68.4	OK	0.65	1.06	0.97	1.03	0.49
	ST-5003	CB/MH 512							5.324	17.14	109	582.8	525	0.35%	14.9	254.4	Surch	2.29	1.14	1.18	1.34	0.19
511	CB 511	CB/MH 512				0.11		0.281	0.281	15.00	120	33.8	300	0.50%	9.2	68.4	OK	0.49	1.00	0.97	0.96	0.16
512	CB/MH 512	DCB/MH 514				0.06		0.167	5.773	17.33	109	627.2	525	0.35%	33.8	254.4	Surch	2.46	1.14	1.18	1.34	0.42
513	CB 513	DCB/MH 514				0.16		0.423	0.423	15.00	120	50.8	375	0.50%	8.9	124.0	OK	0.41	0.95	1.12	1.07	0.14
514	DCB/MH 514	SQU-500				0.07		0.173	6.369	17.75	107	680.4	750	9.80%	9.4	3485.1	OK	0.20	0.78	7.89	6.15	0.03
	SQU-500	OUTLET							6.369	17.77	107	679.7	750	0.10%	14.6	352.0	Surch	1.93	1.14	0.80	0.91	0.27

PREPARED BY: SDS

DATE:December 12, 2023
REV: January 11, 2024

van MEER limited

621 DUNDAS STREET EAST
CITY of BELLEVILLE
2255718 Ontario Inc. - OWNER

STORM SEWER DESIGN SHEET

100 Year Storm Event (Q=2.78 AIR, I=45.6t$^{-0.699}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv. 2.78AR	Accum. 2.78AR	Time of Conc. min.	Rainfall Intensity I (mm/hr)	Peak Flow Q_p(l/s)	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85						DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
SQU-600																						
BLOCK F (West)		CB/MH 602				0.47		1.213	1.213	15.00	120	145.8	375	0.60%	22.6	135.8	Surch	1.07	1.14	1.23	1.40	0.27
601	CB 601	CB/MH 602				0.13		0.333	0.333	15.00	120	40.0	300	0.50%	8.8	68.4	OK	0.58	1.03	0.97	1.00	0.15
602	CB/MH 602	CB/MH 605				0.10		0.263	1.810	15.27	119	214.8	375	0.50%	60.7	124.0	Surch	1.73	1.14	1.12	1.28	0.79
603	CB 603	CB 604				0.08		0.209	0.209	15.00	120	25.1	300	0.50%	6.5	68.4	OK	0.37	0.92	0.97	0.89	0.12
604	CB 604	CB/MH 605				0.12		0.300	0.509	15.12	119	60.8	375	0.50%	8.9	124.0	OK	0.49	1.00	1.12	1.12	0.13
606		CB 606				0.17		0.450	0.450	15.00	120	54.1	300	0.50%	15.3	68.4	OK	0.79	1.11	0.97	1.07	0.24
605	CB/MH 605	CB/MH 608				0.08		0.200	2.969	16.06	115	340.2	375	1.10%	66.7	183.9	Surch	1.85	1.14	1.66	1.90	0.59
607	CB 607	CB/MH 608				0.09		0.222	0.222	15.00	120	26.7	300	0.50%	9.5	68.4	OK	0.39	0.95	0.97	0.91	0.17
608	CB/MH 608	SQU-600				0.07		0.173	3.364	16.64	112	375.9	600	12.10%	5.9	2135.8	OK	0.18	0.76	7.55	5.74	0.02
	SQU-600	OUTLET							3.364	16.66	112	375.6	600	0.30%	10.0	336.3	Surch	1.12	1.14	1.19	1.36	0.12

PREPARED BY: SDS

DATE:December 12, 2023
REV: January 11, 2024

van MEER limited

621 DUNDAS STREET EAST
CITY of BELLEVILLE
2255718 Ontario Inc. - OWNER

STORM SEWER DESIGN SHEET

100 Year Storm Event (Q=2.78 AIR, I=45.6t$^{-0.699}$)

EXTERNAL DRAINAGE AREAS
HAIG ROAD
INTERNAL AREAS

LOCATION			AREAS (ha)					Indiv. 2.78AR	Accum. 2.78AR	Time of Conc. min.	Rainfall Intensity I (mm/hr)	Peak Flow Q_p(l/s)	SEWER DATA								
STREET	FROM	TO	R=0.45	R=0.60	R=0.65	R=0.7	R=0.85						DIA. (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (Q_f) (l/s) n= 0.013		Qp/Qf	Vp/Vf	Vf (m/s)	Vp	TIME of FLOW (min)
SQU-700																					
701	CB 701	CB/MH 702				0.18		0.459	0.459	15.00	120	55.2	300	0.50%	31.3	68.4	OK	0.81	1.12	0.97	1.08	0.48
702	CB 702	CB/MH 703				0.07		0.181	0.181	15.00	120	21.7	300	0.50%	17.5	68.4	OK	0.32	0.89	0.97	0.86	0.34
703	CB/MH 703	ST-7001				0.14		0.372	1.012	15.48	118	118.9	300	0.50%	23.2	68.4	Surch	1.74	1.14	0.97	1.10	0.35
704	CB 704	ST-7001				0.18		0.466	0.466	15.00	120	56.0	300	0.50%	35.4	68.4	OK	0.82	1.12	0.97	1.08	0.55
	ST-7001	CB/MH 706						0.000	1.478	15.83	116	171.0	375	0.50%	30.3	124.0	Surch	1.38	1.14	1.12	1.28	0.39
705	CB 705	CB/MH 706				0.11		0.274	0.274	15.00	120	32.9	300	0.50%	13.6	68.4	OK	0.48	0.99	0.97	0.96	0.24
706	CB/MH 706	SQU-700				0.12		0.302	2.054	16.23	114	233.6	450	2.10%	24.0	413.2	OK	0.57	1.02	2.60	2.65	0.15
707	CB 707	CB/MH 708				0.10		0.252	0.252	15.00	120	30.3	300	0.50%	43.8	68.4	OK	0.44	0.97	0.97	0.94	0.78
708	CB/MH 708	SQU-700				0.10		0.266	0.518	15.78	116	60.1	450	3.40%	14.7	525.7	OK	0.11	0.67	3.31	2.21	0.11
SQU-700		SQU-700							2.572	16.23	114	292.6									
	SQU-700	OUTLET							2.572	16.38	113	290.7	450	0.20%	24.4	127.5	Surch	2.28	1.14	0.80	0.91	0.44
SOUTH DRIVEWAY																					
801	CB 801	CB 802				0.29		0.763	0.763	15.00	120	91.7	300	0.50%	26.2	68.4	Surch	1.34	1.14	0.97	1.10	0.40
802	CB 802	CB/MH 805				0.08		0.215	0.978	15.40	118	115.4	300	0.50%	33.8	68.4	Surch	1.69	1.14	0.97	1.10	0.51
803	CB 803	CB 804				0.30		0.783	0.783	15.00	120	94.1	300	0.50%	52.6	68.4	Surch	1.38	1.14	0.97	1.10	0.79
804	CB 804	CB/MH 805				0.10		0.256	1.039	15.79	116	120.5	300	0.50%	32.2	68.4	Surch	1.76	1.14	0.97	1.10	0.49
805	CB/MH 805	OUTLET				0.16		0.412	2.429	16.28	113	275.6	375	0.45%	14.8	117.6	Surch	2.34	1.14	1.06	1.21	0.20
						0.9319															

PROPOSED INFORMATION — Shown in VERTICAL TEXT
EXISTING INFORMATION — *Shown in ITALISIZED TEXT*

PREPARED BY: SDS

DATE:December 12, 2023
REV: January 11, 2024

van MEER limited

621 DUNDAS STREET EAST
CITY of BELLEVILLE
2255718 Ontario Inc. - OWNER

Date	Description	By	Chk'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

REVISIONS

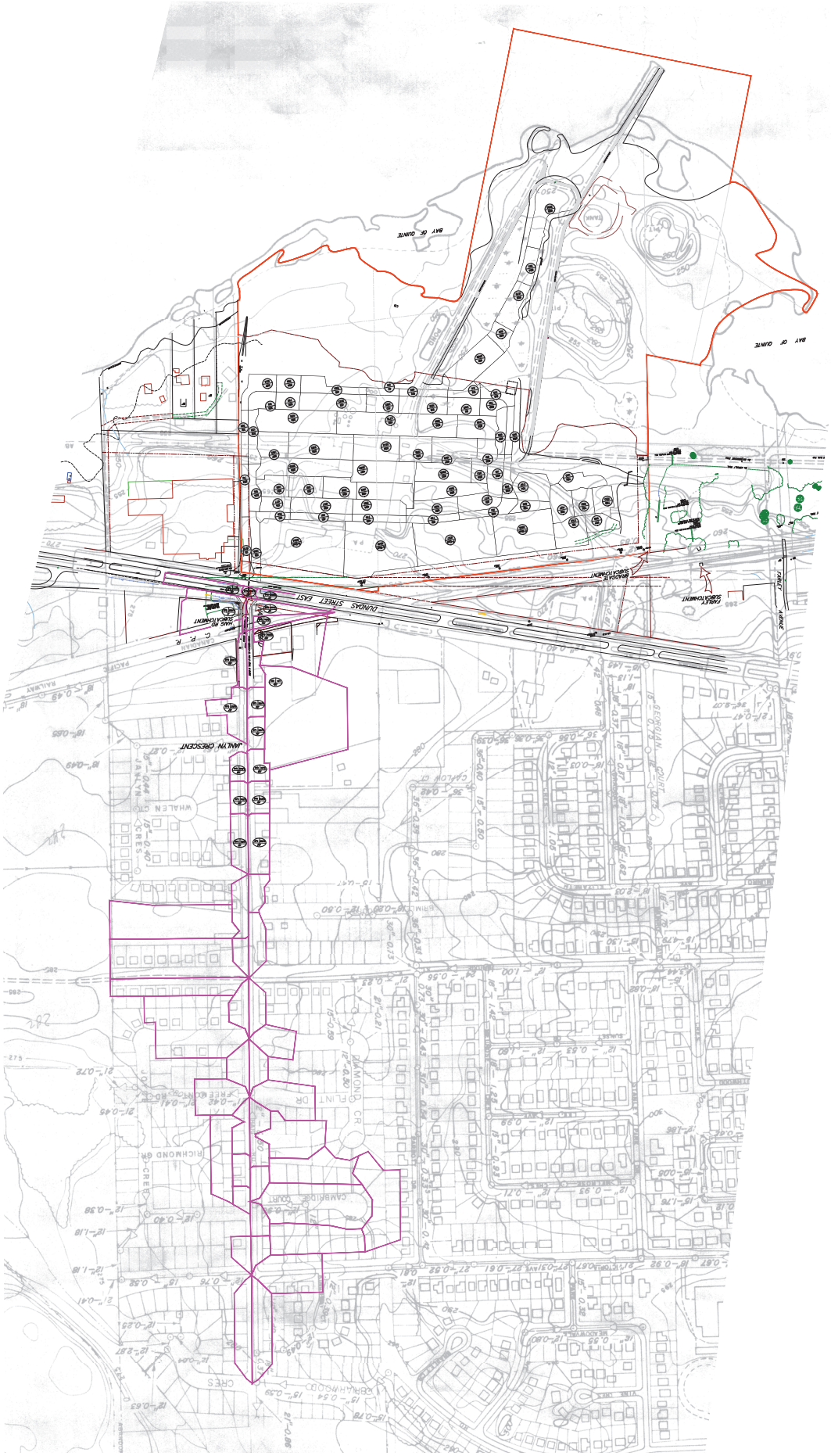
621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

SCALE: 1:1250
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

REGISTERED PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

STORM SEWER DESIGN
DRAINAGE AREA PLAN & PIPE NETWORK
DRAWING Dun/621-St1

DRAWING: 621 Dundas St_24-01-08.dwg



621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Chk'd
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

REVISIONS

SCALE: 1:2500
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

Jan. 18/24

STORM SEWER DESIGN
HAIG ROAD SUB-CATCHMENT
DRAWING Dun/621-St2

DRAWING: 621 Dundas St_24-01-08.dwg

Ontario IDF CURVE LOOKUP

Active coordinate

44° 9' 45" N, 77° 23' 15" W (44.162500,-77.387500)

Retrieved: Wed, 13 Dec 2023 16:28:41 GMT

Location summary

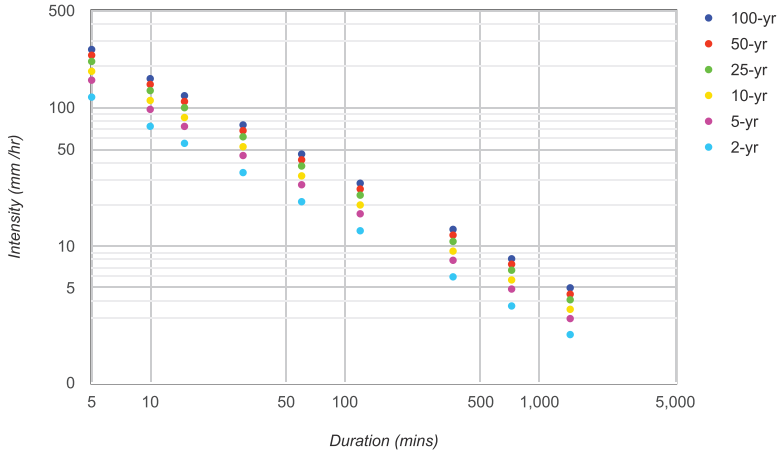
These are the locations in the selection.

IDF Curve: 44° 9' 45" N, 77° 23' 15" W (44.162500,-77.387500)

Results

An IDF curve was found.

Coordinate: 44.162500, -77.387500
IDF curve year: 2010



Coefficient summary

IDF Curve: 44° 9' 45" N, 77° 23' 15" W (44.162500,-77.387500)

Retrieved: Wed, 13 Dec 2023 16:28:41 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	20.9	27.7	32.1	37.8	41.9	46.1
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	118.7	73.1	55.1	33.9	20.9	12.9	6.0	3.7	2.3
5-yr	157.3	96.9	73.0	45.0	27.7	17.1	7.9	4.9	3.0
10-yr	182.3	112.3	84.6	52.1	32.1	19.8	9.2	5.7	3.5
25-yr	214.7	132.3	99.6	61.4	37.8	23.3	10.8	6.7	4.1
50-yr	238.0	146.6	110.4	68.0	41.9	25.8	12.0	7.4	4.5
100-yr	261.8	161.3	121.5	74.8	46.1	28.4	13.2	8.1	5.0

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	9.9	12.2	13.8	17.0	20.9	25.7	35.8	44.2	54.4
5-yr	13.1	16.2	18.2	22.5	27.7	34.1	47.5	58.5	72.1
10-yr	15.2	18.7	21.1	26.1	32.1	39.5	55.0	67.8	83.6
25-yr	17.9	22.0	24.9	30.7	37.8	46.6	64.8	79.9	98.4
50-yr	19.8	24.4	27.6	34.0	41.9	51.6	71.9	88.5	109.1
100-yr	21.8	26.9	30.4	37.4	46.1	56.8	79.1	97.4	120.0

APPENDIX E

Stormwater Management – Design

Storm Sewer Design — Drawing DUN/621-St3

Pre-development Overland Flow Route 100yr Storm Event

Storm Sewer Design — Drawing DUN/621-St4

Post-development Overland Flow Route 100yr Storm Event

Storm Sewer Design — Drawing DUN/621-SWM1

Stormwater Management Areas

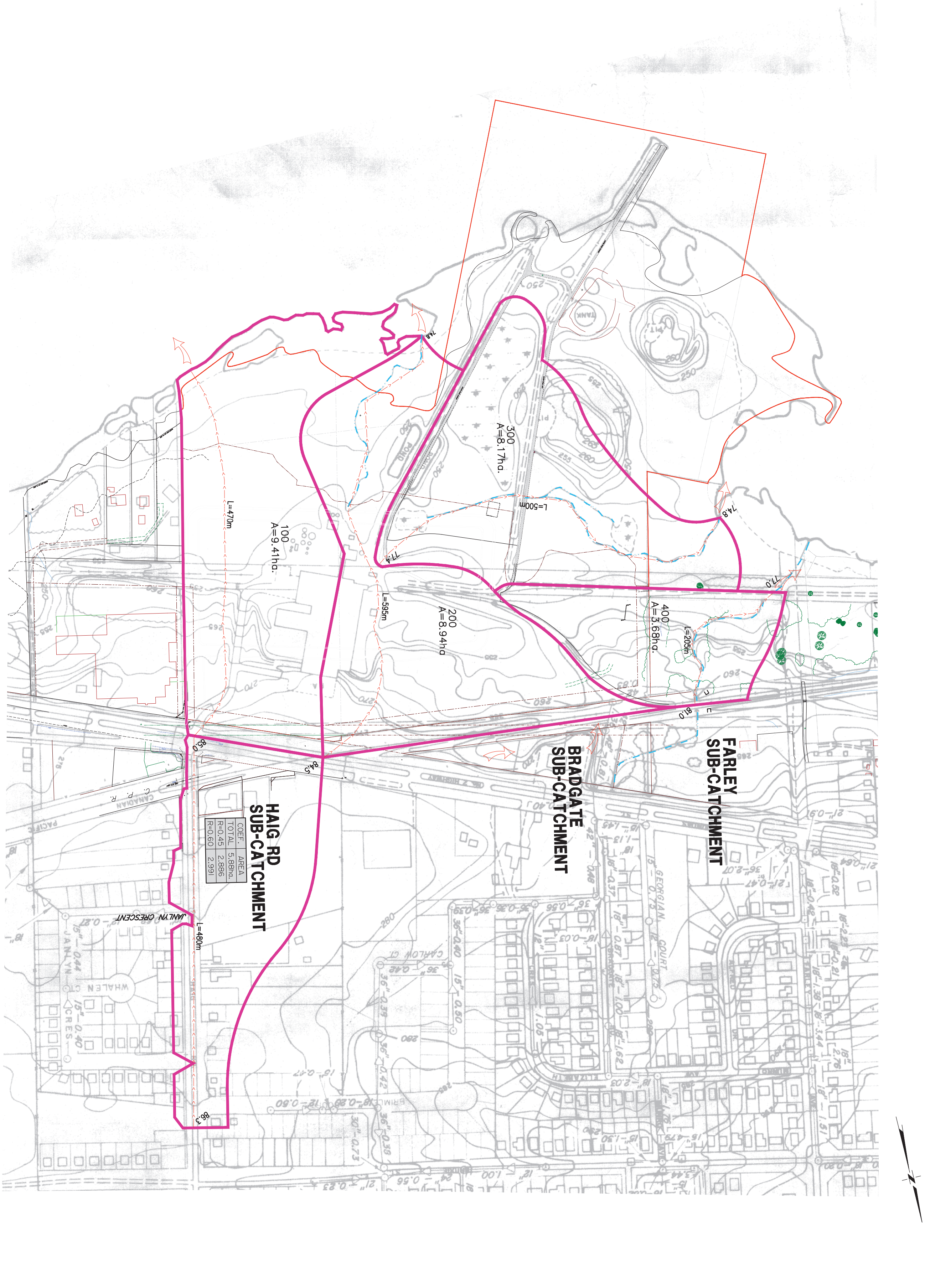
Storm Sewer Design Sheets – Imperviousness and Tc / Flow Calculations

MOE Quality Event Calculations

Summary of TSS Removal of Quality Treatment Units (Downstream Defender)

Hydro International Downstream Defender Sizing

Hydro International Downstream Defender Operation & Maintenance Manual



COEF.	AREA
TOTAL	5.88ha.
R=0.45	2.886
R=0.60	2.991

VAN MEER LIMITED
LAND DEVELOPMENT • PROJECT MANAGEMENT • ENGINEERING
83 North Park Street, Belleville, Ont. K8P 2Y6 Tel. 613-969-0171

621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Chk'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

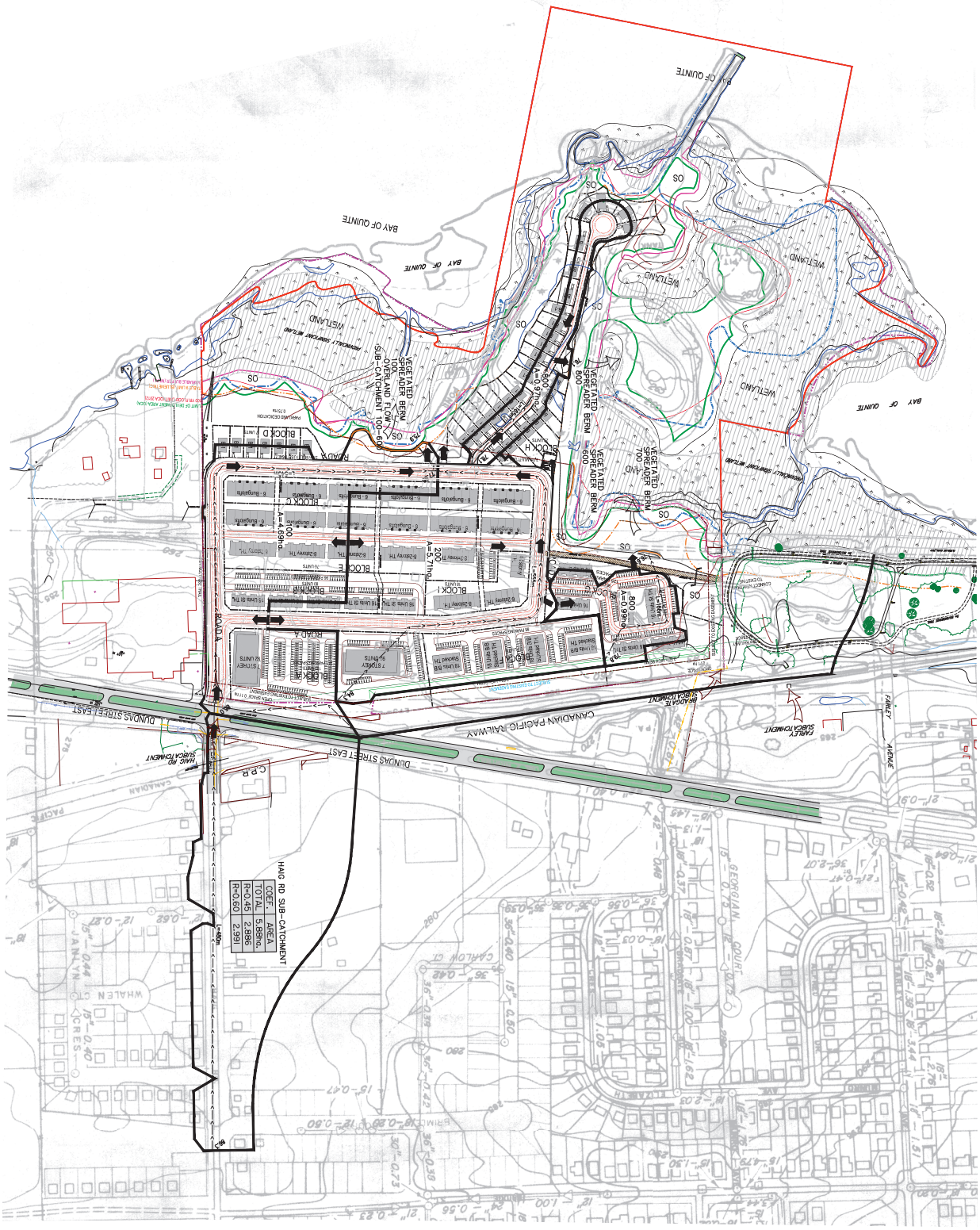
REVISIONS

SCALE: 1:2000
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

REGISTERED PROFESSIONAL ENGINEER
A. H. VANDERMEER
Jan. 18/24
PROVINCE OF ONTARIO

STORM SEWER DESIGN
PRE-DEVELOPMENT OVERLAND
FLOW ROUTE 100yr STORM EVENT
DRAWING Dun/621-St3

DRAWING: 621 Dundas St_24-01-08.dwg



VAN MEER LIMITED
LAND DEVELOPMENT • PROJECT MANAGEMENT • ENGINEERING
83 North Park Street, Belleville, Ont. K8P 2Y6 Tel. 613-969-0171

621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Ck'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

REVISIONS

SCALE: 1:2000
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER: \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

A. H. VROEMEN — Jan. 18/24

STORM SEWER DESIGN
POST-DEVELOPMENT OVERLAND
FLOW ROUTE 100yr STORM EVENT
DRAWING Dun/621-St4

DRAWING: 621 Dundas St_24-01-08.dwg

621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE
STORM SEWER DESIGN
STORMWATER MANAGEMENT AREAS
DRAWING Dun/621-SWM1
REVISIONS
DUNDAS STREET EAST
HAIG ROAD
CANADIAN PACIFIC RAILWAY
BAY OF QUINTE
SQU-100
A=11803
2400mmø
SQU-200
A=12158
1800mmø
SQU-300
A=9748
2400mmø
SQU-400
A=27906
3000mmø
SQU-500
A=24437
3000mmø
SQU-600
A=12907
2400mmø
SQU-700
A=9899
1800mmø
SWMF 800
A=9713
SPREADER BERM
BLOCK D
BLOCK H
ROAD A
PARKLAND DEDICATION
0.75 Ha
WETLAND
OS
OPEN SPACE
0.71 ha
SUBJECT TO EXISTING EASEMENT
LIMIT OF DEVELOPMENT AREA (QCA)
100 YR FLOOD LIMIT (QCA 2017)
CONNECT NEW TRAIL TO EXISTING

STORM SEWER DESIGN SHEET
IMPERVIOUSNESS CALCULATIONS

Post Development Conditions						
			Impervious		Runoff	
Area #		Area m^2	Value	Cummulative	Coefficient	Cummulative
SQU-100						
	Grass	2,596.8	0	0.00	0.2	0.04
	Gravel	0.0	1	0.00	0.9	0.00
	Building	1,838.0	1	0.16	0.9	0.14
	Dwy / SW	4,975.2	1	0.42	0.9	0.38
	Road / SW	2,393.0	1	0.20	0.9	0.18
	Subtotal	11,803.0		**0.78**		**0.75**
SQU-200						
	Grass	4,541.9	0	0.00	0.2	0.07
	Gravel	0.0	1	0.00	0.9	0.00
	Building	3,219.8	1	0.26	0.9	0.24
	Dwy / SW	3,529.7	1	0.29	0.9	0.26
	Road / SW	866.6	1	0.07	0.9	0.06
	Subtotal	12,158.0		**0.63**		**0.64**
SQU-300						
	Grass	4,444.1	0	0.00	0.2	0.09
	Gravel	0.0	1	0.00	0.9	0.00
	Building	2,501.9	1	0.63	0.9	0.23
	Dwy / SW	343.2	1	0.04	0.9	0.03
	Road / SW	2,458.8	1	0.25	0.9	0.23
	Subtotal	9,748.0		**0.92**		**0.58**

PREPARED BY: SDS

DATE: MARCH 1, 2023.
REV: January 11, 2024

621 DUNDAS STREET EAST
CITY OF BELLEVILLE
2255718 Ontario Inc. - OWNER

van MEER limited

STORM SEWER DESIGN SHEET
IMPERVIOUSNESS CALCULATIONS

Post Development Conditions						
			Impervious		Runoff	
Area #		Area m^2	Value	Cummulative	Coefficient	Cummulative
SQU-400						
	Grass	9,661.6	0	0.00	0.2	0.07
	Gravel	0.0	1	0.00	0.9	0.00
	Building	7,733.6	1	0.28	0.9	0.25
	Dwy / SW	6,450.0	1	0.23	0.9	0.21
	Road / SW	4,060.8	1	0.15	0.9	0.13
	Subtotal	27,906.0		**0.65**		**0.66**
SQU-500						
	Grass	7,409.7	0	0.00	0.2	0.06
	Gravel	0.0	1	0.00	0.9	0.00
	Building	6,776.7	1	0.28	0.9	0.25
	Dwy / SW	7,005.3	1	0.29	0.9	0.26
	Road / SW	3,245.3	1	0.13	0.9	0.12
	Subtotal	24,437.0		**0.70**		**0.69**
SQU-600						
	Grass	4,028.8	0	0.00	0.2	0.06
	Gravel	0.0	1	0.00	0.9	0.00
	Building	3,694.7	1	0.29	0.9	0.26
	Dwy / SW	2,387.2	1	0.18	0.9	0.17
	Road / SW	2,796.3	1	0.22	0.9	0.19
	Subtotal	12,907.0		**0.69**		**0.68**
SQU-700						
	Grass	2,764.8	0	0.00	0.2	0.06
	Gravel	0.0	1	0.00	0.9	0.00
	Building	2,188.8	1	0.22	0.9	0.20
	Dwy / SW	4,916.4	1	0.50	0.9	0.45
	Road / SW	0.0	1	0.00	0.9	0.00
	Subtotal	9,870.0		**0.72**		**0.70**
Area 800						
	Grass	4,255.4	0	0.00	0.2	0.09
	Gravel	0.0	1	0.00	0.9	0.00
	Building	2,099.3	1	0.22	0.9	0.19
	Dwy / SW	3,358.3	1	0.35	0.9	0.31
	Road / SW	0.0	1	0.00	0.9	0.00
	Subtotal	9,713.0		**0.56**		**0.59**

STORM SEWER DESIGN SHEET

T_c / FLOW CALCULATIONS

Subcatchment - Haig Rd, Series 100-600

5yr Storm Event

Runoff Coefficient (R)	0.638	0.45	0.6	0.7
Area (A)	16.336	2.886	2.991	10.460
RA	10.415	1.299	1.794	7.322

Bransby-Williams Formula

(C values of 0.4 or greater)

$Elev_H$ =	86.30
$Elev_L$ =	77.85
A (ha)=	16.336
C =	0.638
L =	1020
S_w =	0.83%
T_c =	45.66
I =	32
Q_p =	919.66

100yr Storm Event

Runoff Coefficient (R)	0.797	0.45	0.6	0.7
Area (A)	16.336	2.886	2.991	10.460
RA	13.019	1.623	2.243	9.153

Bransby-Williams Formula

(C values of 0.4 or greater)

$Elev_H$ =	86.30
$Elev_L$ =	77.85
A (ha)=	16.336
C =	0.797
L =	1020
S_w =	0.83%
T_c =	45.66
I =	52
Q_p =	1872.93

Subcatchment - 700

5yr Storm Event

Runoff Coefficient (R)	0.700	0.45	0.6	0.7
Area (A)	0.990			0.990
RA	0.693	0.000	0.000	0.693

Bransby-Williams Formula

(C values of 0.4 or greater)

$Elev_H$ =	79.80
$Elev_L$ =	76.60
A (ha)=	0.990
C =	0.700
L =	166
S_w =	1.93%
T_c =	8.31
I =	101
Q_p =	193.96

100yr Storm Event

Runoff Coefficient (R)	0.875	0.45	0.6	0.7
Area (A)	0.990	0.000	0.000	0.990
RA	0.866	0.000	0.000	0.866

Bransby-Williams Formula

(C values of 0.4 or greater)

$Elev_H$ =	79.80
$Elev_L$ =	76.60
A (ha)=	0.990
C =	0.875
L =	166
S_w =	1.93%
T_c =	8.31
I =	164
Q_p =	395.67

Subcatchment - 800

5yr Storm Event

Runoff Coefficient (R)	0.700	0.45	0.6	0.7
Area (A)	0.971			0.971
RA	0.680	0.000	0.000	0.680

Bransby-Williams Formula

(C values of 0.4 or greater)

$Elev_H$ =	78.10
$Elev_L$ =	76.10
A (ha)=	0.971
C =	0.700
L =	165
S_w =	1.21%
T_c =	9.08
I =	95
Q_p =	179.23

100yr Storm Event

Runoff Coefficient (R)	0.875	0.45	0.6	0.7
Area (A)	0.971	0.000	0.000	0.971
RA	0.850	0.000	0.000	0.850

Bransby-Williams Formula

(C values of 0.4 or greater)

$Elev_H$ =	78.10
$Elev_L$ =	76.10
A (ha)=	0.971
C =	0.875
L =	165
S_w =	1.21%
T_c =	9.08
I =	155
Q_p =	365.59

STORM SEWER DESIGN
MOE QUALITY EVENT CALCULATIONS

$$Q = \frac{CiA}{360}$$

Equation 4.8: Rational Method

where Q = peak flow rate (m^3/s)
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = drainage area (ha)

$$i = 43C + 5.9$$

Equation 4.9: 25 mm Storm Intensity

where I = rainfall intensity mm/hr)
C = runoff coefficient

	AREA	C	i	Q (L/s)
SQU-100	1.18	0.78	39.4	100.9
SQU-200	1.22	0.63	33.0	70.2
SQU-300	0.97	0.92	45.5	113.2
SQU-400	2.79	0.65	33.9	170.6
SQU 500	2.44	0.70	36.0	171.1
SQU-600	1.29	0.69	35.6	88.0
SQU-700	0.99	0.72	36.9	73.0
AREA-800	0.97	0.56	30.0	45.3

STORM SEWER DESIGN

SUMMARY of TSS REMOVAL of QUALITY TREATMENT UNITS (Downstream Defender)

	TREATMENT UNIT SPECIFICATIONS									
SQU No	DIA	PEAK FLOW	SEDIMENT STORAGE	OIL STORAGE	AREA	QUALITY		5 YEAR		NET ANNUAL
						FLOW	TSS Removal	FLOW	TSS Removal	
			m^3	litres	hectares	L/s	%	L/s	%	%
100	2400	425	3.56	2,044	1.18	100.9	87.3%	149.4	77.7%	99.0%
200	1800	227.0	1.61	818	1.22	70.2	82.8%	150.3	45.3%	98.0%
300	2400	425.0	3.56	2044	0.97	113.2	85.1%	124.5	82.9%	99.0%
400	3000	708.0	6.65	3,975	2.79	170.6	85.7%	329.3	62.0%	99.0%
500	3000	798.0	6.65	3,975	2.41	171.1	85.7%	285.3	69.5%	99.0%
600	2400	425.0	3.56	2,044	1.29	88.0	89.6%	157.3	75.9%	99.0%
700	1800	227.0	1.61	818	0.99	73.0	81.8%	122.0	60.6%	98.0%
					10.85		85.60%			
	Subcatchment 800 (LID)				0.97		50.0%			
TOTAL					11.82		82.68%			

PREPARED BY: SDS

DATE: December 12, 2023
REV: January 11, 2024

van MEER limited

621 DUNDAS STREET EAST
CITY OF BELLEVILLE
2255718 Ontario Inc. - OWNER

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-100	
TSS Goal:	80	% Removal
TSS Particle Size:	50 µm	
Water Quality Flow:	100.9	L/s
Peak Storm Flow:	149.4	L/s
Peak Storm Return:	25mm	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	70.6%
DD8	**87.3%**
DD10	93.2%
DD12	95.9%

Performance Statement:

The Hydro International stormwater treatment system, model DD8, achieves the water quality objective of 87.3% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 100.9 L/s.

Model Specification:

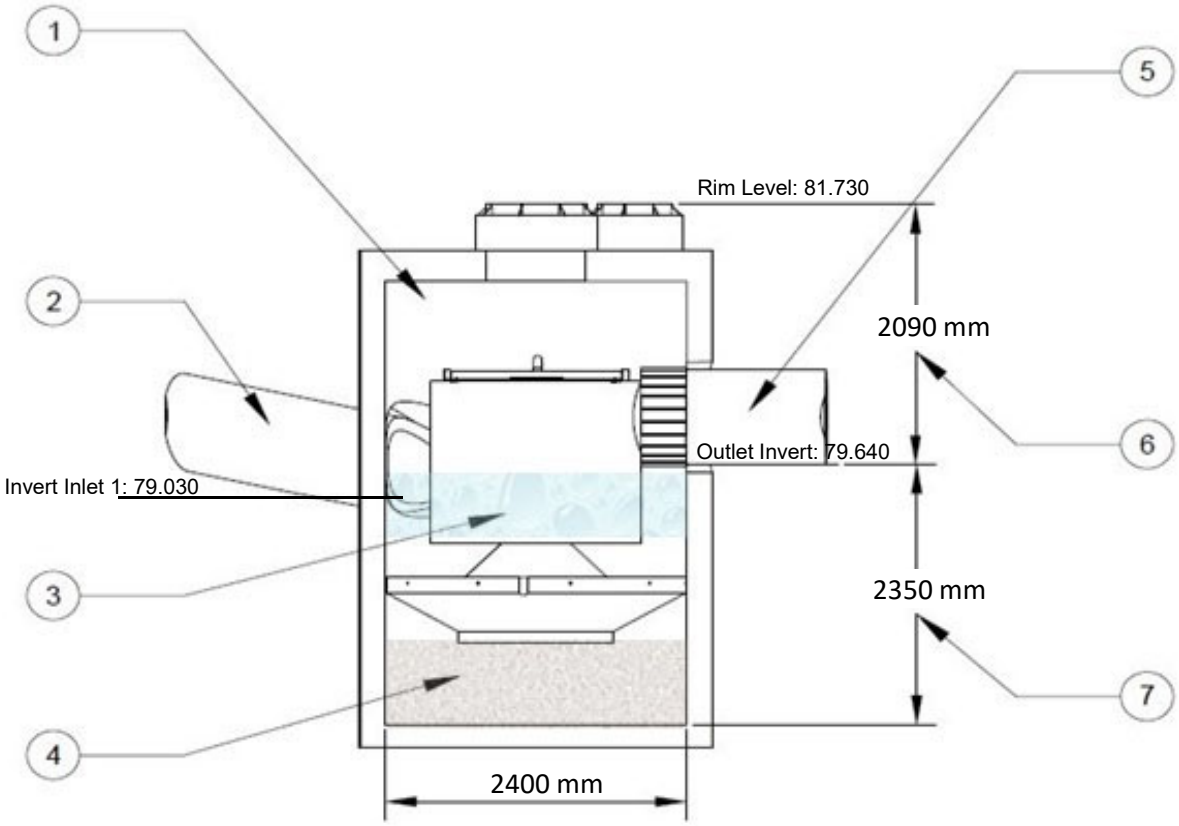
			Checks
Selected Model:	**DD8**		*OK*
Diameter:	2400	mm	
Design WQ Flow:	100.90	L/s	
Peak Flow Capacity:	425.00	L/s	*OK*
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	600	mm	*OK*
Inlet Pipe 1 Size:	600	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	81.730	m	Calc Invs.
Outlet Pipe Invert:	79.640	m	*OK*
Invert Pipe 1:	79.030	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®



DD8 Specification

1	Vortex Chamber Diameter	2400	mm
2	Inlet Pipe Diameter	600	mm
3	Oil Storage Capacity	2044.00	L
4	Min. Provided Sediment Storage Capacity	3.56	m^3
5	Outlet Pipe Diameter	600	mm
6	Height (Final Grade to Outlet Invert)	2090	mm
7	Sump Depth(Outlet Invert to Sump)	2350	mm
	Total Depth	**4440**	**mm**

All drawing elevations are metres.

Designer Notes:

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-100	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	149.4	L/s
Peak Storm Flow:	149.4	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	45.8%
DD8	**77.7%**
DD10	88.2%
DD12	93.0%

Performance Statement:

The Hydro International stormwater treatment system, model DD8, achieves the water quality objective of 77.7% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 149.4 L/s.

Model Specification:

			Checks
Selected Model:	**DD8**		*Selected model does not meet TSS goal.*
Diameter:	2400	mm	
Design WQ Flow:	149.40	L/s	
Peak Flow Capacity:	425.00	L/s	*OK*
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	600	mm	*OK*
Inlet Pipe 1 Size:	600	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	81.730	m	Calc Invs.
Outlet Pipe Invert:	79.640	m	*OK*
Invert Pipe 1:	79.030	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®

Net Annual Water Quality Worksheet

Rev. 12.5

Hydro International

Project Name:	**Bakelite Property**	*Report Date:*	**2023-11-07**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.**

Paste

Treatment Parameters

Structure ID:	SQU-100	
TSS Goal:	80	% Removal
TSS Particle Size:	50	um
Area:	1.18	ha
Percent Impervious:	78%	
Rational C value:	0.77	Calc Cn
Rainfall Station:	Belleville, ONT	MAP
Peak Storm Flow:	149.4	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS	Volume
DD4	92.0%	>90%
DD6	98.0%	>90%
DD8	**99.0%**	**>90%**
DD10	100.0%	>90%
DD12	100.0%	>90%

Model Specification

Select Model	**DD8**		
Diameter:	2400	mm	
Peak Flow Capacity:	425.00	L/s	OK
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

Placement:	Online		
Outlet Pipe Size:	600	mm	*OK*
Inlet Pipe 1 Size:	600	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	81.730	m	Calc Invs.
Outlet Pipe Invert:	79.640	m	*OK*
Invert Pipe 1:	79.030	m	*OK*
Invert Pipe 2:		m	

Net Annual Removal Model: DD8

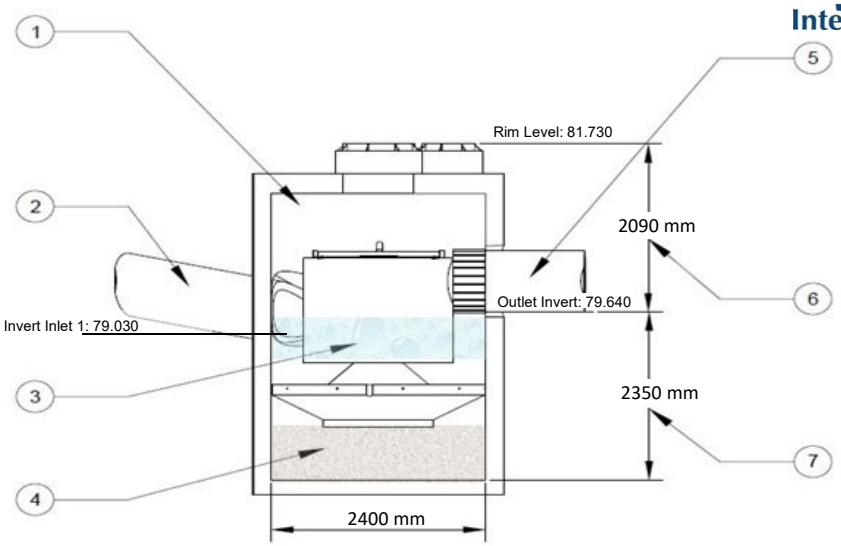
Intensity[1]	Fraction of Rainfall[1]	DD8 Removal Efficiency[2]	Weighted Net Annual Efficiency[4]
(mm/hr)	(%)	(%)	(%)
0.50	0.4%	100.0%	0.42%
1.00	13.2%	100.0%	13.23%
1.50	14.0%	100.0%	13.96%
2.00	14.0%	100.0%	13.96%
2.50	3.6%	100.0%	3.55%
3.00	2.5%	100.0%	2.54%
3.50	8.4%	100.0%	8.44%
4.00	5.1%	100.0%	5.08%
4.50	1.6%	100.0%	1.57%
5.00	5.1%	100.0%	5.05%
6.00	4.8%	100.0%	4.78%
7.00	4.5%	100.0%	4.50%
8.00	3.5%	100.0%	3.52%
9.00	2.4%	100.0%	2.45%
10.00	2.5%	100.0%	2.49%
20.00	9.7%	100.0%	9.66%
30.00	2.8%	96.1%	2.67%
40.00	0.9%	89.1%	0.83%
50.00	0.4%	82.2%	0.37%
100.00	0.6%	47.4%	0.27%
150.00	0.1%	12.5%	0.01%
200.00	0.0%	0.0%	0.00%
Total Net Annual Removal Efficiency:			**99.0%**
Total Annual Runoff Volume Treated:			**>90%**

1. Rainfall Data: 1960:2007, HLY03, Belleville, ONT, 6150700 & 6150689.
2. Based on Washington Departemnt of Ecology TAPE test protocols
3. Rainfall adjusted to 5 min peak intensity based on hourly average.
4. Factored to account for bypass flow.

Designer Notes:

Hydro Downstream Defender®

Hydro International



All drawing elevations are metres.

DD8 Specification

1	Vortex Chamber Diameter	2400	mm
2	Inlet Pipe Diameter	600	mm
3	Oil Storage Capacity	2044	L
4	Min. Provided Sediment Storage Capacity	3.56	m^3
5	Outlet Pipe Diameter	600	mm
6	Rim to Outlet Invert	2090	mm
7	Outlet Invert to Sump	2350	m
	Total Depth	**4440**	**mm**

Notes:

The Downstream Defender is certified by Canada ETV

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-200	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	70.2	L/s
Peak Storm Flow:	150.3	L/s
Peak Storm Return:	25mm	yrs

RESULTS SUMMARY

Model	TSS
DD4	**40.6%**
DD6	**82.8%**
DD8	92.4%
DD10	95.9%
DD12	97.6%

Performance Statement:

The Hydro International stormwater treatment system, model DD6, achieves the water quality objective of 82.8% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 70.2 L/s.

Model Specification:

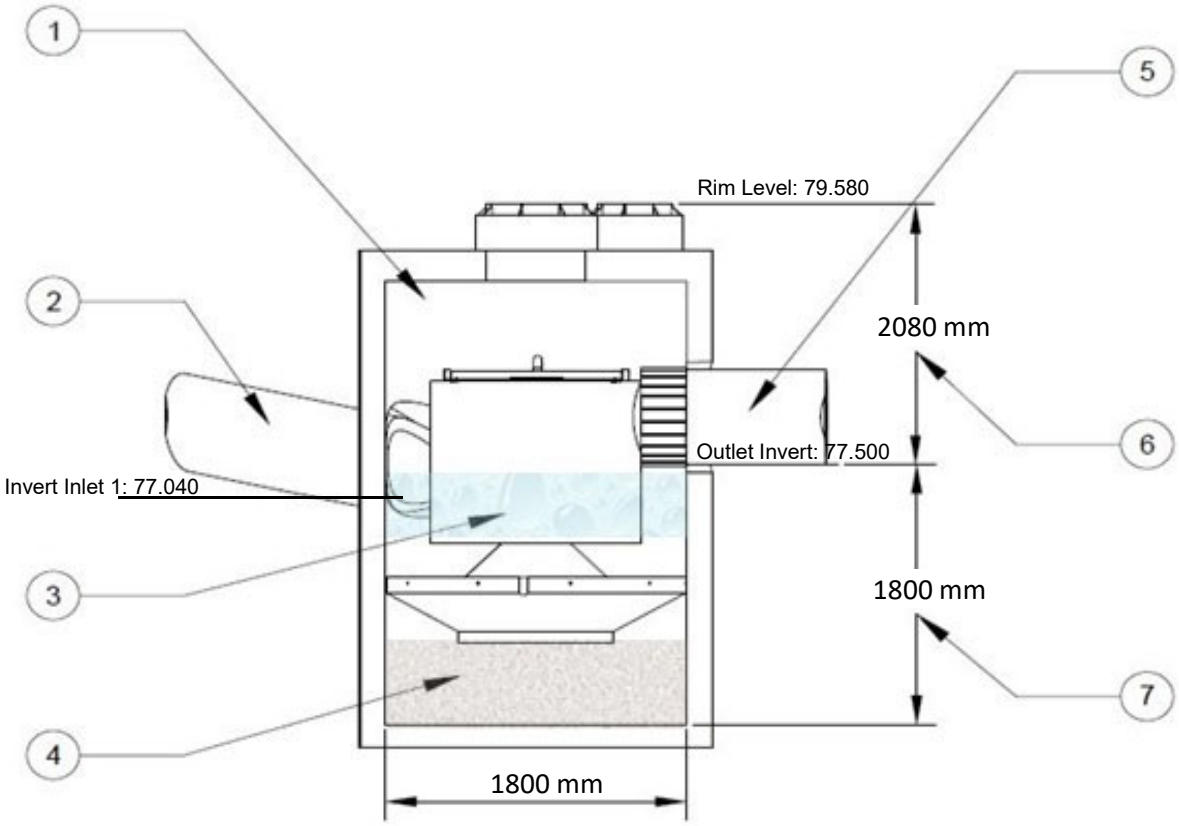
			Checks
Selected Model:	**DD6**		*OK*
Diameter:	1800	mm	
Design WQ Flow:	70.20	L/s	
Peak Flow Capacity:	227.00	L/s	*OK*
Sediment Storage:	1.61	m^3	
Oil Storage:	818.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	450	mm	*OK*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	79.580	m	Calc Invs.
Outlet Pipe Invert:	77.500	m	*OK*
Invert Pipe 1:	77.040	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®



DD6 Specification

1	Vortex Chamber Diameter	1800	mm
2	Inlet Pipe Diameter	450	mm
3	Oil Storage Capacity	818.00	L
4	Min. Provided Sediment Storage Capacity	1.61	m^3
5	Outlet Pipe Diameter	450	mm
6	Height (Final Grade to Outlet Invert)	2080	mm
7	Sump Depth(Outlet Invert to Sump)	1800	mm
	Total Depth	**3880**	**mm**

All drawing elevations are metres.

Designer Notes:

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-200	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	150.3	L/s
Peak Storm Flow:	150.3	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	**45.3%**
DD8	77.5%
DD10	88.1%
DD12	92.9%

Performance Statement:

The Hydro International stormwater treatment system, model DD6, achieves the water quality objective of 45.3% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 150.3 L/s.

Model Specification:

			Checks
Selected Model:	**DD6**		*Selected model does not meet TSS goal.*
Diameter:	1800	mm	
Design WQ Flow:	150.30	L/s	
Peak Flow Capacity:	227.00	L/s	*OK*
Sediment Storage:	1.61	m^3	
Oil Storage:	818.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	450	mm	*OK*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	79.580	m	Calc Invs.
Outlet Pipe Invert:	77.500	m	*OK*
Invert Pipe 1:	77.040	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®

Net Annual Water Quality Worksheet

Rev. 12.5

Hydro International

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.**

Paste

Treatment Parameters

Structure ID:	SQU-200	
TSS Goal:	80	% Removal
TSS Particle Size:	50	um
Area:	1.2158	ha
Percent Impervious:	63%	
Rational C value:	0.68	Calc Cn
Rainfall Station:	Belleville, ONT	MAP
Peak Storm Flow:	150.3	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS	Volume
DD4	93.0%	>90%
DD6	**98.0%**	**>90%**
DD8	99.0%	>90%
DD10	100.0%	>90%
DD12	100.0%	>90%

Model Specification

Select Model	**DD6**		
Diameter:	1800	mm	
Peak Flow Capacity:	227.00	L/s	OK
Sediment Storage:	1.61	m^3	
Oil Storage:	818.00	L	

Installation Configuration

Placement:	Online		
Outlet Pipe Size:	450	mm	*OK*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	79.580	m	Calc Invs.
Outlet Pipe Invert:	77.500	m	*OK*
Invert Pipe 1:	77.043	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Net Annual Removal Model: DD6

Intensity[1]	Fraction of Rainfall[1]	DD6 Removal Efficiency[2]	Weighted Net Annual Efficiency[4]
(mm/hr)	(%)	(%)	(%)
0.50	0.4%	100.0%	0.42%
1.00	13.2%	100.0%	13.23%
1.50	14.0%	100.0%	13.96%
2.00	14.0%	100.0%	13.96%
2.50	3.6%	100.0%	3.55%
3.00	2.5%	100.0%	2.54%
3.50	8.4%	100.0%	8.44%
4.00	5.1%	100.0%	5.08%
4.50	1.6%	100.0%	1.57%
5.00	5.1%	100.0%	5.05%
6.00	4.8%	100.0%	4.78%
7.00	4.5%	100.0%	4.50%
8.00	3.5%	100.0%	3.52%
9.00	2.4%	100.0%	2.45%
10.00	2.5%	100.0%	2.49%
20.00	9.7%	94.5%	9.13%
30.00	2.8%	83.2%	2.31%
40.00	0.9%	72.0%	0.67%
50.00	0.4%	60.7%	0.27%
100.00	0.6%	0.0%	0.00%
150.00	0.1%	0.0%	0.00%
200.00	0.0%	0.0%	0.00%
Total Net Annual Removal Efficiency:			**98.0%**
Total Annual Runoff Volume Treated:			**>90%**

1. Rainfall Data: 1960:2007, HLY03, Belleville, ONT, 6150700 & 6150689.
2. Based on Washington Departemnt of Ecology TAPE test protocols
3. Rainfall adjusted to 5 min peak intensity based on hourly average.
4. Factored to account for bypass flow.

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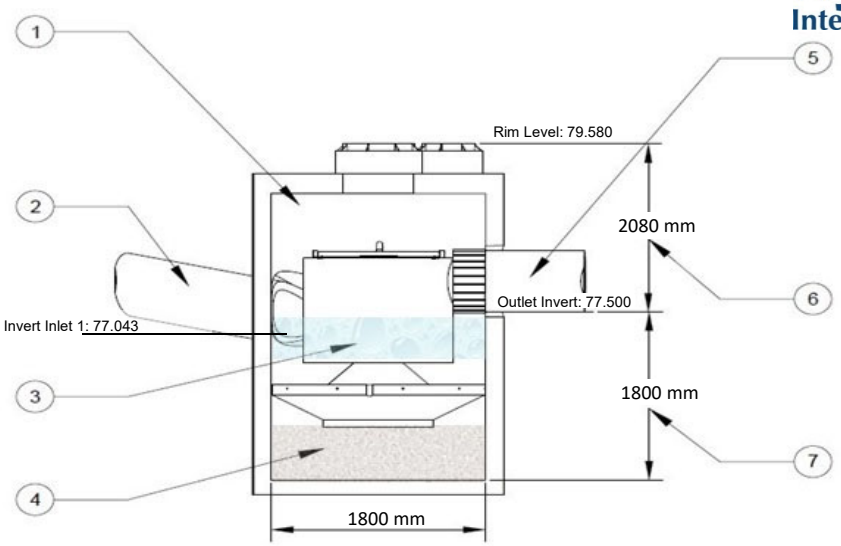
Hydro International



All drawing elevations are metres.

DD6 Specification

1	Vortex Chamber Diameter	1800	mm
2	Inlet Pipe Diameter	450	mm
3	Oil Storage Capacity	818	L
4	Min. Provided Sediment Storage Capacity	1.61	m^3
5	Outlet Pipe Diameter	450	mm
6	Rim to Outlet Invert	2080	mm
7	Outlet Invert to Sump	1800	m
	Total Depth	**3880**	**mm**

Notes:

The Downstream Defender is certified by Canada ETV

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-300	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	113.2	L/s
Peak Storm Flow:	124.5	L/s
Peak Storm Return:	25mm	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	64.9%
DD8	**85.1%**
DD10	92.0%
DD12	95.2%

Performance Statement:

The Hydro International stormwater treatment system, model DD8, achieves the water quality objective of 85.1% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 113.2 L/s.

Model Specification:

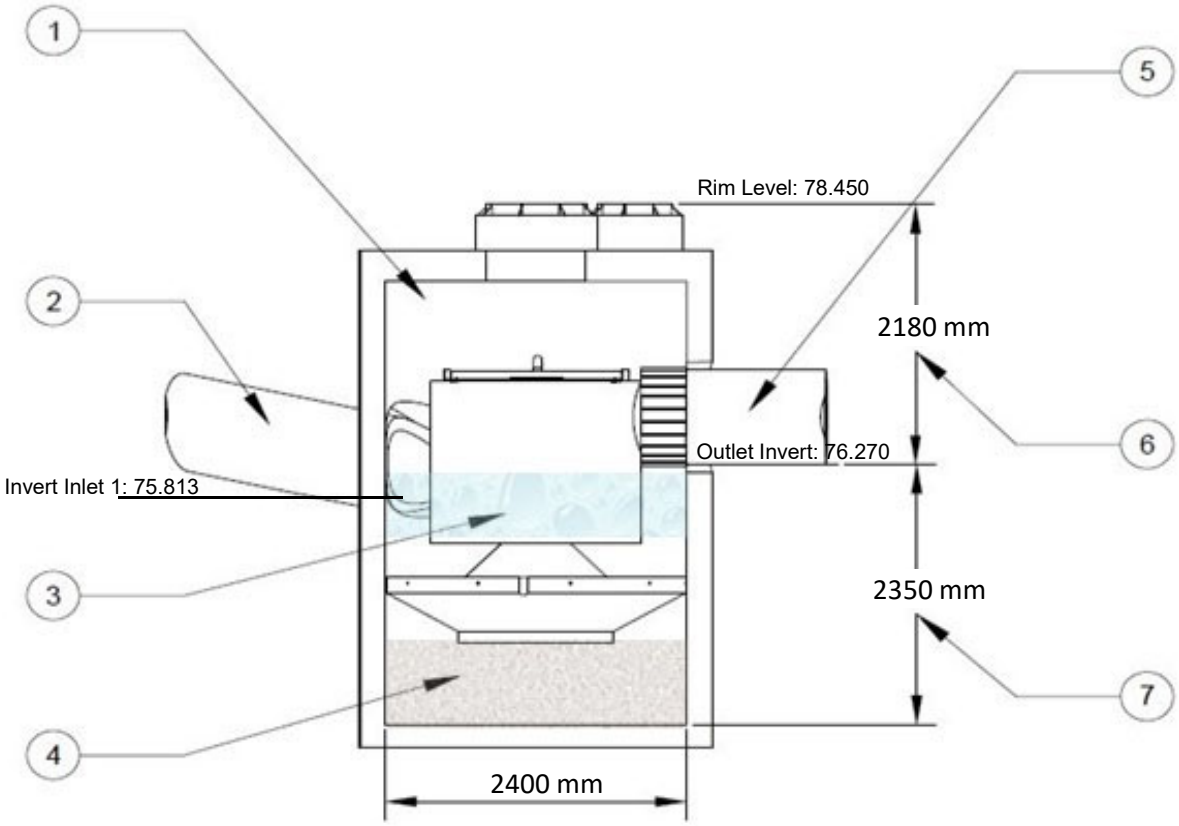
			Checks
Selected Model:	**DD8**		*OK*
Diameter:	2400	mm	
Design WQ Flow:	113.20	L/s	
Peak Flow Capacity:	425.00	L/s	*OK*
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	450	mm	*600 to 450 matched invert coupler required*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.450	m	Calc Invs.
Outlet Pipe Invert:	76.270	m	*OK*
Invert Pipe 1:	75.813	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®



DD8 Specification

1	Vortex Chamber Diameter	2400	mm
2	Inlet Pipe Diameter	450	mm
3	Oil Storage Capacity	2044.00	L
4	Min. Provided Sediment Storage Capacity	3.56	m^3
5	Outlet Pipe Diameter	450	mm
6	Height (Final Grade to Outlet Invert)	2180	mm
7	Sump Depth(Outlet Invert to Sump)	2350	mm
	Total Depth	**4530**	**mm**

All drawing elevations are metres.

Designer Notes:

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-300	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	124.5	L/s
Peak Storm Flow:	124.5	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	59.3%
DD8	**82.9%**
DD10	90.9%
DD12	94.6%

Performance Statement:

The Hydro International stormwater treatment system, model DD8, achieves the water quality objective of 82.9% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 124.5 L/s.

Model Specification:

			Checks
Selected Model:	**DD8**		*OK*
Diameter:	2400	mm	
Design WQ Flow:	124.50	L/s	
Peak Flow Capacity:	425.00	L/s	*OK*
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	450	mm	*600 to 450 matched invert coupler required*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.450	m	Calc Invs.
Outlet Pipe Invert:	76.270	m	*OK*
Invert Pipe 1:	75.813	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®

Net Annual Water Quality Worksheet

Rev. 12.5

Hydro International

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.**

Paste

Treatment Parameters

Structure ID:	SQU-300	
TSS Goal:	80	% Removal
TSS Particle Size:	50	um
Area:	0.9748	ha
Percent Impervious:	92%	
Rational C value:	0.85	Calc Cn
Rainfall Station:	Belleville, ONT	MAP
Peak Storm Flow:	124.5	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS	Volume
DD4	93.0%	>90%
DD6	98.0%	>90%
DD8	**99.0%**	**>90%**
DD10	100.0%	>90%
DD12	100.0%	>90%

Model Specification

Select Model	**DD8**		
Diameter:	2400	mm	
Peak Flow Capacity:	425.00	L/s	OK
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

Placement:	Online		
Outlet Pipe Size:	450	mm	*600 to 450 matched invert coupler required*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.450	m	Calc Invs.
Outlet Pipe Invert:	76.270	m	*OK*
Invert Pipe 1:	75.810	m	*OK*
Invert Pipe 2:		m	

Net Annual Removal Model: DD8

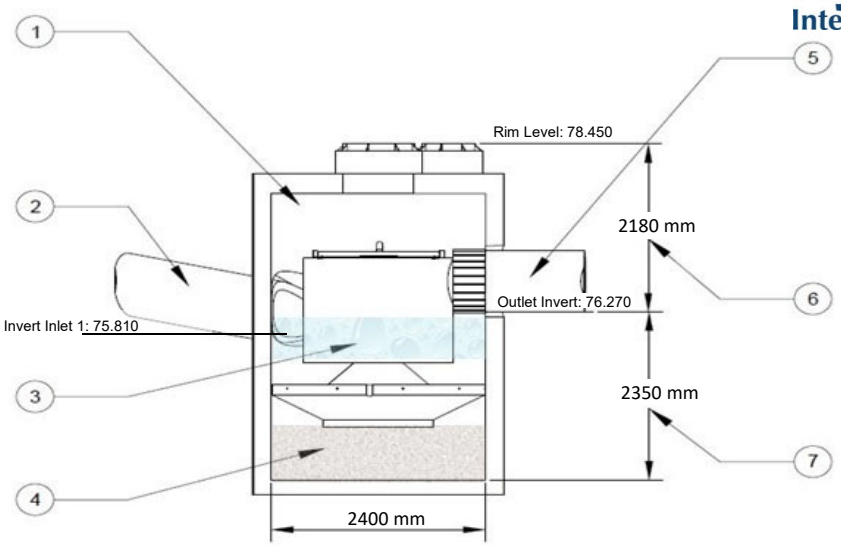
Intensity[1]	Fraction of Rainfall[1]	DD8 Removal Efficiency[2]	Weighted Net Annual Efficiency[4]
(mm/hr)	(%)	(%)	(%)
0.50	0.4%	100.0%	0.42%
1.00	13.2%	100.0%	13.23%
1.50	14.0%	100.0%	13.96%
2.00	14.0%	100.0%	13.96%
2.50	3.6%	100.0%	3.55%
3.00	2.5%	100.0%	2.54%
3.50	8.4%	100.0%	8.44%
4.00	5.1%	100.0%	5.08%
4.50	1.6%	100.0%	1.57%
5.00	5.1%	100.0%	5.05%
6.00	4.8%	100.0%	4.78%
7.00	4.5%	100.0%	4.50%
8.00	3.5%	100.0%	3.52%
9.00	2.4%	100.0%	2.45%
10.00	2.5%	100.0%	2.49%
20.00	9.7%	100.0%	9.66%
30.00	2.8%	97.9%	2.71%
40.00	0.9%	91.5%	0.85%
50.00	0.4%	85.1%	0.38%
100.00	0.6%	53.2%	0.30%
150.00	0.1%	21.3%	0.02%
200.00	0.0%	0.0%	0.00%
Total Net Annual Removal Efficiency:			**99.0%**
Total Annual Runoff Volume Treated:			**>90%**

1. Rainfall Data: 1960:2007, HLY03, Belleville, ONT, 6150700 & 6150689.
2. Based on Washington Departemnt of Ecology TAPE test protocols
3. Rainfall adjusted to 5 min peak intensity based on hourly average.
4. Factored to account for bypass flow.

Designer Notes:

Hydro Downstream Defender®

Hydro International



All drawing elevations are metres.

DD8 Specification

1	Vortex Chamber Diameter	2400	mm
2	Inlet Pipe Diameter	450	mm
3	Oil Storage Capacity	2044	L
4	Min. Provided Sediment Storage Capacity	3.56	m^3
5	Outlet Pipe Diameter	450	mm
6	Rim to Outlet Invert	2180	mm
7	Outlet Invert to Sump	2350	m
	Total Depth	**4530**	**mm**

Notes:

The Downstream Defender is certified by Canada ETV

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2023-11-07**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-400	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	170.6	L/s
Peak Storm Flow:	329.3	L/s
Peak Storm Return:	25mm	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	32.8%
DD8	72.8%
DD10	**85.7%**
DD12	91.6%

Performance Statement:

The Hydro International stormwater treatment system, model DD10, achieves the water quality objective of 85.7% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 170.6 L/s.

Model Specification:

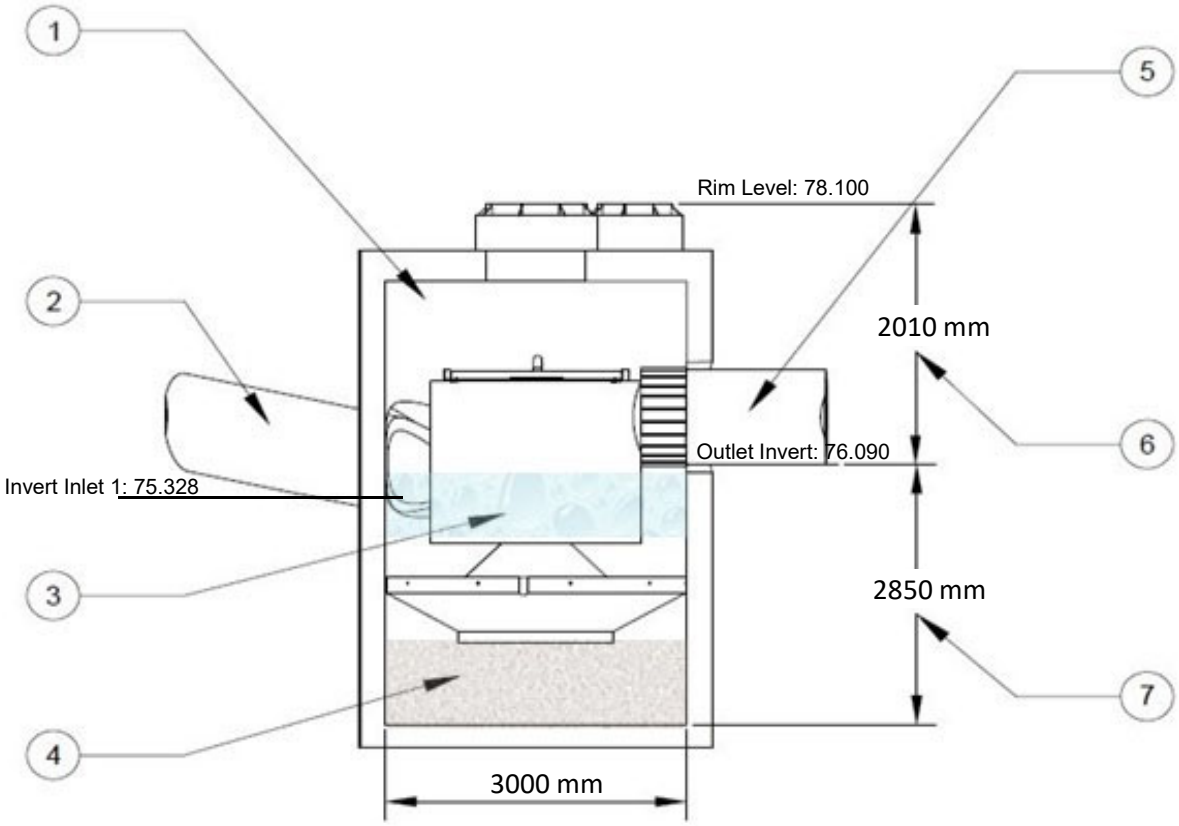
			Checks
Selected Model:	**DD10**		*OK*
Diameter:	3000	mm	
Design WQ Flow:	170.60	L/s	
Peak Flow Capacity:	708.00	L/s	*OK*
Sediment Storage:	6.65	m^3	
Oil Storage:	3975.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	750	mm	*OK*
Inlet Pipe 1 Size:	750	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.100	m	Calc Invs.
Outlet Pipe Invert:	76.090	m	*OK*
Invert Pipe 1:	75.328	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®



DD10 Specification

1	Vortex Chamber Diameter	3000	mm
2	Inlet Pipe Diameter	750	mm
3	Oil Storage Capacity	3975.00	L
4	Min. Provided Sediment Storage Capacity	6.65	m^3
5	Outlet Pipe Diameter	750	mm
6	Height (Final Grade to Outlet Invert)	2010	mm
7	Sump Depth(Outlet Invert to Sump)	2850	mm
	Total Depth	**4860**	**mm**

All drawing elevations are metres.

Designer Notes:

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2023-11-07**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-400	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	329.3	L/s
Peak Storm Flow:	329.3	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	0.0%
DD8	23.3%
DD10	**62.0%**
DD12	78.5%

Performance Statement:

The Hydro International stormwater treatment system, model DD10, achieves the water quality objective of 62.0% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 329.3 L/s.

Model Specification:

			Checks
Selected Model:	**DD10**		*Selected model does not meet TSS goal.*
Diameter:	3000	mm	
Design WQ Flow:	329.30	L/s	
Peak Flow Capacity:	708.00	L/s	*OK*
Sediment Storage:	6.65	m^3	
Oil Storage:	3975.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	750	mm	*OK*
Inlet Pipe 1 Size:	750	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.100	m	Calc Invs.
Outlet Pipe Invert:	76.090	m	*OK*
Invert Pipe 1:	75.328	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®

Net Annual Water Quality Worksheet

Rev. 12.5

Hydro International

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.**

Paste

Treatment Parameters

Structure ID:	SQU-400	
TSS Goal:	80	% Removal
TSS Particle Size:	50	um
Area:	2.7906	ha
Percent Impervious:	65%	
Rational C value:	0.69	Calc Cn
Rainfall Station:	Belleville, ONT	MAP
Peak Storm Flow:	329.3	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS	Volume
DD4	79.0%	>90%
DD6	92.0%	>90%
DD8	97.0%	>90%
DD10	**99.0%**	**>90%**
DD12	99.0%	>90%

Model Specification

Select Model	**DD10**		
Diameter:	3000	mm	
Peak Flow Capacity:	708.00	L/s	OK
Sediment Storage:	6.65	m^3	
Oil Storage:	3975.00	L	

Installation Configuration

Placement:	Online		
Outlet Pipe Size:	750	mm	*OK*
Inlet Pipe 1 Size:	750	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.100	m	Calc Invs.
Outlet Pipe Invert:	76.090	m	*OK*
Invert Pipe 1:	75.328	m	*OK*
Invert Pipe 2:		m	

Net Annual Removal Model: DD10

Intensity[1]	Fraction of Rainfall[1]	DD10 Removal Efficiency[2]	Weighted Net Annual Efficiency[4]
(mm/hr)	(%)	(%)	(%)
0.50	0.4%	100.0%	0.42%
1.00	13.2%	100.0%	13.23%
1.50	14.0%	100.0%	13.96%
2.00	14.0%	100.0%	13.96%
2.50	3.6%	100.0%	3.55%
3.00	2.5%	100.0%	2.54%
3.50	8.4%	100.0%	8.44%
4.00	5.1%	100.0%	5.08%
4.50	1.6%	100.0%	1.57%
5.00	5.1%	100.0%	5.05%
6.00	4.8%	100.0%	4.78%
7.00	4.5%	100.0%	4.50%
8.00	3.5%	100.0%	3.52%
9.00	2.4%	100.0%	2.45%
10.00	2.5%	100.0%	2.49%
20.00	9.7%	98.0%	9.47%
30.00	2.8%	88.6%	2.46%
40.00	0.9%	79.1%	0.73%
50.00	0.4%	69.6%	0.31%
100.00	0.6%	22.2%	0.13%
150.00	0.1%	0.0%	0.00%
200.00	0.0%	0.0%	0.00%
Total Net Annual Removal Efficiency:			**99.0%**
Total Annual Runoff Volume Treated:			**>90%**

1. Rainfall Data: 1960:2007, HLY03, Belleville, ONT, 6150700 & 6150689.
2. Based on Washington Departemnt of Ecology TAPE test protocols
3. Rainfall adjusted to 5 min peak intensity based on hourly average.
4. Factored to account for bypass flow.

Designer Notes:

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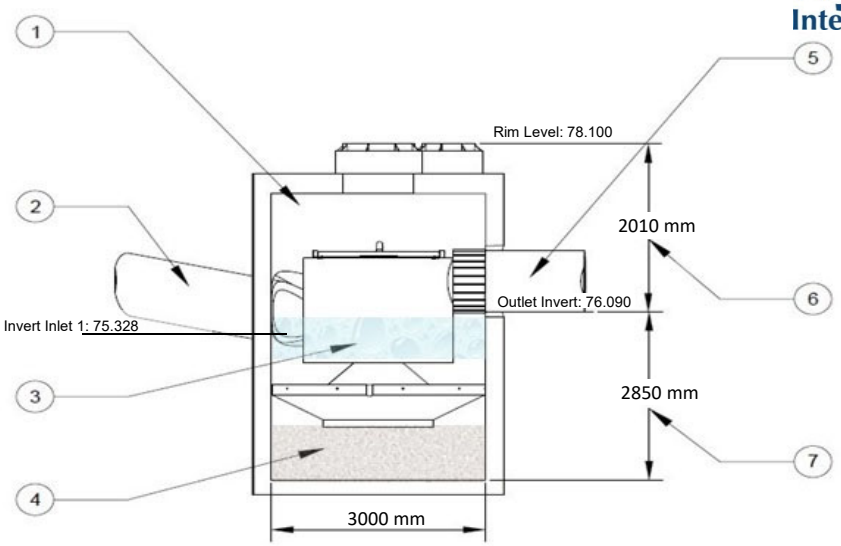
Hydro International



All drawing elevations are metres.

DD10 Specification

1	Vortex Chamber Diameter	3000	mm
2	Inlet Pipe Diameter	750	mm
3	Oil Storage Capacity	3975	L
4	Min. Provided Sediment Storage Capacity	6.65	m^3
5	Outlet Pipe Diameter	750	mm
6	Rim to Outlet Invert	2010	mm
7	Outlet Invert to Sump	2850	m
	Total Depth	**4860**	**mm**

Notes:

The Downstream Defender is certified by Canada ETV

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-500	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	171.1	L/s
Peak Storm Flow:	285.3	L/s
Peak Storm Return:	25mm	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	32.5%
DD8	72.6%
DD10	**85.7%**
DD12	91.6%

Performance Statement:

The Hydro International stormwater treatment system, model DD10, achieves the water quality objective of 85.7% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 171.1 L/s.

Model Specification:

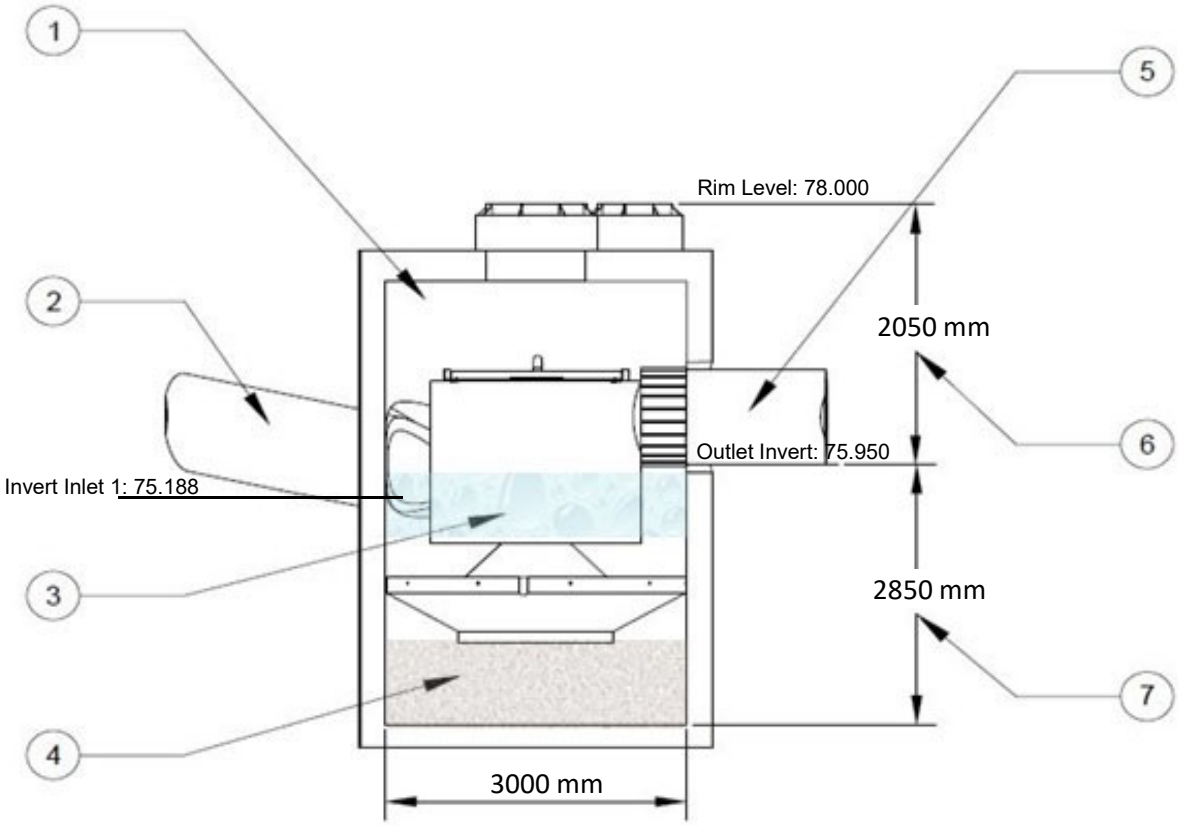
			Checks
Selected Model:	**DD10**		*OK*
Diameter:	3000	mm	
Design WQ Flow:	171.10	L/s	
Peak Flow Capacity:	708.00	L/s	*OK*
Sediment Storage:	6.65	m^3	
Oil Storage:	3975.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	750	mm	*OK*
Inlet Pipe 1 Size:	750	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.000	m	Calc Invs.
Outlet Pipe Invert:	75.950	m	*OK*
Invert Pipe 1:	75.188	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®



DD10 Specification

1	Vortex Chamber Diameter	3000	mm
2	Inlet Pipe Diameter	750	mm
3	Oil Storage Capacity	3975.00	L
4	Min. Provided Sediment Storage Capacity	6.65	m^3
5	Outlet Pipe Diameter	750	mm
6	Height (Final Grade to Outlet Invert)	2050	mm
7	Sump Depth(Outlet Invert to Sump)	2850	mm
	Total Depth	**4900**	**mm**

All drawing elevations are metres.

Designer Notes:

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-500	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	285.3	L/s
Peak Storm Flow:	285.3	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	0.0%
DD8	39.3%
DD10	**69.5%**
DD12	82.6%

Performance Statement:

The Hydro International stormwater treatment system, model DD10, achieves the water quality objective of 69.5% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 285.3 L/s.

Model Specification:

			Checks
Selected Model:	**DD10**		*Selected model does not meet TSS goal.*
Diameter:	3000	mm	
Design WQ Flow:	285.30	L/s	
Peak Flow Capacity:	708.00	L/s	*OK*
Sediment Storage:	6.65	m^3	
Oil Storage:	3975.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	750	mm	*OK*
Inlet Pipe 1 Size:	750	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.000	m	Calc Invs.
Outlet Pipe Invert:	75.950	m	*OK*
Invert Pipe 1:	75.188	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®

Net Annual Water Quality Worksheet

Rev. 12.5

Hydro International

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.**

Paste

Treatment Parameters

Structure ID:	SQU-500	
TSS Goal:	80	% Removal
TSS Particle Size:	50	um
Area:	2.4437	ha
Percent Impervious:	70%	
Rational C value:	0.72	Calc Cn
Rainfall Station:	Belleville, ONT	MAP
Peak Storm Flow:	285.3	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS	Volume
DD4	80.0%	>90%
DD6	93.0%	>90%
DD8	97.0%	>90%
DD10	**99.0%**	**>90%**
DD12	100.0%	>90%

Model Specification

Select Model	**DD10**		
Diameter:	3000	mm	
Peak Flow Capacity:	708.00	L/s	OK
Sediment Storage:	6.65	m^3	
Oil Storage:	3975.00	L	

Installation Configuration

Placement:	Online		
Outlet Pipe Size:	750	mm	*OK*
Inlet Pipe 1 Size:	750	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.000	m	Calc Invs.
Outlet Pipe Invert:	75.950	m	*OK*
Invert Pipe 1:	75.188	m	*OK*
Invert Pipe 2:		m	

Net Annual Removal Model: DD10

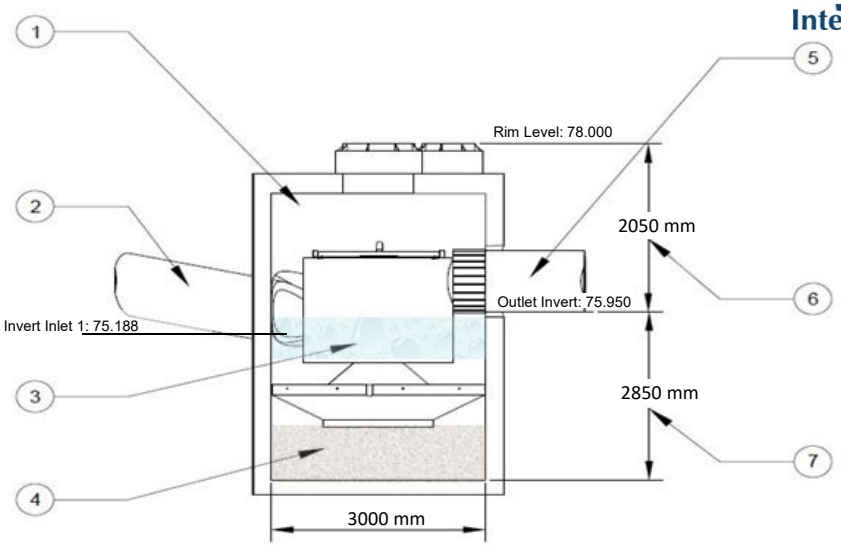
Intensity[1]	Fraction of Rainfall[1]	DD10 Removal Efficiency[2]	Weighted Net Annual Efficiency[4]
(mm/hr)	(%)	(%)	(%)
0.50	0.4%	100.0%	0.42%
1.00	13.2%	100.0%	13.23%
1.50	14.0%	100.0%	13.96%
2.00	14.0%	100.0%	13.96%
2.50	3.6%	100.0%	3.55%
3.00	2.5%	100.0%	2.54%
3.50	8.4%	100.0%	8.44%
4.00	5.1%	100.0%	5.08%
4.50	1.6%	100.0%	1.57%
5.00	5.1%	100.0%	5.05%
6.00	4.8%	100.0%	4.78%
7.00	4.5%	100.0%	4.50%
8.00	3.5%	100.0%	3.52%
9.00	2.4%	100.0%	2.45%
10.00	2.5%	100.0%	2.49%
20.00	9.7%	99.7%	9.63%
30.00	2.8%	91.0%	2.52%
40.00	0.9%	82.4%	0.76%
50.00	0.4%	73.7%	0.33%
100.00	0.6%	30.4%	0.17%
150.00	0.1%	0.0%	0.00%
200.00	0.0%	0.0%	0.00%
Total Net Annual Removal Efficiency:			**99.0%**
Total Annual Runoff Volume Treated:			**>90%**

1. Rainfall Data: 1960:2007, HLY03, Belleville, ONT, 6150700 & 6150689.
2. Based on Washington Departemnt of Ecology TAPE test protocols
3. Rainfall adjusted to 5 min peak intensity based on hourly average.
4. Factored to account for bypass flow.

Designer Notes:

Hydro Downstream Defender®

Hydro International



All drawing elevations are metres.

DD10 Specification

1	Vortex Chamber Diameter	3000	mm
2	Inlet Pipe Diameter	750	mm
3	Oil Storage Capacity	3975	L
4	Min. Provided Sediment Storage Capacity	6.65	m^3
5	Outlet Pipe Diameter	750	mm
6	Rim to Outlet Invert	2050	mm
7	Outlet Invert to Sump	2850	m
	Total Depth	**4900**	**mm**

Notes:

The Downstream Defender is certified by Canada ETV

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-600	
TSS Goal:	80	% Removal
TSS Particle Size:	50 µm	
Water Quality Flow:	88	L/s
Peak Storm Flow:	157.3	L/s
Peak Storm Return:	25mm	yrs

RESULTS SUMMARY

Model	TSS
DD4	**14.1%**
DD6	76.1%
DD8	**89.6%**
DD10	94.4%
DD12	96.7%

Performance Statement:

The Hydro International stormwater treatment system, model DD8, achieves the water quality objective of 89.6% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 88 L/s.

Model Specification:

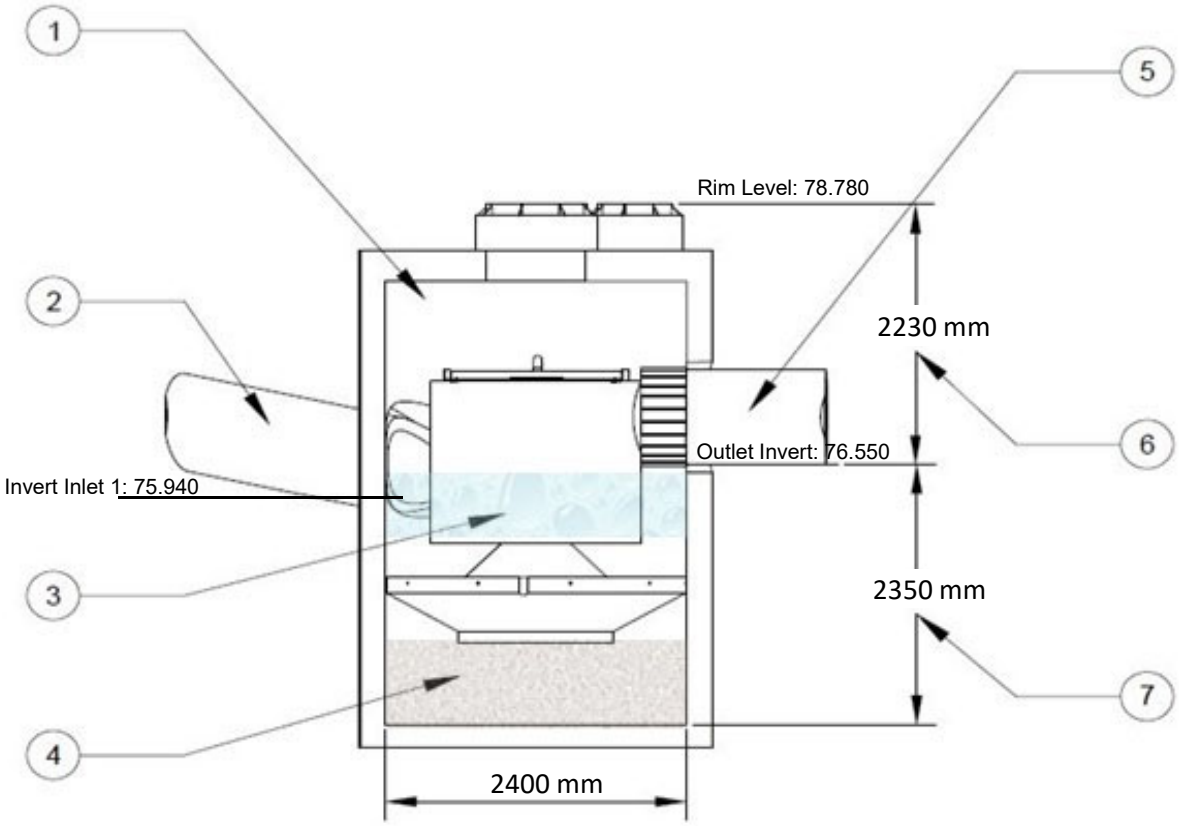
			Checks
Selected Model:	**DD8**		*OK*
Diameter:	2400	mm	
Design WQ Flow:	88.00	L/s	
Peak Flow Capacity:	425.00	L/s	*OK*
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	600	mm	*OK*
Inlet Pipe 1 Size:	600	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.780	m	Calc Invs.
Outlet Pipe Invert:	76.550	m	*OK*
Invert Pipe 1:	75.940	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®



DD8 Specification

1	Vortex Chamber Diameter	2400	mm
2	Inlet Pipe Diameter	600	mm
3	Oil Storage Capacity	2044.00	L
4	Min. Provided Sediment Storage Capacity	3.56	m^3
5	Outlet Pipe Diameter	600	mm
6	Height (Final Grade to Outlet Invert)	2230	mm
7	Sump Depth(Outlet Invert to Sump)	2350	mm
	Total Depth	**4580**	**mm**

All drawing elevations are metres.

Designer Notes:

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

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Treatment Parameters:

Structure ID:	SQU-600	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	157.3	L/s
Peak Storm Flow:	157.3	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	41.1%
DD8	**75.9%**
DD10	87.3%
DD12	92.5%

Performance Statement:

The Hydro International stormwater treatment system, model DD8, achieves the water quality objective of 75.9% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 157.3 L/s.

Model Specification:

			Checks
Selected Model:	**DD8**		*Selected model does not meet TSS goal.*
Diameter:	2400	mm	
Design WQ Flow:	157.30	L/s	
Peak Flow Capacity:	425.00	L/s	*OK*
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	600	mm	*OK*
Inlet Pipe 1 Size:	600	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.780	m	Calc Invs.
Outlet Pipe Invert:	76.550	m	*OK*
Invert Pipe 1:	75.940	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®

Net Annual Water Quality Worksheet

Rev. 12.5

Hydro International

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.**

Paste

Treatment Parameters

Structure ID:	SQU-600	
TSS Goal:	80	% Removal
TSS Particle Size:	50	um
Area:	1.2907	ha
Percent Impervious:	69%	
Rational C value:	0.71	Calc Cn
Rainfall Station:	Belleville, ONT	MAP
Peak Storm Flow:	157.3	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS	Volume
DD4	91.0%	>90%
DD6	97.0%	>90%
DD8	**99.0%**	**>90%**
DD10	100.0%	>90%
DD12	100.0%	>90%

Model Specification

Select Model	**DD8**		
Diameter:	2400	mm	
Peak Flow Capacity:	425.00	L/s	OK
Sediment Storage:	3.56	m^3	
Oil Storage:	2044.00	L	

Installation Configuration

Placement:	Online		
Outlet Pipe Size:	600	mm	*OK*
Inlet Pipe 1 Size:	600	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.780	m	Calc Invs.
Outlet Pipe Invert:	76.550	m	*OK*
Invert Pipe 1:	75.940	m	*OK*
Invert Pipe 2:		m	

Net Annual Removal Model: DD8

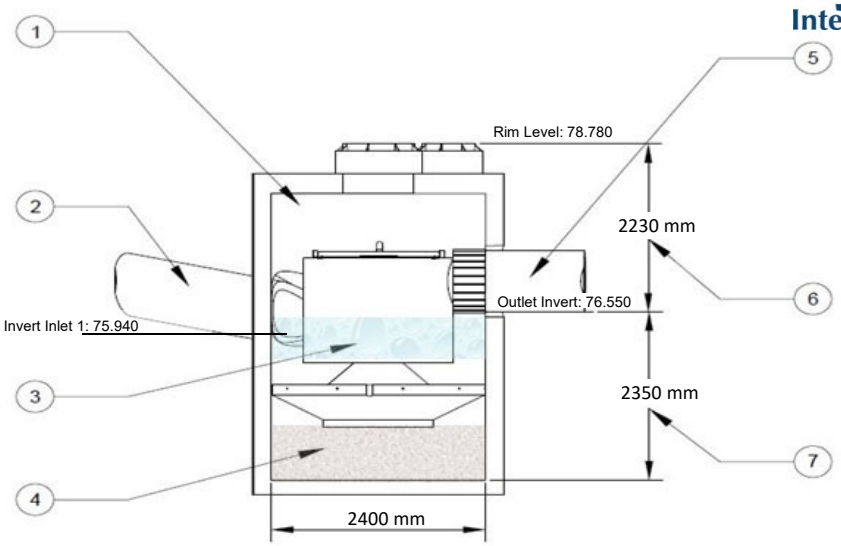
Intensity[1]	Fraction of Rainfall[1]	DD8 Removal Efficiency[2]	Weighted Net Annual Efficiency[4]
(mm/hr)	(%)	(%)	(%)
0.50	0.4%	100.0%	0.42%
1.00	13.2%	100.0%	13.23%
1.50	14.0%	100.0%	13.96%
2.00	14.0%	100.0%	13.96%
2.50	3.6%	100.0%	3.55%
3.00	2.5%	100.0%	2.54%
3.50	8.4%	100.0%	8.44%
4.00	5.1%	100.0%	5.08%
4.50	1.6%	100.0%	1.57%
5.00	5.1%	100.0%	5.05%
6.00	4.8%	100.0%	4.78%
7.00	4.5%	100.0%	4.50%
8.00	3.5%	100.0%	3.52%
9.00	2.4%	100.0%	2.45%
10.00	2.5%	100.0%	2.49%
20.00	9.7%	100.0%	9.66%
30.00	2.8%	95.8%	2.66%
40.00	0.9%	88.7%	0.82%
50.00	0.4%	81.6%	0.36%
100.00	0.6%	46.2%	0.26%
150.00	0.1%	10.8%	0.01%
200.00	0.0%	0.0%	0.00%
Total Net Annual Removal Efficiency:			**99.0%**
Total Annual Runoff Volume Treated:			**>90%**

1. Rainfall Data: 1960:2007, HLY03, Belleville, ONT, 6150700 & 6150689.
2. Based on Washington Departemnt of Ecology TAPE test protocols
3. Rainfall adjusted to 5 min peak intensity based on hourly average.
4. Factored to account for bypass flow.

Designer Notes:

Hydro Downstream Defender®

Hydro International



All drawing elevations are metres.

DD8 Specification

1	Vortex Chamber Diameter	2400	mm
2	Inlet Pipe Diameter	600	mm
3	Oil Storage Capacity	2044	L
4	Min. Provided Sediment Storage Capacity	3.56	m^3
5	Outlet Pipe Diameter	600	mm
6	Rim to Outlet Invert	2230	mm
7	Outlet Invert to Sump	2350	m
	Total Depth	**4580**	**mm**

Notes:

The Downstream Defender is certified by Canada ETV

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

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Treatment Parameters:

Structure ID:	SQU-700	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	73	L/s
Peak Storm Flow:	122	L/s
Peak Storm Return:	25mm	yrs

RESULTS SUMMARY

Model	TSS
DD4	**36.8%**
DD6	**81.8%**
DD8	92.0%
DD10	95.7%
DD12	97.5%

Performance Statement:

The Hydro International stormwater treatment system, model DD6, achieves the water quality objective of 81.8% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 73 L/s.

Model Specification:

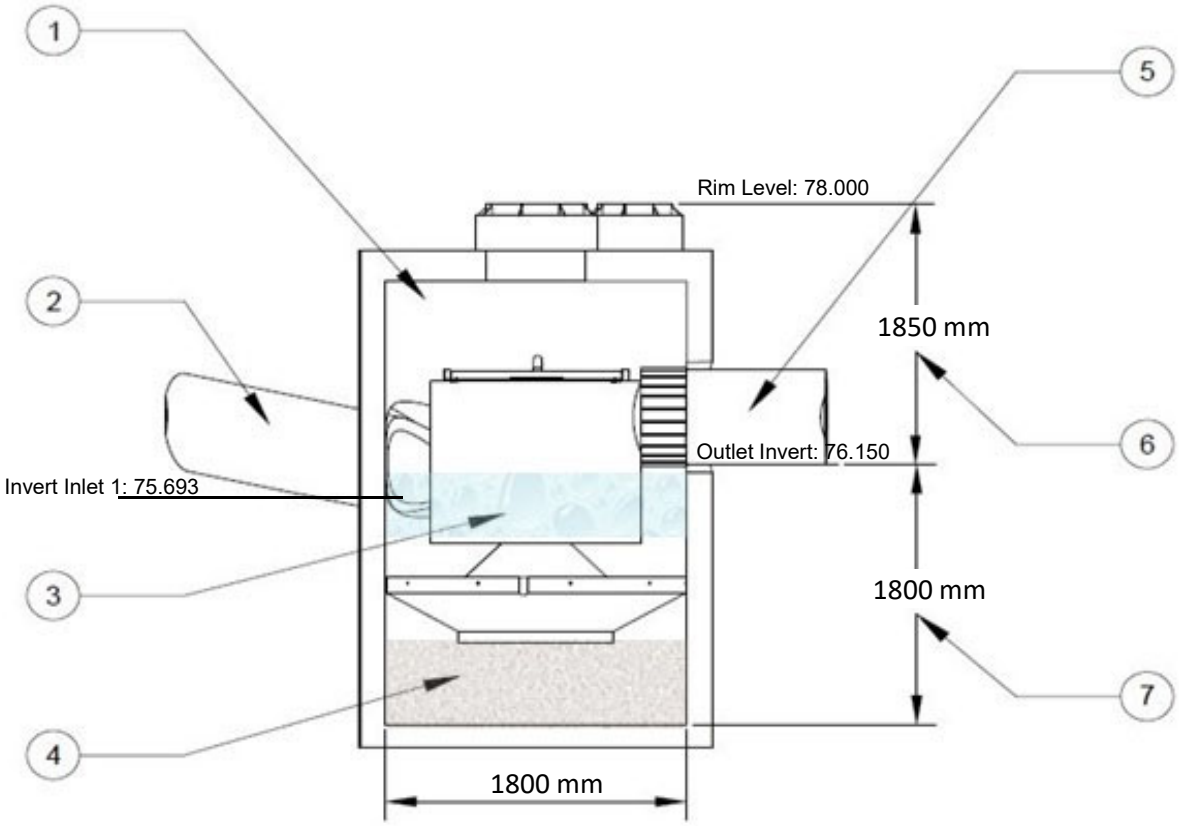
			Checks
Selected Model:	**DD6**		*OK*
Diameter:	1800	mm	
Design WQ Flow:	73.00	L/s	
Peak Flow Capacity:	227.00	L/s	*OK*
Sediment Storage:	1.61	m^3	
Oil Storage:	818.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	450	mm	*OK*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.000	m	Calc Invs.
Outlet Pipe Invert:	76.150	m	*OK*
Invert Pipe 1:	75.693	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®



DD6 Specification

1	Vortex Chamber Diameter	1800	mm
2	Inlet Pipe Diameter	450	mm
3	Oil Storage Capacity	818.00	L
4	Min. Provided Sediment Storage Capacity	1.61	m^3
5	Outlet Pipe Diameter	450	mm
6	Height (Final Grade to Outlet Invert)	1850	mm
7	Sump Depth(Outlet Invert to Sump)	1800	mm
	Total Depth	**3650**	**mm**

All drawing elevations are metres.

Designer Notes:

Hydro Downstream Defender®

Water Quality Flow Rate Worksheet

Rev. 12.5

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.com**

Paste

Treatment Parameters:

Structure ID:	SQU-700	
TSS Goal:	80	% Removal
TSS Particle Size:	50	µm
Water Quality Flow:	122	L/s
Peak Storm Flow:	122	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS
DD4	**0.0%**
DD6	**60.6%**
DD8	83.4%
DD10	91.1%
DD12	94.7%

Performance Statement:

The Hydro International stormwater treatment system, model DD6, achieves the water quality objective of 60.6% TSS based on 50 µm particle size distribution, providing continuous treatment positive removal for the water quality flow of 122 L/s.

Model Specification:

			Checks
Selected Model:	**DD6**		*Selected model does not meet TSS goal.*
Diameter:	1800	mm	
Design WQ Flow:	122.00	L/s	
Peak Flow Capacity:	227.00	L/s	*OK*
Sediment Storage:	1.61	m^3	
Oil Storage:	818.00	L	

Installation Configuration

			Checks
Placement:	Online		
Outlet Pipe Size:	450	mm	*OK*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.000	m	Calc Invs.
Outlet Pipe Invert:	76.150	m	*OK*
Invert Pipe 1:	75.693	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

Hydro Downstream Defender®

Net Annual Water Quality Worksheet

Rev. 12.5

Hydro International

Project Name:	**Bakelite Property**	*Report Date:*	**2024-01-11**
Street:	**621 Dundas St**	*City:*	**Belleville**
Province:	**Ont**	*Country:*	**CA**
Designer:	**Sue Sampson**	*email:*	**meer.SDSampson@gmail.**

Paste

Treatment Parameters

Structure ID:	SQU-700	
TSS Goal:	80	% Removal
TSS Particle Size:	50	um
Area:	0.9899	ha
Percent Impervious:	72%	
Rational C value:	0.73	Calc Cn
Rainfall Station:	Belleville, ONT	MAP
Peak Storm Flow:	122	L/s
Peak Storm Return:	5	yrs

RESULTS SUMMARY

Model	TSS	Volume
DD4	94.0%	>90%
DD6	**98.0%**	**>90%**
DD8	100.0%	>90%
DD10	100.0%	>90%
DD12	100.0%	>90%

Model Specification

Select Model	**DD6**		
Diameter:	1800	mm	
Peak Flow Capacity:	227.00	L/s	OK
Sediment Storage:	1.61	m^3	
Oil Storage:	818.00	L	

Installation Configuration

Placement:	Online		
Outlet Pipe Size:	450	mm	*OK*
Inlet Pipe 1 Size:	450	mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Rim Level:	78.000	m	Calc Invs.
Outlet Pipe Invert:	76.150	m	*OK*
Invert Pipe 1:	75.693	m	*OK*
Invert Pipe 2:		m	

Designer Notes:

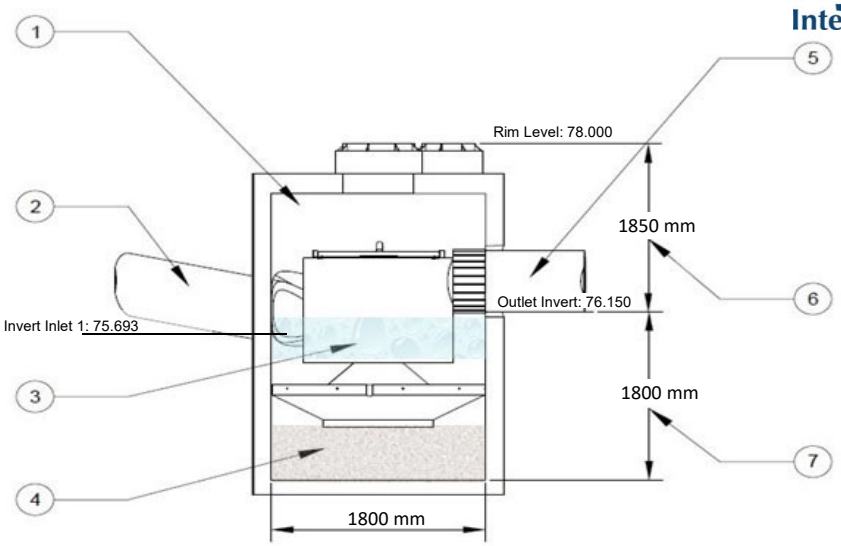
Net Annual Removal Model: DD6

Intensity[1]	Fraction of Rainfall[1]	DD6 Removal Efficiency[2]	Weighted Net Annual Efficiency[4]
(mm/hr)	(%)	(%)	(%)
0.50	0.4%	100.0%	0.42%
1.00	13.2%	100.0%	13.23%
1.50	14.0%	100.0%	13.96%
2.00	14.0%	100.0%	13.96%
2.50	3.6%	100.0%	3.55%
3.00	2.5%	100.0%	2.54%
3.50	8.4%	100.0%	8.44%
4.00	5.1%	100.0%	5.08%
4.50	1.6%	100.0%	1.57%
5.00	5.1%	100.0%	5.05%
6.00	4.8%	100.0%	4.78%
7.00	4.5%	100.0%	4.50%
8.00	3.5%	100.0%	3.52%
9.00	2.4%	100.0%	2.45%
10.00	2.5%	100.0%	2.49%
20.00	9.7%	97.2%	9.39%
30.00	2.8%	87.3%	2.42%
40.00	0.9%	77.4%	0.72%
50.00	0.4%	67.5%	0.30%
100.00	0.6%	18.0%	0.10%
150.00	0.1%	0.0%	0.00%
200.00	0.0%	0.0%	0.00%
Total Net Annual Removal Efficiency:			**98.0%**
Total Annual Runoff Volume Treated:			**>90%**

1. Rainfall Data: 1960:2007, HLY03, Belleville, ONT, 6150700 & 6150689.
2. Based on Washington Departemnt of Ecology TAPE test protocols
3. Rainfall adjusted to 5 min peak intensity based on hourly average.
4. Factored to account for bypass flow.

Hydro Downstream Defender®

Hydro International



All drawing elevations are metres.

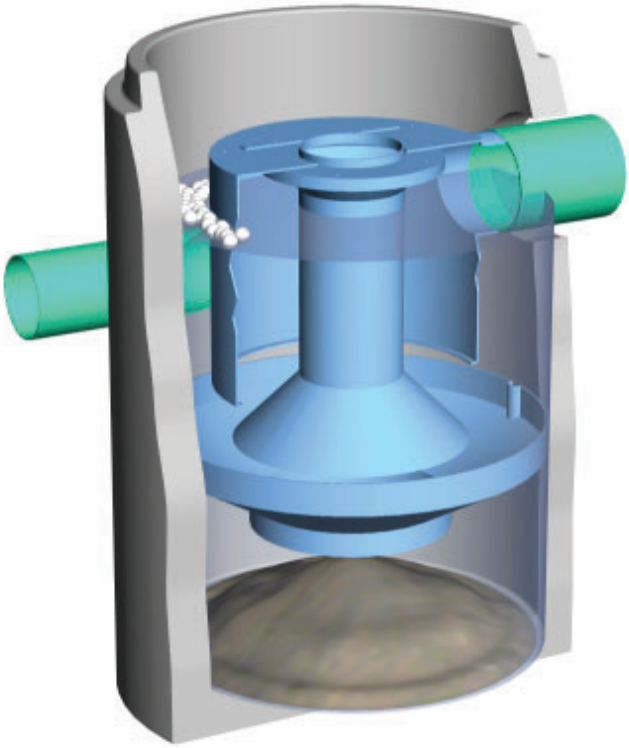
DD6 Specification

1	Vortex Chamber Diameter	1800	mm
2	Inlet Pipe Diameter	450	mm
3	Oil Storage Capacity	818	L
4	Min. Provided Sediment Storage Capacity	1.61	m^3
5	Outlet Pipe Diameter	450	mm
6	Rim to Outlet Invert	1850	mm
7	Outlet Invert to Sump	1800	m
	Total Depth	**3650**	**mm**

Notes:

The Downstream Defender is certified by Canada ETV

Hydro International



Downstream Defender®

Stormwater Treatment System

Operation and Maintenance Manual

Table of Contents

Downstream Defender® by Hydro International

The Downstream Defender is an advanced Hydrodynamic Vortex Separator designed to provide high removal efficiencies of settleable solids and their associated pollutants, oil, and floatables over a wide range of flow rates.

The Downstream Defender has unique, flow-modifying internal components developed from extensive full-scale testing, CFD modeling and over thirty years of hydrodynamic separation experience in wastewater, combined sewer and stormwater applications. These internal components distinguish the Downstream Defender from simple swirl-type devices and conventional oil/grit separators by minimizing turbulence and headlosses, enhancing separation, and preventing washout of previously stored pollutants.

The high removal efficiencies and inherent low headlosses of the Downstream Defender allow for a small footprint making it a compact and economical solution for the treatment of non-point source pollution.

BENEFITS OF THE DOWNSTREAM DEFENDER

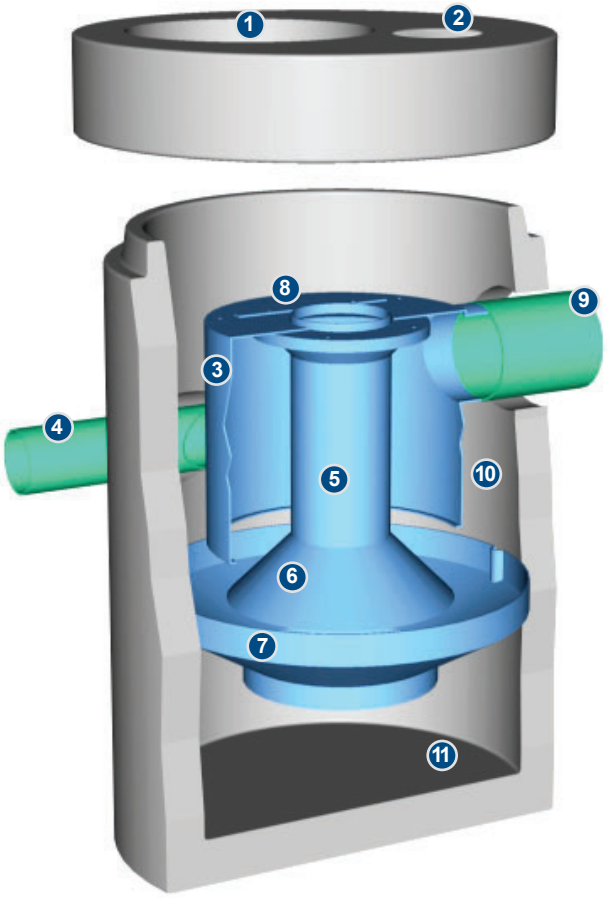
- Removes sediment, floatables, oil and grease
- No pollutant washouts
- Small footprint
- No loss of treatment capacity between clean-outs
- Low headloss
- Efficient over a wide ranges of flows
- Easy to install
- Low maintenance

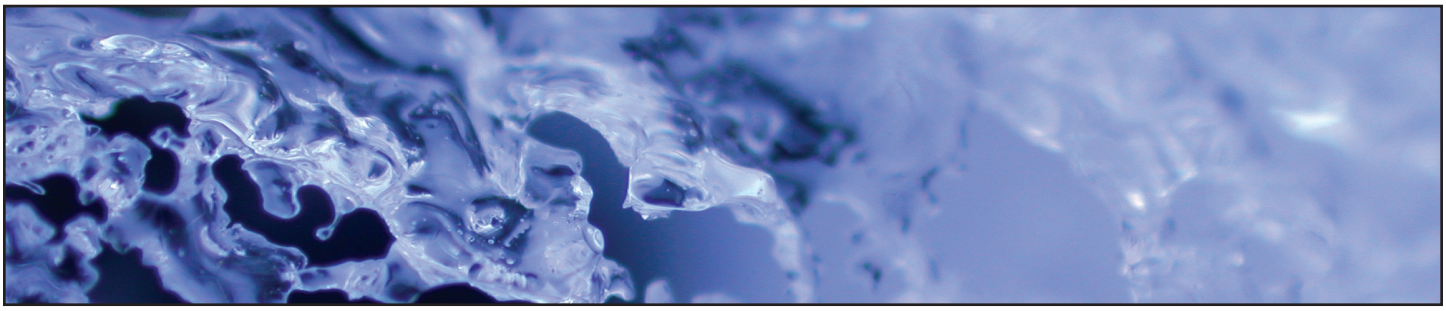
APPLICATIONS

- New developments and retrofits
- Utility yards
- Streets and roadways
- Parking lots
- Pre-treatment for filters, infiltration and storage
- Industrial and commercial facilities
- Wetlands protection

DOWNSTREAM DEFENDER COMPONENTS

1. **Central Access Port**
2. **Floatables Access Port (6-ft., 8-ft. and 10-ft. models only)**
3. **Dip Plate**
4. **Tangential Inlet**
5. **Center Shaft**
6. **Center Cone**
7. **Benching Skirt**
8. **Floatables Lid**
9. **Outlet Pipe**
10. **Floatables Storage**
11. **Isolated Sediment Storage Zone**





Operation

INTRODUCTION

The Downstream Defender operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The Downstream Defender has been designed to allow for easy and safe access for inspection/monitoring and clean-out procedures. Entry into the unit or removal of the internal components is not necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

POLLUTANT CAPTURE AND RETENTION

The internal components of the Downstream Defender have been designed to protect the oil, floatables and sediment storage volumes so that separator performance is not reduced as pollutants accumulate between clean-outs. Additionally, the Downstream Defender is designed and installed into the storm drain system so that the vessel remains wet between storm events. Oil and floatables are stored on the water surface in the outer annulus separate from the sediment storage volume in the sump of the unit providing the option for separate oil disposal, and accessories such as adsorbant pads. Since the oil/floatables and sediment storage volumes are isolated from the active separation region, the potential for re-suspension and washout of stored pollutants between clean-outs is minimized.

WET SUMP

The sump of the Downstream Defender retains a standing water level between storm events. The water in the sump prevents stored sediment from solidifying in the base of the unit. The clean-out procedure becomes more difficult and labor intensive if the system allows fine sediment to dry-out and consolidate. Dried sediment must be manually removed by maintenance crews. This is a labor intensive operation in a hazardous environment.

BLOCKAGE PROTECTION

The Downstream Defender has large clear openings and no internal restrictions or weirs, minimizing the risk of blockage and hydraulic losses. In addition to increasing the system headloss, orifices and internal weirs can increase the risk of blockage within the unit.

Maintenance

OVERVIEW

The Downstream Defender protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the Downstream Defender. The Downstream Defender will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the Downstream Defender will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in Table 5.

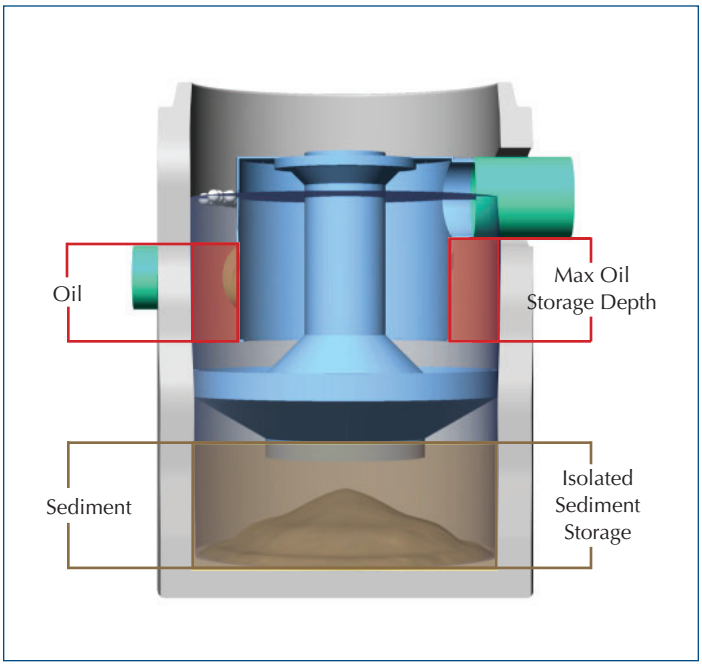


Figure 1: *Pollutant storage volumes of the Downswtream Defender*

The Downstream Defender allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole. On the 6-ft, 8-ft and 10-ft units, the floatables access port is above the outlet pipe between the concrete manhole wall and the dip plate. The sediment removal access ports for all Downstream Defender models are located directly over the hollow center shaft.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the Downstream Defender, nor do they require the internal components of the Downstream Defender to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

DETERMINING YOUR MAINTENANCE SCHEDULE

The frequency of cleanout is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil/flotables removal, for a 6-ft Downstream Defender typically takes less than 30 minutes and removes a combined water/oil volume of about 500 gallons.

INSPECTION PROCEDURES

Inspection is a simple process that does not involve entry into the Downstream Defender. Maintenance crews should be familiar with the Downstream Defender and its components prior to inspection.

SCHEDULING

- It is important to inspect your Downstream Defender every six months during the first year of operation to determine your site-specific rate of pollutant accumulation.
- Typically, inspection may be conducted during any season of the year

RECOMMENDED EQUIPMENT

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net
- Sediment probe (such as a Sludge Judge®)
- Trash bag for removed floatables
- Downstream Defender Maintenance Log

Table 1

Downstream Defender Pollutant Storage Capacities and Max. Cleanout Depths

Unit Diameter	Total Oil Storage	Oil Clean-out Depth	Total Sediment Storage	Sediment Clean-out Depth	Max. Liquid Volume Removed
(feet)	(gal.)	(inches)	(gal.)	(inches)	(gal.)
4	70	<16	141	<18	384
6	230	<23	424	<24	1239
8	525	<33	939	<30	2884
10	1050	<42	1,757	<36	5546

NOTES

1. Refer to Dowmstream Defender Clean-out Detail (Fig. 1) for measurement of depths.

2. Oil accumulation is typically less than sediment, however, removal of oil and sediment during the same service is recommended.

3. Remove floatables first, then remove sediment storage volume.

Figure 4

Figure 5

Figure 6

INSPECTION PROCEDURES

1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the lids to the manhole. Figure 4. (NOTE: The 4-ft Downstream Defender® will only have one lid).

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. See Figure 7 and 8 for typical inspection views.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the outer annulus of the chamber.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel. Figure 5.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

FLOATABLES AND SEDIMENT CLEANOUT

Floatables cleanout is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Figure 6.

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

SCHEDULING

- Floatables and sump cleanout are typically conducted once a year during any season.

- Floatables and sump cleanout should occur as soon as possible following a spill in the contributing drainage area

Figure 7: *View over Center Shaft into sediment storage Zone*

Figure 8: *View of outer annulus of floatables and oil collection zone*

RECOMMENDED EQUIPMENT

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- Downstream Defender Maintenance Log

FLOATABLES AND SEDIMENT CLEAN OUT PROCEDURES

1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the lids to the manhole (NOTE: The 4-ft Downstream Defender® will only have one lid).
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Using the Floatables Port for access, remove oil and floatables stored on the surface of the water with the vactor hose or the skimmer net. Figure 9.
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).
6. Once all floatables have been removed, drop the vactor hose to the base of the sump via the Central Access Port. Vactor out the sediment and gross debris off the sump floor. Figure 6.
7. Retract the vactor hose from the vessel.
8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
9. Securely replace the grate or lid.

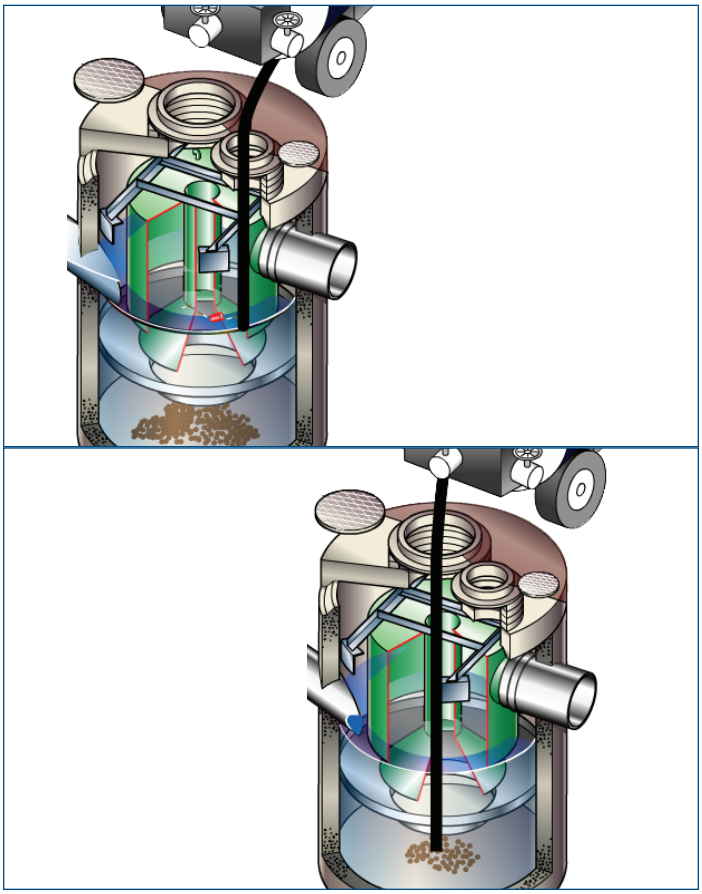


Figure 9: *Floatables and sediment are removed with a vactor hose*

Maintenance at a Glance

ACTIVITY	FREQUENCY
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most cleanouts it is not necessary to remove the entire volume of liquid in the vessel. Only removing the first few inches of oils/floatables and the sediment storage volume is required.	

Downstream Defender Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	**CONTRACTOR:**
CONTACT NAME:	**CONTACT NAME:**
COMPANY NAME:	**COMPANY NAME:**
ADDRESS:	**ADDRESS:**
TELEPHONE:	**TELEPHONE:**
FAX:	**FAX:**

INSTALLATION DATE: / /

MODEL (CIRCLE ONE): 4-FT 6-FT 8-FT 10-FT CUSTOM

Downstream Defender Inspection and Maintenance Log

DATE	INITIALS	DEPTH OF FLOATABLES AND OILS	SEDIMENT DEPTH MEASURED	VOLUME OF SEDIMENT REMOVED	SITE ACTIVITY AND COMMENTS

Hydro International

www.hydrointernational.biz

United Kingdom

Shearwater House • Clevedon Hall Estate
Victoria Road • Clevedon, BS21 7RD
Tel: +44 (0) 1275 878371
Fax: +44 (0) 1275 874979

United States

94 Hutchins Drive
Portland, ME 04102
Tel: 207 756 6200
Fax: 207 756 6212

Ireland

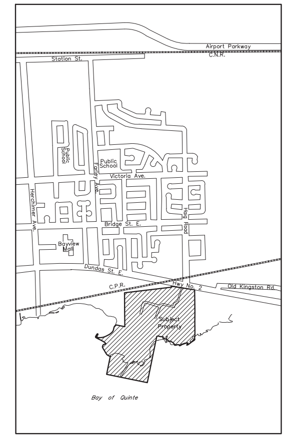
Tootenhill House
Rathcoole • Co Dublin
Tel: +353 (0)1 4013964
Fax: +353 (0)1 4013978

USDD0406

APPENDIX F

Engineering Drawings

Drawing Name		Drawing Number
Cover Page	Land Use	DUN/621-00
General Servicing Plan	Overall Development	DUN/621-01
General Servicing Plan	West Portion of Site	DUN/621-01A
General Servicing Plan	Middle Portion of Site	DUN/621-01B
General Servicing Plan	South Portion of Site	DUN/621-01C
General Servicing Plan	East Portion of Site	DUN/621-01D1
General Servicing Plan	Ex. Dwellings to East of Site	DUN/621-01D2
Plan / Profile Sanitary Easement	Sta. 0+000 to 0+240	DUN/621-P1
Plan / Profile Road A - South	Sta. 0+000 to 0+270	DUN/621-P2
Plan / Profile Road A - South	Sta. 0+270 to 0+460	DUN/621-P3
Outflow to Bay of Quinte	Sta. 0+300 to 0+400	
Plan / Profile Middle Driveway	Sta. 0+000 to 0+220	DUN/621-P4
Plan / Profile Middle Driveway	Sta. 0+220 to 0+360	DUN/621-P5
Plan / Profile Road A - North	Sta. 0+000 to 0+320	DUN/621-P6
Plan / Profile Road A - North	Sta. 0+320 to 0+420	DUN/621-P7
Plan / Profile Road A	Sta. 0+000 to 0+300	DUN/621-P8
Plan / Profile Road A – South Driveway	Sta. 0+000 to 0+360	DUN/621-P9
Plan / Profile Road A – Interim Water Service	Sta. 0+000 to 0+220	DUN/621-P10
Plan / Profile Watermain Easement	Sta. 0+000 to 0+220	DUN/621-P11



KEY PLAN

NOT TO SCALE

LEGAL DESCRIPTION

PART of LOTS 12 and 13, CONCESSION 1
PART of LOTS 11, 12 and 13,
BROKEN FRONT CONCESSION
WATER LOTS lying in front of LOTS 11 and 12,
BROKEN FRONT CONCESSION
AND PART of the ROAD ALLOWANCE BETWEEN
BROKEN FRONT CONCESSION and CONCESSION 1
CITY OF BELLEVILLE, THURLOW WARD
COUNTY OF HASTINGS

OWNER

2255718 ONTARIO INC.

DRAWING LIST

DRAWING	DRAWING NUMBER
COVER PAGE	Dun/621-00
LAND USE	
GENERAL SERVICING PLAN OVERALL DEVELOPMENT	Dun/621-01
GENERAL SERVICING PLAN WEST PORTION OF SITE	Dun/621-01A
GENERAL SERVICING PLAN MIDDLE PORTION OF SITE	Dun/621-01B
GENERAL SERVICING PLAN SOUTH PORTION OF SITE	Dun/621-01C
GENERAL SERVICING PLAN EAST PORTION OF SITE	Dun/621-01D
PLAN / PROFILE SANITARY EASEMENT STA. 0+000 to 0+200	Dun/621-P1
PLAN / PROFILE ROAD A – SOUTH STA. 0+000 to 0+270	Dun/621-P2
PLAN / PROFILE ROAD A – SOUTH STA. 0+270 to 0+460	Dun/621-P3
PLAN / PROFILE OUTFLOW to BAY of QUINTE STA. 0+300 to 0+400	
PLAN / PROFILE MIDDLE DRIVEWAY STA. 0+000 to 0+220	Dun/621-P4
PLAN / PROFILE MIDDLE DRIVEWAY STA. 0+220 to 0+360	Dun/621-P5
PLAN / PROFILE ROAD A – NORTH STA. 0+000 to 0+320	Dun/621-P6
PLAN / PROFILE ROAD A – NORTH STA. 0+320 to 0+420	Dun/621-P7
PLAN / PROFILE ROAD A STA. 0+000 to 0+300	Dun/621-P8
PLAN / PROFILE SOUTH DRIVEWAY STA. 0+000 to 0+360	Dun/621-P9
PLAN / PROFILE ROAD A – Interim Water Service STA. 0+140 TO BAY OF QUINTE	Dun/621-P10
PLAN / PROFILE WATERMAIN EASEMENT STA. 0+000 to 0+200	Dun/621-P11
SANITARY SEWER DESIGN DRAINAGE AREA PLAN & PIPE NETWORK	Dun/621-Sa1
SANITARY SEWER DESIGN GRAVITY vs PIPED SYSTEMS	Dun/621-Sa2
STORM SEWER DESIGN DRAINAGE AREA PLAN & PIPE NETWORK	Dun/621-St1
STORM SEWER DESIGN HAIG ROAD SUB-CATCHMENT	Dun/621-St2
STORM SEWER DESIGN PRE-DEVELOPMENT OVERLAND FLOW ROUTE 100yr STORM EVENT	Dun/621-St3
STORM SEWER DESIGN POST-DEVELOPMENT OVERLAND FLOW ROUTE 100yr STORM EVENT	Dun/621-St4
STORM SEWER DESIGN STORMWATER MANAGEMENT AREAS	Dun/621-SWM1
WATERMAIN DESIGN PIPE NETWORK	Dun/621-W1

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621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

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JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

R E V I S I O N S

SCALE: 1:1500
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 8/24 PROVINCE OF ONTARIO REGISTERED

COVER PAGE
DRAWING Dun/621-00

DRAWING: 621 Dundas St_24-01-08.dwg

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REVISIONS

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DRAWN: S.D.S.
DATE: 22/02/22
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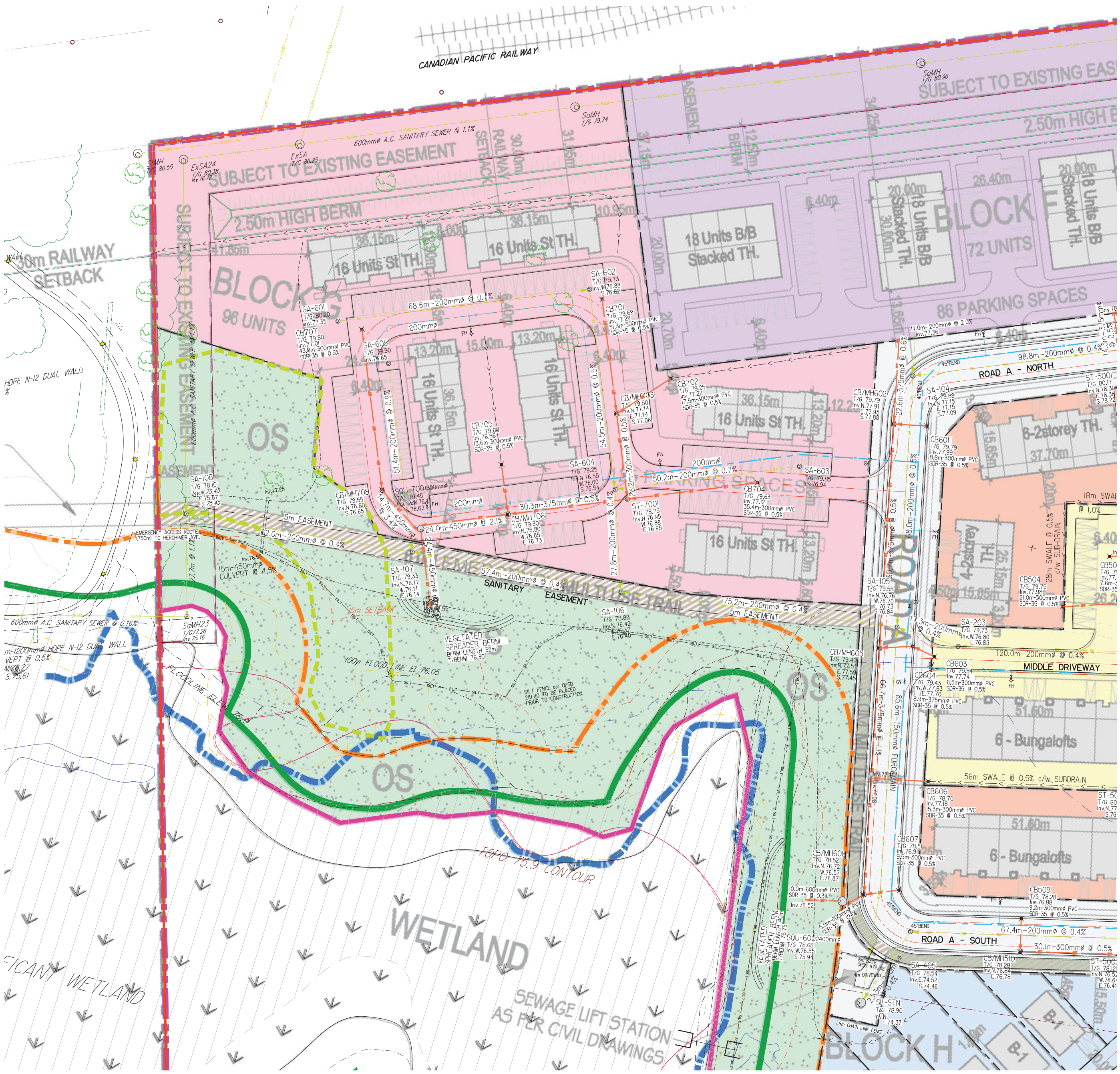
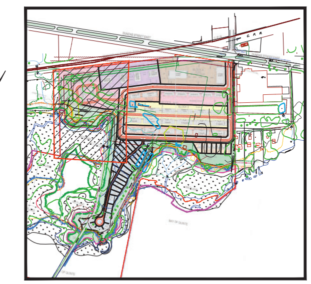
A. H. VROOMEN — Jan. 18/24

GENERAL SERVICING PLAN
OVERALL DEVELOPMENT
DRAWING Dun/621-01

DRAWING: 621 Dundas St_24-01-08.dwg





DRAWING KEY PLAN

BENCH MARK

BM ELEV. 85.926
TOP NUT OF FIRE HYDRANT
EAST SIDE HAIG RD NORTH OF DUNDAS ST EAST

BM ELEV. 85.774
TOP NUT OF FIRE HYDRANT
SOUTH SIDE OF DUNDAS ST EAST SOUTH OF HAIG RD

NOTES

SEE DRAWING CME/E-D1 FOR CONSTRUCTION NOTES AND DETAILS

LEGEND

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EXISTING GROUND ELEVATION	ELEV		
FINISHED GROUND ELEVATION		ELEV OR ELEV (ELEV)	ELEV
SWALE ELEVATION	(ELEV)	(ELEV)	(ELEV)
SWALE			
MAINTENANCE HOLE	SA/ST	SA/ST	SA/ST
CATCH BASIN	CB	CB	CB
DITCH INLET	DI	DI	DI
SANITARY SEWER	ExSA	SA	SA
SAN. LATERAL c/w CLEAN-OUT	S	S	S
STORM SEWER	ExST	ST	ST
STORM RESIDENTIAL LATERAL	ExST	S	S
WATERMAIN			
WATERMAIN VERTICAL DEFLECTION			
WATER LATERAL c/w CURB STOP			
GATE VALVE	GV	GV	GV
BLOW OFF	B/O	B/O ASSEMBLY c/w 50mmø PIPING	B/O
FIRE HYDRANT	FH	FH	FH
UTILITY POLE			
UTILITY POLE/LIGHT STANDARD			
POLE MOUNT TRANSFORMER			
PAD MOUNT TRANSFORMER			
STREETLIGHT PEDESTAL	SP	SP	SP
SWITCHING KIOSK	SK	SK	SK
BELL PEDESTAL	B	B	B
BELL GRADE LEVEL BOX	B/GB	B/GB	B/GB
CABLE PEDESTAL	C	C	C
ELECTRICAL SERVICE			
COMMUNITY MAIL BOX	CMB	CMB	CMB

ONLY WHEN NOT INSTALLED AS PROPOSED

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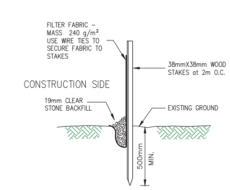

SILTATION FENCE
N.T.S.

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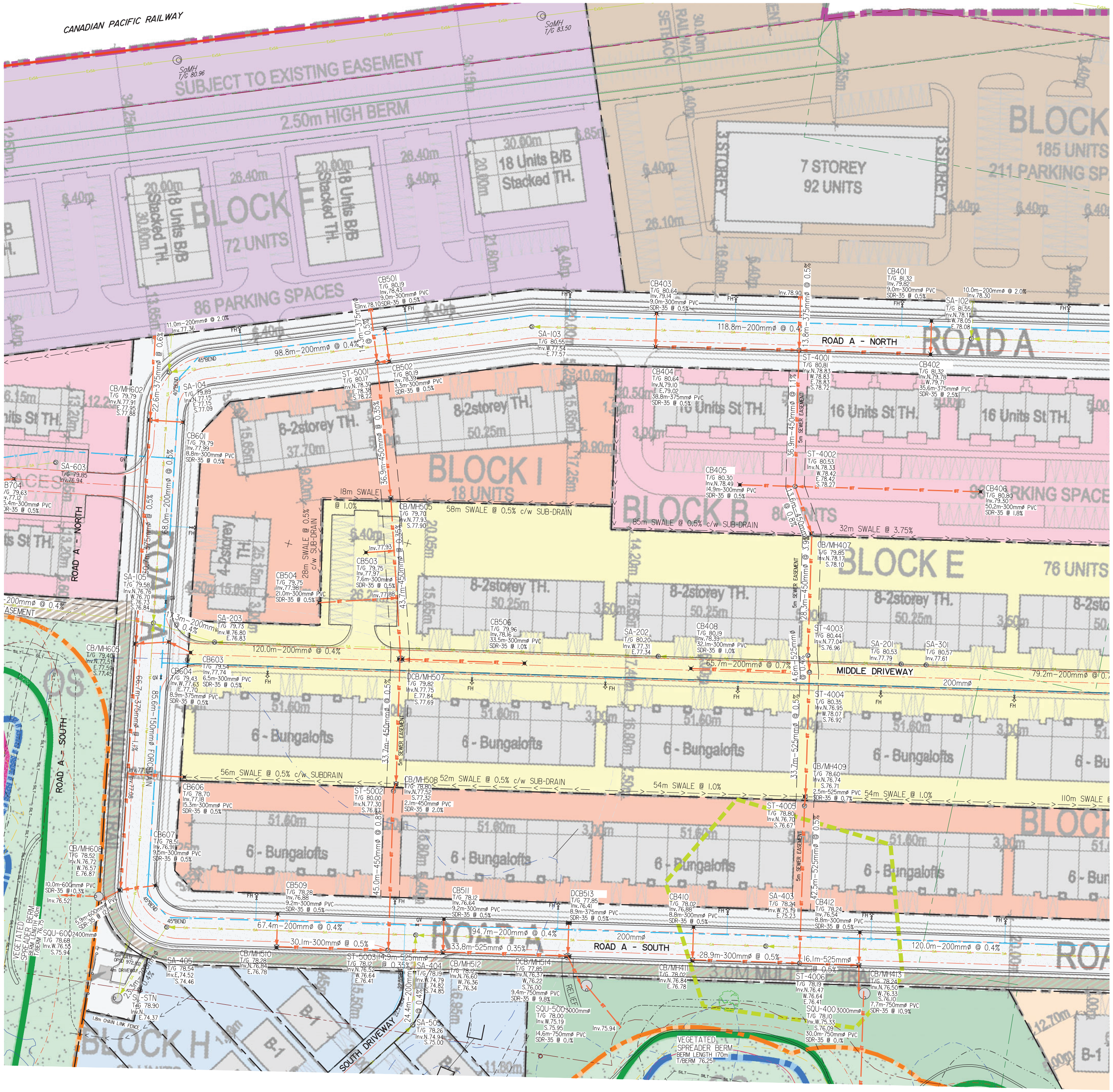
R E V I S I O N S

SCALE: 1:500
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER: \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

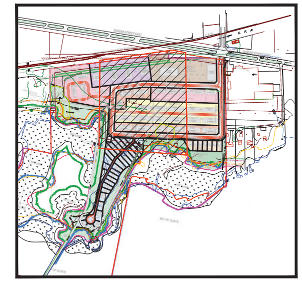
REGISTERED PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

GENERAL SERVICING PLAN
DRAWING Dun/621-01A

DRAWING: 621 Dundas St_24-01-08.dwg



DRAWING KEY PLAN



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BM ELEV. 85.926
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TOP NUT OF FIRE HYDRANT
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NOTES

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DITCH INLET	DI	DI	DI
SANITARY SEWER	ExSA	SA	SA
SAN. LATERAL c/w CLEAN-OUT	S	S	S
STORM SEWER	ExST	ST	ST
STORM RESIDENTIAL LATERAL	ExST	S	S
WATERMAIN			
WATERMAIN VERTICAL DEFLECTION			
WATER LATERAL c/w CURB STOP			
GATE VALVE	GV	GV	GV
BLOW OFF	B/O	B/O ASSEMBLY c/w 50mmø PIPING	B/O
FIRE HYDRANT	FH	FH	FH
UTILITY POLE			
UTILITY POLE/LIGHT STANDARD			
POLE MOUNT TRANSFORMER			
PAD MOUNT TRANSFORMER			
STREETLIGHT PEDESTAL	SP	SP	SP
SWITCHING KIOSK	SK	SK	SK
BELL PEDESTAL	B	B	B
BELL GRADE LEVEL BOX	B/GB	B/GB	B/GB
CABLE PEDESTAL	C	C	C
ELECTRICAL SERVICE			
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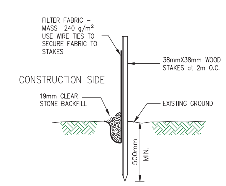

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R E V I S I O N S

SCALE: 1:500
DESIGNED: A.H.V.
DRAWN: S.D.S.
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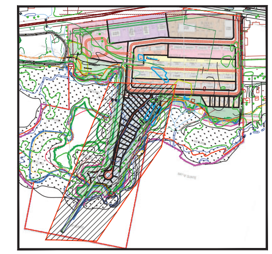
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

REGISTERED PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

GENERAL SERVICING PLAN
DRAWING Dun/621-01B

DRAWING: 621 Dundas St_24-01-08.dwg



DRAWING KEY PLAN

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EAST SIDE HAIG RD NORTH OF DUNDAS ST EAST

BM ELEV. 85.774
TOP NUT OF FIRE HYDRANT
SOUTH SIDE OF DUNDAS ST EAST SOUTH OF HAIG RD

NOTES

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CATCH BASIN	CB	CB	CB
DITCH INLET	DI	DI	DI
SANITARY SEWER			
SAN. LATERAL c/w CLEAN-OUT			
STORM SEWER			
STORM RESIDENTIAL LATERAL			
WATERMAIN			
WATERMAIN VERTICAL DEFLECTION			
WATER LATERAL c/w CURB STOP			
GATE VALVE	GV	GV	GV
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UTILITY POLE			
UTILITY POLE/LIGHT STANDARD			
POLE MOUNT TRANSFORMER			
PAD MOUNT TRANSFORMER			
STREETLIGHT PEDESTAL	SP	SP	SP
SWITCHING KIOSK	SK	SK	SK
BELL PEDESTAL	B	B	B
BELL GRADE LEVEL BOX	B/GB	B/GB	B/GB
CABLE PEDESTAL	C	C	C
ELECTRICAL SERVICE			
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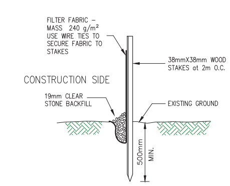

SILTATION FENCE
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621 DUNDAS STREET EAST
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JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

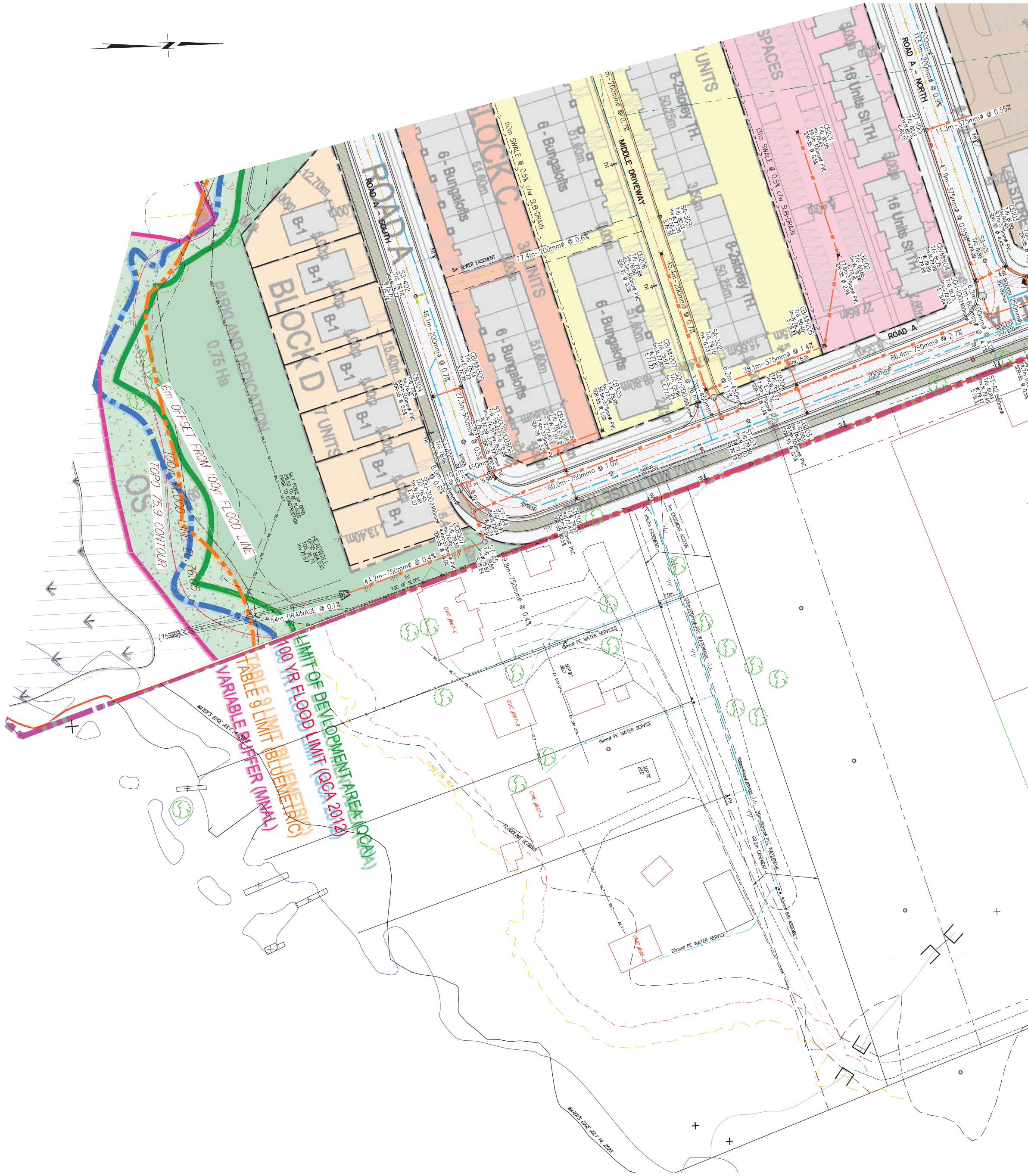
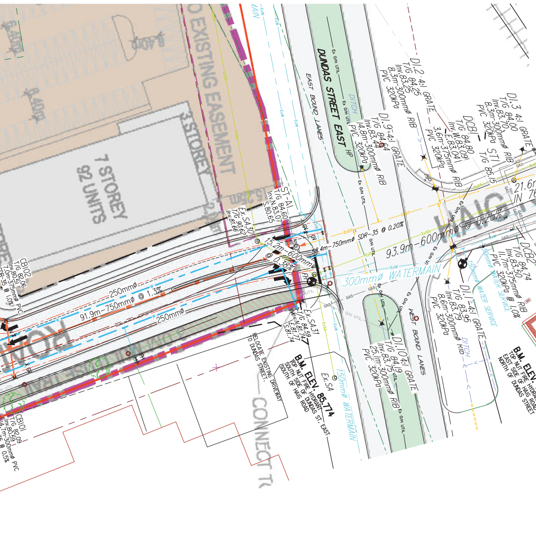
R E V I S I O N S

SCALE: 1:750
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER: \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

REGISTERED PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

GENERAL SERVICING PLAN
DRAWING Dun/621-OIC

DRAWING: 621 Dundas St_24-01-08.dwg

SEDIMENTATION & EROSION CONTROL MEASURES

PRIOR TO REMOVAL OF TOPSOIL OR EARTH, SEDIMENT CONTROL FENCE SHALL BE INSTALLED per OPSD. 219.110. THIS INCLUDES ALL DOWNSTREAM SLOPES ADJACENT TO ANY WORK AREAS AND STRAW BALE CHECK DAMS ALONG ANY DRAINAGE PATH.

STRAWBALE FILTER TO BE CONSTRUCTED AS PER S.C.S.2 OF ONTARIO GUIDELINES ON EROSION & SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES MAY 1987.

STRAWBALE SILT FENCE SHALL BE CHECKED REGULARILY AND MAINTAINED ACCORDINGLY.

TOPSOIL TO BE STRIPPED AND STOCK PILED PRIOR TO EXCAVATION.

TOPSOIL STOCK PILE TO BE ENCLOSED IN STRAWBALE SILTATION FENCE.

ALL DISTURBED AREAS TO BE TOPSOILED AND SEEDED WITH NATIVE GRASS SPECIES AS SOON AS POSSIBLE.

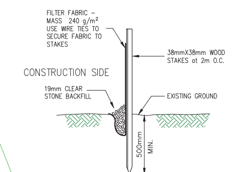
ALL CATCHBASINS TO HAVE FILTER CLOTH PLACED BELOW THE GRATES AS THEY ARE INSTALLED INCLUDING EXISTING CB's. CONTRACTOR TO MAINTAIN AND CLEAN AS NECESSARY UNTIL CONSTRUCTION HAS BEEN COMPLETED.

STORM POND SHALL BE CONSTRUCTED WITH NATIVE MATERIAL.

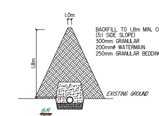
BOTTOM OF POND TO BE TOPSOILED TO A DEPTH OF 100mm THROUGH OUT.

POND BERM TO BE HYDRO SEEDED IMMEDIATELY AFTER CONSTRUCTION IS COMPLETED.

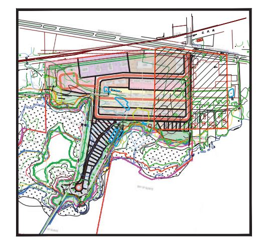
PRIOR TO DECOMMISSIONING THE SILTATION FENCE AND SILT DAMS, ALL SILT SHALL BE COLLECTED AND REMOVED FROM THE SITE.



SILTATION FENCE
N.T.S.



STANDARD DRAWING SD-WD-1001
MODIFIED TO SITE CONDITIONS



DRAWING KEY PLAN

BENCH MARK

BM ELEV. 85.926
TOP NUT OF FIRE HYDRANT
EAST SIDE HAIG RD NORTH OF DUNDAS ST EAST

BM ELEV. 85.774
TOP NUT OF FIRE HYDRANT
SOUTH SIDE OF DUNDAS ST EAST SOUTH OF HAIG RD

NOTES

SEE DRAWING CME/E-D1 FOR CONSTRUCTION NOTES AND DETAILS

LEGEND

DESCRIPTION — EXISTING — PROPOSED — AS-BUILT

EXISTING GROUND ELEVATION
FINISHED GROUND ELEVATION
SWALE ELEVATION
SWALE
MAINTENANCE HOLE
CATCH BASIN
DITCH INLET
SANITARY SEWER
SAN. LATERAL c/w CLEAN-OUT
STORM SEWER
STORM RESIDENTIAL LATERAL
WATERMAIN
WATERMAIN VERTICAL DEFLECTION
WATER LATERAL c/w CURB STOP
GATE VALVE
BLOW OFF
FIRE HYDRANT
UTILITY POLE
UTILITY POLE/LIGHT STANDARD
POLE MOUNT TRANSFORMER
PAD MOUNT TRANSFORMER
STREETLIGHT PEDESTAL
SWITCHING KIOSK
BELL PEDESTAL
BELL GRADE LEVEL BOX
CABLE PEDESTAL
ELECTRICAL SERVICE
COMMUNITY MAIL BOX

B/O ASSEMBLY c/w 50mmø PIPING

ONLY WHEN NOT INSTALLED AS PROPOSED

ALL ITALICIZED TEXT INDICATES EXISTING INFORMATION
ALL VERTICAL TEXT INDICATES PROPOSED INFORMATION
ALL UNDERSCORE TEXT INDICATES AS-CONSTRUCTED INFORMATION

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621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Chk'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
JAN. 8/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-04	S.D.S.	
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NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

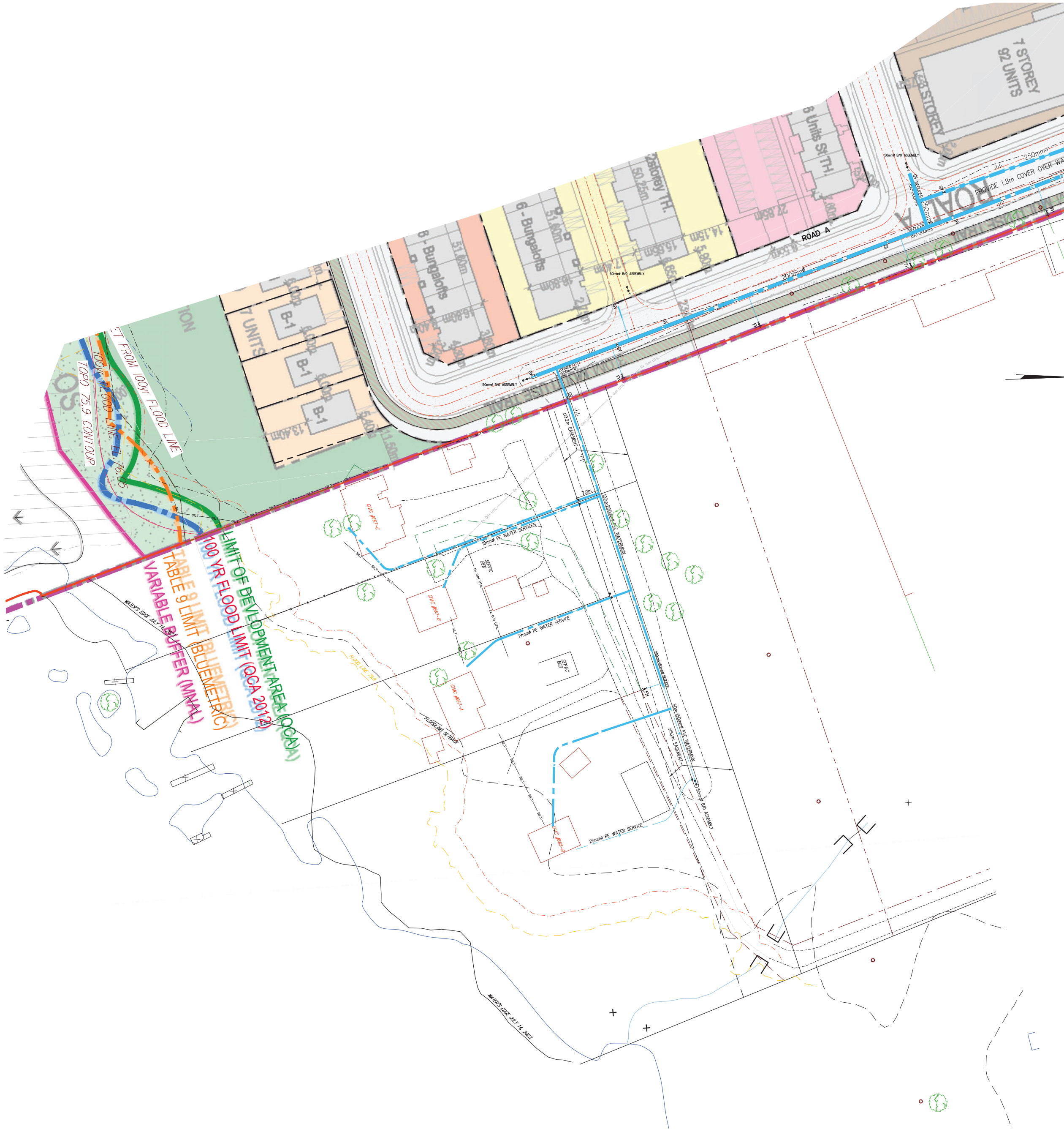
R E V I S I O N S

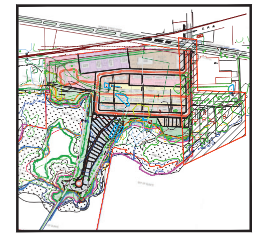
SCALE: 1:600
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

REGISTERED PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

GENERAL SERVICING PLAN
DRAWING Dun/621-01D1

DRAWING: 621 Dundas St_24-01-08.dwg





DRAWING KEY PLAN

BENCH MARK

BM ELEV. 85.926
TOP NUT OF FIRE HYDRANT
EAST SIDE HAIG RD NORTH OF DUNDAS ST EAST

BM ELEV. 85.774
TOP NUT OF FIRE HYDRANT
SOUTH SIDE OF DUNDAS ST EAST SOUTH OF HAIG RD

NOTES

SEE DETAIL DRAWING FOR CONSTRUCTION NOTES AND DETAILS

LEGEND

DESCRIPTION	EXISTING	PROPOSED	AS-BUILT
EXISTING GROUND ELEVATION	ELEV		
FINISHED GROUND ELEVATION		ELEV OR ELEV	ELEV
SWALE ELEVATION	(ELEV)	(ELEV)	(ELEV)
SWALE			
MAINTENANCE HOLE	SA/ST	SA/ST	SA/ST
CATCH BASIN	CB	CB	CB
DITCH INLET	DI	DI	DI
SANITARY SEWER	ExSA	SA	SA
SAN. LATERAL c/w CLEAN-OUT	S	S	S
STORM SEWER	ExST	ST	ST
STORM RESIDENTIAL LATERAL	ExST		S
WATERMAIN			
WATERMAIN VERTICAL DEFLECTION			
WATER LATERAL c/w CURB STOP			
GATE VALVE	GV	GV	GV
BLOW OFF	B/O	B/O ASSEMBLY c/w 50mmø PIPING	B/O
FIRE HYDRANT	FH	FH	FH
UTILITY POLE			
UTILITY POLE/LIGHT STANDARD			
POLE MOUNT TRANSFORMER			
PAD MOUNT TRANSFORMER			
STREETLIGHT PEDESTAL	SP	SP	SP
SWITCHING KIOSK	SK	SK	SK
BELL PEDESTAL	B	B	B
BELL GRADE LEVEL BOX	B/GB	B/GB	B/GB
CABLE PEDESTAL	C	C	C
ELECTRICAL SERVICE			
COMMUNITY MAIL BOX	CMB	CMB	CMB

ONLY WHEN NOT INSTALLED AS PROPOSED

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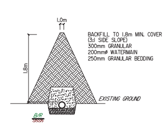
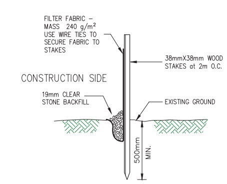
ALL VERTICAL TEXT INDICATES PROPOSED INFORMATION
ALL UNDERSCORE TEXT INDICATES AS-CONSTRUCTED INFORMATION



STANDARD DRAWING SD-WD-1001
MODIFIED TO SITE CONDITIONS



SILTATION FENCE
N.T.S.

SEDIMENTATION & EROSION CONTROL MEASURES

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621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Chk'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
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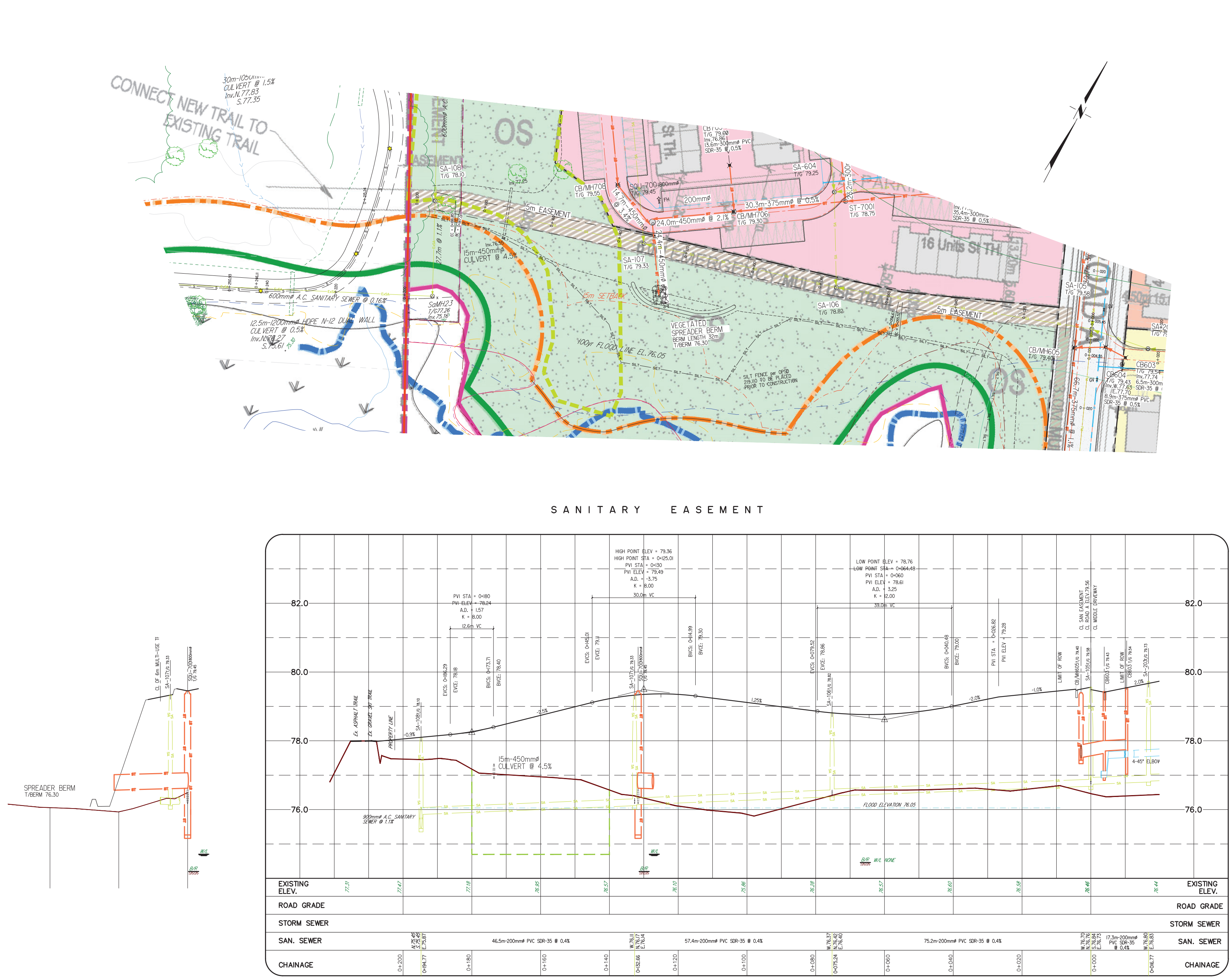
R E V I S I O N S

SCALE: 1:600
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

REGISTERED PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

GENERAL SERVICING PLAN
DRAWING Dun/621-OID2

DRAWING: 621 Dundas St._24-01-08.dwg


CONNECT NEW TRAIL TO EXISTING TRAIL
30m-1050mmø CULVERT @ 1.5%
Inv.N.77.83
S.77.35
600mmø A.C. SANITARY SEWER @ 0.16%
12.5m-1200mmø HDPE N-12 DUAL WALL CULVERT @ 0.5%
SaMH23
T/G77.26
Inv.75.16
15m-450mmø CULVERT @ 4.5%
5m EASEMENT
15m SETBACK
100yr FLOOD LINE EL.76.05
VEGETATED SPREADER BERM
BERM LENGTH 32m
T/BERM 76.30
SILT FENCE per OPSD 219.110 TO BE PLACED PRIOR TO CONSTRUCTION
SA-108
T/G 78.10
SA-107
T/G 79.33
SA-106
T/G 78.82
SA-105
T/G 79.58
SA-604
T/G 79.25
ST-7001
T/G 78.75
CB/MH706
T/G 79.30
CB/MH708
T/G 79.55
CB/MH605
T/G 79.49
CB603
CB604
16 Units St TH.
St TH.
OS
30.3m-375mmø @ 0.5%
24.0m-450mmø @ 2.1%
14.7m-450mmø @ 3.4%
24.4m-450mmø
SANITARY EASEMENT
HIGH POINT ELEV = 79.36
HIGH POINT STA = 0+125.01
PVI STA = 0+130
PVI ELEV = 79.49
A.D. = -3.75
K = 8.00
30.0m VC
LOW POINT ELEV = 78.76
LOW POINT STA = 0+064.48
PVI STA = 0+060
PVI ELEV = 78.61
A.D. = 3.25
K = 12.00
39.0m VC
PVI STA = 0+180
PVI ELEV = 78.24
A.D. = 1.57
K = 8.00
12.6m VC
FLOOD ELEVATION 76.05
900mmø A.C. SANITARY SEWER @ 1.1%
4-45° ELBOW
SPREADER BERM
T/BERM 76.30
EXISTING ELEV.
ROAD GRADE
STORM SEWER
SAN. SEWER
CHAINAGE
46.5m-200mmø PVC SDR-35 @ 0.4%
57.4m-200mmø PVC SDR-35 @ 0.4%
75.2m-200mmø PVC SDR-35 @ 0.4%
17.3m-200mmø PVC SDR-35 @ 0.4%
0+200
0+194.77
0+180
0+160
0+140
0+132.66
0+120
0+100
0+080
0+075.24
0+060
0+040
0+020
0+000
0+016.77
82.0
80.0
78.0
76.0

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83 North Park Street, Belleville, Ont. K8P 2Y6 Tel. 613-969-0171

621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Chk'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
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R E V I S I O N S

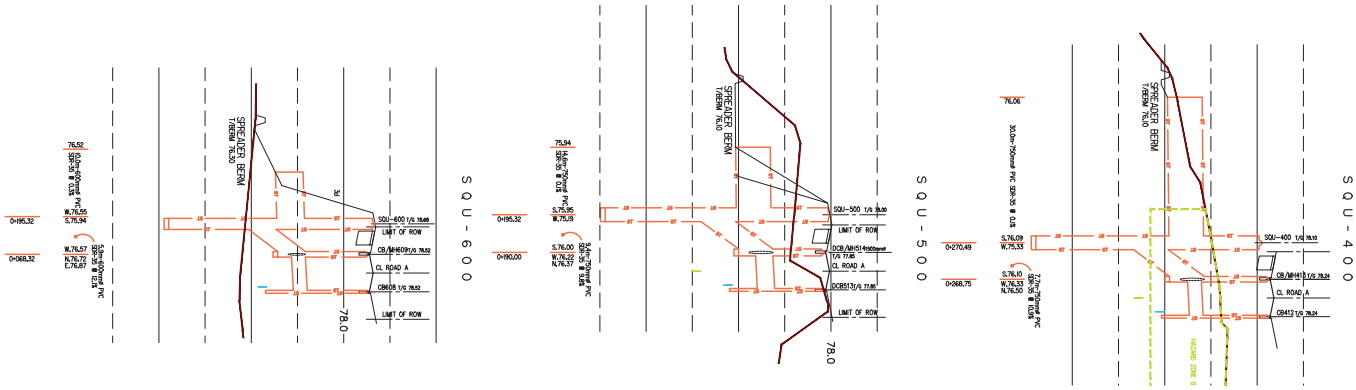
SCALE: H-1:500 V-1:50
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: JAN/23
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

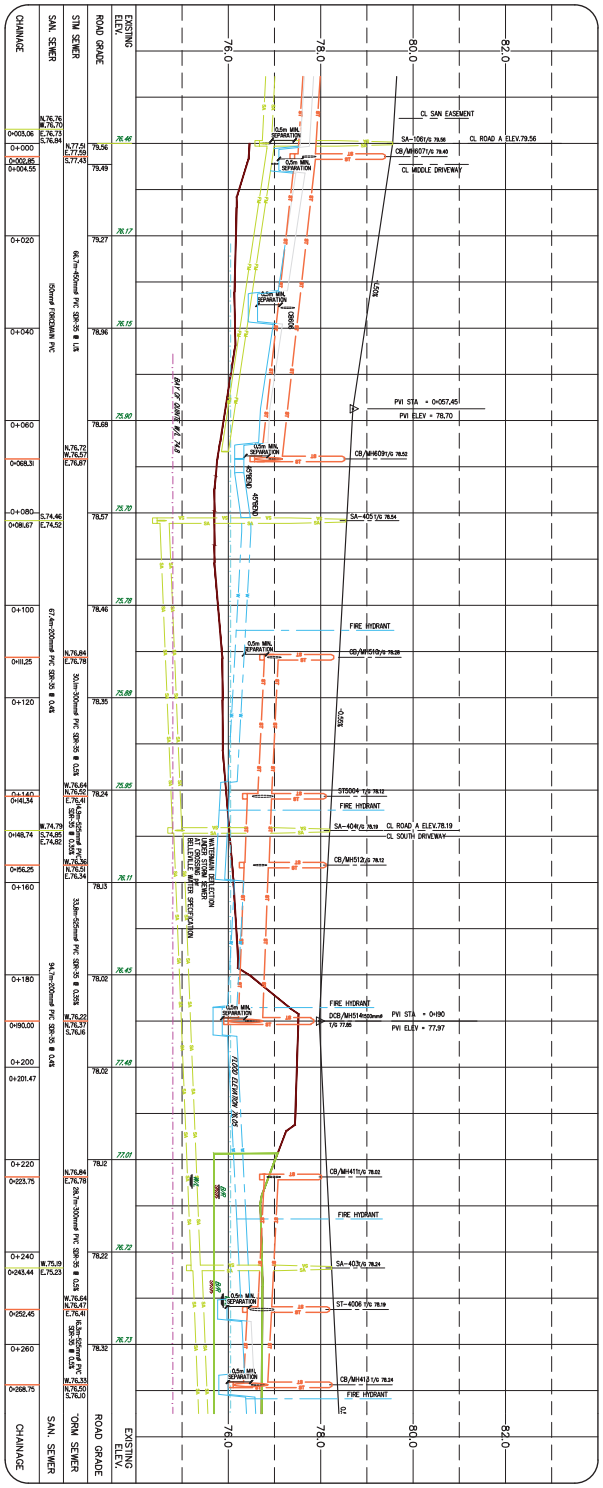
REGISTERED PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

PLAN / PROFILE
SANITARY EASEMENT

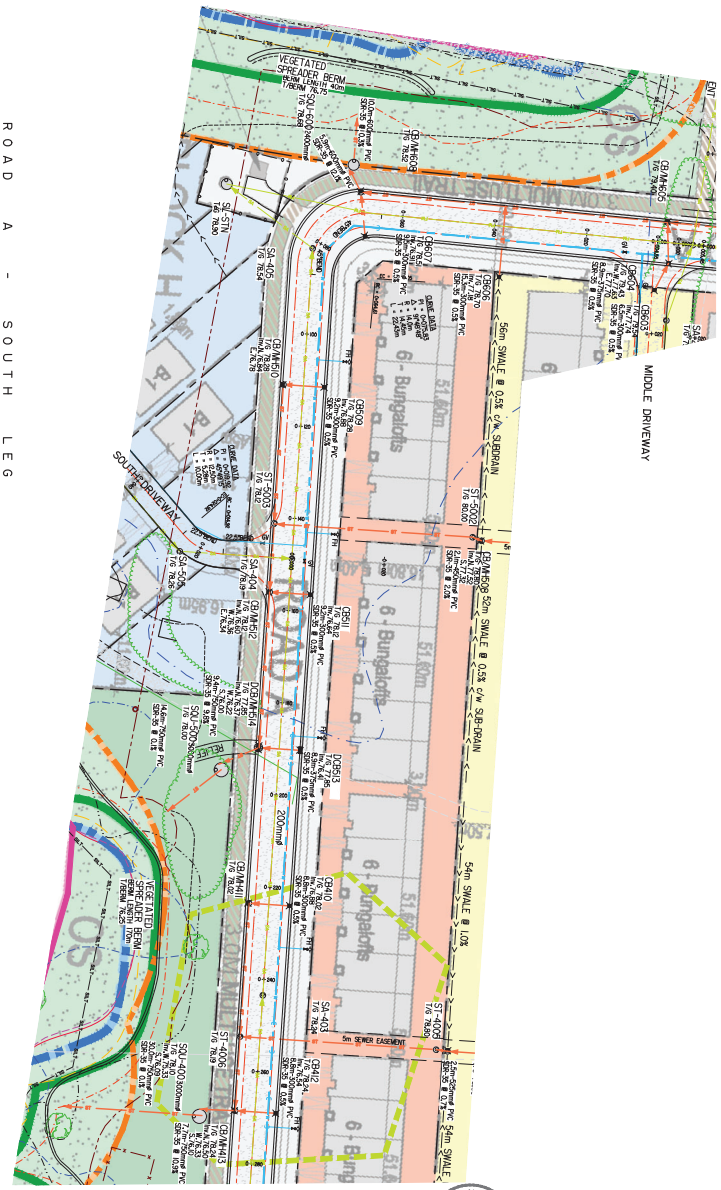
DRAWING Dun/621-P1

DRAWING: 621 Dundas St_24-01-08.dwg





ROAD A - SOUTH LEG



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621 DUNDAS STREET EAST
WEST OF HAIG ROAD
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REVISIONS

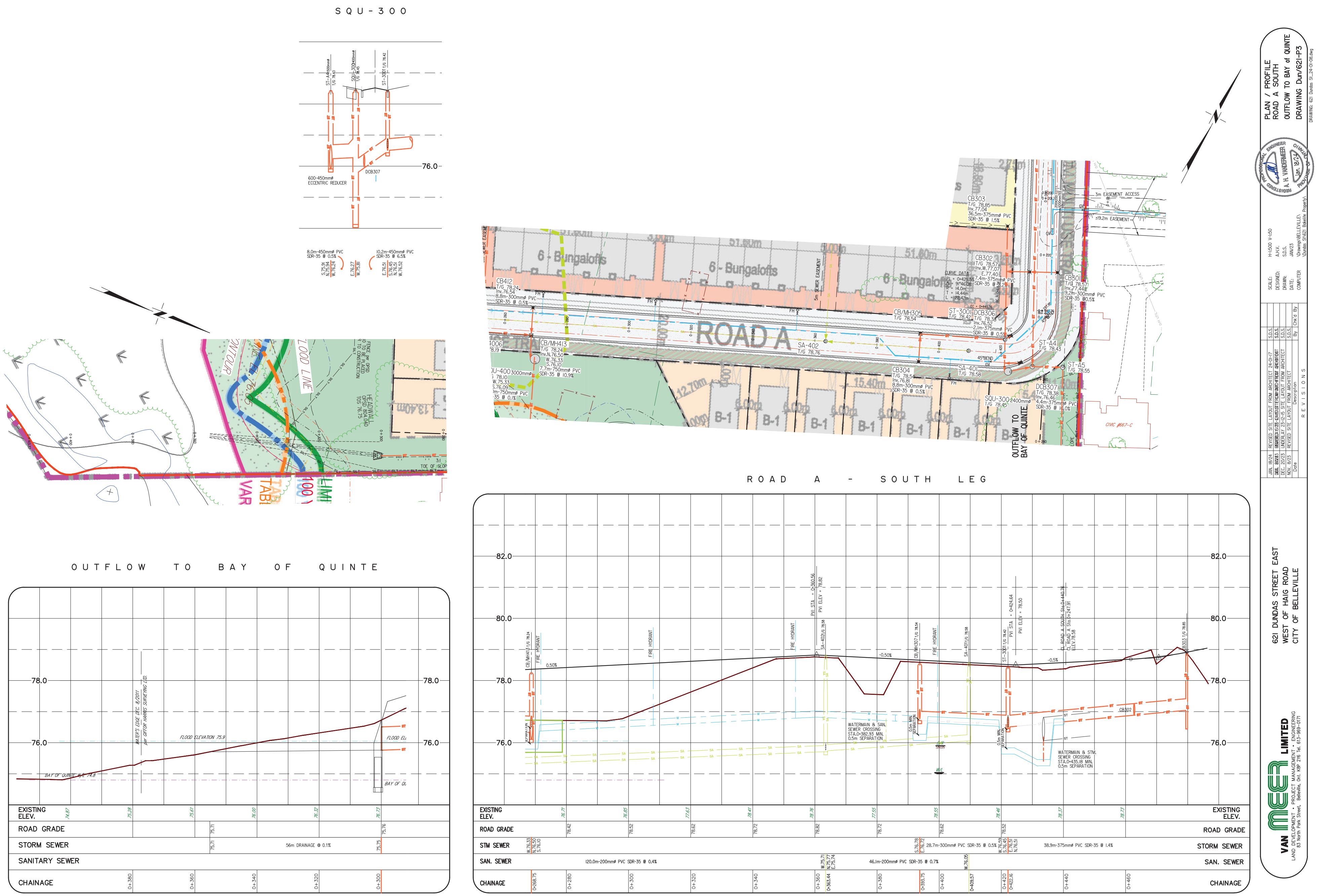
SCALE: H-1:500 V-1:50
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: JAN/23
COMPUTER: \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

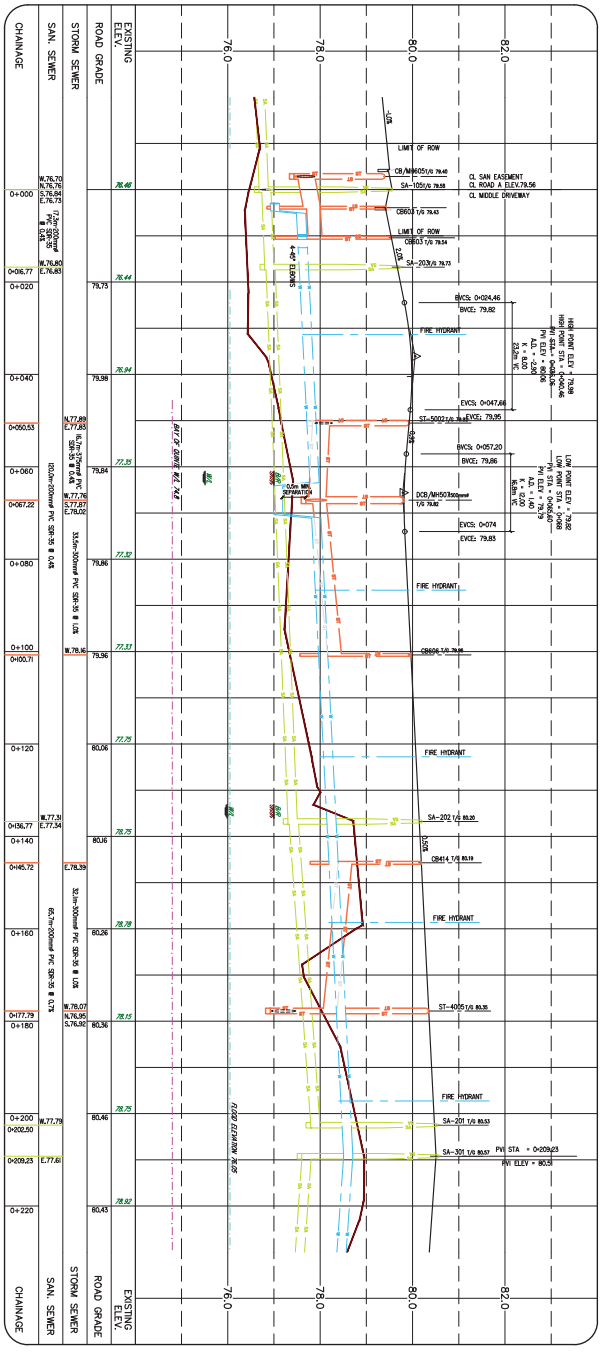
PROFESSIONAL ENGINEER PROVINCE OF ONTARIO
A. H. VINCENNES
Jan. 18/24

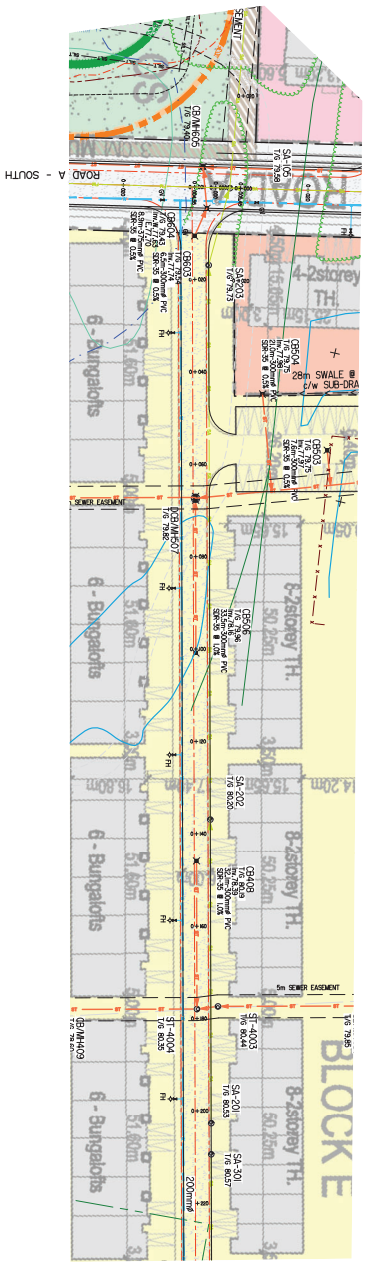
PLAN / PROFILE
ROAD A SOUTH

DRAWING Dun/621-P2

DRAWING: 621 Dundas St_24-01-08.dwg


SQU-300
ROAD A - SOUTH LEG
OUTFLOW TO BAY OF QUINTE
ROAD A
OUTFLOW TO BAY OF QUINTE
EXISTING ELEV.
ROAD GRADE
STORM SEWER
SANITARY SEWER
CHAINAGE
STM SEWER
SAN. SEWER
VAN MEER LIMITED
LAND DEVELOPMENT • PROJECT MANAGEMENT • ENGINEERING
83 North Park Street, Belleville, Ont. K8P 2Y6 Tel. 613-969-0171
621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE
REVISIONS
PLAN / PROFILE
ROAD A SOUTH
OUTFLOW TO BAY of QUINTE
DRAWING Dun/621-P3





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REVISIONS

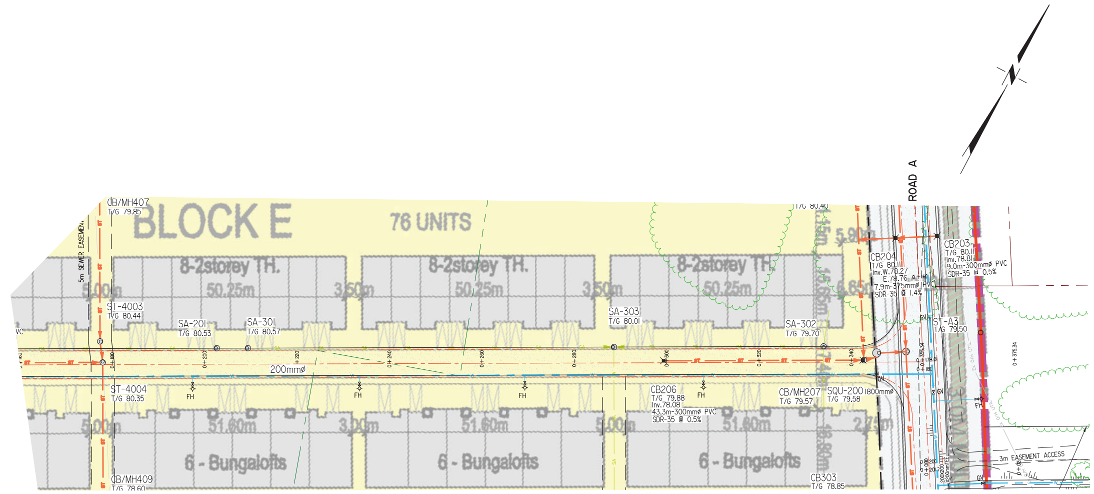
SCALE: H-1:500 V-1:50
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: JAN/23
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bubelle Property\

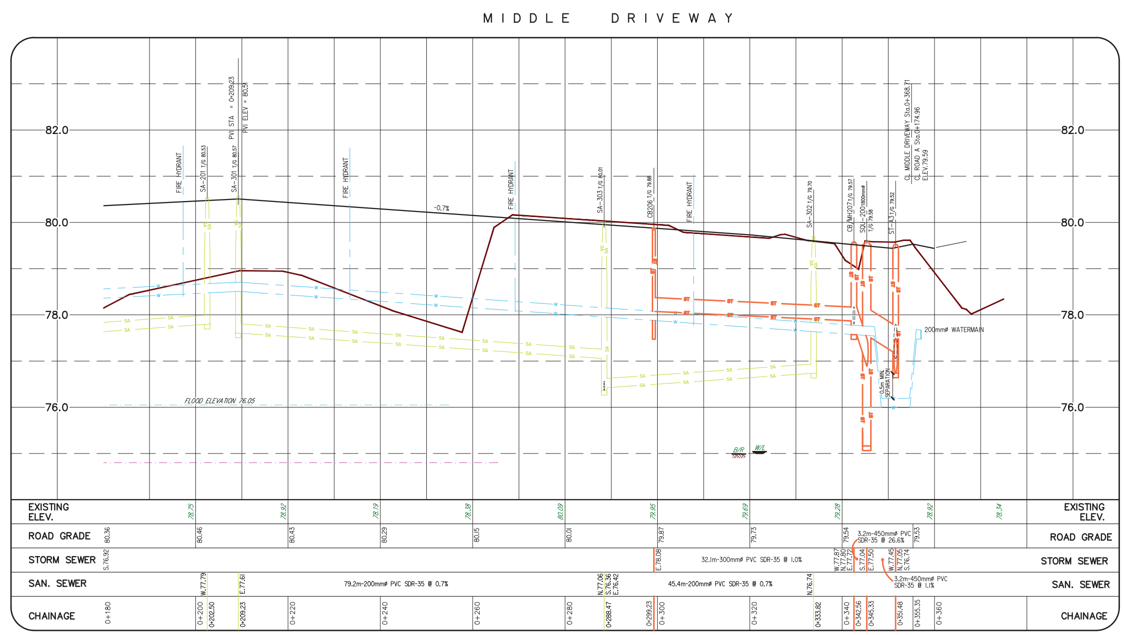
A. H. VINCKEMEIER — Jan. 18/24

PLAN / PROFILE
MIDDLE DRIVEWAY

DRAWING Dun/621-P4

DRAWING: 621 Dundas St_24-01-08.dwg





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R E V I S I O N S

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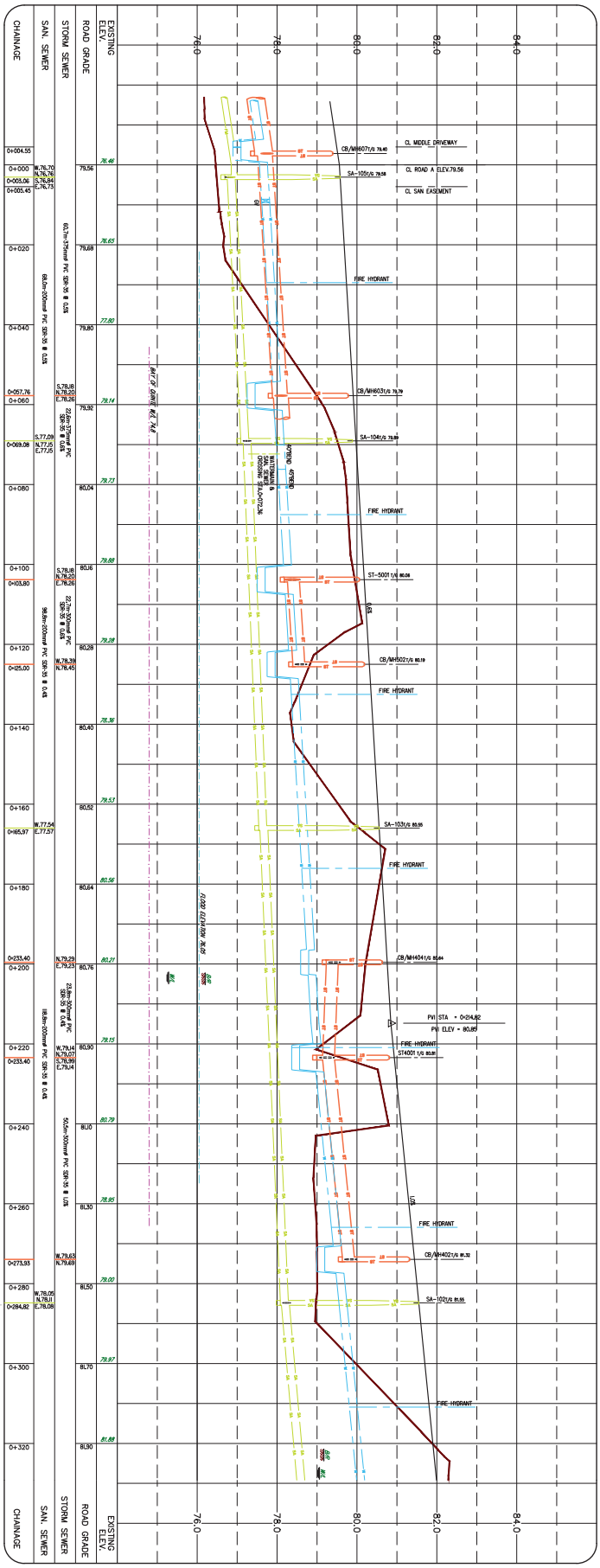
DRAWN: S.D.S.
DATE: JAN/23
COMPUTER: \Drawings\BELLEVILLE\Dundas St\621 Bleeker Property\

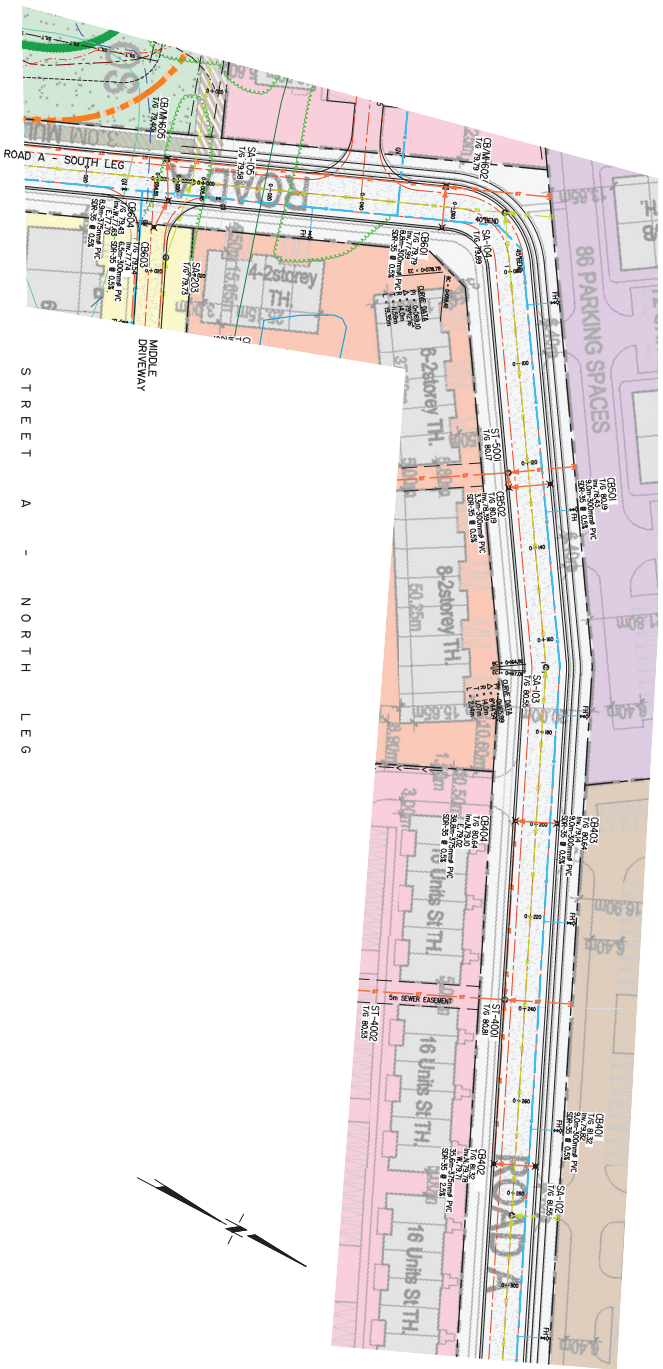
A. H. VANDERMEER — PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

PLAN / PROFILE
MIDDLE DRIVEWAY

DRAWING Dun/621-P5

DRAWING: 621 Dundas St._24-01-08.dwg





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DEC. 20/23	UNDERLAY 23-12-15 SITE LAYOUT FROM ARCHITECT	S.D.S.	
NOV. 8/23	REVISED SITE LAYOUT FROM ARCHITECT	S.D.S.	

REVISIONS

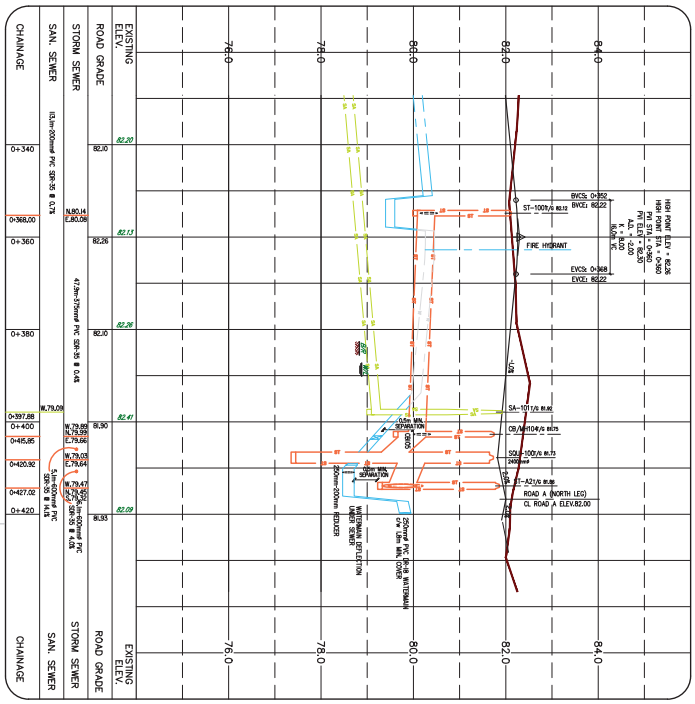
SCALE: H-1:500 V-1:50
DESIGNED: A.J.V.
DRAWN: S.D.S.
DATE: XX-JAN-18
COMPUTER: \Drawings\BELLEVILLE\ \Dundas St\621 Bataille Property\

Jan. 18/24

PLAN / PROFILE
ROAD A - NORTH
STA.0+000 to 0+320

DRAWING Dun/621-P6

DRAWING: 621 Dundas St_24-01-08.dwg



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83 North Park Street, Belleville, Ont. K8P 2Y6 Tel. 613-969-0171

621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

Date	Description	By	Chk'd By
JAN. 18/24	REVISED SITE LAYOUT FROM ARCHITECT 24-01-17	S.D.S.	
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REVISIONS

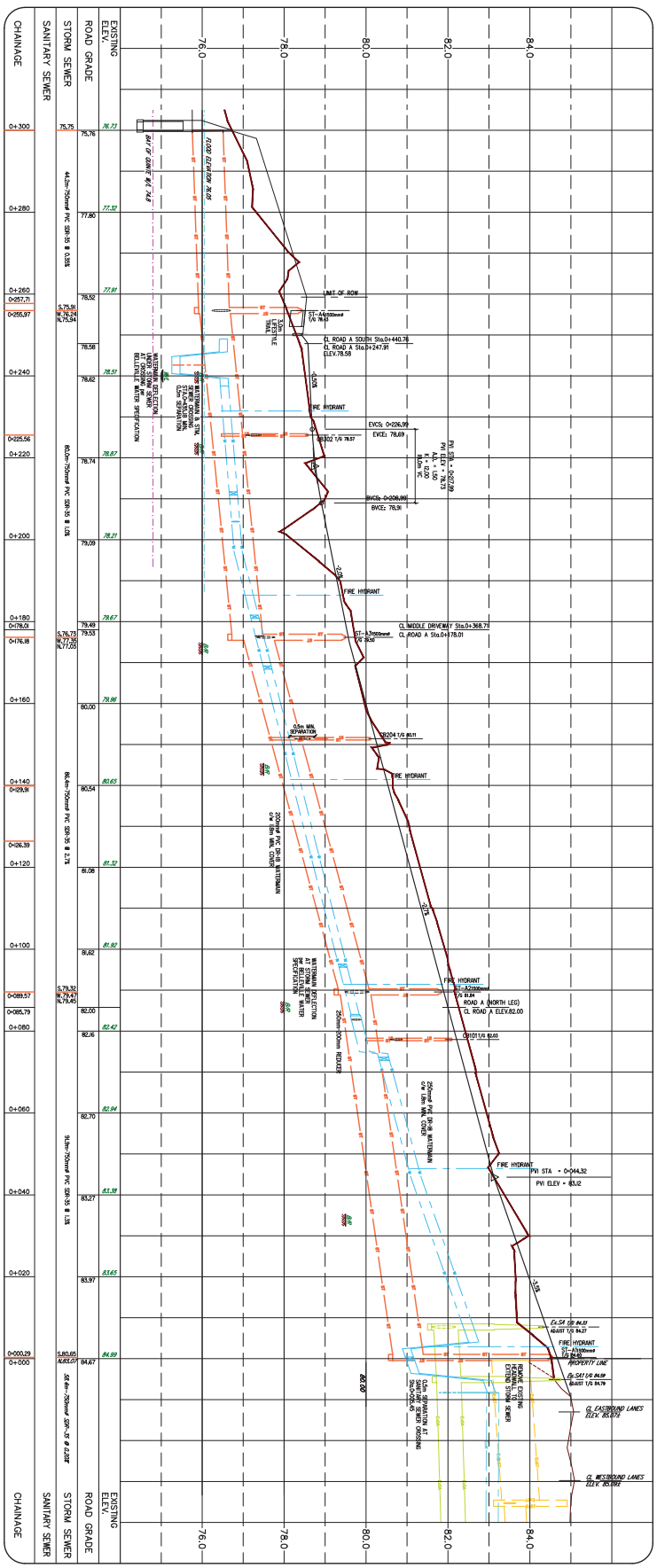
SCALE: H-1:500 V-1:50
DESIGNED: A.J.V.
DRAWN: S.D.S.
DATE: XX-JAN-18
COMPUTER: \Drawings\BELLEVILLE\ \Dundas St\621 Belleville Property\

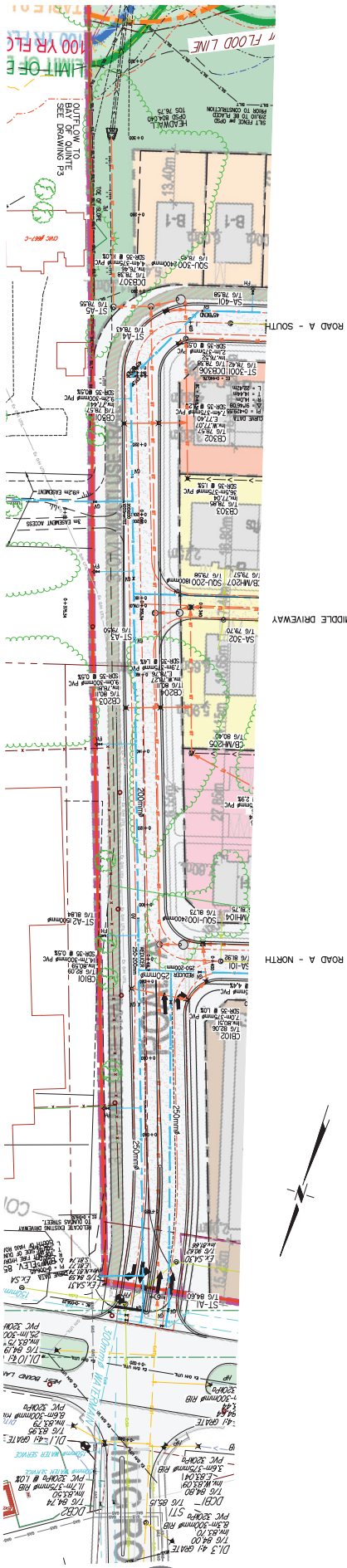
Jan. 18/24

PLAN / PROFILE
ROAD A - NORTH
STA.0+320 to 0+420

DRAWING Dun/621-P7

DRAWING: 621 Dundas St_24-01-08.dwg





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621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

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REVISIONS

SCALE: H-1:500 V-1:50
DESIGNED: A.J.V.
DRAWN: S.D.S.
DATE: XX-JAN-18
COMPUTER: \Drawings\BELLEVILLE\Dundas St\621 Belleville Property\

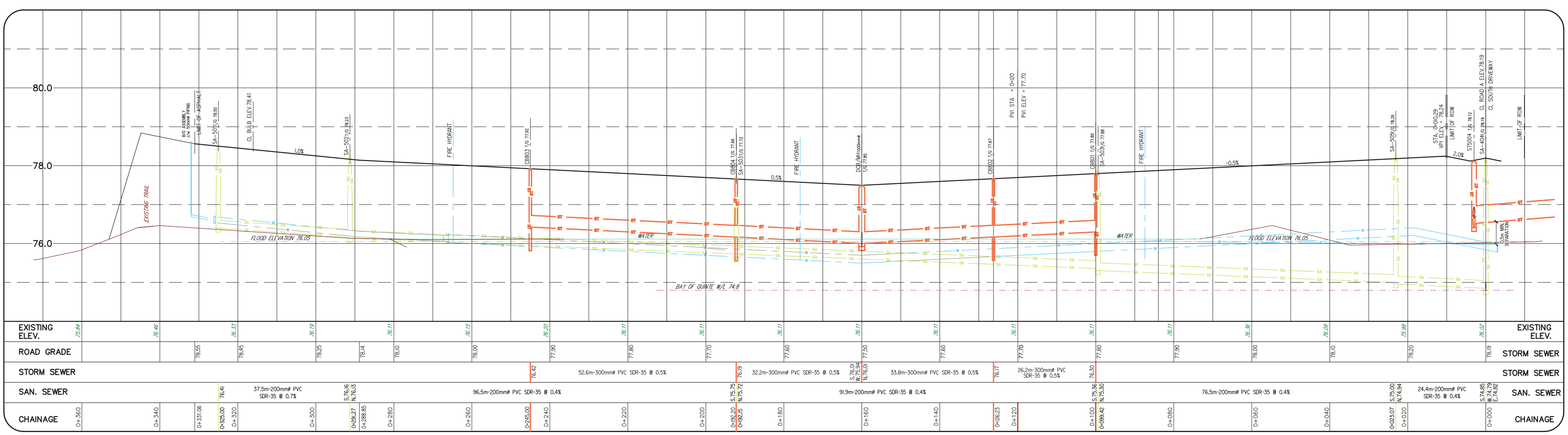
PLAN / PROFILE
ROAD A
STA. 0+000 to 0+300

DRAWING 621-P8

DRAWING 621 Dundas St_24-01-08.dwg


ROAD A
B-1
OS
15m OFFSET FROM WETLAND & 100yr FLOOD ELEVATION 76.05
6m OFFSET FROM 100yr FLOOD ELEVATION 76.05
VEGETATED BERM
BERM LENGTH 30m
T/BERM 76.20
EXISTING GRAVEL PATH
EXISTING GRAVEL DRIVEWAY
TOE OF SLOPE
CB804 T/G 77.66
CB801 T/G 77.80
SA-503 T/G 77.72
DCB/MH805 T/G 77.50
CB802 T/G 77.67
SA-504 T/G 77.88
CB803 T/G 77.92
SA-501 T/G 78.50
SA-502 T/G 78.23
R15.00m
200mmø
150mmø

SOUTH DRIVEWAY


80.0
78.0
76.0
EXISTING ELEV.
ROAD GRADE
STORM SEWER
SAN. SEWER
CHAINAGE
FLOOD ELEVATION 76.05
BAY OF QUINTE W/L 74.8
WATER
FIRE HYDRANT
EXISTING TRAIL
CL BULB ELEV.78.41
CL ROAD A ELEV.78.19
CL SOUTH DRIVEWAY
LIMIT OF ROW
PVI STA. = 0+120
PVI ELEV = 77.70
52.6m-300mmø PVC SDR-35 @ 0.5%
32.2m-300mmø PVC SDR-35 @ 0.5%
33.8m-300mmø PVC SDR-35 @ 0.5%
26.2m-300mmø PVC SDR-35 @ 0.5%
37.5m-200mmø PVC SDR-35 @ 0.7%
96.5m-200mmø PVC SDR-35 @ 0.4%
91.9m-200mmø PVC SDR-35 @ 0.4%
76.5m-200mmø PVC SDR-35 @ 0.4%
24.4m-200mmø PVC SDR-35 @ 0.4%

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621 DUNDAS STREET EAST
WEST OF HAIG ROAD
CITY OF BELLEVILLE

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REVISIONS

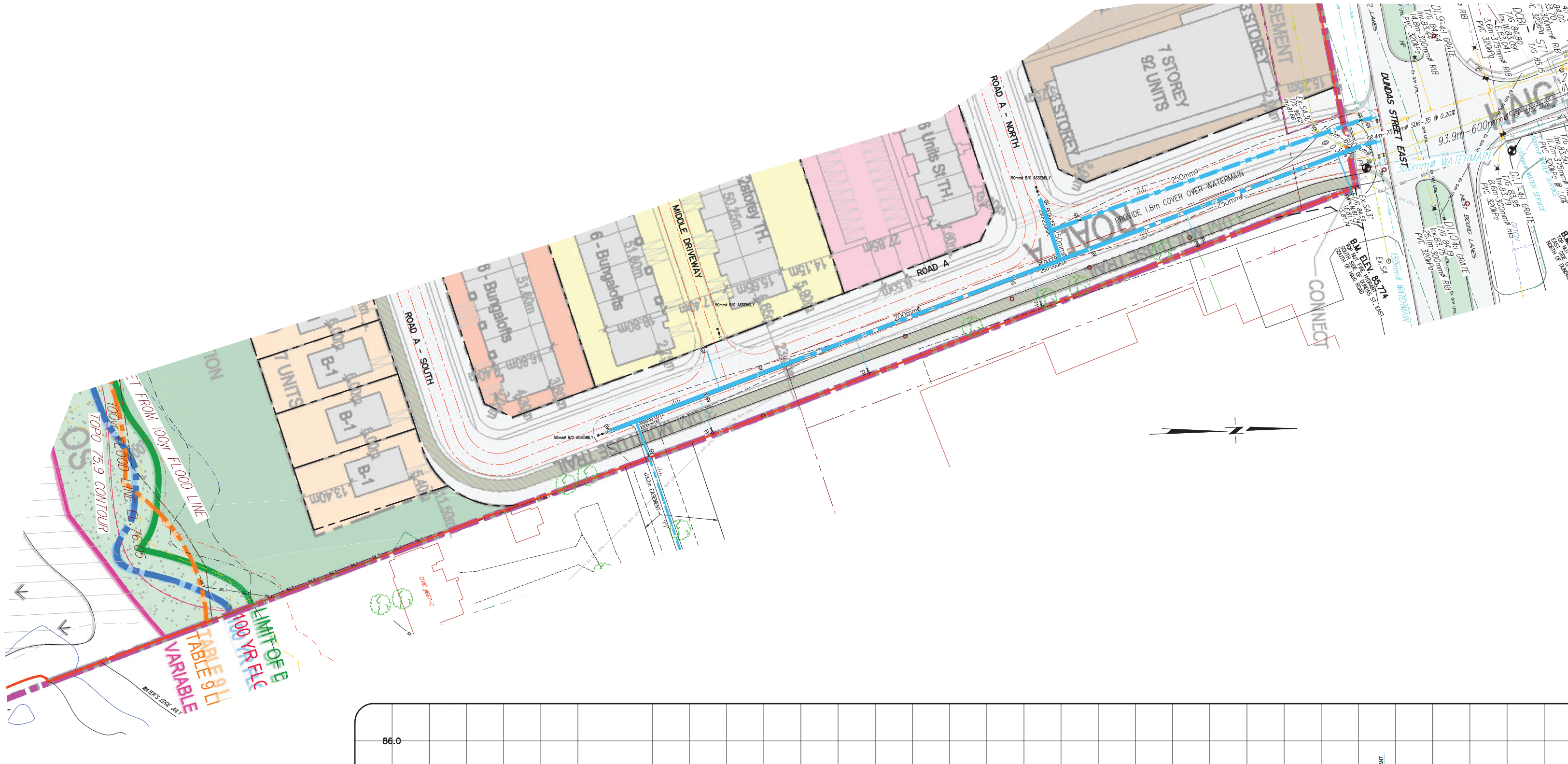
SCALE: H-1:500 V-1:50
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: JAN/23
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property\

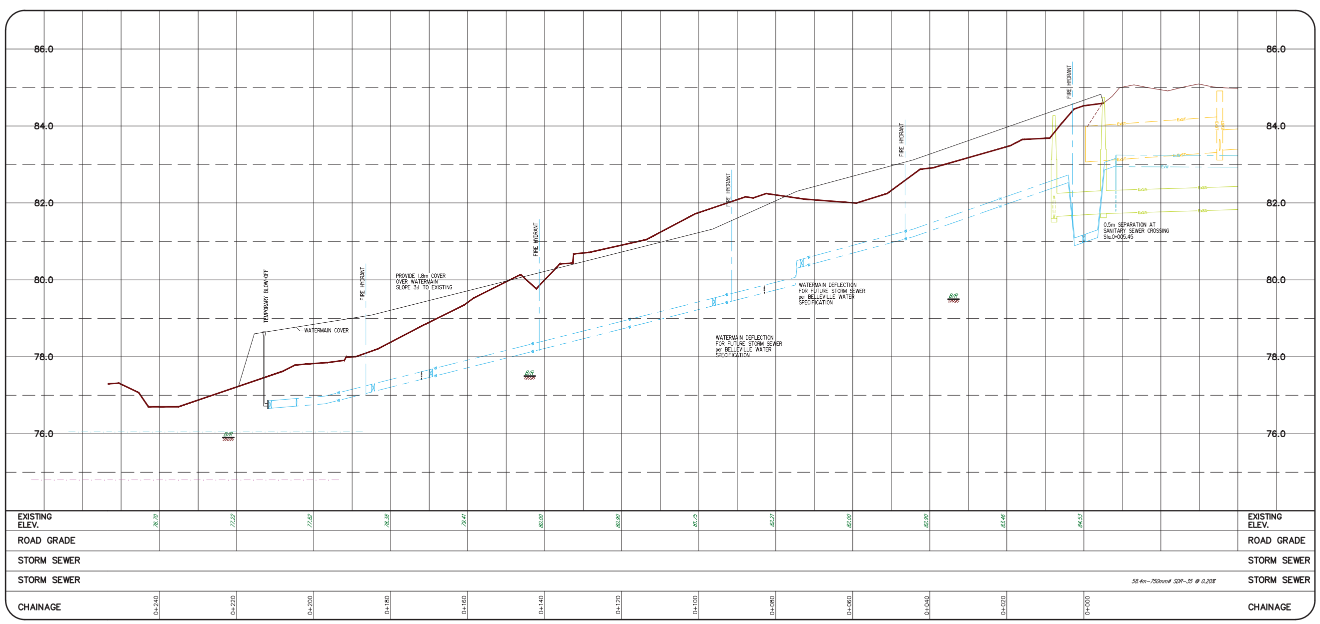
REGISTERED PROFESSIONAL ENGINEER
A. H. VANDERMEER
Jan. 18/24
PROVINCE OF ONTARIO

PLAN / PROFILE
SOUTH DRIVEWAY

DRAWING Dun/621-P9

DRAWING: 621 Dundas St_24-01-08.dwg


DUNDAS STREET EAST
ROAD A
ROAD A - NORTH
ROAD A - SOUTH
MIDDLE DRIVEWAY
7 STOREY
92 UNITS
3 STOREY
6 Units St.TH.
2storey TH.
6 - Bungalofts
B-1
7 UNITS
CONNECT
PROVIDE 1.8m COVER OVER WATERMAIN
LIMIT OF D
100 YR FLO
TABLE 9 LI
VARIABLE
TOPO 75.9 CONTOUR
100yr FLOOD LINE
B.M. ELEV. 85.774


86.0
84.0
82.0
80.0
78.0
76.0
FIRE HYDRANT
TEMPORARY BLOW-OFF
WATERMAIN COVER
PROVIDE 1.8m COVER OVER WATERMAIN SLOPE 3:1 TO EXISTING
WATERMAIN DEFLECTION FOR FUTURE STORM SEWER per BELLEVILLE WATER SPECIFICATION
0.5m SEPARATION AT SANITARY SEWER CROSSING
EXISTING ELEV.
ROAD GRADE
STORM SEWER
STORM SEWER
CHAINAGE
0+240
0+220
0+200
0+180
0+160
0+140
0+120
0+100
0+080
0+060
0+040
0+020
0+000

BENCH MARK

BM ELEV. 85.926
TOP NUT OF FIRE HYDRANT
EAST SIDE HAIG RD NORTH OF DUNDAS ST EAST

BM ELEV. 85.774
TOP NUT OF FIRE HYDRANT
SOUTH SIDE OF DUNDAS ST EAST SOUTH OF HAIG RD

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R E V I S I O N S

SCALE: 1:600
DESIGNED: A.H.V.
DRAWN: S.D.S.
DATE: /07
COMPUTER \Drawings\BELLEVILLE\ \Dundas St\621 Bakelite Property

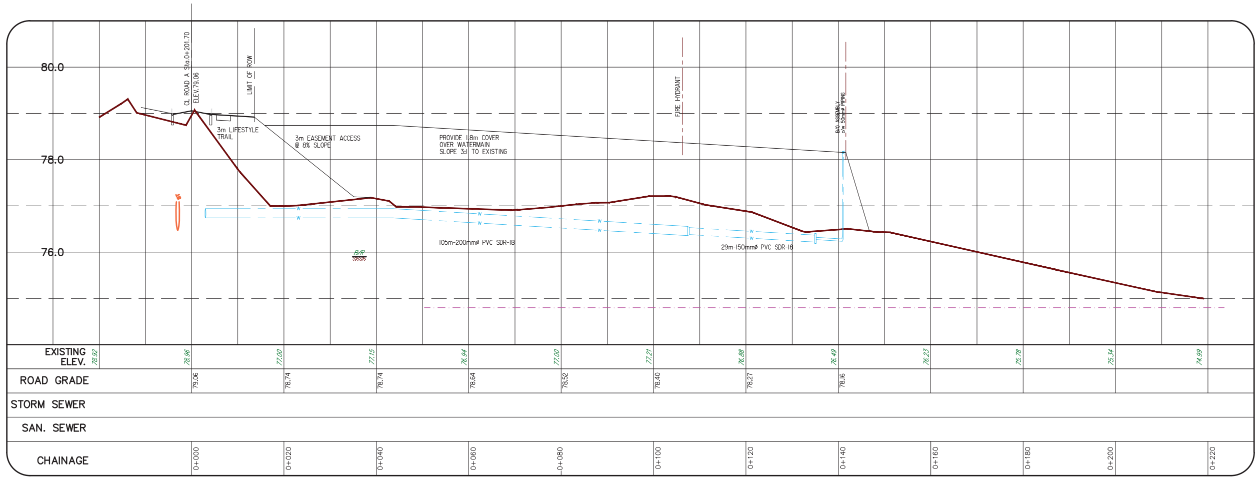
A. H. VANDERMEER — Jan. 18/24 — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

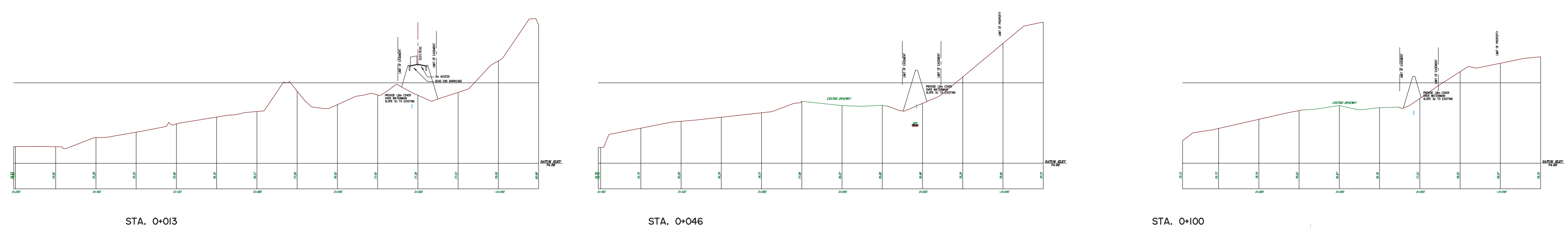
PLAN / PROFILE
ROAD A - INTERIM WATER SERVICE

DRAWING Dun/621-P10

DRAWING: 621 Dundas St_24-01-08.dwg


MIDDLE DRIVEWAY
ROAD A - SOUTH
ROAD A
6 - Bungalofts
3m EASEMENT ACCESS
105m-200mmø PVC WATERMAIN
30m-150mmø PVC WATERMAIN
±9.2m EASEMENT
50mmø B/O ASSEMBLY
19mmø PE WATER SERVICE
25mmø PE WATER SERVICE
SEPTIC BED
FH
9.8m-750mmø @ 0.4%
80.0m-750mmø @ 1.0%
WATERMAIN EASEMENT


80.0
78.0
76.0
CL ROAD A Sta.0+201.70
ELEV.79.06
LIMIT OF ROW
3m LIFESTYLE TRAIL
3m EASEMENT ACCESS @ 8% SLOPE
PROVIDE 1.8m COVER OVER WATERMAIN SLOPE 3:1 TO EXISTING
FIRE HYDRANT
B/O ASSEMBLY c/w 50mmø PIPING
105m-200mmø PVC SDR-18
29m-150mmø PVC SDR-18
EXISTING ELEV.
ROAD GRADE
STORM SEWER
SAN. SEWER
CHAINAGE
0+000
0+020
0+040
0+060
0+080
0+100
0+120
0+140
0+160
0+180
0+200
0+220
79.06
78.74
78.74
78.64
78.52
78.40
78.27
78.16



BENCH MARK

BM ELEV. 85.926
TOP NUT OF FIRE HYDRANT
EAST SIDE HAIG RD NORTH OF DUNDAS ST EAST

BM ELEV. 85.774
TOP NUT OF FIRE HYDRANT
SOUTH SIDE OF DUNDAS ST EAST SOUTH OF HAIG RD

NOTES

SEE DETAIL DRAWING FOR CONSTRUCTION NOTES AND DETAILS

LEGEND

DESCRIPTION	EXISTING	PROPOSED	AS-BUILT
EXISTING GROUND ELEVATION	ELEV		
FINISHED GROUND ELEVATION		ELEV OR ELEV	ELEV
SWALE ELEVATION	(ELEV)	(ELEV)	(ELEV)
SWALE			
MAINTENANCE HOLE	SA/ST	SA/ST	SA/ST
CATCH BASIN	CB	CB	CB
DITCH INLET	DI	DI	DI
SANITARY SEWER			
SAN. LATERAL c/w CLEAN-OUT			
STORM SEWER			
STORM RESIDENTIAL LATERAL			
WATERMAIN			
WATERMAIN VERTICAL DEFLECTION			
WATER LATERAL c/w CURB STOP			
GATE VALVE	GV	GV	GV
BLOW OFF	B/O	B/O ASSEMBLY c/w 50mmø PIPING	B/O
FIRE HYDRANT	FH	FH	FH
UTILITY POLE			
UTILITY POLE/LIGHT STANDARD			
POLE MOUNT TRANSFORMER			
PAD MOUNT TRANSFORMER			
STREETLIGHT PEDESTAL	SP	SP	SP
SWITCHING KIOSK	SK	SK	SK
BELL PEDESTAL	B	B	B
BELL GRADE LEVEL BOX	B/GB	B/GB	B/GB
CABLE PEDESTAL	C	C	C
ELECTRICAL SERVICE	E		E
COMMUNITY MAIL BOX	CMB	CMB	CMB

ONLY WHEN NOT INSTALLED AS PROPOSED

ALL ITALICIZED TEXT INDICATES EXISTING INFORMATION
ALL VERTICAL TEXT INDICATES PROPOSED INFORMATION
ALL UNDERSCORE TEXT INDICATES AS-CONSTRUCTED INFORMATION

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PROFESSIONAL ENGINEER A. H. VANDERMEER Jan. 18/24 PROVINCE OF ONTARIO

PLAN / PROFILE
WATERMAIN EASEMENT
DRAWING Dun/621-PII

DRAWING: 621 Dundas St_24-01-08.dwg