JLR No.: 27296-01
Revision: 2

February 27, 2019

Site Servicing Report

Dymon Self Storage, 1375 Clyde Avenue

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Value through **service** and **commitment**

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1.0 INTRODUCTION

Dymon Group of Companies (Dymon) has retained the services of J.L. Richards & Associates Limited (JLR) to proceed with detailed design of municipal infrastructure for the redevelopment of their property located at 1375 Clyde Avenue in the City of Ottawa.

This Site Servicing Report outlines the design objectives and criteria, servicing constraints and strategies for developing the subject lands with water, wastewater, storm and stormwater management services in accordance with the November 2009 Servicing Study Guidelines for Development Applications in the City of Ottawa (City) as well as the Ottawa Sewer Design Guidelines (2012) and associated Technical Bulletins. This report also includes strategies and solutions for implementing erosion and sedimentation control measures throughout construction.

1.1 Site Description and Background

The subject property is located within the urban limits of the City of Ottawa. As depicted on Figure 1 below, the subject site consists of one retail building located along the south limit of the property. The site is bounded by Baseline Road to the north, Clyde Avenue to the west, existing commercial/retail developments to the south and undeveloped lands to the east.

Figure 1: Site Location

Based on review of the aerial photo, the site is fully impervious with the exception of small portions of grass along the Clyde Avenue and Baseline Road frontages. Currently, storm runoff generated by the 1375 Clyde Avenue property, during minor events, sheet flows to on-site catch basins that outlet to the existing Clyde Avenue 375 mm diameter storm sewer, which eventually outlets to the Ottawa River via Pinecrest Creek, approximately 5.7 km downstream of the site.

Runoff events exceeding the existing onsite minor system capacity flow uncontrolled onto Clyde Avenue.

1.2 Proposed Development and Building Configuration

Dymon wishes to redevelop the above-described property totaling 1.09 ha in size into a development with the following key buildings (refer to attached Site Plan at the back of this report):

1. A five (5) storey storage facility building with a covered drive-through garage;
2. A one (1) storey restaurant with a drive-through at the north end of the site;
3. The existing retail building along the south limit of the site;
4. A three (3) storey storage facility addition to the east of the existing retail building.

1.3 Existing Infrastructure and Existing Conditions Survey

This Site Servicing Report has been prepared to present the proposed onsite servicing and demonstrate that the existing municipal infrastructure fronting the subject property along Clyde Avenue can accommodate the proposed development. The following describes the existing municipal infrastructure located on Clyde Avenue and Baseline Road (refer to Appendix 'B' for a copy of the background drawings):

Water

- Existing 305 mm diameter PVC watermain (1999) located along Clyde Avenue within the Meadowlands high pressure zone. Based on the existing City drawings, the site is currently being serviced by two (2) 150 mm diameter water service laterals off the existing 305 mm watermain;

- Existing 406 mm diameter cast iron watermain (1960) located along Baseline Road within the Carlington Heights low pressure zone.

Sanitary

- Existing 300 mm diameter concrete sanitary sewer along Baseline Road;

- Existing 200 mm diameter concrete sanitary sewer along Clyde Avenue. Based on information provided by Dymon, the existing building is currently serviced by a 150 mm diameter sanitary service lateral off the existing 200 mm diameter sanitary sewer.

Storm

- Existing 375 mm diameter concrete storm sewer along Clyde Avenue. Based on information provided by Clean Water Works (CCTV Inspections), the site is currently being serviced by an onsite storm sewer network that outlets via a 250mm diameter storm sewer to the existing 375 mm diameter storm sewer along Clyde Avenue.

1.4 Grading

The subject property currently slopes south-west towards the Clyde Avenue right-of-way. The difference in existing ground surface elevations ranges from ±95.00 m at the existing Clyde Avenue entrance to ±99.50 m at the existing Baseline Road entrance. A topographical survey was completed by Farley, Smith & Denis Surveying LTD. on February 22, 2017. A copy of the topographical survey has been included at the back of this Report with the Surveyor's Area Certificate included in Appendix 'A'.

1.5 Pre-Consultation, Permits and Approvals

A pre-consultation meeting was held between the Owner's representatives and staff from the City in May 2017. A copy of the pre-consultation meeting notes (received May 8, 2017) have been provided in Appendix 'C'. The following summarizes the expected site servicing requirements:

- Post-development 1:100 year peak flow to be controlled to the pre-development 1:2 year peak flow;
- Water quality control measures to meet a total suspended solids (TSS) removal of 80%.

Subsequent discussions between JLR and City of Ottawa approvals staff recognized downstream capacity constraints in the City storm sewer system. As a result of the discussions and consideration of the system constraints, an over-controlled storm water release rate of 60 L/s was established for the 1:100 year peak flows. Refer to attached September 17, 2018 email in Appendix 'G'.

The Ministry of the Environment, Conservation and Parks (MECP) has confirmed that this site is exempt from requiring an ECA and that no Environmental Compliance Approval (ECA) under the Water Resources Act would be required for the 1375 Clyde Avenue site. A copy of the email correspondence with the MECP (received February 1, 2019) has been provided in Appendix 'C'.

As a condition of Site Plan Approval, the City will require the approval of the engineering documentation (Drawings and Report) prepared for this site. The City of Ottawa Development Servicing Study Checklist; which provides all the details associated with this development and the approval and permit requirements, has therefore been included in this document (refer to Appendix 'D').

1.6 Geotechnical and infiltration considerations

A preliminary geotechnical investigation was carried out by Fisher Environmental Limited (Fisher) to assess the site's subsurface soil and groundwater conditions and to outline geotechnical parameters and recommendations for the design of the proposed development. The findings and recommendations of this investigation have been compiled in the Report entitled "Preliminary Geotechnical Investigation, 1375 Clyde Avenue, Nepean, Ontario" Project Number FE-P-16-7971, dated November 18, 2016, herein referred to as the November 18, 2016 Geotechnical Report.

1.7 Engineering Drawings

Engineering Drawings have been prepared in support of the redevelopment of the 1375 Clyde Avenue property. The following four (4) drawings are included at the back of this Report:

- Site Servicing Plan (Drawing S1);
- Grading Plan (Drawing G1)
- Ponding Plan (Drawing SWM); and
- Erosion and Sediment Control Plan (Drawing ESC).

2.0 WATER SERVICING

2.1 Design Criteria

A Hydraulic Network Analysis (HNA) was conducted for the proposed 1375 Clyde Avenue site to confirm that the existing watermains and water services can provide adequate supply while complying with the City of Ottawa Design Guidelines for Water Distribution (July 2010) and Technical Bulletins ISDTB-2014-02 and ISTB-2018-02. These documents have been referred to in this section as the Design Guidelines, TB-2014-02, and TB-2018-02, respectively. The Design Guidelines require that a water supply system be designed to satisfy the following demand criteria:

- maximum day demand plus fire flow; and
- maximum hourly demand (peak hour demand).

From a water quality perspective, supply to the proposed site will be achieved from the existing 305 mm diameter watermain on Clyde Avenue via two (2) existing 152 mm diameter water service laterals currently servicing the site. The HNA was completed to satisfy the above demand criteria.

2.2 System Pressures

Section 4.2.2 of the Design Guidelines requires that new development additions to the public water distribution system be designed such that the minimum and maximum water pressures, as well as flow rates, conform to the following:

i. Under maximum hourly demand conditions (peak hour), the pressures shall not fall below 276 kPa (40 psi).

ii. During periods of simultaneous maximum day and fire flow demand, the residual pressure at any point in the distribution system shall not be less than 140 kPa (20 psi).

iii. In accordance with the Ontario Code & Guide for Plumbing, the static pressure at any fixture shall not exceed 552 kPa (80 psi) in areas that may be occupied.

iv. The maximum pressure at any point in the distribution system shall not exceed 689 kPa (100 psi) in unoccupied areas.

v. Feedermains, which have been provided primarily for the purpose of redundancy, shall meet, at a minimum, the basic day plus fire flow demand. This criterion is irrelevant to this HNA as there are no feedermains proposed.

The HNA was carried out to fulfill the above watermain pressure and demand objectives.

2.3 Water Demands

To assess the performance of the existing water distribution system (refer to Drawing S1 at the back of this Report), the above-noted water demand scenarios were developed and evaluated against the pressure criteria listed in Section 2.2 using the WaterCAD® software platform.

Rather than using the theoretical domestic demand described in the Design Guidelines, the domestic demand for the proposed 1375 Clyde Avenue development was obtained from the Owner's mechanical engineer (Miriton Ltd.), based on the fixture count. A peak hour demand was estimated by the mechanical engineer (refer to Appendix 'E1' for a copy of the e-mail correspondence) for each of the four (4) buildings as identified on the Site Plan. Using the prescribed peaking factors of 1.8 for maximum day to peak hour and 1.5 for average day to maximum day (refer to Table 4.2 of the Design Guidelines), maximum day and average day demands were calculated for each of the four buildings. Each building will also be equipped with a fire suppression system. The required flows for these systems were estimated by the mechanical engineer for each building. Note that Building 1A and Building 1B will be separated by a 2-hour fire resistance rating demising wall. Table 1 summarizes the overall water demands used in the HNA.

Table 1: Calculated Water Demands

BLDG	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Sprinkler / Standpipe Demand (L/s)	Peak Hourly Demand (L/s)
1A	1.41	2.11	18.93	3.79
1B	0.59	0.88	31.55	1.58
2	0.59	0.88	31.55	1.58
3	1.41	2.11	14.19	3.79
Total	4.00	5.98	96.22	10.74

It is noted that under the maximum day plus fire flow demand scenario, each building was treated as a separate fire area with its own sprinkler system, and it was not assumed that all four buildings would activate their sprinkler systems at the same time in the event of a fire. As such, four different scenarios were investigated by applying the maximum day demand to all four buildings at the same time while adding the sprinkler system demand to a single building at a time.

2.4 Simulation of Fire Flows

Various guidelines are used throughout North America to establish fire flow requirements for different types of buildings. The Guidelines entitled "Water Supply for Public Fire Protection

(1999)" developed by the Fire Underwriters Survey (FUS) govern fire flow protection requirements in the City of Ottawa. In addition, fire flow requirements used in this HNA have been calculated in accordance with TB-2014-02 and TB-2018-02. Based on these documents, the governing fire flow requirement for the proposed Dymon Storage and retail buildings (Building 1A, 1B and 2) was estimated at 11,000 L/min (183 L/s), while the fire flow requirement for the proposed restaurant building (Building 3) was estimated at 4,000 L/min (67 L/s) per FUS. The Owner's mechanical engineer has also provided a letter to confirm that the proposed sprinkler systems satisfy the Ontario building Code's (OBC) requirements for a fully supervised system (refer to Appendix 'E2' for governing FUS calculations, and sprinkler system letter).

2.5 Watermain Sizing and Roughness Coefficients

The existing and proposed watermain layout for the 1375 Clyde Avenue site is shown on the Site Servicing Plan (Drawing S1) at the back of this Report. The water servicing for the site consists of the following components:

- It has been determined that the existing watermains on Baseline Road and Clyde Avenue cannot be looped as they are fed from two distinct pressure zones. As such, it is proposed to service the four buildings from the existing 305 mm diameter watermain within the Meadowlands high pressure zone along Clyde Avenue. The two (2) existing 152 mm diameter watermain services currently servicing Building 1A from Clyde Avenue will remain. It is understood from field investigations completed by the Owner and confirmed by the mechanical engineer that the two 150 mm service laterals off of the Clyde Avenue 305 mm diameter watermain currently interconnect onsite prior to entering the building with a single 200mm diameter watermain lateral to service both the domestic and sprinkler system uses for Building 1A. In order to provide water supply to the other proposed buildings and achieve the required fire flows at the proposed hydrants throughout the site, it is proposed to extend the 200mm diameter watermain to service the site.

- In terms of fire protection, each of the buildings will have a sprinkler system which will be supplemented by three (3) proposed onsite hydrants, which will connect to the proposed 200 mm diameter watermain via 150 mm diameter hydrant laterals.

The WaterCAD® schematic and watermain layout has been included in Appendix 'E3' for reference. The watermain roughness coefficients for the existing and proposed watermains were input as per Section 4.2.12 of the Design Guidelines.

2.6 Hydraulic Boundary Conditions

The HNA was carried out based on hydraulic boundary conditions provided by the City under various water demand conditions, as described in Section 2.3 (refer to Appendix 'E4' for a copy of the e-mail correspondence – See "Scenario 2").

Boundary conditions received from the City are summarized in Table 2 below:

Table 2: Hydraulic Boundary Conditions

Water Demands	Clyde Avenue HGL (m)
Peak Hour	158.3
Maximum Day + Fire Flow	146.4
High Pressure Check	163.4

2.7 Simulation Results

2.7.1 Peak Hour Demand

The proposed servicing as depicted on Drawing S1 was simulated under the peak hourly demand based on the water demands summarized in Table 1 and the hydraulic boundary conditions presented in Table 2. It should be noted that J-17, J-11, J-10 and J-9 were set to the finished floor elevations for Building 1A, 1B, 2 and 3, respectively.

The simulation results show a minimum residual pressure of 584 kPa (84.7 psi) at Junction J-8 (i.e. near Building 3) under the peak hour demand, which exceeds the minimum operating pressure of 276 kPa (40 psi) as recommended in the Design Guidelines (refer to Appendix 'E5' for WaterCAD® simulation schematic and results).

2.7.2 Maximum Day Demand plus Fire Flow

Section 4.2.2.3 of the Design Guidelines requires that the water distribution system satisfy the maximum day demand combined with the FUS fire flow requirement, as presented in Appendix 'E2'. The fire flow simulation was carried out by allowing WaterCAD® to calculate the available fire flow that can be drawn from a hydrant without allowing any part of the system to experience pressures below 140 kPa (20 psi).

As noted in Section 2.3, the simulation was undertaken based on the total maximum day demand of 5.98 L/s allocated between the four buildings (per the fixture count) combined with the sprinkler system demand applied at each building separately. The minimum available fire flow that should be provided by each on-site hydrant can be determined by deducting the most conservative sprinkler system demand from the calculated FUS required fire flow. Consequently, the total FUS requirement of 183 L/s can be conservatively targeted at proposed hydrants H-1 and H-2, while 67 L/s can be conservatively targeted at proposed hydrant H-3.

The simulation results indicate that the targeted fire flow of 183 L/s is available at hydrants H-1 and H-2 and the targeted fire flow of 67 L/s is available at hydrant H-3 while fulfilling the maximum day and sprinkler system demands for the four sprinkler scenarios. Consequently, the distribution system can deliver fire flows in excess of FUS requirements (refer to Appendix 'E6' for WaterCAD® simulation schematic and results).

2.7.3 High Pressure Check

The Design Guidelines require that a high pressure check (maximum hydraulic grade elevation) be performed on the proposed system to ensure that the maximum pressure constraint of 552 kPa (80 psi) of the Ontario Code & Guide for Plumbing is not exceeded. To generate the highest pressure, the demands at Junctions J-17, J-11, J-10 and J-9 were set to zero (0 L/s).

Simulation results for this scenario indicate a minimum residual pressure of 635 kPa (92.1 psi) at Junction J-8 (refer to Appendix 'E7' for WaterCAD® simulation schematic and results). Since the simulated pressures are above the maximum pressure constraint of 552 kPa (80 psi), it is recommended that pressure reducing valves (PRVs) be installed for all buildings.

2.8 Internal Pumping

Simulation results have shown that there is no requirement to provide internal pumping during domestic usage as all of the proposed fixtures are located at ground level. In terms of pumping requirements for the sprinkler system, it will be the responsibility of the certified fire protection specialist to recommend whether a pump is required.

2.9 Summary and Conclusions

Based on the above simulation results, it is recommended that the water servicing shown on the Site Servicing Plan (Drawing S1) be implemented to provide potable water for domestic and fire flow usages for the proposed development.

3.0 WASTEWATER SERVICING

3.1 Background

Wastewater flows generated from the proposed development are to be conveyed to the existing Clyde Avenue 200 mm diameter sanitary sewer via a connection to the existing onsite sanitary maintenance hole (ex. SAN MH 1A) and the existing 150 mm diameter sanitary service as depicted on the Site Servicing Plan (Drawing S1). Wastewater flows will eventually outlet to the Pinecrest Trunk sanitary collector via the Baseline Road sewers.

3.2 Design Criteria

The proposed wastewater servicing for the subject property was designed based on the City of Ottawa Sewer Design Guidelines (October 2012) and associated Technical Bulletins. Key design parameters have been summarized in Table 3 below:

Table 3: Wastewater Servicing Design Criteria

Design Criteria	Design Value	Reference
Commercial/institutional average flow	28,000 L/gross ha/day	Technical Bulletin ISTB-2018-01
Residential peaking factor	Harmon Formula	City Section 4.4.1
Commercial/institutional peaking factor	1.5	Technical Bulletin ISTB-2018-01
Infiltration flow	0.33 L/s/effective gross ha	Technical Bulletin ISTB-2018-01
Minimum velocity	0.6 m/s	City Section 6.1.2.2
Maximum velocity	3.0 m/s	City Section 6.1.2.2
Manning Roughness Coefficient (for smooth wall pipes)	0.013	City Section 6.1.8.2
Minimum allowable slopes	Varies	City Table 6.2, Section 6.1.2.2

3.3 Proposed Sanitary Servicing and Calculations

As previously noted, the wastewater flows from the site will be discharged into the municipal system via the existing 150 mm diameter sanitary service and an extended 150 mm sanitary sewer system throughout the 1375 Clyde Avenue development. Based on the proposed site, the peak wastewater flows were investigated using the following two (2) approaches:

- Peak flow calculation based on the design value of 28,000 L/ha/day for commercial development as per the design parameters listed in Table 3;
- Peak flow calculation based on the mechanical fixture count.

Based on the above two (2) approaches, the most conservative peak flow estimate was used, which was based on the anticipated fixture count. As such, a peak flow of 11.67 L/s was used as the design target for the proposed sanitary service (refer to Appendix 'F' for details). To fulfill the design target of 11.67 L/s, the existing 150 mm diameter sanitary service at an existing slope of ±2.0% is sufficient.

3.4 Summary and Conclusions

Based on the above wastewater servicing details, it is recommended that the wastewater servicing shown on the Site Servicing Plan (Drawing S1) be implemented to provide wastewater servicing for the proposed development.

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

4.1 Storm Criteria

Storm servicing for the subject property has been designed in accordance with the City of Ottawa Sewer Design Guidelines (2012) and Technical Bulletins. The minor system has been designed to capture and convey runoff during frequent storm events up to the 1:2 year recurrence, while the major system has been designed to capture and retain runoff onsite for storm events up to the 1:100 year recurrence.

In addition to the general City of Ottawa design criteria, storm servicing for the proposed development has been designed to comply with the storm servicing requirements outlined in the pre-consultation meeting notes received May 8, 2017 (Appendix 'C') as well as the email correspondence received from the City on June 14, 2017 (Appendix 'C') and on September 18, 2018 (Appendix 'G') as summarized below:

- Storm runoff from the site to be restricted to 60.00 L/s;
- The calculated 1:2 year peak flow to be based on a calculated time of concentration reflecting the existing condition and shall not be less than 10 minutes;
- Runoff in excess of the 1:2 year peak flow and up to the 1:100 year recurrence shall be retained on site;
- Runoff for all asphalted areas shall meet an enhanced protection level (TSS removal of 80%) prior to leaving the site.

4.2 Allowable Release Rate

Based on the existing servicing of the subject property, runoff is currently collected by an on-site storm sewer system that outlets to the 375 mm diameter Clyde Avenue storm sewer. The City has raised concerns as the property contributes runoff to the Pinecrest Creek study area which is prone to flooding at its downstream reaches, and the existing constraints on the storm sewer system on Clyde Avenue (refer to Appendix 'G' for email correspondence dated September 28, 2018). As such, the developer has agreed to an over-controlled release rate of 60.00 L/s for the subject site as determined by the City.

4.3 Proposed Storm Servicing

Storm runoff generated by the 1.09 ha site will be collected by proposed on-site storm sewers that will discharge to the existing 375 mm diameter storm sewer on Clyde Avenue (refer to Drawing S1 provided at the back of this report). The 1:100 year storm event from the controlled areas of the property will be detained on site and the total of the controlled flows and uncontrolled flows will be restricted to the total allowable release rate of 60.00 L/s. The following calculations demonstrate that the proposed servicing concept meets the allowable release rate of 60.00 L/s (refer to SWM calculations in Appendix 'G').

4.4 Proposed Stormwater Management Solution and Calculations

4.4.1 Water Quantity

Storm servicing and stormwater management was developed to limit the 1:100 year post-development flows to 60.00 L/s. In order to achieve this criterion, on-site restrictions (i.e., inlet control devices (ICDs) in paved areas and rooftop restrictors) were utilized for the controlled conveyance of site runoff. Consequently, the storm servicing includes the provision of on-site storage which is achieved via rooftop storage, parking lot depressions and underground storage. For the stormwater management calculations, the site was divided into sixteen (16) drainage areas based on the proposed site grading (refer to Drawing SWM included at the back of this Report). The drainage areas, associated runoff coefficients, 1:100 year peak flows, and total release rates for each area have been summarized in Table 4 below:

Table 4: Summary of Controlled and Uncontrolled Areas

Area No.	Type or ID. No	Area (ha)	C-Factor (100 year)	$Q_{(100\text{-}yr)}$ (L/s)	$Q_{(100\text{-}yr)}$ (restricted)	$Q_{(100\text{-}yr)}$ (unrestricted)	$Q_{(100\text{-}yr)}$ (total) (L/s)
2	Rooftop - 1B	0.116	1.00	57.58	5.05		5.05
3	Rooftop - 2	0.204	1.00	101.26	5.05		5.05
4	Rooftop - 3	0.039	1.00	19.36	2.52		2.52
5	Uncontrolled-1	0.007	0.25	0.87		0.87	0.87
6	Uncontrolled-2	0.026	0.25	3.23		3.23	3.23
8	100 Year - CB 1	0.007	0.79	2.73		2.73	2.73
9	100 Year - CB 7	0.011	0.80	4.34		4.34	4.34
10	100 Year - CB 8	0.005	1.00	2.48		2.48	2.48
11	ICD1 - CB 4	0.131	0.92		6.00		6.00
12-13	ICD2 - CB 5	0.139	0.92		6.00		6.00
Areas 1,7,14-16	ICD3	0.420	0.92		21.73		21.73
	Total Area =	**1.104 ha**				**$Q_{(100\text{-}yr)}$ = (Total)**	**60.00 L/s**

For areas 2-6, and 8-10, the 1:5 year and 1:100 year peak flows were calculated using the Rational Method. Due to site grading constraints, some of the narrow landscaped strips along the north-west property limit (Area 5) and south-west property limit (Area 6) will drain off-site as major overland flow. As such, these areas were designed to be uncontrolled and the 1:100 year peak flow was subtracted from the total allowable release rate. Similarly, Areas 8, 9, and 10 were designed to capture the 1:100 year storm event (unrestricted) to avoid inconveniences due to surface ponding near Building 3 (proposed restaurant) sidewalk and the depressed truck loading ramps. The 1:100 year peak flows for these areas were subtracted from the total allowable release rate.

Stormwater runoff generated from building rooftops will be controlled by the implementation of rooftop restrictors on Buildings 1B (Area 2), 2 (Area 3), and 3 (Area 4). Rooftop ponding storage will therefore be provided for Buildings 1B, 2 and 3. A memorandum sealed by the mechanical engineer has been provided in Appendix 'G' that confirms that the roof designs will meet the stormwater management objectives with flow control drains and roof spill scuppers in accordance with the OBC. To eliminate the risk of surcharging the roof drains during heavy storm events, a catch basin maintenance hole has been placed at each building outlet to allow for emergency storm overflow to the surface of the parking lot. Given that Building 1A is existing and the rooftop capacity of the building is unknown at this time, it is assumed that Building 1A has no rooftop restrictors and therefore will not accommodate any rooftop storage.

Given the remaining allocated release rate, a restricted release rate of 6 L/s was allocated to Areas 11 (ICD1-CB4) and 12-13 (ICD2-CB5). Surface storage has been provided for Area 11 and any excess stormwater will cascade into Area 12-13. In order to accommodate the stormwater runoff in Areas 1, 7, 14-16, and the excess runoff cascading from Areas 11 and 12-13, an underground storage system is proposed underneath the parking area between Buildings 1A/1B and Building 2.

The minimum storage volume requirement for the underground storage system was calculated using SWMHYMO (refer to Appendix 'G'). A rating was first developed at various stages that estimated the outflows at various water elevations, which are dictated by the ICD in ST MH 2A, and associated incremental storage volumes were calculated for the underground storage design. From the SWMHYMO model, the storage capacity required for the above-noted contributing areas was calculated to be 250 m3.

The proposed underground storage system consists of six (6) HDPE storage chambers, each approximately 37 meters in length (see Appendix 'G' for storage chamber specifications), providing a total storage capacity of 298 m3, which exceeds the required 250 m3. The underground storage system will be lined along the sides and bottom with an impermeable liner system. Considerations were given to the potential uplift on the system should the groundwater elevation rise above the base of the system. The Preliminary Geotechnical Investigation (November, 18, 2016) involved limited groundwater monitoring, which located the groundwater at a 2.8 m depth near the west side of the proposed chambers, but this result could fluctuate seasonally. Calculations were performed to determine the buoyancy force, assuming a groundwater elevation at the surface, and the resisting force, accounting for the combined weight of the chambers, clearstone, and groundwater cover. It was found that the resisting force counteracts the buoyancy force by a factor of safety of 1.68 (refer to Appendix 'G') even with a groundwater elevation at the surface. Thus, the underground storage system will resist uplift from the groundwater. The underground storage network will outlet to the proposed storm sewer system at a restricted release rate of 21.73 L/s at the outlet pipe of ST MH 2A.

The total release rates of the sixteen (16) on-site drainage areas is restricted to the 60.00 L/s and as a result, the 1:100 year storm event can be detained on-site. As depicted on the Ponding Plan (Drawing SWM), the underground storage system has been designed to detain the full 1:100 year volume of stormwater from the contributing areas without surface ponding on the parking lot above it. This added volume (±103 m^3)

would be available for storage for storm runoff in excess of the 1:100 year storm event, prior to discharging to the Clyde Avenue right-of-way. Details associated with ICDs, drainage areas, and storage requirements are provided in Appendix 'G'.

Based on the design above, the water quantity criterion provided by the City will be fulfilled.

4.4.2 Water Quality

Storm runoff generated by the proposed site will be collected and conveyed by an on-site storm sewer system into the Clyde Avenue storm sewer system and other trunk storm sewers that will eventually outlet into the Ottawa River, via Pinecrest Creek located 5.7 km downstream. Given the parking spaces proposed and in light of the proximity of the site to the Ottawa River, the City has advised that stormwater leaving the site should meet an enhanced level of protection (80% TSS removal). To fulfil this criterion, an oil and grit separator is proposed. A CDS Unit (PMSU 2015-4) was sized to be placed at the downstream maintenance hole, WQU ST MH1, as depicted on Drawing S1.

4.5 Summary and Conclusions

The storm servicing and stormwater management solution presented in this Site Servicing Report has been designed to satisfy the quantity and quality criteria specified by the City of Ottawa. The prescribed release rate of 60.00 L/s for the 1:100 year peak flow is met with the addition of underground storage while achieving an overall TSS removal in excess of 80% using an oil-grit separator, CDS Unit (PMSU 2015-4) proposed at WQU ST MH1.

5.0 EROSION AND SEDIMENTATION CONTROL

Prior to initiating construction of the proposed development, erosion and sedimentation control measures, as outlined in the Ontario Ministry of Natural Resources (MNR) Guidelines on Erosion and Sediment Control for Urban Construction Sites, are to be implemented to trap sediment on site.

The following erosion and sedimentation control measures are proposed, as shown on Drawing ESC:

- supply and installation of a silt fence barrier, as per OPSD 219.110;
- supply and installation of filter fabric between the frame and cover of existing catch basins adjacent to the proposed development, including regular inspection and maintenance as required;
- stockpiles of material during construction is to be located along flat areas away from drainage paths and are to be enclosed with additional silt fence;
- proposed catch basins are to be equipped with sumps, inspected frequently, and cleaned as required;
- sandbags are to be placed blocking part of the sewer pipe in the connecting storm maintenance holes to eliminate construction debris from entering the existing storm

sewer system. The sandbags are to be removed after the proposed storm sewers have been fully cleaned.

The proposed erosion control measures shall conform to the following documents:

- “Guidelines on Erosion and Sediment Control for Urban Construction Sites” published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs, and Transportation & Communication, Association of Construction Authorities of Ontario and Urban Development Institute, Ontario, May 1987.
- “MTO Drainage Manual”, Chapter F: “Erosion of Materials and Sediment Control”, Ministry of Transportation & Communications, 1985.
- “Erosion and Sediment Control” Training Manual by Ministry of Environment, Spring 1998.
- Applicable Regulations and Guidelines of the Ministry of Natural Resources.

This report has been prepared for the exclusive use of Dymon Self Storage, for the stated purpose, for the named development. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of Dymon Self Storage and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.

J.L. RICHARDS & ASSOCIATES LIMITED

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Appendix A

Surveyor Area Certificate

364454, 5024835

TOPOGRAPHIC PLAN OF SURVEY OF

PART OF LOT 21
REGISTERED PLAN 30
CITY OF OTTAWA

FARLEY, SMITH & DENIS SURVEYING LTD. 2017

Scale 1: 200

0 2.5 5 10 15 20 metres

Notes & Legend

	Denotes	
—○—	=	Survey Monument Planted
—■—	=	Survey Monument Found
SIB	=	Standard Iron Bar
SSIB	=	Short Standard Iron Bar
IB	=	Iron Bar
IB@	=	Round Iron Bar
CC	=	Cut Cross
CP	=	Concrete Pin
S&W	=	Spike & Washer
IP	=	Iron Pipe
(Wit)	=	Witness
Meas	=	Measured
(P1)	=	Plan by (AOG) dated February 14, 2012 (Ref. 12582-11)
(P2)	=	Plan 5R-13485
(P3)	=	Plan by (1287) dated September 23, 1998 (Ref. 315-98)
(P4)	=	Plan by (1287) dated September 23, 1988
(P5)	=	Plan Attached to Inst. CR500186
○ MH–ST	=	Maintenance Hole (Storm)
○ MH–S	=	Maintenance Hole (Sanitary)
○ MH	=	Maintenance Hole (Unidentified)
○ MH–B	=	Maintenance Hole (Bell)
○ HH–T	=	Handhole
◎ MW	=	Monitoring Well
ST	=	Underground Storm Sewer
S	=	Underground Sanitary Sewer
W	=	Underground Water
T	=	Underground Traffic
OHW	=	Overhead Wires
B	=	Underground Bell
G	=	Underground Gas
OHW	=	Overhead Wires

Notes & Legend

	Denotes	
○ UP	=	Utility Pole
○ AN	=	Anchor
○ LS	=	Light Standard
CB	=	Catch Basin
CBM	=	Catch Basin-Inlet
◇ FH	=	Fire Hydrant
WV	=	Water Valve
Inv.	=	Invert
Inv.(City)	=	City of Ottawa Invert
T/G	=	Top of Grate
○ TB–B	=	Bell Terminal Box
○ TB–C	=	Cable Terminal Box
○ TB–T	=	Traffic Terminal Box
Ø	=	Diameter
CLF	=	Chain Link Fence
BF	=	Board Fence
EOA	=	Edge of Asphalt
x 65.00	=	Location of Elevations
x 65.00	=	Top of Concrete Curb Elevation
	=	Deciduous Tree

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2002715
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29 (3).

CO-ORDINATES WERE DERIVED FROM SMART-NET REAL TIME NETWORK OBSERVATIONS, MTM ZONE 9, N.A.D. 1983 (ORIGINAL).		
POINT ID	NORTHING	EASTING
A	5024945.05	364479.44
B	5025001.62	364569.38
01919680005	5027191.26	361496.76
01919680105	5024915.16	373971.65

CO-ORDINATES ARE MTM ZONE 9, N.A.D. 1983 (ORIGINAL), TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

Metric Note

Distances and coordinates on this plan are in metres and can be converted to feet by dividing by 0.3048.

Distance Note

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.999934.

Bearing Note

Bearings are MTM grid, derived from simultaneous GPS observations from monument A to B having a bearing of N 57° 49' 50" E referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) Nad-83 (Original).

For bearing comparisons, a rotation of 0°58'35" counter-clockwise was applied to bearings on Plan P2 and P3.

Elevation Notes

1. Elevations shown are geodetic and are referred to Geodetic Datum CGVD-1928 :1978.
2. Elevations derived from City of Ottawa Monument No. N-63, Index 65 (Brass Plate at 1460 Baseline Road) having a published elevation of 95.138m.
3. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

Utility Notes

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. Underground utility data derived from City of Ottawa utility sheet reference: I-04-12 and Drawings 833, 6068, 6492, 8771 (Sheets 6 & 7), 9236, 10071 and 11459.
4. Sanitary and storm sewer grades were derived from field measurement.
5. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

DETAIL
Scale 1:100

SEE DETAIL

TOPOGRAPHIC DATA WAS COLLECTED UNDER WINTER CONDITIONS. SNOW COVER AND ICE PRECLUDE DETERMINING LOCATION AND ELEVATION OF SOME TOPOGRAPHICAL DATA THAT IS OTHERWISE VISIBLE.

TOPO 36X48

Surveyor's Certificate

I certify that :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Regulations made under them.
2. The survey was completed on the 22nd day of February, 2017.

Mar. 10/17
Date

Daniel Robinson
Ontario Land Surveyor

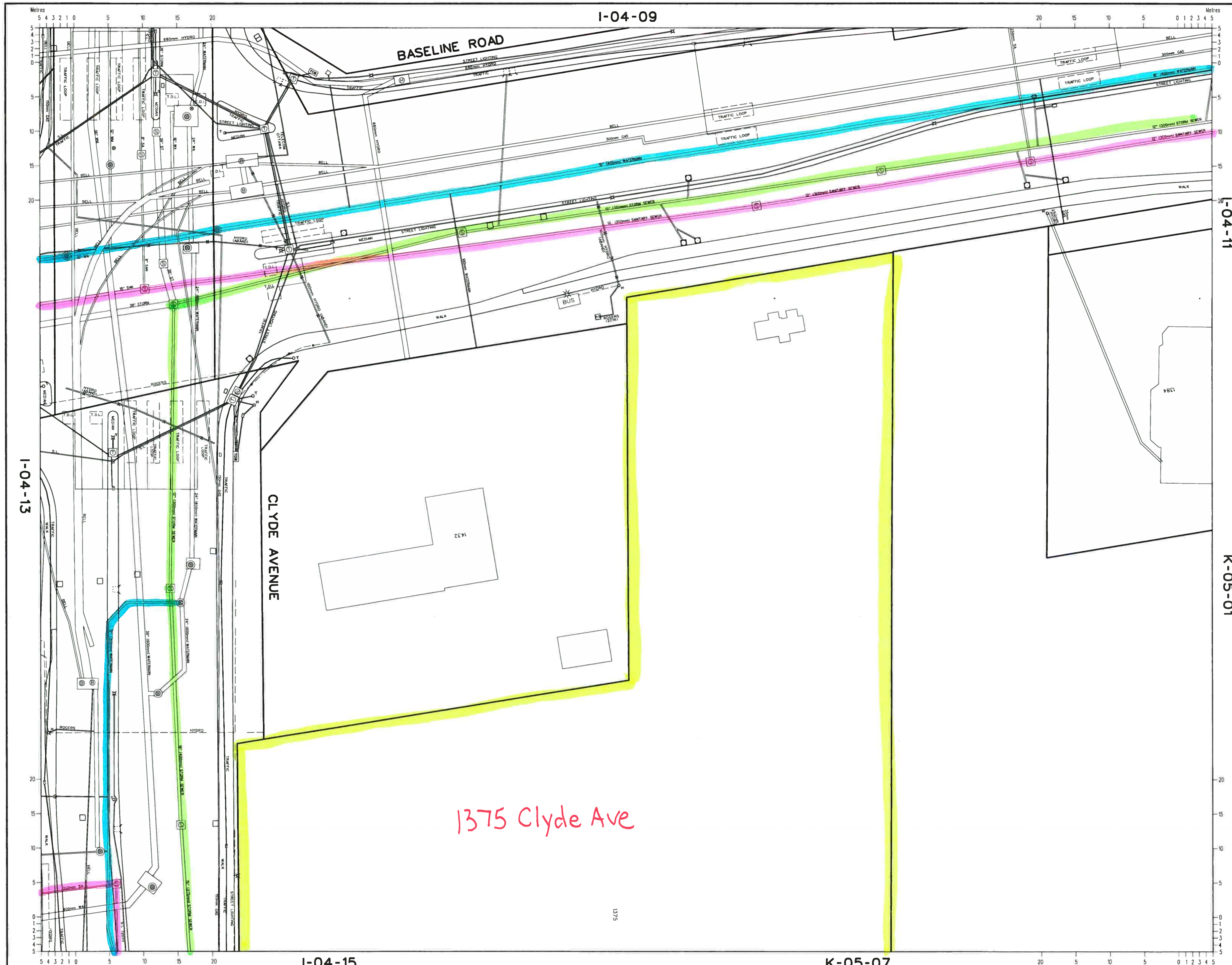
FARLEY, SMITH & DENIS SURVEYING LTD.
ONTARIO LAND SURVEYORS
CANADA LAND SURVEYORS
190 COLONNADE ROAD, OTTAWA, ONTARIO K2E 7J5
TEL. (613) 727-8226 FAX. (613) 727-1826

FILE No.: 37-17

J:\2017\37-17_1375 Clyde Ave_Topo\Final\37-17_Dymon Capital_1375 Clyde_Prt(121RP30_7_F2.dwg

Appendix B

Abutting Municipal Services from GIS and Design Drawings



REVISIONS / RÉVISIONS	DATE	BY
6771P04352 CLYDE AND BASELINE (2003) TOTAL STATION APPLIED CLYDE AND BASELINE	JUNE 2007	MH
2086 CLYDE BASELINE (MAR. 2001) TELECOM OTTAWA REVISION APPLIED	JUNE 2007	MH
RMOC 8236 (DEC. 1999) ENG DRAWING ENG DRAWING APPLIED WAITING FOR AS-BUILT	JULY 2007	MH
TU5068 (FEB 1991) TRAFFIC AS-BUILT APPLIED BASELINE AT CLYDE	JULY 2007	MH
8236/pbp12.pdf NEPEAN/CLYDE (MAR 2003) STORM SEWER/CB's/WATER REVISED	MAY 2008	JW
8771/pbp06.tif GRANTON/NEPEAN SEP 1995 WATERMAIN/SANITARY/CBs VERIFIED	MAY 2008	JW
BELL - BEL08275 (JAN 2011) CONDUIT & PANEL ADDED TO CLYDE	JULY 2012	DC
SL02010-021-STREETLIGHTING (NOV 2011) S.L. UPDATED ON BASELINE, CLYDE	SEP 2012	JM
ROG1410404-ROGERS (MAR 2014) CONDUIT AND P/S ADDED TO BASELINE	DEC 2016	JM
HYDRO,BELL,ENBRIDGE,ROGERS, CITY SEWER, WATER, TRAFFIC, SL COMPILED/DIGITIZED FROM UTILITY/CITY DATA	DEC 2016	JM

LEGEND

- Pipe, Duct, Conduit, Lateral
- Culvert
- Abandoned
- Capped
- Buried Cable
- Property Line

CAUTION/ATTENTION

Although utility locations are established using the best available information, they cannot be guaranteed.
Property lines were compiled from plans and documents recorded in the Land Registry System and are for indexing purposes only.

Bien que l'emplacement des services publics soient établis en utilisant la meilleure information disponible, ils ne peuvent pas être garantis.
Des lignes de propriété ont été compilées en utilisant des plans et des documents enregistrés dans le système de cadastre et sont pour l'indexation seulement.

Ottawa

Department of Public Works and Services / Services et Travaux publics
Infrastructure Services Branch / Direction des services d'infrastructure
Infrastructure Management Division / Division de la gestion de l'infrastructure
100 Constellation Cres., 6th Floor East / 6ème Étage Est, Ottawa, ON K2G 6J8

OTTAWA UTILITY COORDINATING COMMITTEE
CENTRAL REGISTRY

COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
ENREGISTREMENT CENTRAL

N. SCHEPERS, P.Eng. DCM, ISCS	W. NEWELL, P. Eng. DIRECTOR, INFRASTRUCTURE SERVICES
C. COLAIACOVO MANAGER, BUSINESS & TECHNICAL SERVICES	R. ZORGEL COORDINATOR, INFORMATION CENTRE
PRODUCED BY: UCC MAPPING STAFF	SHEET NUMBER I-04-12
SCALE: 1:250	

I-04-13

I-04-12

I-04-16

K-05-07

K-04-06

1375 Clyde Ave

CLYDE AVENUE

1377

1383

REVISIONS / RÉVISIONS	DATE	BY
REDRAWN FROM VOIDED UTILITY PLAN I-04-15	JULY 2007	JW
WATERMAIN/SANITARY/CBs VERIFIED	May. 14, 2008	JW
STORM SEWER/RCB's/WATER REVISED	May. 13, 2008	JW
UPDATED FROM DATA RECEIVED	SEP 2012	JM
CONDUIT ADDED TO CLYDE	SEP 2012	JM

LEGEND

Poles: Rogers, Bell, Hydro, Hydro One, Traffic, Utility	
Poles w/ Light Std.: Bell, Hydro, Hydro-Bell, Traffic, Utility	
Manholes-City: Sanitary,Storm,Water, Catchbasin, Generic	
Manholes-Utility: Bell,Hydro,Traffic,Allstream, Atria, PWGSC, Group Telecom, Rogers, Street Lighting, OC Transpo	
Catch Basins: Heavy Duty, Standard, Curb Inlet, CI for CBMH Ditch Inlet, Rear Yard, Wing Wall	
Pedestals: Allstream, Atria, Bell, Hydro, Gas, Group Telecom, Rogers, Telus, Videotron	
Hand Holes: Allstream, Atria, Group Telecom, Hydro, Hydro One Traffic, Street Lighting, OC Transpo	
Bell: Bell Dip, Guy Wire, Bell Panel, Telephone Booth	
Gas: Reducer, Meter, Valve, Regulator	
Hydro: Thermocouple, Transformer, Tower	
OC Transpo: Bus Shelter-No Power, Energized, Isolated	
Rogers: Power Supply, Panel, Vault, Amplifier	
Street Lighting: Light Standard, Disconnect	
Streetscape: Decorative Light, Planter Box	
Traffic: Connect Box, Disconnect Box, Ground Rod	
Water : Reducer, Fire Hydrant, Wtar Valve, Meter, Wall Hydrant	
Pipe, Duct, Conduit, Laters/	
Culvert	
Abandoned	
Capped	
Buried Cable	
Property Line	

CAUTION/ATTENTION

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Property lines were compiled from plans and documents recorded in the Land Registry System and are for indexing purposes only.

Bien que l'emplacement des services publics soient établis en utilisant la meilleure information disponible, ils ne peuvent pas être garantis.

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Department of Public Works and Services / Services et Travaux publics
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100 Constellation Cres., 6th Floor East / 6ème Étage Est, Ottawa, ON K2G 6J8

OTTAWA UTILITY COORDINATING COMMITTEE
CENTRAL REGISTRY

COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
ENREGISTREMENT CENTRAL

N. SCHEPERS, P.Eng. DEN. ISCS.	W. NEWELL, P. Eng. DIRECTOR, INFRASTRUCTURE SERVICES
C. COLAIACOVO MANAGER, BUSINESS & TECHNICAL SERVICES	R. ZORGEL COORDINATOR, INFORMATION CENTRE
PRODUCED BY: UCC MAPPING STAFF	SHEET NUMBER: I-04-15
SCALE: 1:250	

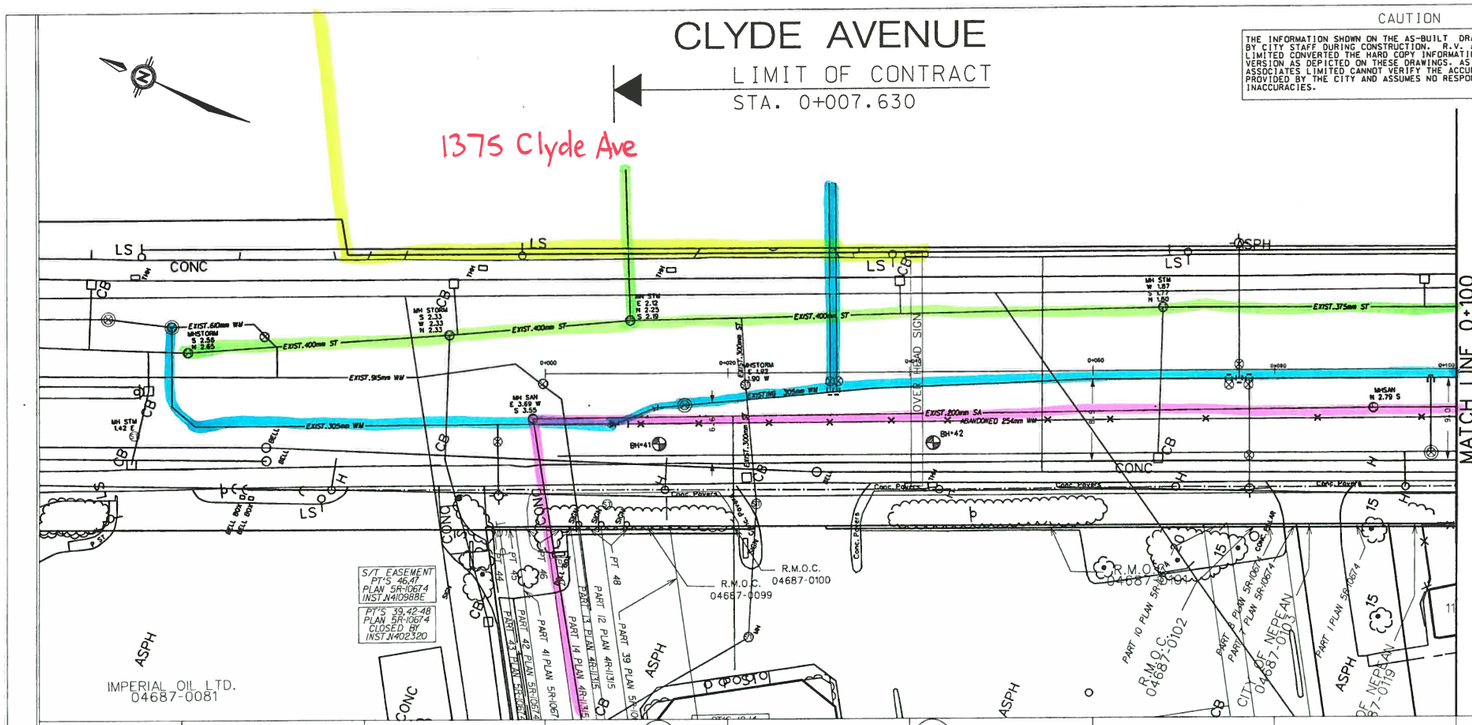
CLYDE AVENUE

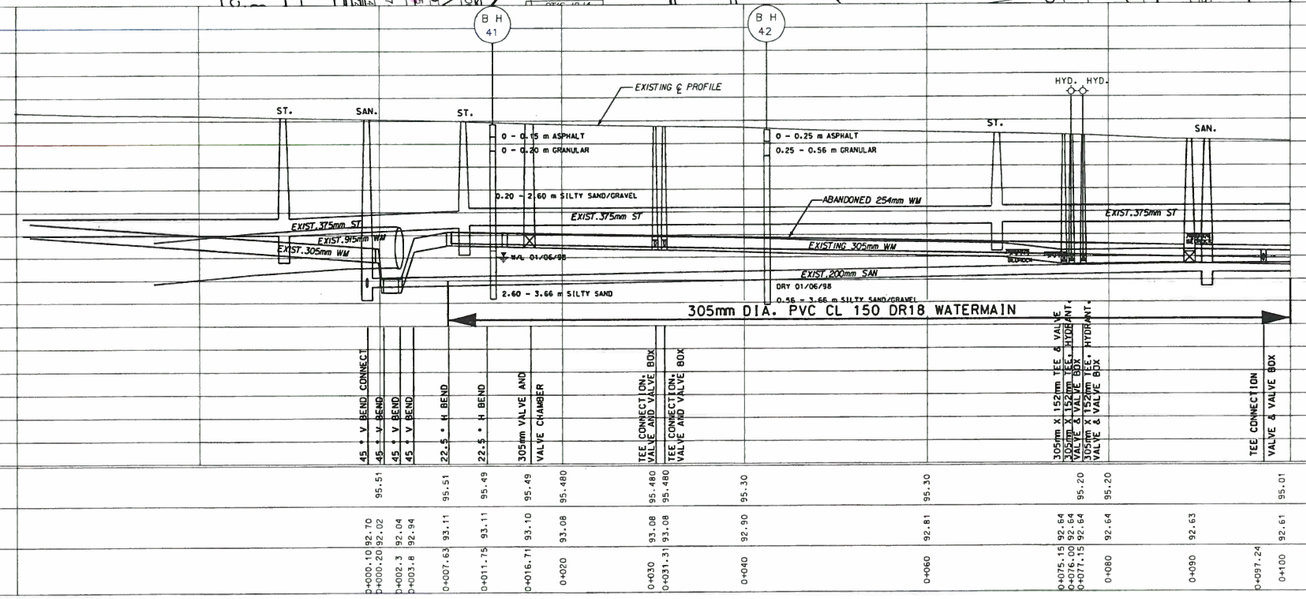
LIMIT OF CONTRACT
STA. 0+007.630

1375 Clyde Ave

CAUTION

THE INFORMATION SHOWN ON THE AS-BUILT DRAWINGS WAS COLLECTED BY CITY STAFF DURING CONSTRUCTION. R.V. ANDERSON ASSOCIATES LIMITED CONVERTED THE HARD COPY INFORMATION INTO THE ELECTRONIC VERSION AS DEPICTED ON THESE DRAWINGS. AS SUCH, R.V. ANDERSON ASSOCIATES LIMITED CANNOT VERIFY THE ACCURACY OF INFORMATION AS PROVIDED BY THE CITY AND ASSUMES NO RESPONSIBILITY FOR ANY INACCURACIES.





STATION	AS BUILT TOP WATERMAIN	ELEVATION AT ℄ ROAD
0+000.10	92.70	95.51
0+000.20	92.02	
0+002.3	92.04	95.51
0+003.8	92.94	
0+007.63	93.11	95.51
0+011.75	93.11	95.49
0+016.71	93.10	95.49
0+020	93.08	95.480
0+030	93.08	95.480
0+031.31	93.08	95.480
0+040	92.90	95.30
0+060	92.81	95.30
0+075.15	92.64	95.20
0+076.10	92.64	
0+077.15	92.64	95.20
0+080	92.64	95.20
0+090	92.63	
0+097.24	92.61	95.01
0+100	92.61	

68-32912.dgn 08/03/2007 01:17:13 PM

Ottawa-Carleton

ENVIRONMENT and TRANSPORTATION DEPARTMENT

M.J.E. SHEFLIN P.Eng.
ENVIRONMENT and TRANSPORTATION COMMISSIONER

Approved by:
Environmental Projects Branch
Date:

Project Manager: Ziad A. Ghadban — Date

Drawn by: W. Curry — Sakkio * — Date

Survey details by: — Book * — Date

"As Built" Inspection by: — Date

NOTES ARE TYPICAL FROM SHEET NO. 11.

RV Anderson Associates Limited
consulting engineers, architects, technology managers
RVA 4925
1750 Courtwood Crescent, Suite 205, Ottawa, Ontario, Canada K2C 2B5
Telephone: (613)225-1644 Fax: (613) 225-8335 E-mail: ottawa@rvanderson.com

By	Description	Date
KPT	AS BUILT RECORD	MARCH 18 2003
WJC	ISSUED FOR TENDER	MARCH 02 1999

Scales: HORIZ. 1:250
VERT. 1:50

Project Title:

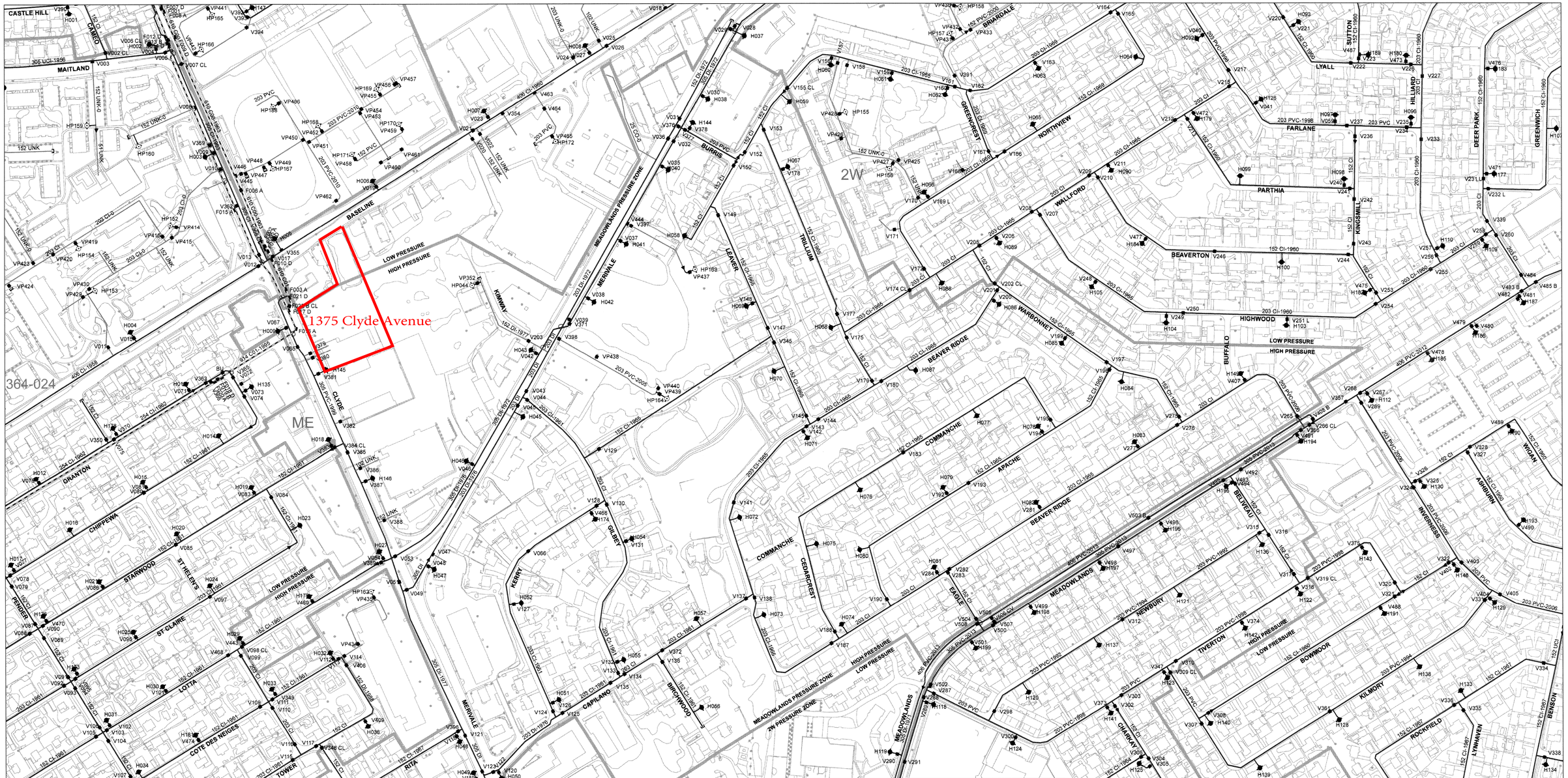
PART B
CLYDE AVENUE

AS BUILT
305mm WATERMAIN

STA. 0+007.63
to
STA. 0+100.00

Drawing No.: 68-32912 | Sheet No.: 12

9236



2014 Water Distribution System

Department of Infrastructure Services

This map was compiled from existing & collected engineering information from the City of Ottawa Geographic Information System and is protected by copyright. The location of Infrastructure is approximate and should not be used for construction purposes.

Scale 1:2,500

Ottawa

Legend

- Public Hydrant
- Private Hydrant
- Summer only Flusher Hydrant
- Flusher Hydrant
- Acoustic Fibre Optic
- Gate Valve
- Tapping Valve
- Butterfly Valve
- Buried Valve
- Drain Pipe
- Check Valve
- Closed Valve
- Drain-Out Valve
- Left Hand Valve
- Spot Elevation
- Pressure Reducing Valve
- Air Relief Valve
- Bypass Valve
- Feedermain Valve
- Inspection Plate
- Cap
- Reducer
- Jump
- Water Meter
- Water Service
- Backbone Pipe
- Watermain with Pipe Diameter, Material and Install Year
- Pipe Casing
- Pressure Zone Delineation and Identifier
- Well
- Elevated Tank
- Water Pumping Station
- Water Reservoir
- Water Treatment Plant

Pipe Equivalents

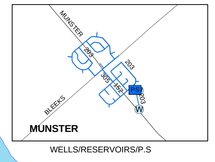
nominal (mm)	actual (inches)	nominal (mm)	actual (inches)	nominal (mm)	actual (inches)
100	4	675	27	1800	72
150	6	750	30	1950	78
200	8	825	33	2025	80
250	10	900	36	2100	84
300	12	975	39	2250	90
375	15	1050	42	2400	96
400	16	1200	48	2550	102
450	18	1350	54	2700	108
525	21	1500	60	2850	114
600	24	1650	66	3000	120

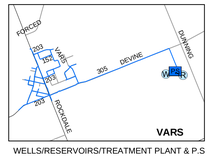
Pipe Materials

- A - ASBESTOS
- CI - CAST IRON
- CO - COPPER
- CO0 - AWWA C300
- CO1 - AWWA C301
- CO2 - AWWA C302
- CO3 - AWWA C303
- DI - DUCTILE IRON
- PE - POLYETHYLENE (DR11 TO DR21)
- PVC - POLYVINYL CHLORIDE
- STC - CONCRETE LINED STEEL PIPE
- UCI - UNLINED CAST IRON
- UNK - UNKNOWN MATERIAL

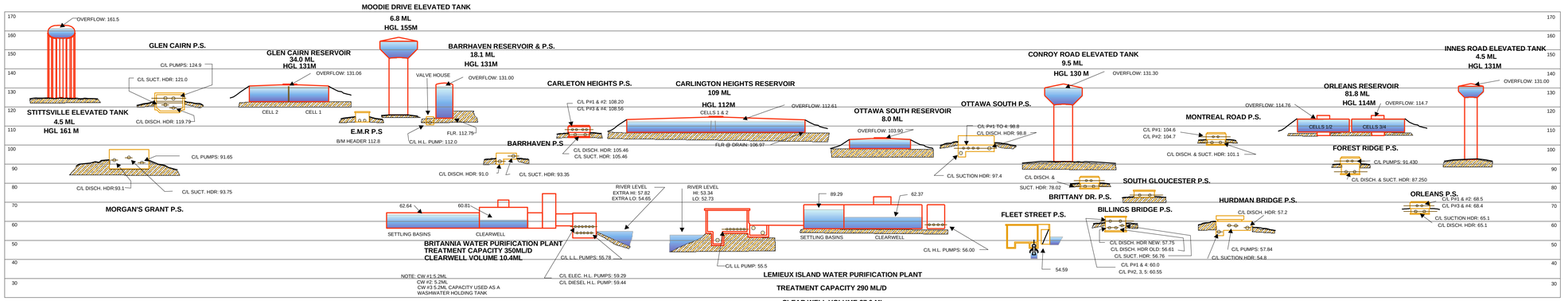
362-026	364-026	366-026
362-025	364-025	366-025
362-024	364-024	366-024
362-023	364-023	366-023
362-022	364-022	366-022

City of Ottawa - Water Distribution System
Facilities & Feedermains





ORLEANS P.S.
FOREST RIDGE P.S
MONTREAL ROAD P.S.
BRITTANY DRIVE P.S.
FLEET STREET P.S.
LEMIEUX ISLAND PURIFICATION PLANT & P.S. & RES.
1375 Clyde Avenue
BRITANNIA PURIFICATION PLANT & P.S. & RES.
MORGAN'S GRANT P.S.
ENERGY MINES & RESOURCES P.S.
GLEN CAIRN P.S. & RES
STITTSVILLE ELEVATED TANK
MOODIE ELEVATED TANK
BARRHAVEN P.S.
BARRHAVEN RES. & P.S.
ORLEANS RES.
INNES RD ELEVATED TANK
HURDMAN P.S.
BILLINGS BRIDGE P.S.
CARLINGTON HEIGHTS P.S. & RES.
CONROY RD ELEVATED TANK
SOUTH GLOUCESTER P.S.
OTTAWA SOUTH P.S & RES.
SHADOW RIDGE P.S. & WELLS
SHOWDOW RIDGE WELL
Shadow Ridge
1E
MONT
2E
2C
1W
ME
MG
2W
3C
EMR
3W
BARR
SHAD



Legend

Water System Structure

- Pump Station
- Water Treatment Plant
- Well
- Elevated Tank
- Reservoir

WATERMAINS

- 305mm - 406mm Backbone
- 407mm - 762mm Backbone
- 763mm - 1067mm Backbone
- 1068mm - 1372mm Backbone
- 1373mm - 1981mm Backbone
- 305mm - 406mm Feedermain
- 407mm - 762mm Feedermain
- 763mm - 1067mm Feedermain
- 1068mm - 1372mm Feedermain
- 1373mm - 1981mm Feedermain

PRESSURE ZONES

- 1E
- 1W
- 2C
- 2E
- 2W
- 3C
- 3W
- BARR
- EMR
- ME
- MG
- MONT
- SHAD

N
W E
S

Infrastructure Services & Community Sustainability
Infrastructure Services Branch
Infrastructure Management Division

0 1,000 2,000 4,000 6,000
Meters

FIGURE 1-1

DRAWN BY: D. HESS DATE: Oct 6/09

Appendix C

Pre-Consultation Correspondences
(City, RVCA and MOECC)

Karla Ferrey

Subject: RE: 1375 Clyde - preconsultation follow up

From: Bliss Edwards [mailto:bedwards@dymon.ca]
Sent: June 5, 2017 1:15 PM
To: Lucie Dalrymple
Cc: Sarah Gore
Subject: FW: 1375 Clyde - preconsultation follow up

Bliss Edwards, MCIP RPP
Senior Director - Planning

Dymon Group of Companies
2-1830 Walkley Road | Ottawa ON K1H 8K3
Direct +14168443874 | E-mail bedwards@dymon.ca

From: Dickinson, Mary [mailto:mary.dickinson@ottawa.ca]
Sent: May 8, 2017 3:52 PM
To: Bliss Edwards <bedwards@dymon.ca>; Miguel Tremblay <tremblay@fotenn.com>
Subject: 1375 Clyde - preconsultation follow up

At long last. Please accept this email as formal follow up to our preconsultation discussions for 1375 Clyde Ave. I apologize for the delay.

Summary of Proposal

These comments are based on the March 17, 2017 concept plan, which includes a retail pad at Baseline Road (467 square metres), maintaining the majority of the existing 'Value Village' building and adding a second retail unit immediately east of the existing (1487 square metres and 1117 square metres), and a stand-alone Dymon facility fronting Clyde abutting the south property line of the gas station which is located at the corner of Baseline and Clyde.

A drive-through is proposed at the rear of the pad building along Baseline Road, and approximately 115 parking spaces total are being shown.

The Dymon building is proposed to be 5 storeys and consist of dymon retail at the ground floor adjacent to Clyde, along with the entrance to the interior loading area.

A total of three private approaches are proposed on the concept – two 2-way, one in-only at the entrance to the interior loading.

Policy context

Please include a rationale based on both the current Official Plan direction as well as the Council approved OPA 150.

The subject site is designated Arterial Mainstreet – both Baseline Road and Clyde Avenue frontages fall within the AM designation.

Development is subject to the Urban Design and Compatibility policies found in Section 2.5.1 and 4.11 of the Official Plan, and Section 2.2.2 – Managing Growth within the Urban Area.

The site is subject to the policies Merivale Road Secondary Plan

The Arterial Mainstreet Design Guidelines should be consulted

Engineering

Stormwater criteria – control pre to post

Further information contact Eric Surprenant at eric.surprenant@ottawa.ca or 613-580-2424 ext27794

Urban Design Comments

1. The buildings should be located at the street edge with no drive aisle or parking between the building and the street.

2. Active entrances at the street and significant clear glazing is important to improve the interaction of the buildings with the public realm.

3. Relocating the entrance to the existing Value Village building to Clyde or to the corner of Clyde and the parking lot will improve the interaction of this building with the street.

4. A minimum of a two storey building should be achieved for all new buildings at the AM frontages.

5. The sides as well as the front of the Dymon building will be very visible and as such the materials and treatments of all visible sides will be important.

6. Tying together the treatments on all buildings in some way may have a positive cohesive effect on the development and help integrate the old with the new.

Transportation Comments (Directly from Wally Dubyk)

7. Clyde Avenue is designated as an Arterial road within the City's Official Plan with a ROW protection of 34.0 metres. The ROW limits are to be shown on all the drawings and the offset distance (17.0 metres) to be dimensioned from the existing centerline of pavement.

8. Baseline Road is designated as an Arterial road within the City's Official Plan with a ROW protection of 44.5 metres. The ROW limits are to be shown on all the drawings and the offset distance (22.25 metres) to be dimensioned from the existing centerline of pavement.

9. ROW interpretation – Land for a road widening will be taken equally from both sides of a road, measured from the centreline in existence at the time of the widening if required by the City. The centreline is a line running down the middle of a road surface, equidistant from both edges of the pavement. In determining the centreline, paved shoulders, bus lay-bys, auxiliary lanes, turning lanes and other special circumstances are not included in the road surface.

10. The concrete sidewalk is to meet City standards and be 2.0 metres in width and to be continuous along property frontage and depressed through the proposed access (please refer to the City's sidewalk and curb standard drawing SC7.1 for unsignalized entrance).

11. The access shall be 6.7 metres minimum in width for 2-way traffic.

12. Please identify the type of delivery truck that would be servicing the site and provide a truck turning movement drawing..

13. Curb returns are to be provided at the accesses with a minimum radius of 5.0 metres and are to be dimensioned on the drawings.

14. Ensure that the end of the curb return does not extend beyond the property line.

15. The closure of an existing private approach shall reinstate the sidewalk, shoulder, curb and boulevard to City standards.

16. No person shall construct a private approach within 3.0 metres of any property line as stated in By-Law No. 2003-447 Section 25 (o).

17. No person shall construct a private approach serving any parking area with a grade exceeding 2% and the grade on the private approach shall descend in the direction of the roadway.

18. Minimum lane width for fire trucks is 6.0 metres.

19. A fire route plan is to be shown on an 8.5" x 11" format and will include the following information – please provide five (5) copies:
    a. Plans should be drawn to scale, with the scale shown;
    b. Site property lines have to be shown;
    c. Pavement widths dimensioned;
    d. Radius of all corners;
    e. Location of all buildings and structures on the site;
    f. Location of pedestrian walks, parking areas, parking aisles and driveways on the site;
    g. Fire hydrant location(s)/Fire Department connections;
    h. Proposed fire route sign locations; and
    i. Proposed fire route.

20. In addition, the Ontario Building Code requires specific information to be shown on the fire route plan, and it is the responsibility of the applicant to ensure that the proposed fire route plan complies with the provisions of the Code. Excerpts from the Code have been provided for reference purposes to assist with the design of the fire route; however, it is the responsibility of the applicant to refer to the most recent version of the Code to ensure that the proposed fire route is in compliance.

21. Please refer to TAC Manual Part 2; Table 3.2.9.3 and Figure 3.2.5.2 for appropriate throat length and dimensioning.

22. Inadequate driveway throat length is a common problem when internal land development circulation is poorly designed. This can lead to situations in which traffic circulation within the development is chaotic. It can also lead to situations in which traffic turning into a development queues on the arterial roadway while waiting for vehicles to clear the short driveway either by queuing or backing out into the driveway. This is unsafe and may cause accidents on the main roadway. Adequate throat length allows stacking, or queuing, to occur on site particularly for heavy vehicles. This reduces driver confusion, traffic problems, and unsafe conditions. Insufficient throat length and poor site planning can cause unsafe conditions and result in vehicles backing out onto the main roadway interrupting traffic flow.

23. Signs related to the development site are to be placed in accordance with the applicable sign by-law. An Encroachment Agreement will be required for any signage on the road allowance.

24. As identified in the Transportation Impact Assessment Guidelines (TIA) a Transportation Impact Study (TIS) will be required for all proposals that include drive-thru facilities regardless of the size or location of the development.

Planning Comments

25. Consideration for the additional warehouse self-storage use on the subject property must be consistent with the Official Plan, including all relevant urban design direction, and provisions relating to the Arterial Mainstreet designation, and the Merivale Road Secondary Plan. With the self-storage use being a lower intensity use, a rationale for how adding this use to the subject property will still allow density targets/density requirements to be met is also important.

26. Please identify in your planning rationale whether you believe there to be further development potential on the subject property. If so please provide details about how the property could further evolve in the future.

27. The AM10 zoning designation outlines development standards that facilitate development appropriate for portions of Arterial Mainstreets that are desired and expected to evolve into a more pedestrian-friendly environment over time. The proposed project is expected to conform to the AM10 provisions. Any aspect of the project that is proposed to deviate from the AM10 provisions should be accompanied by a rationale that outlines how the alternative provisions equally achieve, or achieve more effectively, the Official Plan policies for arterial mainstreets and Merivale Road Secondary Plan policies.

28. The Merivale Road Secondary Plan places a significant emphasis on creating active street frontages, and this will need to be reflected in the submission. The widths of the private approaches on Clyde in particular will work against any attempt to successfully activate the street frontage. Reducing these private approaches needs to be looked at, as well as including elements and treatments that will contribute positively to the public realm and pedestrian environment.

29. Building locations and setbacks from both Clyde and Baseline need to have regard for the right of way protection, as this will have a notable impact on both frontages.

30. The Merivale Road triangle remains underdeveloped and consideration needs to be given to possible connection from this site to future development to the east. The current site layout allows for options to remain open. Other considerations such as grading should also be looked at on a preliminary basis.

31. Consideration should be given to logical pedestrian movement through the site. A safe and logical path of movement for pedestrians going from the north building to the retail at the south, and out to Clyde (and vise versa) will be required.

32. Although the existing value village building is being maintained, relocating a front door to this tenancy to either the corner at Clyde or along the Clyde building front would improve the activation with the public realm significantly and therefore help achieve the Official Plan policies.

33. Generous walkway widths leading to building entrances and providing logical and safe pedestrian path of movement through the site is important.

34. Use of landscape islands and providing the full landscape buffers in accordance with the zoning by-law will be very important to break up the parking areas and add some green pervious surfaces to the property.

35. I would like to see street trees at approx 7-10 metre separation at Clyde and Baseline frontages.

36. The drive-through must have a minimum of 11 queuing spaces with 7 before or at the order board

37. There is a bus stop located at the south end of the subject site. Please expect to receive comments from OC Transpo requesting the installation of a concrete pad for future bus shelter.

38. Sidewalks and curbs at Clyde and Baseline are in various states of disrepair and should be replaced as part of the redevelopment of the site.

39. Minimum throat length needs to be achieved at all access points (typically minimum is 15 metres).

40. Cash in lieu of parkland fees may apply.

Public Consultation

I strongly suggest you contact Councillor Egli as soon as possible to discuss the development proposal.

The Ward 9 Community Associations are active and have a particular interest in the redevelopment along Merivale Road and within the Merivale triangle. I strongly suggest you reach out to the General Burns Community Association before submitting your application.

General Burns CA	Jeff Seaman	President	(613)769-0308	jseaman@magma.ca

Application type and submission requirements

The proposal will require (a) major zoning by-law amendment, and (b) site plan control, manager approval, with public consultation.
The zoning/site plan will be subject to the UDRP for formal review.
Submission requirements are attached. Please provide pdf copies of all submission material along with the paper copies.

Please let me know if you have any questions.

Mary

Mary Dickinson, MCIP, RPP
Planner
Development Review West
Urbaniste
Examen des demandes d'aménagement ouest

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 13923
ottawa.ca/planning / ottawa.ca/urbanisme

Karla Ferrey

From: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Sent: June 14, 2017 8:22 AM
To: Guy Forget
Cc: Dickinson, Mary; Karla Ferrey; Lucie Dalrymple
Subject: RE: 1375 Clyde - preconsultation follow up

Hi Guy,

Stormwater management criteria is to be based on a calculated time of concentration which cannot be less than 10 minutes.

Thanks

Eric Surprenant, C.E.T. / 613 580-2424 ext.:27794
Project Manager, Infrastructure Approvals
Development Review Suburban Services Branch
Planning, Infrastructure and Economic Development Dept.

Gestionaire de projets, Approbation de l'infrastructure
Examen des demandes d'aménagement (Services Suburbains Ouest)
Services de la planification, de l'infrastructure et du développement économique

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27794

ottawa.ca/planning / ottawa.ca/urbanisme

From: Guy Forget [mailto:gforget@jlrichards.ca]
Sent: June 13, 2017 1:40 PM
To: Surprenant, Eric
Cc: Dickinson, Mary; Karla Ferrey; Lucie Dalrymple
Subject: RE: 1375 Clyde - preconsultation follow up

Eric,

Given other similar project, can we assume that the 2 year pre-development should be calculated based on the existing time of concentration and shall not be less than 10 minutes.

Guy

Guy Forget, P.Eng., LEED AP
Associate
Senior Water Resources Engineer

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

J.L. Richards & Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS

BEST MANAGED COMPANIES

From: Lucie Dalrymple
Sent: June 13, 2017 1:05 PM
To: Surprenant, Eric
Cc: Dickinson, Mary; Karla Ferrey; Guy Forget
Subject: RE: 1375 Clyde - preconsultation follow up

Thank you Eric for the clarification/confirmation.

The person you were speaking with was Karla Ferrey.

Overall, Karla, Guy and myself will be involved with this project, but with Karla being the PM and main point of contact.

Thanks again,

Lucie

Lucie Dalrymple, P.Eng.
Associate
Senior Civil Engineer

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

J.L. Richards & Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS

BEST MANAGED COMPANIES

From: Surprenant, Eric [mailto:Eric.Surprenant@ottawa.ca]
Sent: June 13, 2017 1:01 PM
To: Lucie Dalrymple
Cc: Dickinson, Mary
Subject: RE: 1375 Clyde - preconsultation follow up

Lucie,

Hope things are good.
I spoke with someone from your office yesterday who is working with you on the above site. Following the discussion I had a closer look at the design requirements for sites within the Pinecrest Creek drainage area. In this case although the site is close to the study area boundary and the Pinecrest Creek contributing area, the site is considered to be outside the limits and therefore in this particular case we will not require you to design to the Pinecrest Creek study criteria. That being said due to the age of the receiving strom sewer the requirements for storm release rate which you will need to control to will be 100 year post to the 2 year pre-development flows, while using the more stringent of either the calculated C value or a 0.5 C value.

Merci

Eric Surprenant, C.E.T. / 613 580-2424 ext.:27794
Project Manager, Infrastructure Approvals

Development Review Suburban Services Branch
Planning, Infrastructure and Economic Development Dept.

Gestionaire de projets, Approbation de l'infrastructure
Examen des demandes d'aménagement (Services Suburbains Ouest)
Services de la planification, de l'infrastructure et du développement économique

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ottawa.ca/planning / ottawa.ca/urbanisme

From: Surprenant, Eric
Sent: June 12, 2017 9:43 AM
To: 'Lucie Dalrymple'
Subject: RE: 1375 Clyde - preconsultation follow up

Hopefully this will be clearer.
Thanks
Eric S.


geoOttawa
I want to ...
1375 clyde
Base Maps
IN138204
IN138202
IN66553
IN66552
WAT17687 (1960)
406mmØ - CI
IN66554
ch. Baseline Rd.
SAN27153 (1965)
90.3m - 300mmØ CONR
IN66555
IN138201
H005
IN66551
IN106962
MHST27977
F002
F010 D
IN66547
IN66546
STM07094 (1965)
44m - 300mmØ CONC
20 m
50 ft
© 2017 - City Of Ottawa/Ville d'Ottawa, © Teranet Enterprises

From: Lucie Dalrymple [mailto:ldalrymple@jlrichards.ca]
Sent: June 09, 2017 8:21 AM
To: Surprenant, Eric
Subject: RE: 1375 Clyde - preconsultation follow up

Merci Eric. I just left you a voice mail, so when you have a minute please call me.

I tried expanding the snap shot you provided, but unfortunately it is not legible. If there is a way that you could send it in a different format (maybe PDF) it would be appreciated. In my voice mail, I also mentioned the section along Baseline as the property has also frontage along Baseline. Could you also provide a snap shot for this section.

Thanks again for your assistance.

Lucie

Lucie Dalrymple, P.Eng.
Associate
Senior Civil Engineer

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

From: Surprenant, Eric [mailto:Eric.Surprenant@ottawa.ca]
Sent: June 8, 2017 10:42 AM
To: Lucie Dalrymple
Cc: Karla Ferrey; Bliss Edwards; Guy Forget; Dickinson, Mary
Subject: RE: 1375 Clyde - preconsultation follow up

Hi Lucie,
I am providing the below information which was taken from our municipal system. You may need to make additional inquiries to obtain any other missing information.

Following up on the pre-application consultation for the 1375 Clyde, apologies as design guidelines affecting the stormwater design for the proposed site had not been attached to the previous information I had provided. This site actually drains to the Pinecrest Creek and I've obtained the final draft Stormwater Management Guidelines for the Pinecrest Creek/ Westboro Area (June 2012) and have the following information to convey to the applicant:

· Storm Water Quantity – The more stringent of the following criteria will govern:
  i. Developments draining to Pinecrest Creek shall control the 1:100 year discharge from the site to a maximum rate of 33.5 L/s/ha; this unit flow target has been set based on the hydrologic (SWMHYMO) modelling conducted for the Pinecrest Creek/Westboro Stormwater Management Retrofit Study (May 2011); or
  ii. Requirements of section 8 of the Ottawa Sewer Design Guidelines;
· Storm Water Quality – The equivalent of an enhanced level of treatment (TSS removal of 80%) is required for institutional/commercial/industrial sites draining to Pinecrest Creek; the proponent may wish to consult with the conservation authority to confirm that no additional requirements are applicable.

Particular measures for controlling stormwater release to the receiving storm sewer in Clyde would have been required being that the receiving storm sewers had been constructed pre-1970, however in this case the above Pinecrest Creek criteria is the criteria which would apply.

As it relates to Sanitary and Watermain public services analysis for Zoning , please ensure that existing uses and flows are compared against proposed development requirements, i.e.(fire flow requirements and confirming sanitary flows all versus existing.

If you require any additional information, please don't hesitate to contact me.

Thanks

Eric Surprenant, C.E.T. / 613 580-2424 ext.:27794
Project Manager, Infrastructure Approvals
Development Review Suburban Services Branch
Planning, Infrastructure and Economic Development Dept.

Gestionaire de projets, Approbation de l'infrastructure
Examen des demandes d'aménagement (Services Suburbains Ouest)
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ottawa.ca/planning / ottawa.ca/urbanisme

From: Lucie Dalrymple [mailto:ldalrymple@jlrichards.ca]
Sent: June 06, 2017 11:31 AM
To: Surprenant, Eric
Cc: Karla Ferrey; Bliss Edwards; Guy Forget
Subject: RE: 1375 Clyde - preconsultation follow up

Hi Eric,

Thank you for your time in discussing the specifics for the required Adequacy of Public Service Brief requested from the City for the Zoning application.

As discuss, we will await your confirmation and/or information on the:

Annie Williams

From: Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Sent: February 1, 2019 8:26 AM
To: Annie Williams
Subject: RE: MOE ECA Exemption - Dymon Self Storage - 1375 Clyde Avenue

Hi Annie,

From the information provided, the site would meet the exemption requirements set out in Ontario Regulation 525/98 therefore an ECA would not be required.

Regards,

Emily Diamond
Environmental Officer
Ministry of the Environment, Conservation and Parks
Ottawa District Office
2430 Don Reid Drive
Ottawa, Ontario, K1H 1E1
Tel: 613-521-3450 ext 238
Fax: 613-521-5437
e-mail: emily.diamond@ontario.ca

From: Annie Williams
Sent: December 5, 2018 12:17 PM
To: emily.diamond@ontario.ca
Cc: Sheldon Dattenberger <sdattenberger@jlrichards.ca>
Subject: RE: MOE ECA Exemption - Dymon Self Storage - 1375 Clyde Avenue

Hi Emily,

We would like to follow up on our email sent back in June. Can you please confirm that the project is exempt from requiring an ECA?

Thank you,

From: Julie White <jwhite@jlrichards.ca>
Sent: June 06, 2018 1:53 PM
To: emily.diamond@ontario.ca
Cc: Surprenant, Eric <Eric.Surprenant@ottawa.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>; Bliss Edwards <bedwards@dymon.ca>
Subject: MOE ECA Exemption - Dymon Self Storage - 1375 Clyde Avenue

Hi Emily,

JLR has been retained by Dymon Self Storage for the detailed design of municipal services for a subject site located at 1375 Clyde Avenue in the City of Ottawa. A figure outlining the site limits and location has been included below:

Dymon wishes to redevelop the subject property into a development with the following key buildings:

1) A five (5) storey storage facility building with a covered drive-through garage
2) A one (1) storey restaurant with a drive-through at the north end of the site
3) Maintaining the majority of the existing retail building along the south limit of the site
4) A five (5) storey storage facility addition to the east of the existing retail building

Similar to other Dymon sites within the Ottawa area (most recently the 2599 Carling Avenue site) and as summarized below, we are of the understanding that an MOE ECA for the 1375 Clyde Avenue site will not be required.

1) The lands are zoned Arterial Main street (AM), therefore is not an industrial zoned area or industrial lands.
2) Nonetheless, the definition of industrial lands is too broad. All land uses have a certain amount of storage of good and materials (office space, residential, commercial). The intent of the definition has an emphasis on production, processing, repair which by no means is a Dymon Self Storage Facility.
3) Dymon's facilities are no different than storage lockers provided in residential condominium buildings. Residential condominium buildings do not require an MOE ECA and are not within the definition of industrial lands.
4) Dymon's facilities are specifically for the storage of 'dry' goods. Paints, solvents, fuel, etc. is prohibited, a copy of the tenant contracts can be provided if needed.
5) Dymon's facilities are extremely well maintained. These facilities are clean, bright, and designed to provide a safe and secure environment.
6) There are other Dymon facilities located on lands not zoned industrial (Carling, Greenbank, Bank / Hunt Club). The City sees them fit to be cited in 'non-industrial' areas and did not require to have MOE ECAs.

Given the pending Site Plan Approval, I have copied the City on this email, therefore please confirm that the project is exempt from requiring an ECA given the attached information.

Thank you,

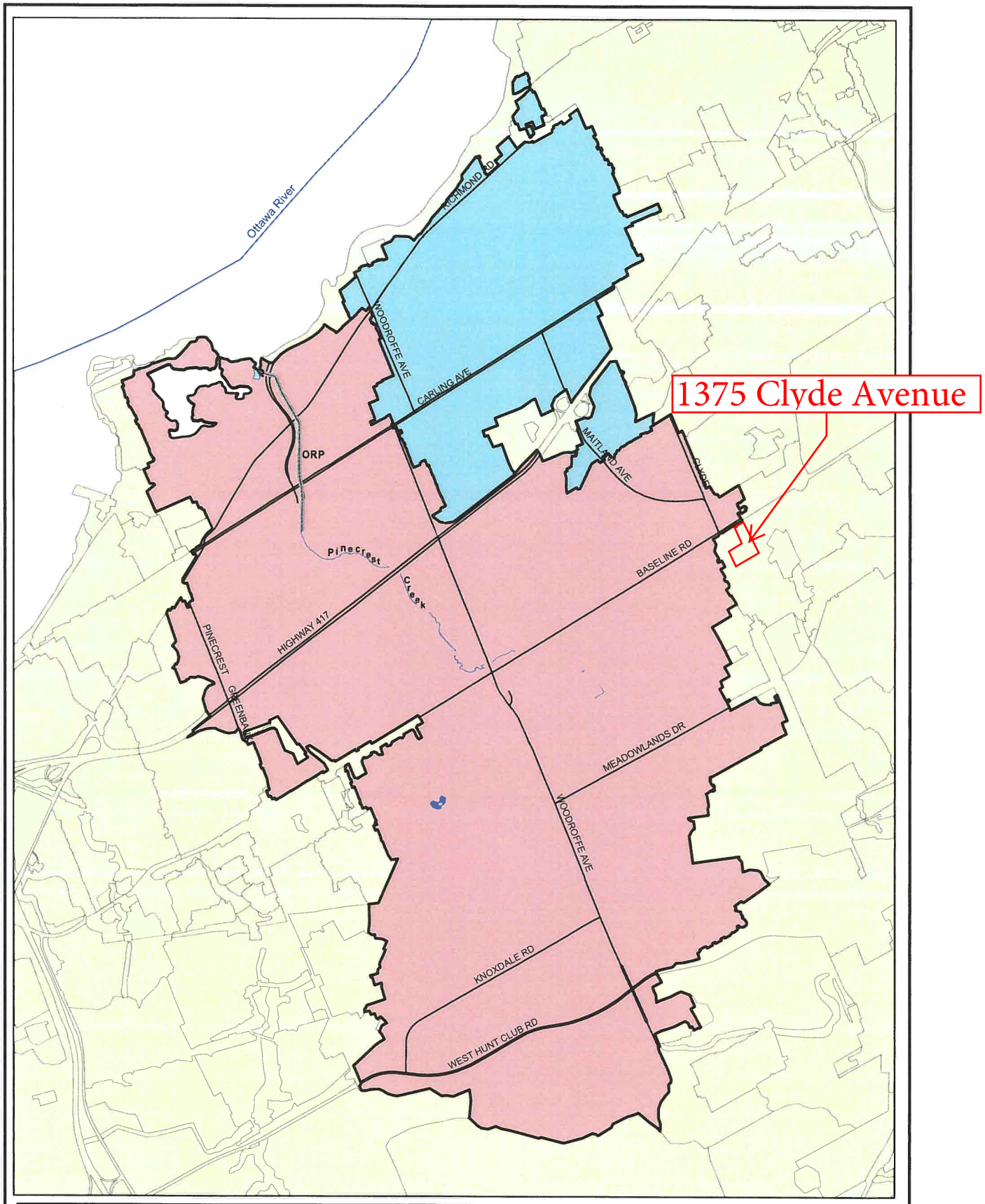
Julie

Julie White, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

'

'



LEGEND:

Ottawa River Parkway Pipe (ORP)
Roads_Clipped
Main Roads
Pinecrest Creek
BritanniaSWMpond
Ottawa River
Westboro Study Area
Pinecrest Study Area
Stormsewer_Outfalls

CLIENT: Ottawa

NOTES:
- The background data was provided by the City of Ottawa

0 185 370 740 1,110 1,480 Meters

N

NOV 2011 | REV. 4

BY: JFSA Water Resources and Environmental Consultants

PROJECT: STORMWATER MANAGEMENT GUIDELINES FOR THE PINECREST CREEK / WESTBORO AREA

TITLE: Study Area

PROJECT No. 741(02)

DESIGN	KM		
GIS	KM		
CHECK	JFS		
REVIEW	JFS		

FIGURE 1.1

MAP REF: 741_02\Design\GIS\Maps\StudyArea_revised2012_v4.mxd

Appendix D

City of Ottawa Development
Servicing Checklist

DYMON SELF STORAGE, 1375 CLYDE AVENUE

DEVELOPMENT SERVICING STUDY CHECKLIST

REFERENCED STUDIES AND REPORTS	REFERENCE
Site Servicing Report for Dymon Self Storage, 1375 Clyde Avenue (J.L. Richards & Associates Limited, May 2018)	SSR

4.1	GENERAL CONTENT	REFERENCE
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	SSR (Title Page)
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	SSR (Figure 1, Appendix A, Section 1.1)
☒	Plan showing the site and location of all existing services.	Site Servicing Plan (S1)
☐	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	SSR (Appendix C)
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	SSR (Appendix C)
☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	SSR (Sect. 1.3, 3.1, 3.2, 4.1. 4.2)
☒	Statement of objectives and servicing criteria.	SSR (Sect. 1.2, 2.1, 2.2, 3.1, 3.2, 4.1, 4.2)
☒	Identification of existing and proposed infrastructure available in the immediate area.	SSR (Sect. 1.3, 3.3, 4.4) Site Servicing Plan (S1)
☐	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A
☒	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	SSR (Sect. 4.2, Appendix G) Grading Plan (G1) Stormwater Management Plan (SWM)

☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Site Servicing Plan (S1)
☒	All preliminary and formal site plan submissions should have the following information: ▪ Metric scale ▪ North arrow (including construction North) ▪ Key plan ▪ Name and contact information of applicant and property owner ▪ Property limits, including bearings and dimensions ▪ Existing and proposed structures and parking areas ▪ Easements, road widening and rights-of-way ▪ Adjacent street names	All Drawings

4.2	**DEVELOPMENT SERVICING REPORT: WATER**	**REFERENCE**
☐	Confirm consistency with Master Servicing Study, if available.	N/A
☒	Availability of public infrastructure to service proposed development.	SSR (Sect. 1.3) Site Servicing Plan (S1)
☒	Identification of system constraints.	SSR (Sect. 2.1, 2.2)
☒	Identify boundary conditions.	SSR (Sect. 2.6, Table 2)
☒	Confirmation of adequate domestic supply and pressure.	SSR (Sect. 2.2, 2.7.1, Appendix E5)
☒	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	SSR (Sect. 2.2, 2.4, 2.7.2, Appendix E6)
☒	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	SSR (Sect. 2.2, 2.7.3, Appendix E7)
☒	Definition of phasing constraints. Hydraulic modelling is required to confirm servicing for all defined phases of the project, including the ultimate design.	SSR (Sect. 2.7)
☒	Address reliability requirements, such as appropriate location of shutoff valves.	Site Servicing Plan (S1)
☒	Check on the necessity of a pressure zone boundary modification.	SSR (Sect. 2.7)

☒	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	SSR (Sect. 2.3, 2.7, 2.9, Appendix E5, Appendix E6, Appendix E7)
☒	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants), including special metering provisions.	SSR (Sect. 2.9) Site Servicing Plan (S1)
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	SSR (Sect. 2.1)
☒	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	SSR (Appendices E3, E5, E6, E7)

4.3	**DEVELOPMENT SERVICING REPORT: WASTEWATER**	**REFERENCE**
☒	Summary of proposed design criteria (Note: Wet weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	SSR (Sect. 3.2)
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the Guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	SSR (Sect. 1.3, 3.1, 3.3)
☒	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable.)	SSR (Sect. 3.3, Appendix F)
☐	Calculations related to dry weather and wet weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A

☒	Description of proposed sewer network, including sewers, pumping stations and forcemains.	SSR (Sect. 3.3, Appendix F) Site Servicing Plan (S1)
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations, such as contamination, corrosive environment, etc.	N/A

4.4	**DEVELOPMENT SERVICING REPORT: STORMWATER**	**REFERENCE**
☒	Description of Drainage outlets and downstream constraints, including legality of outlets (i.e., municipal drain, right-of-way, watercourse, or private property).	SSR (Sect. 1.3, 4.1, 4.3, Appendix G)
☒	Analysis of available capacity in existing public infrastructure.	SSR (Section 4.1, 4.3, 4.4)
☒	A Drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	SSR (Figure 1) Site Servicing Plan (S1)
☒	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	SSR (Sect. 4.2)
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	SSR (Sect. 4.2)
☐	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	SSR (Sect. 4.4) Stormwater Management Plan (SWM)
☐	Setback from private sewage disposal systems.	N/A

☐	Watercourse and hazard lands setbacks.	N/A
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	SSR (Appendix C)
☐	Confirm consistency with subwatershed and Master Servicing Study, if applicable study exists.	N/A
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	SSR (Sect. 4.4, 4.5, Appendix G)
☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
☒	Calculate pre- and post-development peak flow rates, including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	SSR (Sect. 4.4, 4.5, Appendix G)
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☒	Proposed minor and major systems, including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	SSR (Sect. 4.5) Site Servicing Plan (S1) Stormwater Management Plan (SWM)
☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
☐	Identification of potential impacts to receiving watercourses.	N/A
☐	Identification of municipal drains and related approval requirements.	N/A
☒	Description of how the conveyance and storage capacity will be achieved for the development.	SSR (Sect. 4.5)
☒	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	SSR (Sect. 4.5) Site Servicing Plan (S1) Stormwater Management Plan (SWM)
☐	Inclusion of hydraulic analysis, including hydraulic grade line elevations.	N/A
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	SSR (Sect. 5.0) Erosion & Sediment Control Plan (ESC)

☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5	**APPROVAL AND PERMIT REQUIREMENTS**	**REFERENCE**
The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development, as well as the relevant issues affecting such approval. The approval and permitting shall include but not be limited to the following:		
☐	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams, as defined in the Act.	N/A
☒	Application for Environmental Compliance Approval (ECA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation, etc.).	N/A

4.6	**CONCLUSION CHECKLIST**	**REFERENCE**
☒	Clearly stated conclusions and recommendations.	SSR (Sect. 2.9, 3.4, 4.6)
☒	Comments received from review agencies, including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	
☒	All draft and final reports shall be signed and stamped by a Professional Engineer registered in Ontario.	SSR (Section 5.0)

Appendix E

Hydraulic Network Analysis (Water Distribution System)

Appendix E1

Water Demands

Annie Williams

From: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Sent: November 16, 2018 10:13 AM
To: Annie Williams
Cc: Sheldon Dattenberger
Subject: RE: 1375 Clyde Ave - Water Demands

Good morning Annie,

We have no comments on the below.

Have a nice weekend.

Johnnie Chahwan, BASc Eng, MBA
President
Miriton Ltd.
excellence by design

tel: (613) 722 5486 x 221
fax: (613) 722 2817
cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com

From: Annie Williams <awilliams@jlrichards.ca>
Sent: November 15, 2018 4:11 PM
To: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Cc: Sheldon Dattenberger <sdattenberger@jlrichards.ca>
Subject: RE: 1375 Clyde Ave - Water Demands

Hi Johnnie,

To summarize, we are using the following design parameters for the water servicing:

Building 1A	Building 1B	Building 2	Building 3
16,005 sq ft Peak Hour Demand = 60 GPM Sprinkler = 300 GPM 8” water service	12,023 sq ft Peak Hour Demand = 25 GPM Sprinkler/Standpipe = 500 GPM 6” water service	104,787 sq ft Peak Hour Demand = 25 GPM Sprinkler/Standpipe = 500 GPM 6” water service	4100 sq ft Peak Hour Demand = 60 GPM Sprinkler = 225 GPM 6” water service

Please let me know if you have any comments on the above.

Thank you,

Annie Williams, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Sent: September 24, 2018 2:18 PM
To: Sheldon Dattenberger <sdattenberger@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: 1375 Clyde Ave - Water Demands

Good afternoon

Please see updates below, also kindly request the assumed layout (8" water main and individual 6" pipes to each building),

2. For building 1(B)-Dymon storage, (3) storey (now 5-storey building): Miriton: please provide assumed sanitary fixtures for 5- storey building: (Miriton assumed fixtures same as building 2)
    d. Water peak demand - 20GPM (now 25GPM)
    e. Fire system required flow 500GPM (sprinkler and standpipe)
    f. 6" water supply pipe size, 6" SAN pipe size and 8" STO pipe size
3. For building 2-Dymon storage, (5) storey:
    g. Water peak demand - 25GPM
    h. Fire system required flow 500GPM (sprinkler and standpipe)
    i. 6" water supply pipe size, 6" SAN pipe size and 8" STO pipe size
4. For building 3- Restaurant, (1) storey:
    j. Water peak demand - 60GPM.
    k. Fire system required flow 225GPM (sprinkler)
    l. 6" water supply pipe size, 6" SAN pipe size and 6" STO pipe size.

Information provided above are estimates based on input provided (no Architectural drawings were provided), also

The above does not include site or any irrigation requirements.

Johnnie Chahwan, BASc Eng, MBA
President
Miriton Ltd.
excellence by design

tel: (613) 722 5486 x 221
fax: (613) 722 2817

cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com

From: Sheldon Dattenberger <sdattenberger@jlrichards.ca>
Sent: September 14, 2018 3:29 PM
To: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: 1375 Clyde Ave - Water Demands

Hi Johnnie,
Annie is pretty busy trying to get a project wrapped up, so I thought I could save her some effort.

I looked at the building flows and relatively low flow rates didn't seem to warrant an 8" pipe for the individual lines to the buildings. The main line will remain 8". This was confirmed with a check of the water model. So to save some unnecessary costs for the client, we reduced the size to the 6" for the individual building leads from the 8" line through the site.

I also attached the Tech Bulletin you requested.
Regards,

Sheldon Dattenberger, P.Eng., PMP, FEC
Senior Civil Engineer

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Sent: September 14, 2018 11:58 AM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Sheldon Dattenberger <sdattenberger@jlrichards.ca>
Subject: RE: 1375 Clyde Ave - Water Demands

Hi Annie

Would you mind informing us the reason for this reduction?

Johnnie Chahwan, BASc Eng, MBA
President
Miriton Ltd.
excellence by design

tel: (613) 722 5486 x 221
fax: (613) 722 2817

cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com

From: Annie Williams <awilliams@jlrichards.ca>
Sent: September 11, 2018 11:51 AM
To: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Cc: Sheldon Dattenberger <sdattenberger@jlrichards.ca>
Subject: RE: 1375 Clyde Ave - Water Demands

Hi Johnnie,

Your email dated May 23, 2018 indicates an 8" water supply for each building at the Dymon Clyde site. We are wondering if this can be reduced to a 6" water supply for Buildings 1B, 2, and 3?

Thank you,

Annie Williams, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Sent: May 23, 2018 4:28 PM
To: Julie White <jwhite@jlrichards.ca>; Nicholas Caragianis at Nicholas Caragianis Architect Inc. <nicholas@ncarchitect.ca>
Cc: Tishaunna Harper at Nicholas Caragianis Architect Inc. <tharper@ncarchitect.ca>; Santiago Guardia at Nicholas Caragianis Architect Inc. <jguardia@ncarchitect.ca>; Bliss Edwards <bedwards@dymon.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: 1375 Clyde Ave - Water Demands

Hi Julie,

Yes it is, the assumptions below remain the same.

Thank you

Johnnie Chahwan, BASc Eng, MBA
President
Miriton Ltd.
excellence by design

tel: (613) 722 5486 x 221
fax: (613) 722 2817
cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com

From: Julie White <jwhite@jlrichards.ca>
Sent: May 23, 2018 3:16 PM
To: Nicholas Caragianis at Nicholas Caragianis Architect Inc. <nicholas@ncarchitect.ca>
Cc: Tishaunna Harper at Nicholas Caragianis Architect Inc. <tharper@ncarchitect.ca>; Santiago Guardia at Nicholas Caragianis Architect Inc. <jguardia@ncarchitect.ca>; Bliss Edwards <bedwards@dymon.ca>; Johnnie Chahwan <johnnie.chahwan@miriton.com>; Lucie Dalrymple <ldalrymple@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: 1375 Clyde Ave - Water Demands

Johnnie,

Is the information provided by Nicholas sufficient to provide the revised water and sanitary demands?

Julie White, EIT
Civil Engineering Intern

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

From: Nicholas Caragianis at Nicholas Caragianis Architect Inc. <nicholas@ncarchitect.ca>
Sent: May 23, 2018 1:25 PM
To: Julie White <jwhite@jlrichards.ca>
Cc: Tishaunna Harper at Nicholas Caragianis Architect Inc. <tharper@ncarchitect.ca>; Santiago Guardia at Nicholas Caragianis Architect Inc. <jguardia@ncarchitect.ca>; Bliss Edwards <bedwards@dymon.ca>; Johnnie Chahwan <Johnnie.Chahwan@miriton.com>; Lucie Dalrymple <ldalrymple@jlrichards.ca>
Subject: Re: 1375 Clyde Ave - Water Demands

There is a maximum of two toilets in each of he self storage buildings and one additional sink

Nicholas Caragianis

Sent from my iPhone

On May 23, 2018, at 1:23 PM, Julie White <jwhite@jlrichards.ca> wrote:

> Team,
>
> To reconfirm the water demands in all building for the Clyde avenue site, Miriton has asked for the assumed sanitary fixtures for the new 5-storey building (Building 1B) – NCA, are you able to answer this?

Johnnie,

Just to reconfirm, the assumed water demand for Building 1-A has increased from 15 GPM to 60 GPM (45 GPM increase) ?

Thanks,

Julie

Julie White, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
864 Lady Ellen Place, Ottawa, ON K1Z 5M2
Tel: 613-728-3571 Fax: 613-728-6012
<JLR_sig_logo_715c24bf-568b-46ae-8040-22d550fc23e3.png>

From: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Sent: May 23, 2018 12:48 PM
To: Julie White <jwhite@jlrichards.ca>
Subject: RE: 375 Clyde Ave - Water Demands

Hi Julie,

Information provided are estimates based on input provided (no Architectural drawings were provided):

1. For building 1(A)-Retail, 1 storey:
a. Water peak demand - 15GPM (now 60GPM)
    b. Fire system required flow 300GPM (sprinkler)
    c. 8" water supply pipe size, 6" SAN pipe size and 8" STO pipe size
2. For building 1(B)-Dymon storage, (3) storey (now 5-storey building): Miriton: please provide assumed sanitary fixtures for 5- storey building
d. Water peak demand - 20GPM
    e. Fire system required flow 500GPM (sprinkler and standpipe)
    f. 8" water supply pipe size, 6" SAN pipe size and 6" STO pipe size
3. For building 2-Dymon storage, (5) storey:
g. Water peak demand - 25GPM
    h. Fire system required flow 500GPM (sprinkler and standpipe)
    i. 8" water supply pipe size, 6" SAN pipe size and 8" STO pipe size
4. For building 3- Restaurant, (1) storey:
j. Water peak demand - 60GPM.
    k. Fire system required flow 225GPM (sprinkler)
    l. 8" water supply pipe size, 6" SAN pipe size and 6" STO pipe size.

The above does not include site or the irrigation requirements.

Johnnie Chahwan, BASc Eng, MBA
President
Miriton Ltd.
excellence by design

tel: (613) 722 5486 x 221
fax: (613) 722 2817

cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com

From: Julie White <jwhite@jlrichards.ca>
Sent: May 23, 2018 11:37 AM
To: Johnnie Chahwan <johnnie.chahwan@miriton.com>
Subject: RE: 375 Clyde Ave - Water Demands

Hi Johnnie,

As per my voicemail, can you please re-confirm all water demands listed below for Dymon's Clyde Avenue site. Any revisions can be added in red to the below email.

Thanks,

Julie

Julie White, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
864 Lady Ellen Place, Ottawa, ON K1Z 5M2
Tel: 613-728-3571 Fax: 613-728-6012
<image001.png>

From: Johnnie Chahwan [mailto:johnnie.chahwan@miriton.com]
Sent: August 8, 2017 4:24 PM
To: Annie Williams
Cc: Andrew Beyer
Subject: 375 Clyde Ave - Water Demands

Hi Annie

Please see below:

Information provided are estimates based on input provided (no Architectural drawings were provided):

1. For building 1(A)-Retail, 1 storey:
a. Water peak demand - 15GPM
    b. Fire system required flow 300GPM (sprinkler)
    c. 8" water supply pipe size, 6" SAN pipe size and 8" STO pipe size
2. For building 1(B)-Dymon storage, (3) storey (now 5-storey building):
d. Water peak demand - 20GPM
    e. Fire system required flow 500GPM (sprinkler and standpipe)
    f. 8" water supply pipe size, 6" SAN pipe size and 6" STO pipe size
3. For building 2-Dymon storage, (5) storey:
g. Water peak demand - 25GPM
    h. Fire system required flow 500GPM (sprinkler and standpipe)

i. 8” water supply pipe size, 6” SAN pipe size and 8” STO pipe size

4. For building 3- Restaurant, (1) storey:

j. Water peak demand - 60GPM.

k. Fire system required flow 225GPM (sprinkler)

l. 8” water supply pipe size, 6” SAN pipe size and 6” STO pipe size.

The above does not include site or the irrigation requirements.

Johnnie Chahwan, BASc Eng, MBA
President
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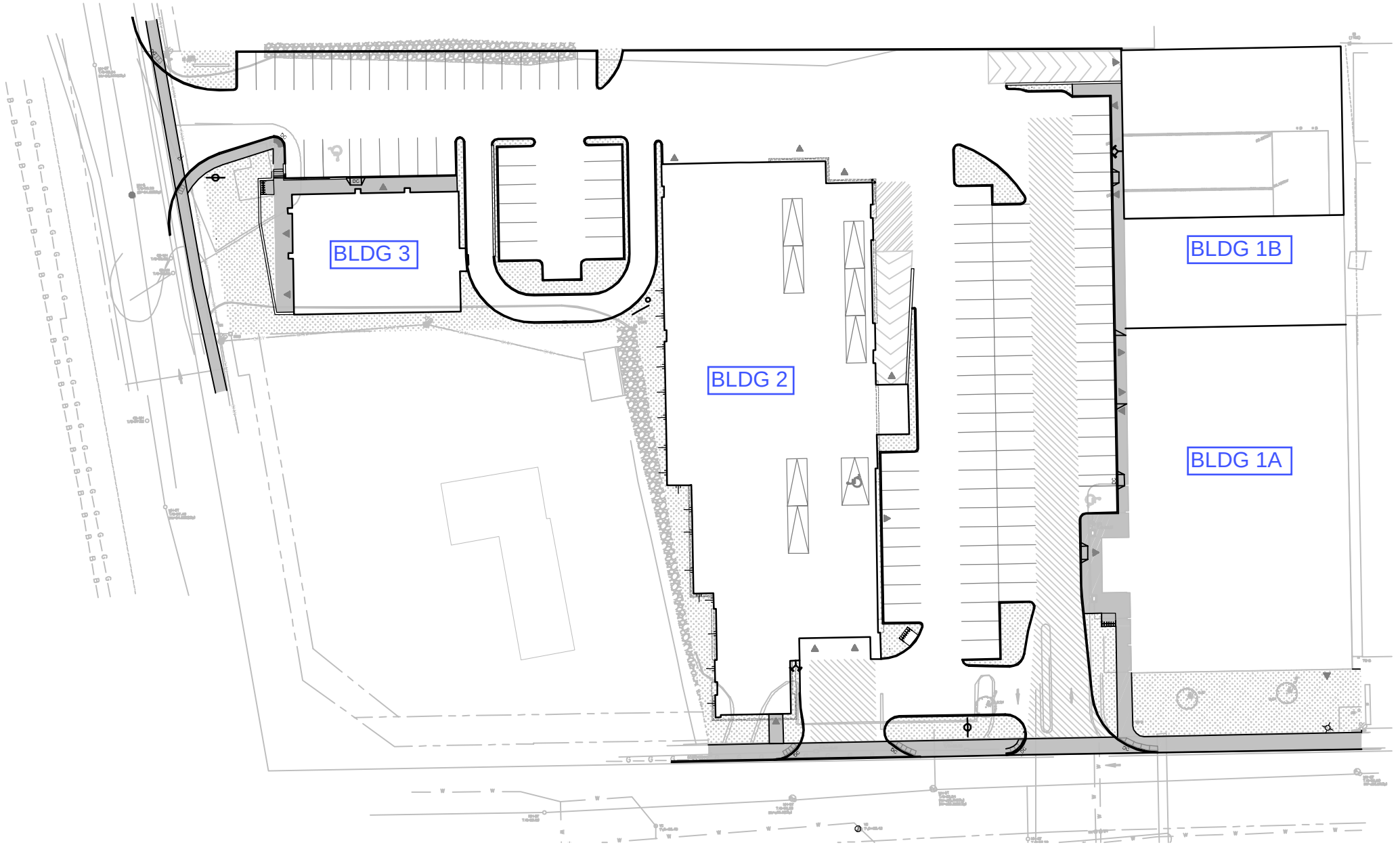
cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com
NEW ADDRESS: 200-1716 Woodward Drive, Ottawa, ON K2C 0P8


BLDG 3
BLDG 2
BLDG 1B
BLDG 1A

Appendix E2

FUS Calculations

FUS Fire Flow Calculations

Dymon Storage - 1375 Clyde Avenue - BLDG 2

Step	Parameter	Value		Note
A	Type of Construction	Non-combustible		
	Coefficient (C)	0.8		
B	Ground Floor Area	1947	m^2	No basement
C	Height in storeys	5	storeys	
	Total Floor Area	9735	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	17365	L/min	
	Rounded Fire Flow	17000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Combustible		
	Occupancy Charge	0%		
	Occupancy Increase or Decrease	0		
	Fire Flow	17000	L/min	No rounding applied.
F	Sprinkler Protection	Automatic Fully Supervised		
	Sprinkler Credit	-50%		
	Decrease for Sprinkler	-8500	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	16.5	m	
	Height of Exposed Wall:	1	storeys	
	Length-Height Factor	16.5	m-storeys	
	Separation Distance	27.0	m	
	North Side Exposure Charge	8%		
	East Side Exposure			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Blank Wall (No Openings)		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	100.0	m	
	East Side Exposure Charge	0%		
	South Side Exposure			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Non-combustible		
	Length of Exposed Wall:	70.0	m	
	Height of Exposed Wall:	3	storeys	
	Length-Height Factor	210.0	m-storeys	
	Separation Distance	30.1	m	
	South Side Exposure Charge	5%		
	West Side Exposure			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Blank Wall (No Openings)		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	100.0	m	
	West Side Exposure Charge	0%		
	Total Exposure Charge	13%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	2210	L/min	
H	Fire Flow	10710	L/min	
	Rounded Fire Flow	11000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**11000**	**L/min**	The City of Ottawa's cap does not apply since this is a commercial building.
		183	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

FUS Fire Flow Calculations

Dymon Storage - 1375 Clyde Avenue - BLDG 3

Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		
	Coefficient (C)	1.5		
B	Ground Floor Area	381	m^2	No basement
C	Height in storeys	1	storeys	
	Total Floor Area	381	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	6441	L/min	
	Rounded Fire Flow	6000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Combustible		
	Occupancy Charge	0%		
	Occupancy Increase or Decrease	0		
	Fire Flow	6000	L/min	No rounding applied.
F	Sprinkler Protection	Automatic Fully Supervised		
	Sprinkler Credit	-50%		
	Decrease for Sprinkler	-3000	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Blank Wall (No Openings)		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	100.0	m	
	North Side Exposure Charge	0%		
	East Side Exposure			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Blank Wall (No Openings)		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	100.0	m	
	East Side Exposure Charge	0%		
	South Side Exposure			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Non-combustible		
	Length of Exposed Wall:	16.5	m	
	Height of Exposed Wall:	5	storeys	
	Length-Height Factor	82.5	m-storeys	
	Separation Distance	27.0	m	
	South Side Exposure Charge	9%		
	West Side Exposure			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Blank Wall (No Openings)		
	Length of Exposed Wall:	13.5	m	
	Height of Exposed Wall:	1	storeys	
	Length-Height Factor	13.5	m-storeys	
	Separation Distance	22.0	m	
	West Side Exposure Charge	0%		
	Total Exposure Charge	9%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	540	L/min	
H	Fire Flow	3540	L/min	
	Rounded Fire Flow	4000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**4000**	**L/min**	The City of Ottawa's cap does not apply since this is a commercial building.
		67	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

Project: **Dymon Self-Storage - 1375 Clyde Avenue**
Project Reference: **17088**
Client: **Dymon Capital Corporation**
Building Permit: **SPC**
Date: **2018-10-19**

Mr. Eric Surprenant, C.E.T. – City of Ottawa
Project Manager, Infrastructure Approvals
Development Review Suburban Services Branch
Planning, Infrastructure and Economic Development Dept.
Via e-mail

Dear Sir,

We hereby confirm that the automatic sprinkler and fire alarm systems design of the above mentioned project, shall meet the Ontario building code (OBC), hence, each subject building equipped with a sprinkler system will have a fire alarm panel that will provide the supervisory and alarm signals associated with the sprinkler system as stipulated in OBC clauses 3.2.4.8 (2) and 3. 2.4.10.

We believe that this satisfies OBC's requirements for a fully supervised system; however, should you require further clarification or information please do not hesitate to contact us.

Yours truly,

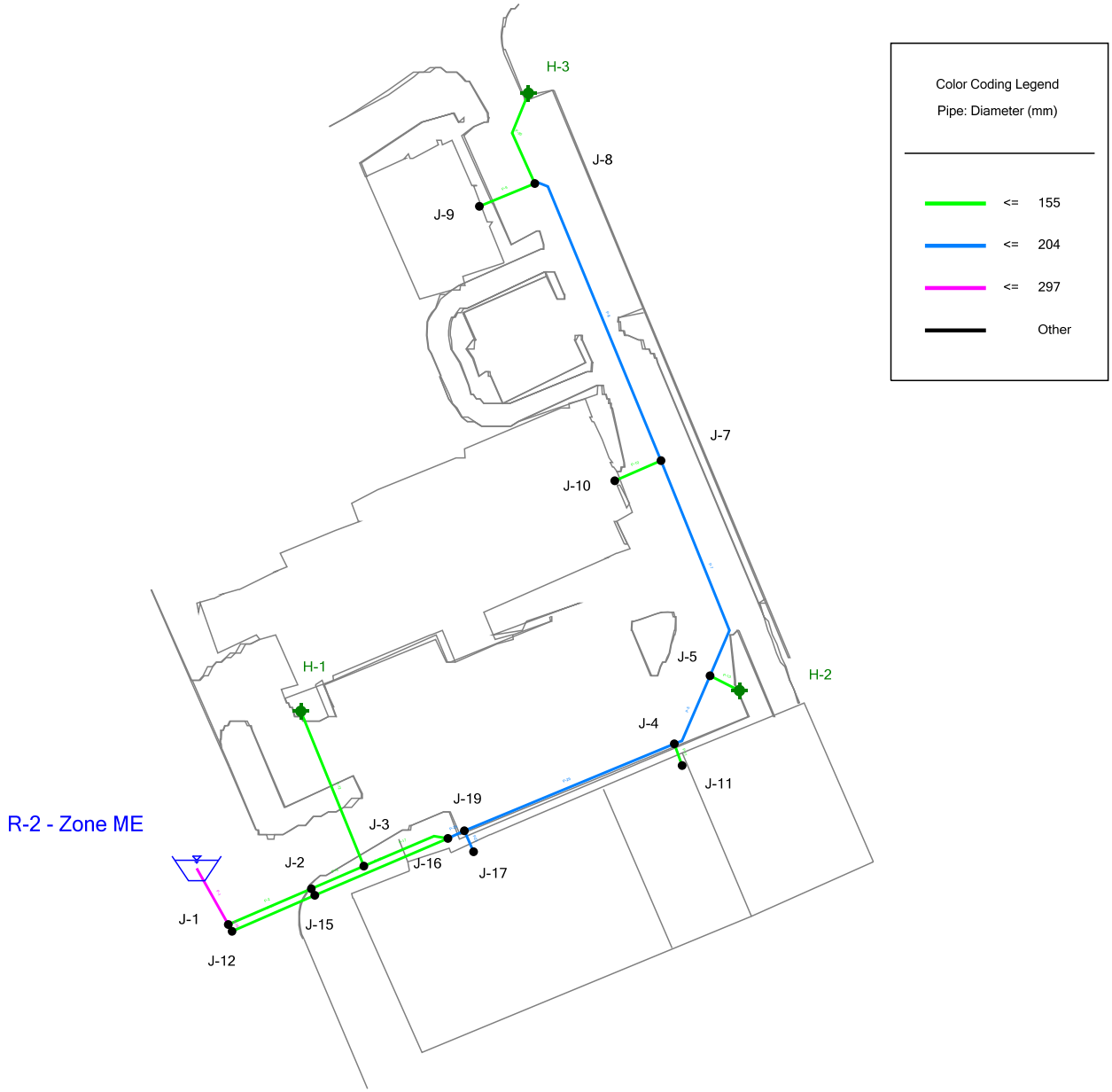
Ralph Siciliano – P.Eng., LEED AP, CEM
Miriton Ltd.

200-1716 Woodward Drive, Ottawa, Ontario, Canada, K2C 0P8
voice: (613) 722 5486 ▣ fax: (613) 722 2817 ▣ web: www.miriton.com

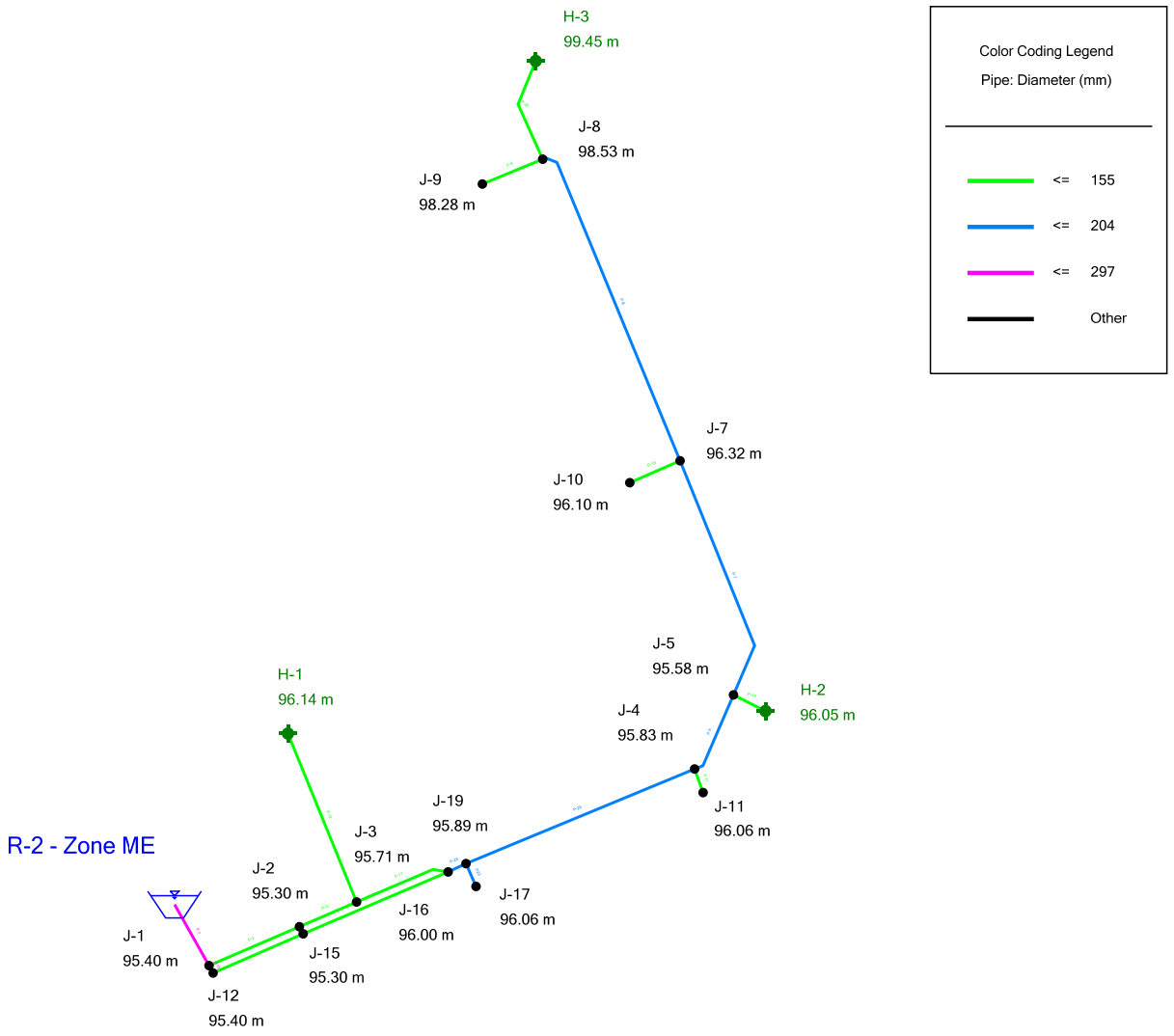
Appendix E3

Overall Schematic &
Watermain Layout

Dymon Storage - 1375 Clyde Avenue
Overall Schematic



Dymon Storage - 1375 Clyde Avenue
Model Elevations



Appendix E4

Hydraulic Boundary Conditions

Annie Williams

From: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Sent: August 16, 2017 10:39 AM
To: Annie Williams
Cc: Karla Ferrey
Subject: RE: 1375 Clyde Ave - Dymon Storage - Request for Hydraulic Boundary Conditions
Attachments: 1375 Clyde Aug 2017.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Annie,

The following are boundary conditions, HGL, for hydraulic analysis at 1375 Clyde assumed to be connected to either the 305mm on Clyde (zone ME) or the 406m on Baseline (zone 2W), (see attached PDF for location).

	Scenario 1A	Scenario 1B	Scenario 2
	HGL (m)	HGL (m)	HGL (m)
BSDY - Min	127.7	160.8	160.8
BSDY - Max	131.4	163.4	163.4
Peak hr- Min	126.5	158.5	158.3
Peak hr- Max	135.2	162.7	162.6
Max Day + Fire Flow	128.5	146.9	146.4

Scenario 1a – Restaurant service from Baseline 406Ø WM
Scenario 1b – Retail/Storage service from Clyde 305Ø WM
Scenario 2 – Both Restaurant and Retail/Storage service from Clyde 305Ø WM

The maximum pressure is estimated to be more than 80 psi for Scenario 1B and 2. A pressure check at completion of construction is recommended to determine if pressure control is required.

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

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

Thanks

Eric Surprenant, C.E.T. / 613 580-2424 ext.:27794
Project Manager, Infrastructure Approvals
Development Review Suburban Services Branch
Planning, Infrastructure and Economic Development Dept.

Gestionaire de projets, Approbation de l'infrastructure
Examen des demandes d'aménagement (Services Suburbains Ouest)
Services de la planification, de l'infrastructure et du développement économique

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27794

ottawa.ca/planning / ottawa.ca/urbanisme

From: Annie Williams [mailto:awilliams@jlrichards.ca]
Sent: August 15, 2017 9:01 AM
To: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>
Subject: RE: 1375 Clyde Ave - Dymon Storage - Request for Hydraulic Boundary Conditions

Good morning Eric,

Just looking to follow up on this request, do you know when we can expect to receive these boundary conditions?

Thank you,

Annie Williams, EIT
Civil Engineering Intern

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

From: Annie Williams
Sent: August 10, 2017 10:35 AM
To: 'eric.surprenant@ottawa.ca'
Cc: 'Dickinson, Mary'; Bliss Edwards; Andrew Beyer; Katelyn Lucas; Johnnie Chahwan; Karla Ferrey; Lucie Dalrymple
Subject: 1375 Clyde Ave - Dymon Storage - Request for Hydraulic Boundary Conditions

Hi Eric,

We would like to obtain hydraulic boundary conditions for Dymon Storage's redevelopment of a site located at 1375 Clyde Avenue (refer to attached Location Plan).

The proposed usage is commercial and consists of a 5-storey storage facility building (BLDG 2) with a covered drive-through garage and additional retail area at the ground floor. In addition, it is proposed to maintain the majority of the

existing retail building (BLDG 1A) while adding a second 3-storey retail unit (BLDG 1B) to the east of the existing building. There is also a drive-through restaurant (BLDG 3) proposed at the north end of the site along Baseline Road, as depicted on the attached Site Plan.

There is an existing 305 mm diameter PVC watermain along Clyde Avenue, as well as an existing 406 mm diameter cast iron watermain along Baseline Road. Please note that these two existing watermains fall within two separate City of Ottawa pressure zones; the Baseline Road watermain is within the Carlington Heights low pressure zone while the Clyde Avenue watermain is within the Meadowlands high pressure zone. It has been determined that there cannot be looping between these two watermains (i.e. there cannot be one watermain to service the redevelopment that connects both of the existing watermains). There is a possibility that the proposed restaurant (BLDG 3) will be serviced from the existing Baseline watermain while the remaining buildings will be serviced from the existing Clyde watermain. Alternatively, all of the buildings may be serviced from the existing Clyde watermain. As such, we request boundary conditions for the existing watermains under the following three demand scenarios:

Scenario 1a – Restaurant service from Baseline 406Ø WM:
Maximum Day = 2.10 L/s
Peak Hour = 3.78 L/s
Required Fire Flow = 33 L/s (2,000 L/min)

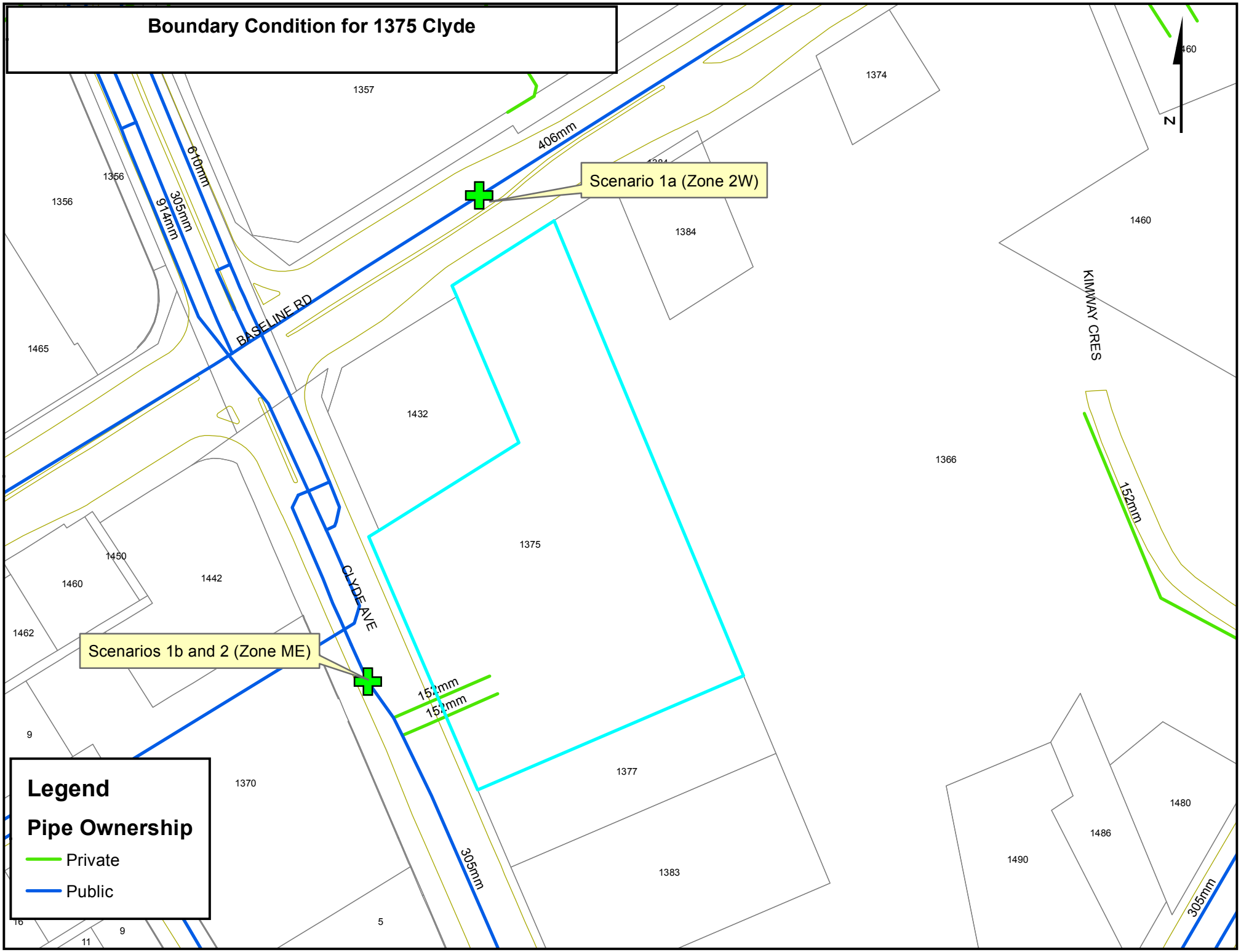
Scenario 1b – Retail/Storage service from Clyde 305Ø WM:
Combined (3 retail/storage buildings) Maximum Day = 2.11 L/s
Combined (3 retail/storage buildings) Peak Hour = 3.79 L/s
Required Fire Flow = 183 L/s (11,000 L/min)

Scenario 2 – Both Resaturant and Retail/Storage service from Clyde 305Ø WM:
Combined (3 retail/storage buildings + 1 restaurant) Maximum Day = 4.21 L/s
Combined (3 retail/storage buildings + 1 restaurant) Peak Hour = 7.57 L/s
Required Fire Flow = 183 L/s (11,000 L/min)

The fire flow requirements were calculated as per the FUS (attached) and all buildings will have fire suppression systems.

Should you have any questions or require any further information, please do not hesitate to contact me.

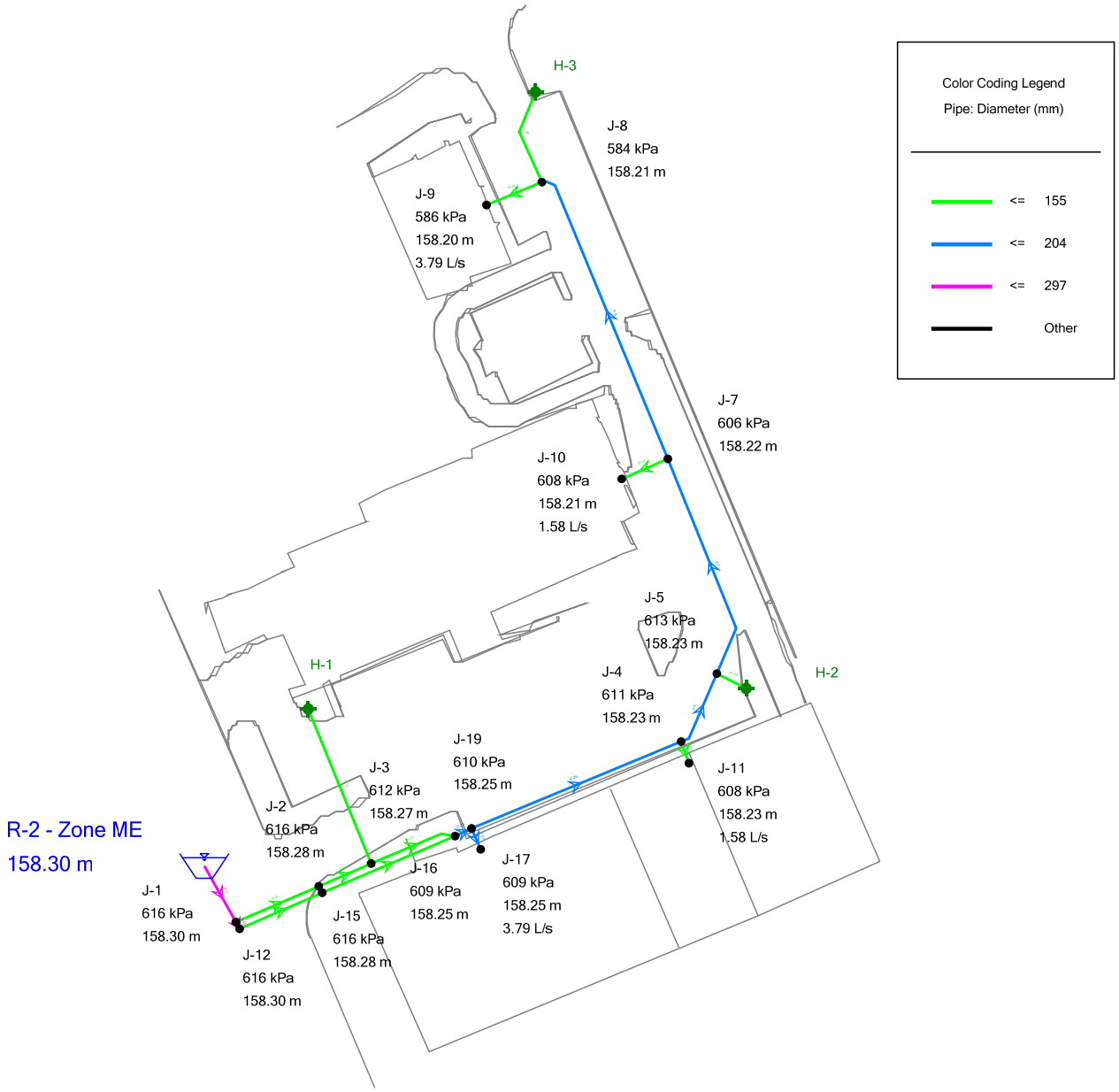
Thank you,


Boundary Condition for 1375 Clyde
Scenario 1a (Zone 2W)
Scenarios 1b and 2 (Zone ME)
406mm
610mm
305mm
914mm
BASELINE RD
CLYDE AVE
KIMWAY CRES
152mm
152mm
152mm
305mm
305mm
1357
1374
1356
1356
1384
1460
1465
1432
1366
1375
1450
1460
1442
1462
9
1370
1377
1480
1486
1490
1383
16
9
11
5
N
Legend
Pipe Ownership
Private
Public

Appendix E5

Peak Hour Simulation Results

Dymon Storage - 1375 Clyde Avenue
Peak Hour Demand



Dymon Storage - 1375 Clyde Avenue

Peak Hour Demand

Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-8	98.53	0.00	158.21	584
J-9	98.28	3.79	158.20	586
J-7	96.32	0.00	158.22	606
J-10	96.10	1.58	158.21	608
J-11	96.06	1.58	158.23	608
J-17	96.06	3.79	158.25	609
J-16	96.00	0.00	158.25	609
J-19	95.89	0.00	158.25	610
J-4	95.83	0.00	158.23	611
J-3	95.71	0.00	158.27	612
J-5	95.58	0.00	158.23	613
J-12	95.40	0.00	158.30	616
J-1	95.40	0.00	158.30	616
J-2	95.30	0.00	158.28	616
J-15	95.30	0.00	158.28	616

Dymon Storage - 1375 Clyde Avenue

Peak Hour Demand

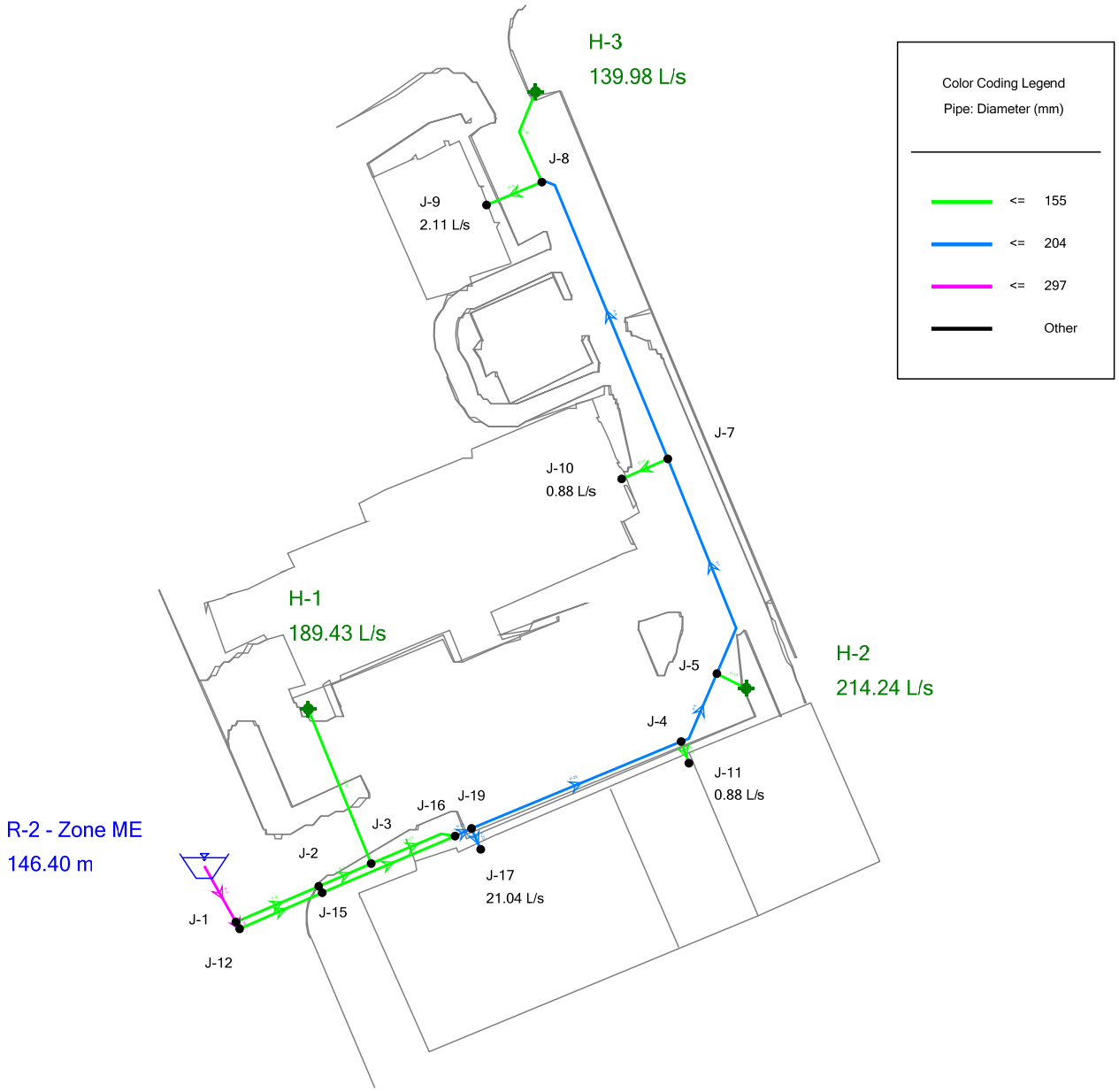
Pipe Table

Label	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)	Velocity (m/s)	Flow (L/s)
P-1	11.2	297	PVC	120	158.30	158.30	0.16	10.74
P-2	18.8	155	PVC	100	158.30	158.28	0.28	5.37
P-3	8.8	155	PVC	100	158.28	158.27	0.28	5.37
P-5	13.8	204	PVC	110	158.23	158.23	0.16	5.37
P-7	39.4	204	PVC	110	158.23	158.22	0.16	5.37
P-8	53.9	204	PVC	110	158.22	158.21	0.12	3.79
P-9	13.0	155	PVC	100	158.21	158.20	0.20	3.79
P-10	8.4	155	PVC	100	158.22	158.21	0.08	1.58
P-11	3.0	155	PVC	100	158.23	158.23	0.08	1.58
P-12	29.0	155	PVC	100	158.27	158.27	0.00	0.00
P-13	5.7	155	PVC	100	158.23	158.23	0.00	0.00
P-15	0.7	297	PVC	120	158.30	158.30	0.08	5.37
P-17	15.8	155	PVC	100	158.27	158.25	0.28	5.37
P-20	16.1	155	PVC	100	158.21	158.21	0.00	0.00
P-21	18.8	155	PVC	100	158.30	158.28	0.28	5.37
P-22	24.6	155	PVC	100	158.28	158.25	0.28	5.37
P-23	3.4	204	PVC	110	158.25	158.25	0.12	3.79
P-25	3.0	204	PVC	110	158.25	158.25	0.33	10.74
P-26	39.4	204	PVC	110	158.25	158.23	0.21	6.95

Appendix E6

Maximum Day Plus Fire Flow
Simulation Results

Dymon Storage - 1375 Clyde Avenue
Maximum Day + Fire Flow Demand (Sprinkler Bldg 1A)

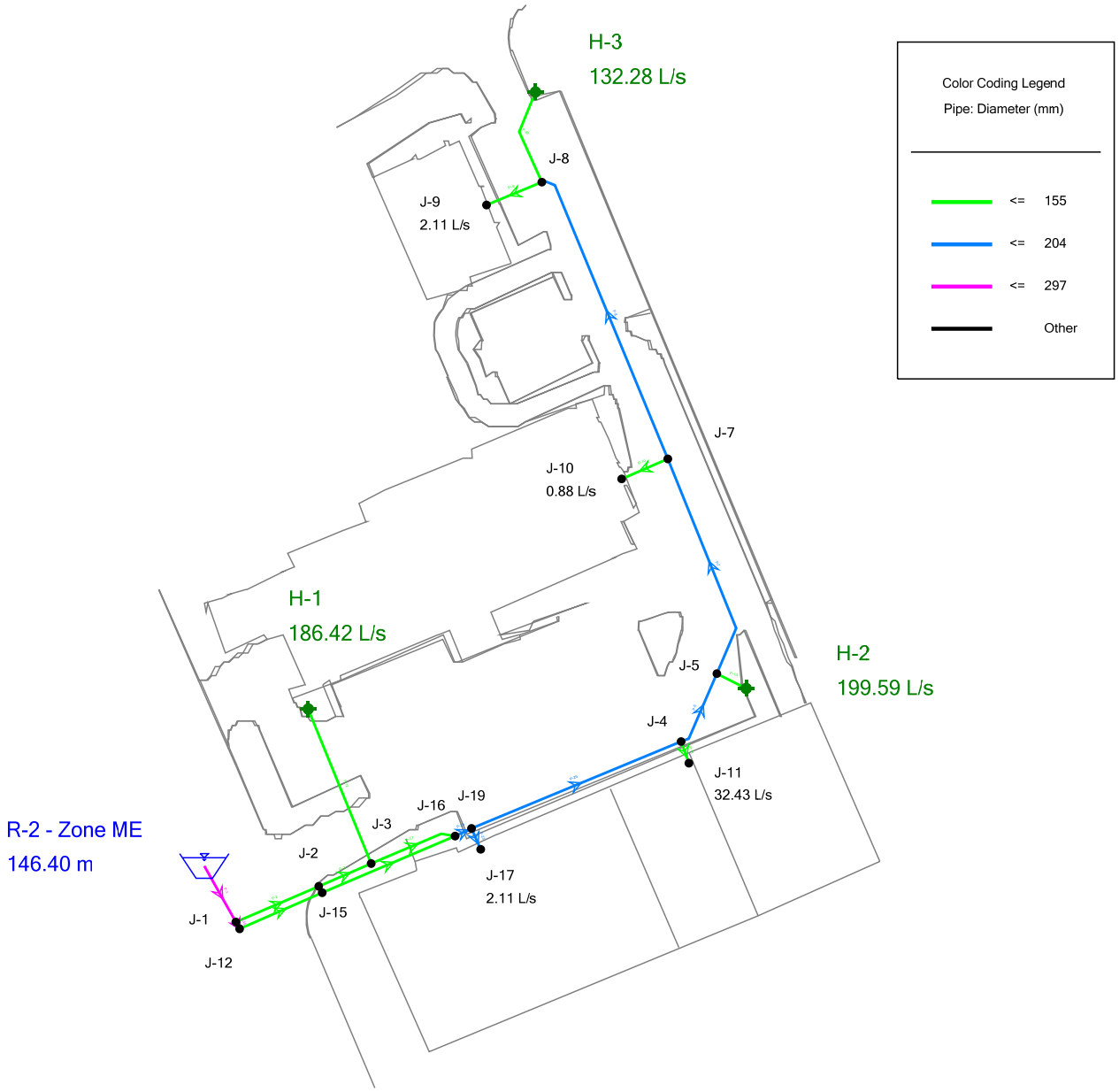


Dymon Storage - 1375 Clyde Avenue

Maximum Day + Fire Flow Demand (Sprinkler Bldg 1A)

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Junction w/ Minimum Pressure (System)	Pressure (Calculated System Lower Limit) (kPa)
H-1	183.00	189.43	189.43	True	140	140	H-3	366
H-2	183.00	214.24	214.24	True	140	140	H-3	166
H-3	67.00	139.98	139.98	True	140	140	J-8	226

Dymon Storage - 1375 Clyde Avenue
Maximum Day + Fire Flow Demand (Sprinkler Bldg 1B)

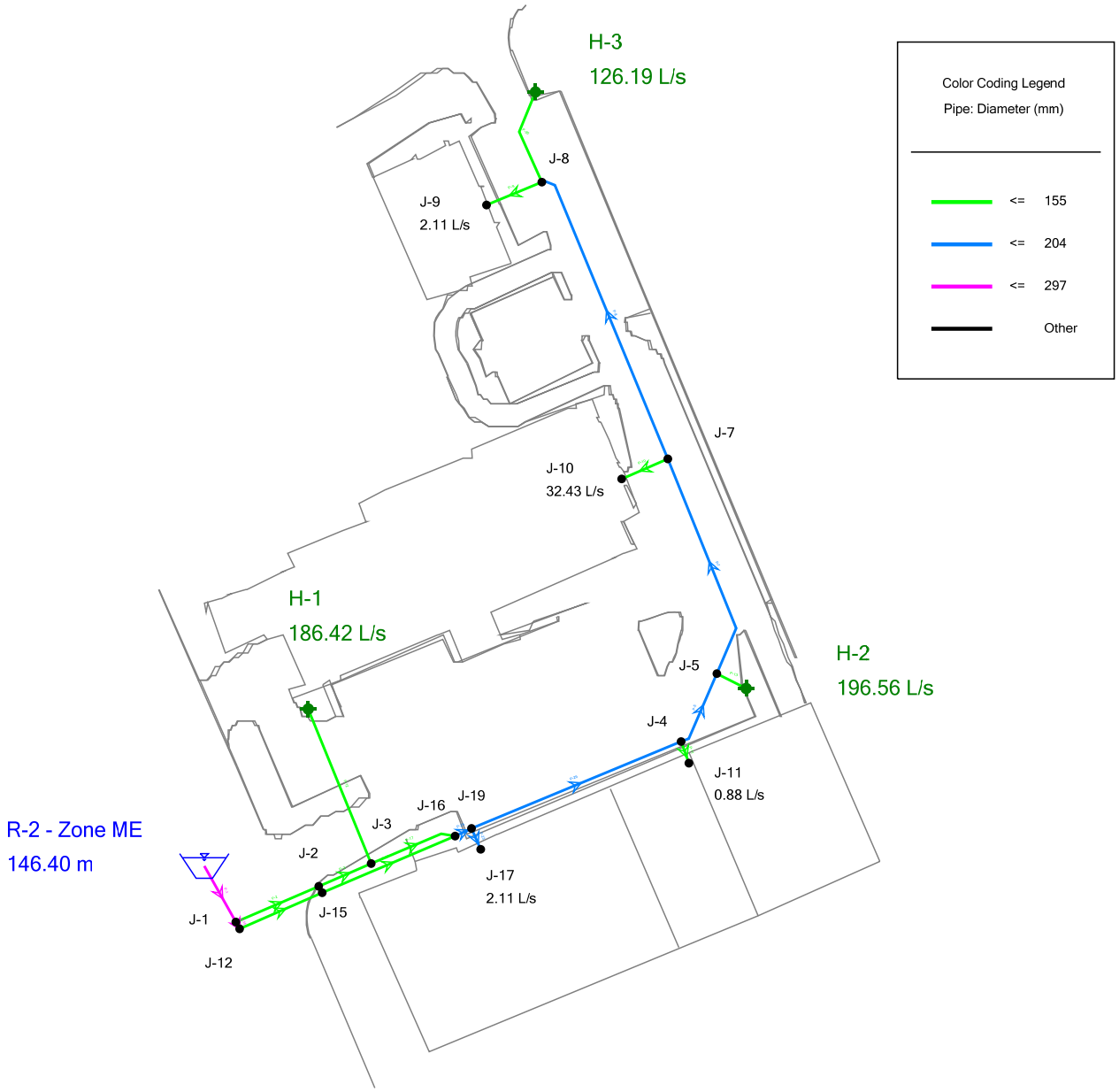


Dymon Storage - 1375 Clyde Avenue

Maximum Day + Fire Flow Demand (Sprinkler Bldg 1B)

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Junction w/ Minimum Pressure (System)	Pressure (Calculated System Lower Limit) (kPa)
H-1	183.00	186.42	186.42	True	140	140	H-3	353
H-2	183.00	199.59	199.59	True	140	140	H-3	159
H-3	67.00	132.28	132.28	True	140	140	J-8	218

Dymon Storage - 1375 Clyde Avenue
Maximum Day + Fire Flow Demand (Sprinkler Bldg 2)

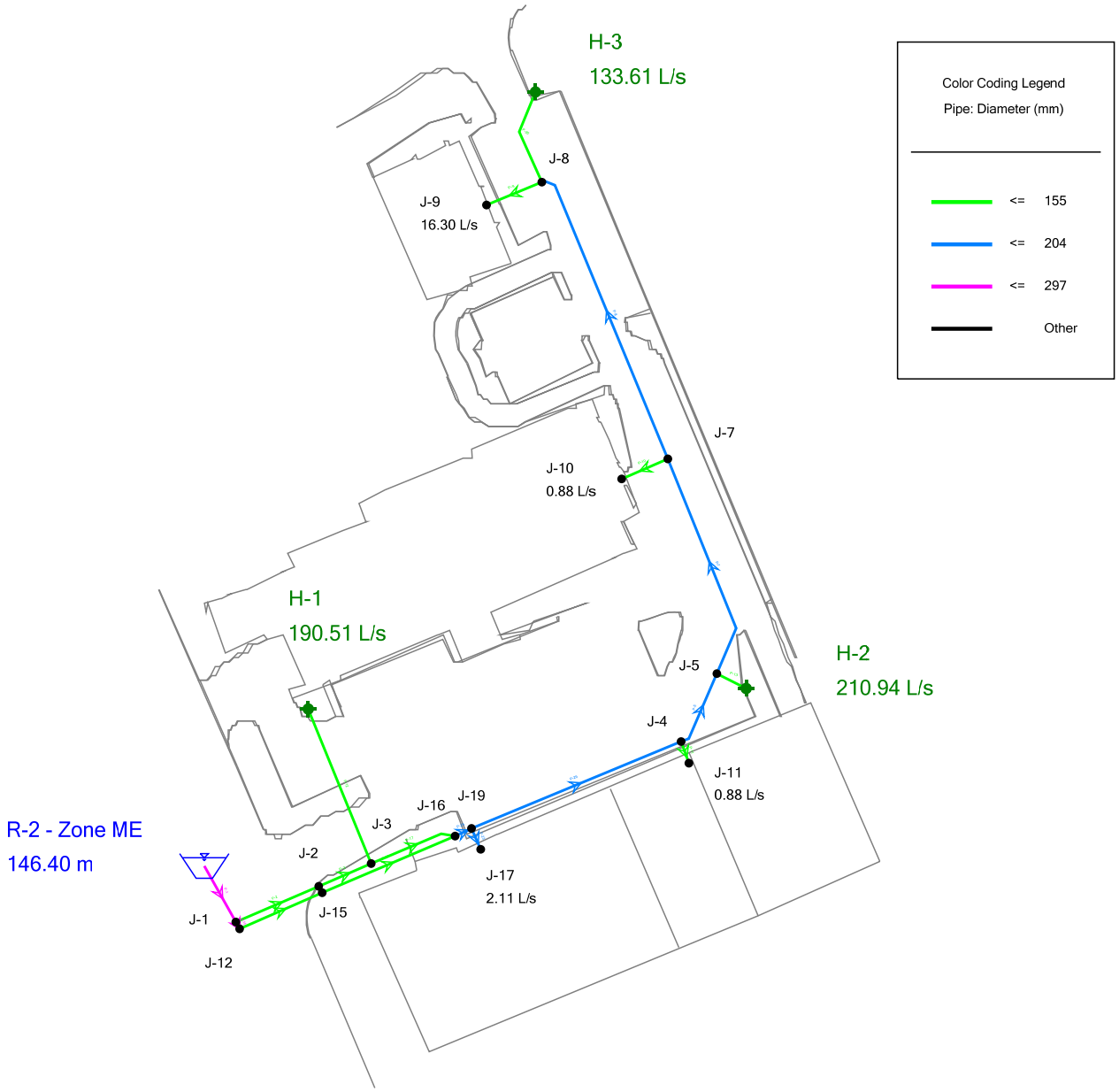


Dymon Storage - 1375 Clyde Avenue

Maximum Day + Fire Flow Demand (Sprinkler Bldg 2)

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Junction w/ Minimum Pressure (System)	Pressure (Calculated System Lower Limit) (kPa)
H-1	183.00	186.42	186.42	True	140	140	H-3	348
H-2	183.00	196.56	196.56	True	140	140	H-3	154
H-3	67.00	126.19	126.19	True	140	140	J-8	212

Dymon Storage - 1375 Clyde Avenue
Maximum Day + Fire Flow Demand (Sprinkler Bldg 3)



Dymon Storage - 1375 Clyde Avenue

Maximum Day + Fire Flow Demand (Sprinkler Bldg 3)

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Junction w/ Minimum Pressure (System)	Pressure (Calculated System Lower Limit) (kPa)
H-1	183.00	190.51	190.51	True	140	140	H-3	367
H-2	183.00	210.94	210.94	True	140	140	H-3	163
H-3	67.00	133.61	133.61	True	140	140	J-8	219

Appendix E7

Maximum Pressure Check

Dymon Storage - 1375 Clyde Avenue
Maximum Pressure

Dymon Storage - 1375 Clyde Avenue

Maximum Pressure

Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-8	98.53	0.00	163.40	635
J-9	98.28	0.00	163.40	637
J-7	96.32	0.00	163.40	657
J-10	96.10	0.00	163.40	659
J-11	96.06	0.00	163.40	659
J-17	96.06	0.00	163.40	659
J-16	96.00	0.00	163.40	660
J-19	95.89	0.00	163.40	661
J-4	95.83	0.00	163.40	661
J-3	95.71	0.00	163.40	662
J-5	95.58	0.00	163.40	664
J-1	95.40	0.00	163.40	666
J-12	95.40	0.00	163.40	666
J-2	95.30	0.00	163.40	666
J-15	95.30	0.00	163.40	666

Dymon Storage - 1375 Clyde Avenue

Maximum Pressure

Pipe Table

Label	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)	Velocity (m/s)	Flow (L/s)
P-1	11.2	297	PVC	120	163.40	163.40	0.00	0.00
P-2	18.8	155	PVC	100	163.40	163.40	0.00	0.00
P-3	8.8	155	PVC	100	163.40	163.40	0.00	0.00
P-5	13.8	204	PVC	110	163.40	163.40	0.00	0.00
P-7	39.4	204	PVC	110	163.40	163.40	0.00	0.00
P-8	53.9	204	PVC	110	163.40	163.40	0.00	0.00
P-9	13.0	155	PVC	100	163.40	163.40	0.00	0.00
P-10	8.4	155	PVC	100	163.40	163.40	0.00	0.00
P-11	3.0	155	PVC	100	163.40	163.40	0.00	0.00
P-12	29.0	155	PVC	100	163.40	163.40	0.00	0.00
P-13	5.7	155	PVC	100	163.40	163.40	0.00	0.00
P-15	0.7	297	PVC	120	163.40	163.40	0.00	0.00
P-17	15.8	155	PVC	100	163.40	163.40	0.00	0.00
P-20	16.1	155	PVC	100	163.40	163.40	0.00	0.00
P-21	18.8	155	PVC	100	163.40	163.40	0.00	0.00
P-22	24.6	155	PVC	100	163.40	163.40	0.00	0.00
P-23	3.4	204	PVC	110	163.40	163.40	0.00	0.00
P-25	3.0	204	PVC	110	163.40	163.40	0.00	0.00
P-26	39.4	204	PVC	110	163.40	163.40	0.00	0.00

Appendix F

Sanitary Sewer Calculations

Julie White

From: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Sent: May 23, 2018 10:21 AM
To: Julie White
Subject: RE: 375 Clyde Ave - Water Demands

HI Julie

Based on the latest drawings received for

1. For building 1(A)-Retail, 1 storey:
   Max. probable drainage - 40GPM

We have not received design drawings for the other buildings, therefore the estimates below remain as is.

Johnnie Chahwan, BASc Eng, MBA
President
Miriton Ltd.
excellence by design

tel: (613) 722 5486 x 221
fax: (613) 722 2817
cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com

From: Julie White <jwhite@jlrichards.ca>
Sent: May 17, 2018 1:08 PM
To: Johnnie Chahwan <johnnie.chahwan@miriton.com>
Subject: RE: 375 Clyde Ave - Water Demands

Hi Johnnie,

As per the email below, at that time you were only able to provide estimated fixture counts as the architectural drawings were not provided. Can you confirm if the following demands are still applicable or if they have been revised due to updated fixture counts?

Thanks,

Julie

Julie White, EIT
Civil Engineering Intern

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

J.L. Richards & Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS

CANADA'S BEST MANAGED COMPANIES

From: Johnnie Chahwan <johnnie.chahwan@miriton.com>
Sent: August 30, 2017 9:56 AM
To: Julie White <JWhite@jlrichards.ca>
Subject: FW: 375 Clyde Ave - Water Demands

Good morning Julie

The sanitary flow will be different than the water peak demand, please see below:

Information provided are estimates based on input provided (no Architectural drawings were provided):

1. For building 1(A)-Retail, 1 storey:
    a. Max. probable drainage - 35GPM
2. For building 1(B)-Dymon storage, (3) storey:
    d. Max. probable drainage – 35GPM
3. For building 2-Dymon storage, (5) storey:
    g. Max. probable drainage – 35GPM
4. For building 3- Restaurant, (1) storey:
    j. Max. probable drainage - 75GPM.

Johnnie Chahwan, BASc Eng, MBA
President
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cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com
NEW ADDRESS: 200-1716 Woodward Drive, Ottawa, ON K2C 0P8

From: Ahmed Aljazaeri
Sent: August 30, 2017 9:34 AM
To: Johnnie Chahwan <johnnie.chahwan@miriton.com>
Subject: RE: 375 Clyde Ave - Water Demands

Hi Johnnie,

The sanitary flow is different than the water peak demand, please see below:

Information provided are estimates based on input provided (no Architectural drawings were provided):

1. For building 1(A)-Retail, 1 storey:
a. Max. probable drainage - 35GPM
2. For building 1(B)-Dymon storage, (3) storey:
d. Max. probable drainage – 35GPM
3. For building 2-Dymon storage, (5) storey:
g. Max. probable drainage – 35GPM
4. For building 3- Restaurant, (1) storey:
j. Max. probable drainage - 75GPM.

Regards,

Ahmed Al Jazaeri
Miriton Ltd.
excellence by design

tel: (613) 722 5486
fax: (613) 722 2817
email: ahmed.aljazaeri@miriton.com
web: www.miriton.com
NEW ADDRESS: 200-1716 Woodward Drive, Ottawa, ON K2C 0P8

From: Johnnie Chahwan
Sent: August 29, 2017 7:06 PM
To: Ahmed Aljazaeri <ahmed.aljazaeri@miriton.com>
Subject: FW: 375 Clyde Ave - Water Demands

Please see Julie's question below.

Johnnie Chahwan, BASc Eng, MBA
President
Miriton Ltd.
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cel: (613) 262 9292
email: johnnie.chahwan@miriton.com
web: www.miriton.com
NEW ADDRESS: 200-1716 Woodward Drive, Ottawa, ON K2C 0P8

From: Julie White [mailto:jwhite@jlrichards.ca]
Sent: August 28, 2017 4:21 PM
To: Johnnie Chahwan <johnnie.chahwan@miriton.com>
Subject: RE: 375 Clyde Ave - Water Demands

Hi Johnnie,

Please confirm that the following peak flows can be used to estimate the sanitary design flows.

Thanks,

Julie

Julie White, EIT
Civil Engineering Intern

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

From: Johnnie Chahwan [mailto:johnnie.chahwan@miriton.com]
Sent: August 8, 2017 4:24 PM
To: Annie Williams
Cc: Andrew Beyer
Subject: 375 Clyde Ave - Water Demands

Hi Annie

Please see below:

Information provided are estimates based on input provided (no Architectural drawings were provided):

1. For building 1(A)-Retail, 1 storey:

a. Water peak demand - 15GPM

   b. Fire system required flow 300GPM (sprinkler)
   c. 8" water supply pipe size, 6" SAN pipe size and 8" STO pipe size

2. For building 1(B)-Dymon storage, (3) storey:

d. Water peak demand - 20GPM

   e. Fire system required flow 500GPM (sprinkler and standpipe)
   f. 8" water supply pipe size, 6" SAN pipe size and 6" STO pipe size

3. For building 2-Dymon storage, (5) storey:

g. Water peak demand - 25GPM

   h. Fire system required flow 500GPM (sprinkler and standpipe)

i. 8” water supply pipe size, 6” SAN pipe size and 8” STO pipe size

4. For building 3- Restaurant, (1) storey:

j. Water peak demand - 60GPM.

k. Fire system required flow 225GPM (sprinkler)

l. 8” water supply pipe size, 6” SAN pipe size and 6” STO pipe size.

The above does not include site or the irrigation requirements.

Johnnie Chahwan, BASc Eng, MBA
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Dymon Self Stroage - 1375 Clyde Avenue

Wastewater Design Calculations - Fixture Count

Calculation Method 1 (refer to Sanitary Sewer Design Sheet):

Total Gross Area =	1.104	ha	
Commercial Average Flow =	28,000	L/ha/day	per City of Ottawa Technical Bulletin ISTB-2018-01
Theoretical Average Flow =	56,000	L/ha/day	assuming buildings are in operation for 12hrs per day
Peaking Factor =	1.50		per City of Ottawa Technical Bulletin ISTB-2018-01
Infiltration Allowance =	0.33	L/s/ha	per City of Ottawa Technical Bulletin ISTB-2018-01

Peak Design Flow = (1.104 ha)*(56,000 L/ha/day)*(1.5) / (86400 s/day) + (0.33 L/s/ha)*(1.104 ha)

Peak Design Flow =	1.44 L/s

Calculation Method 2 (Mechanical Fixture Count provided by Mechanical Consultant):

Building 1A - Existing =	40 GPM	= 2.52 L/s
Building 1B - Dymon (5-Storey) =	35 GPM	= 2.21 L/s
Building 2 - Dymon (5-Storey) =	35 GPM	= 2.21 L/s
Building 3 - Restaurant =	75 GPM	= 4.73 L/s

Peak Design Flow =	11.67 L/s

Use the most conservative method; Q = 11.67 L/s

The existing 150 mm diameter sanitary service with a slope of ± 2.0% has a capacity of 22.5 L/s and a full flow velocity of 1.23 m/s. Therefore, the existing sanitary service has sufficient capacity to accommodate the Peak Design Flow of 11.67 L/s.

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

1375 Clyde Avenue

Dymon Self Storage
JLR No. 27296-01

SANITARY SEWER DESIGN SHEET

Institutional / Commercial Flow =	28,000	L / ha / day
Institutional / Commercial Flow =	56,000	L / ha / day
Inst. / Comm. Peaking Factor =	1.5	
Infiltration =	0.33	L / s / ha
Manning's Coeff. N =	0.013	

* Assuming buildings are in operation for 12 hours a day.

Designed by:	J.W.
Checked by:	L.D.
Date:	May 2018

M.H. #		INSTITUTIONAL / COMMERICAL			INFILTRATION			PEAK DES.	Actual	SEWER DATA					UPSTREAM				DOWNSTREAM				
		AREA	CUMM. AREA	PEAK FLOW	AREA	CUMM. AREA	PEAK EXTR.	l/s	DIA.	DIA.	SLOPE	CAPAC.	VEL.	LENGTH	Center	Obvert	Invert	Cover	Center	Obvert Drop	Obvert	Invert	Cover
FROM	TO	ha	ha	l/s	ha	ha	l/s		mm	mm	%	l/s	m/s	m	Line				Line				
BLDG 3	MH5	0.046	0.046	0.04	0.05	0.05	0.02	**0.06**	152.40	150	1.00	15.9	0.87	10.6	98.28	95.77	95.62	2.51	98.44		95.66	95.51	2.78
MH5	MH4	0.139	0.185	0.18	0.14	0.19	0.06	**0.24**	152.40	150	3.00	27.5	1.51	49.9	98.44	95.66	95.51	2.78	96.25		94.16	94.01	2.09
BLDG 2	MH4	0.204	0.204	0.20	0.20	0.20	0.07	**0.27**	152.40	150	1.00	15.9	0.87	6.4	96.08	94.45	94.30	1.63	96.25	0.220	94.38	94.23	1.87
MH4	MH3	0.083	0.472	0.46	0.08	0.47	0.16	**0.61**	152.40	150	0.50	11.2	0.62	31.9	96.25	94.16	94.01	2.09	95.70		94.01	93.85	1.69
MH3	MH2	0.060	0.532	0.52	0.06	0.53	0.18	**0.69**	152.40	150	0.50	11.2	0.62	16.0	95.70	94.01	93.85	1.69	95.75		93.93	93.77	1.82
BLDG 1B	MH2	0.116	0.116	0.11	0.12	0.12	0.04	**0.15**	152.40	150	1.00	15.9	0.87	7.9	96.04	94.00	93.85	2.04	95.75		93.93	93.77	1.82
MH2	MH1	0.212	0.860	0.84	0.21	0.86	0.28	**1.12**	152.40	150	0.50	11.2	0.62	42.4	95.75	93.93	93.77	1.82	95.70		93.71	93.56	1.99
MH1	EX. MH1A	0.000	0.860	0.84	0.00	0.86	0.28	**1.12**	152.40	150	0.50	11.2	0.62	4.2	95.70	93.71	93.56	1.99	95.95		93.69	93.54	2.26
BLDG 1A	EX. MH1A	0.147	0.147	0.14	0.15	0.15	0.05	**0.19**	152.40	150	1.00	15.9	0.87	8.0	96.04	93.77	93.62	2.27	95.95		93.69	93.54	2.26
EX. MH1A	MAIN - CLYDE	0.097	1.104	1.07	0.10	1.10	0.36	**1.44**	152.40	150	1.97	22.3	1.22	51.3	95.95	93.69	93.54	2.26	95.10		92.68	92.53	2.42
																					EX. MH	92.53	
	Total Area =	1.104																					

Appendix G

Storm Calculations and E-mail Correspondences

Annie Williams

From: Sheldon Dattenberger
Sent: September 18, 2018 11:17 AM
To: Annie Williams; Bliss Edwards (bedwards@dymon.ca)
Cc: Guy Forget
Subject: FW: Dymon site - 1375 Clyde - Storm water Retention with existing service

Follow Up Flag: Follow up
Flag Status: Completed

From: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Sent: September 17, 2018 3:39 PM
To: Sheldon Dattenberger <sdattenberger@jlrichards.ca>
Subject: RE: Dymon site - 1375 Clyde - Storm water Retention with existing service

Hello Sheldon,

Sorry for the delay in following up on the below. Considering the context of this site we had to carefully consider your request.

Just as additional background, which you may be aware of already, the site is located immediately outside of the Pinecrest Creek study area, which would have imposed much more stringent controls on the site. Even though the site is just outside of the study area the drainage still goes to Pinecrest Creek and therefore the constraints are a real issue that we needed to consider.

With that said and considering the pre development conditions we have reviewed the below information you have provided and we agree with a maximum 60L/s release rate.

On the other item relating to the valve chamber, we will need to insist on the inclusion of a chamber and valve at property line.

Please look at how this could be achieved.
Thanks

Eric Surprenant, C.E.T. / 613 580-2424 ext.:27794
Project Manager, Infrastructure Approvals
Development Review Suburban Services Branch
Planning, Infrastructure and Economic Development Dept.

Gestionaire de projets, Approbation de l'infrastructure
Examen des demandes d'aménagement (Services Suburbains Ouest)
Services de la planification, de l'infrastructure et du développement économique

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27794

ottawa.ca/planning / ottawa.ca/urbanisme

Eric S.

From: Sheldon Dattenberger <sdattenberger@jlrichards.ca>
Sent: August 31, 2018 11:00 AM
To: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Subject: Dymon site - 1375 Clyde - Storm water Retention with existing service

Hi Eric,
As a follow up from my phone message, the last time we met you had indicated that we should limit the site storm water release rate to the capacity of the existing service rather than our 1:2 year, C=0.5 rate. We initially thought we would be able to do that, but it is turning out to be very restrictive.

I apologize in advance if the information below is difficult to follow.

I have looked at the on street storm system a bit (from the information we have) and I can understand the constraints on your system and the desire to limit flow to the piped system in the road.

The existing service lead is 250mm and only at an approx.. grade of between 0.35% and 0.4%. This gives a capacity of only 36.7 L/s at the 0.35%.

Our previous post development release rate was established at 116 L/s, so we are dealing with a 68% reduction, on an already over-controlled site.

We are working on design options but it involves a considerable amount of subsurface storage and reconfiguring some of the utility servicing, which is increasing the cost of development and we are not sure yet how we can make it work.

Considering the existing site had such an undersized storm system without any stormwater management (i.e. ponding), the water from the site would have simply spilled over onto Clyde during even minor storm events (i.e. <1 yr storm).

With the redevelopment of the site, the overall stormwater management will significantly improve the existing conditions.

Here is my rational (and it may be argued as being flawed):

- The storm system on Clyde is the upstream end of a large area that picks up drainage from maybe 4 or 5 properties fronting on Clyde Avenue that contribute to the line.
- The size and slope of the existing storm line on Clyde would likely not be able to accept the allowable release rate of the 2 year storms from the contributing sites if we assume a C=0.5. I say likely, as there is some discrepancy in the information we have. The GIS system shows a 375mm line with a couple of invert elevations indicating a 0.3% slope. The survey inform we received from the City indicates a 400mm storm sewer with a significantly higher slope ranging from 0.4% to 1.3%, & the CCTV we had done shows a 450mm line.
- Based on geo Ottawa – The area of the private property sites contributing to the storm line are estimated as follows:

ADDRESS	AREA (m^2)
1375 Clyde	11371.6
1383 Clyde	4287.5
1370 Clyde	8660.2
1377 Clyde	2580.3
5 Starwood	5678.2

- The ROW area contributing to the same storm length is approx.. 30m x 200 = 6000 m^2
- Therefore the Dymon site is approximately 11,371m2/ 38,577.8m2 = approx. 30% of the contributing drainage area.
- The difficulty is coming up with the pipe capacity based on the various differing data we have from the various sources.
    - 375mm @ 0.3% = 100.2 L/s capacity (GIS data based on 2 invert elevations and lengths shown on the system)
    - 400mm @ 0.4% = 137.4 L/s capacity(size at the min. slope provided by City survey)
    - 450mm @ 0.4% = 188.1 L/s capacity (cctv size at the min. slope provided by City survey - which is upstream of where the site ties in)
    - 400mm @ 1.28% = 245.8 L/s capacity (from City survey for the pipe the existing service ties in to)
- The average of the 4 capacities = 167.9 L/s, The average of the highest and lowest capacity = 172.8 L/s. Arbitrarily pick the capacity at 170 L/s.

- If we are able to use the % of the capacity based on an approximate area that is contributing, Dymon would be able to discharge at approximately 51 L/s (30% of 170 L/s).

Proposed solution:

- As we know there are limits of the downstream system, the existing conditions are contributing to significant uncontrolled surface drainage which will be greatly improved with the new design, the request to limit the piped discharge from the site to the existing service capacity is somewhat arbitrary and not in accordance with any policies/guidelines, and the limited discharge rate of 36.7 L/s is overly onerous, we ask that the discharge rate be increased to at least the rate proportional of the contributing drainage area to the pipe. Approximately 30% of the pipe capacity. (50-65 L/s discharge rate)

We will continue working on the storm modeling iterations to work on solutions, but I can say the 36.7 L/s discharge limit is creating some challenges.

If you have additional information that we currently do not have, I would be happy to work through other possibilities / solutions with you.

Thank you for your consideration,
Sheldon

PS – we have reworked the grading for the north end of the site that seems to work much better by flattening the grades in the parking areas. I will forward it once it has been drafted and QC'd.

Sheldon Dattenberger, P.Eng., PMP, FEC
Senior Civil Engineer

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
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J.L.Richards
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STORMWATER MANAGEMENT CALCULATIONS

Existing Conditions:

An allowable release rate of 60 L/s was provided by the City of Ottawa. This release rate was provided for the site as a result of the proximity of the site to the Pincrest Creek study area, and the capacity of the existing on street stormwater system.

Please see Appendix G for email correspondence regarding the release rate of the site.

Storm servicing to be developed to limit the 1:100 year peak flows to the allowable peak flow of 60.00 L/s

Summary of Controlled and Uncontrolled Areas:

Area No.	Type or ID. No	Area (ha) C=0.20	Area (ha) C=0.40	Area (ha) C=0.90	C-Factor (100 year)	$Q_{(5\text{-yr})}$ (L/s)	$Q_{(100\text{-yr})}$ (L/s)	$Q_{(100\text{-yr})}$ (restricted)	$Q_{(100\text{-yr})}$ (unrestricted)	$Q_{(100\text{-yr})}$ (total) (L/s)	Hydrovex
2	Rooftop - 1B			0.116	1.00	30.24	57.58	5.05		5.05	N/A
3	Rooftop - 2			0.204	1.00	53.18	101.26	5.05		5.05	N/A
4	Rooftop - 3			0.039	1.00	10.17	19.36	2.52		2.52	N/A
5	Uncontrolled-1	0.007			0.25	0.41	0.87		0.87	0.87	N/A
6	Uncontrolled-2	0.026			0.25	1.51	3.23		3.23	3.23	N/A
8	100 Year - CB 1	0.002		0.005	0.79	1.42	2.73		2.73	2.73	N/A
9	100 Year - CB 7	0.003		0.008	0.80	2.26	4.34		4.34	4.34	N/A
10	100 Year - CB 8			0.005	1.00	1.30	2.48		2.48	2.48	N/A
11	ICD1 - CB 3							6.00		6.00	75 VHV-1
12-13	ICD2 - CB 5							6.00		6.00	75 VHV-1
1,7,14-16	ICD3							21.73		21.73	Custom ICD 100 mm Ø
									$Q_{(100\text{-yr})}$ = (restricted)	**60.00**	

Areas modeled in SWMHYMO (refer to Appendix G, SWMHYMO model)

Area 2: Building 1B - Dymon (5-storey)

Assumed Rooftop Properties:

Total Area Roof =	0.116 ha	Rooftop Volume (m^3) =	Usable rooftop area (m^2) x storage depth (m)
Unusable roof (25%) =	0.029 ha	Rooftop Volume (m^3) =	870 m^2 x 0.15 m
Usable roof (75%) =	0.087 ha	Rooftop Volume (m^3) =	131 m^3
Depth of Storage =	0.150 m		

Based on the Watts Adjustable Accutrol Weir, each weir can provide the following:

4 drains @ 1/2 opening	5.05 L/s	(each drain = 1.262 L/s)
Total release rate =	5.05 L/s	

Rooftop Area =	0.116
C-Factor (1:5 year) =	0.9
C-Factor (1:100 year) =	1.0

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp roof drain (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp roof drain (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.19	30.24	5.05	25.19	15.12	178.56	57.58	5.05	52.53	31.52
15	83.56	24.25	5.05	19.20	17.28	142.89	46.08	5.05	41.03	36.93
20	70.25	20.39	5.05	15.34	18.41	119.95	38.68	5.05	33.63	40.36
25	60.90	17.67	5.05	12.63	18.94	103.85	33.49	5.05	28.44	42.66
30	53.93	15.65	5.05	10.60	19.09	91.87	29.63	5.05	24.58	44.24
35	48.52	14.08	5.05	9.03	18.97	82.58	26.63	5.05	21.58	45.32
40	44.18	12.82	5.05	7.78	18.66	75.15	24.23	5.05	19.18	46.04
45	40.63	11.79	5.05	6.74	18.21	69.05	22.27	5.05	17.22	46.49
50	37.65	10.93	5.05	5.88	17.64	63.95	20.62	5.05	15.58	46.73
55	35.12	10.19	5.05	5.15	16.98	59.62	19.23	5.05	14.18	46.79
60	32.94	9.56	5.05	4.51	16.25	55.89	18.02	5.05	12.98	46.72
65	31.04	9.01	5.05	3.96	15.45	52.65	16.98	5.05	11.93	46.52
70	29.37	8.52	5.05	3.48	14.60	49.79	16.06	5.05	11.01	46.23

Area 3: Building 2 - Dymon (5-storey)

Assumed Rooftop Properties:

Total Area Roof =	0.204 ha	Rooftop Volume (m^3) =	Usable rooftop area (m^2) x storage depth (m)
Unusable roof (25%) =	0.051 ha	Rooftop Volume (m^3) =	1530 m^2 x 0.15 m
Usable roof (75%) =	0.153 ha	Rooftop Volume (m^3) =	230 m^3
Depth of Storage =	0.150 m		

Based on the Watts Adjustable Accutrol Weir, each weir can provide the following:

4 drains @ 1/2 opening	5.05 L/s	(each drain = 1.262 L/s)
Total release rate =	5.05 L/s	

Rooftop Area =	0.204
C-Factor (1:5 year) =	0.9
C-Factor (1:100 year) =	1.0

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp roof drain (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp roof drain (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.19	53.18	5.05	48.13	28.88	178.56	101.26	5.05	96.22	57.73
15	83.56	42.65	5.05	37.60	33.84	142.89	81.04	5.05	75.99	68.39
20	70.25	35.86	5.05	30.81	36.97	119.95	68.03	5.05	62.98	75.57
25	60.90	31.08	5.05	26.03	39.05	103.85	58.89	5.05	53.85	80.77
30	53.93	27.53	5.05	22.48	40.46	91.87	52.10	5.05	47.05	84.69
35	48.52	24.76	5.05	19.72	41.40	82.58	46.83	5.05	41.78	87.75
40	44.18	22.55	5.05	17.50	42.01	75.15	42.62	5.05	37.57	90.16
45	40.63	20.74	5.05	15.69	42.36	69.05	39.16	5.05	34.11	92.10
50	37.65	19.22	5.05	14.17	42.51	63.95	36.27	5.05	31.22	93.66
55	35.12	17.93	5.05	12.88	42.50	59.62	33.81	5.05	28.77	94.93
60	32.94	16.81	5.05	11.77	42.36	55.89	31.70	5.05	26.65	95.94
65	31.04	15.84	5.05	10.80	42.11	52.65	29.86	5.05	24.81	96.75
70	29.37	14.99	5.05	9.94	41.76	49.79	28.24	5.05	23.19	97.39
75	27.89	14.23	5.05	9.19	41.34	47.26	26.80	5.05	21.75	97.88
80	26.56	13.56	5.05	8.51	40.85	44.99	25.52	5.05	20.47	98.24
85	25.37	12.95	5.05	7.90	40.29	42.95	24.36	5.05	19.31	98.49
90	24.29	12.40	5.05	7.35	39.68	41.11	23.31	5.05	18.27	98.64
95	23.31	11.90	5.05	6.85	39.03	39.43	22.36	5.05	17.32	98.70
100	22.41	11.44	5.05	6.39	38.33	37.90	21.50	5.05	16.45	98.69
105	21.58	11.02	5.05	5.97	37.60	36.50	20.70	5.05	15.65	98.60
110	20.82	10.63	5.05	5.58	36.83	35.20	19.96	5.05	14.92	98.45
115	20.12	10.27	5.05	5.22	36.03	34.01	19.29	5.05	14.24	98.24

Area 4: Building 3 - Restaurant

Assumed Rooftop Properties:

Total Area Roof =	0.039 ha	Rooftop Volume (m^3) =	Usable rooftop area (m^2) x storage depth (m)
Unusable roof (25%) =	0.010 ha	Rooftop Volume (m^3) =	290 m^2 x 0.15 m
Usable roof (75%) =	0.029 ha	Rooftop Volume (m^3) =	44 m^3
Depth of Storage =	0.150 m		

Based on the Watts Adjustable Accutrol Weir, each weir can provide the following:

2 drains @ 1/2 opening	2.52 L/s	(each drain = 1.262 L/s)
Total release rate =	2.52 L/s	

Rooftop Area =	0.039
C-Factor (1:5 year) =	0.9
C-Factor (1:100 year) =	1.0

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp roof drain (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp roof drain (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.19	10.17	2.52	7.64	4.59	178.56	19.36	2.52	16.84	10.10
15	83.56	8.15	2.52	5.63	5.07	142.89	15.49	2.52	12.97	11.67
20	70.25	6.85	2.52	4.33	5.20	119.95	13.01	2.52	10.48	12.58
25	60.90	5.94	2.52	3.42	5.13	103.85	11.26	2.52	8.74	13.10
30	53.93	5.26	2.52	2.74	4.93	91.87	9.96	2.52	7.44	13.39
35	48.52	4.73	2.52	2.21	4.64	82.58	8.95	2.52	6.43	13.50
40	44.18	4.31	2.52	1.79	4.29	75.15	8.15	2.52	5.62	13.50
45	40.63	3.96	2.52	1.44	3.89	69.05	7.49	2.52	4.96	13.40
50	37.65	3.67	2.52	1.15	3.45	63.95	6.93	2.52	4.41	13.23
55	35.12	3.43	2.52	0.90	2.98	59.62	6.46	2.52	3.94	13.00
60	32.94	3.21	2.52	0.69	2.49	55.89	6.06	2.52	3.54	12.73
65	31.04	3.03	2.52	0.51	1.97	52.65	5.71	2.52	3.18	12.42
70	29.37	2.87	2.52	0.34	1.44	49.79	5.40	2.52	2.87	12.07
75	27.89	2.72	2.52	0.20	0.89	47.26	5.12	2.52	2.60	11.70

Area 5: Uncontrolled Area 1 (Total Area = 0.007)

	5 year	100 year
A asph =	0.000	0.000
C-Factor =	0.900	1.000
A landscape =	0.007	0.007
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.001	0.002

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.2	0.41	N/A	N/A	N/A	178.56	0.87	N/A	N/A	N/A
15	83.6	0.33	N/A	N/A	N/A	142.89	0.70	N/A	N/A	N/A
20	70.3	0.27	N/A	N/A	N/A	119.95	0.58	N/A	N/A	N/A
25	60.9	0.24	N/A	N/A	N/A	103.85	0.51	N/A	N/A	N/A

Area 6: Uncontrolled Area 2 (Total Area = 0.026)

	5 year	100 year
A asph =	0.000	0.000
C-Factor =	0.900	1.000
A landscape =	0.026	0.026
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.005	0.007

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.2	1.51	N/A	N/A	N/A	178.56	3.23	N/A	N/A	N/A
15	83.6	1.21	N/A	N/A	N/A	142.89	2.58	N/A	N/A	N/A
20	70.3	1.02	N/A	N/A	N/A	119.95	2.17	N/A	N/A	N/A
25	60.9	0.88	N/A	N/A	N/A	103.85	1.88	N/A	N/A	N/A

Area 8: CB No. 1 - Unrestricted (100 Year) (Total Area = 0.007)

	5 year	100 year
A asph =	0.005	0.005
C-Factor =	0.900	1.000
A landscape =	0.002	0.002
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.005	0.006
C avg =		0.786

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.2	1.42	N/A	N/A	N/A	178.56	2.73	N/A	N/A	N/A
15	83.6	1.14	N/A	N/A	N/A	142.89	2.18	N/A	N/A	N/A
20	70.3	0.96	N/A	N/A	N/A	119.95	1.83	N/A	N/A	N/A
25	60.9	0.83	N/A	N/A	N/A	103.85	1.59	N/A	N/A	N/A
30	53.9	0.73	N/A	N/A	N/A	91.87	1.40	N/A	N/A	N/A
35	48.5	0.66	N/A	N/A	N/A	82.58	1.26	N/A	N/A	N/A
40	44.2	0.60	N/A	N/A	N/A	75.15	1.15	N/A	N/A	N/A
45	40.6	0.55	N/A	N/A	N/A	69.05	1.06	N/A	N/A	N/A
50	37.7	0.51	N/A	N/A	N/A	63.95	0.98	N/A	N/A	N/A
55	35.1	0.48	N/A	N/A	N/A	59.62	0.91	N/A	N/A	N/A
60	32.9	0.45	N/A	N/A	N/A	55.89	0.85	N/A	N/A	N/A

Area 9: CB No. 7 - Unrestricted (100 Year) (Total Area = 0.011)

	5 year	100 year
A asph =	0.008	0.008
C-Factor =	0.900	1.000
A landscape =	0.003	0.003
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.008	0.009
C avg =		0.795

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.2	2.26	N/A	N/A	N/A	178.56	4.34	N/A	N/A	N/A
15	83.6	1.81	N/A	N/A	N/A	142.89	3.48	N/A	N/A	N/A
20	70.3	1.52	N/A	N/A	N/A	119.95	2.92	N/A	N/A	N/A
25	60.9	1.32	N/A	N/A	N/A	103.85	2.53	N/A	N/A	N/A
30	53.9	1.17	N/A	N/A	N/A	91.87	2.23	N/A	N/A	N/A
35	48.5	1.05	N/A	N/A	N/A	82.58	2.01	N/A	N/A	N/A
40	44.2	0.96	N/A	N/A	N/A	75.15	1.83	N/A	N/A	N/A
45	40.6	0.88	N/A	N/A	N/A	69.05	1.68	N/A	N/A	N/A
50	37.7	0.82	N/A	N/A	N/A	63.95	1.56	N/A	N/A	N/A
55	35.1	0.76	N/A	N/A	N/A	59.62	1.45	N/A	N/A	N/A
60	32.9	0.71	N/A	N/A	N/A	55.89	1.36	N/A	N/A	N/A

Area 10: CB No. 8 - Unrestricted (100 Year) (Total Area = 0.005)

	5 year	100 year
A asph =	0.005	0.005
C-Factor =	0.900	1.000
A landscape =	0.000	0.000
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.005	0.005
C avg =		1.000

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.2	1.30	N/A	N/A	N/A	178.56	2.48	N/A	N/A	N/A
15	83.6	1.05	N/A	N/A	N/A	142.89	1.99	N/A	N/A	N/A
20	70.3	0.88	N/A	N/A	N/A	119.95	1.67	N/A	N/A	N/A
25	60.9	0.76	N/A	N/A	N/A	103.85	1.44	N/A	N/A	N/A
30	53.9	0.67	N/A	N/A	N/A	91.87	1.28	N/A	N/A	N/A
35	48.5	0.61	N/A	N/A	N/A	82.58	1.15	N/A	N/A	N/A
40	44.2	0.55	N/A	N/A	N/A	75.15	1.04	N/A	N/A	N/A
45	40.6	0.51	N/A	N/A	N/A	69.05	0.96	N/A	N/A	N/A
50	37.7	0.47	N/A	N/A	N/A	63.95	0.89	N/A	N/A	N/A
55	35.1	0.44	N/A	N/A	N/A	59.62	0.83	N/A	N/A	N/A
60	32.9	0.41	N/A	N/A	N/A	55.89	0.78	N/A	N/A	N/A

WATTS®	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

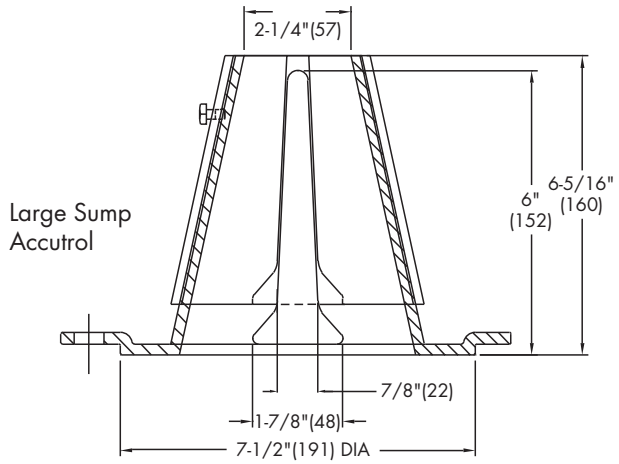
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

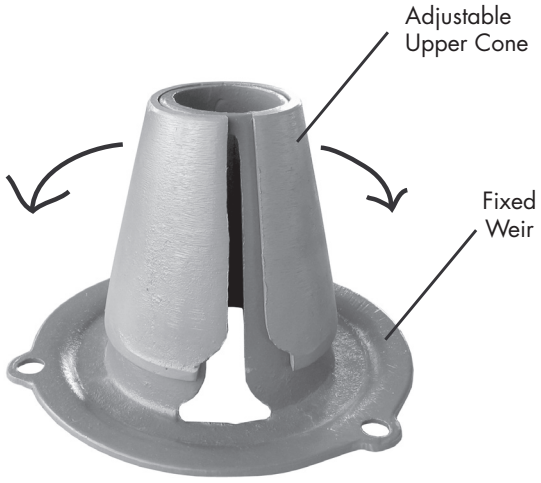
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

USA: Tel: (800) 338-2581 • Fax: (828) 248-3929 • Watts.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • Watts.ca
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

WATTS®
A Watts Water Technologies Company

miriton

memorandum

Project: **Dymon Self-Storage – 1375 Clyde Avenue**
Project Reference: **17088**
Client: **Dymon Capital Corporation**
Contractor: **Dymon Construction**
Building Permit: **SPC (First Round)**

Mr. Brock Loftus
Dymon Group of Companies
2-1830 Walkley Road
Ottawa, Ontario K1H 8K3
Via email

Dear Brock,

In response to the City of Ottawa comment number 3.56.28, we provide the following acknowledgment.

We confirm that the roof will be designed with flow control drains and roof spill scuppers for storm water management in accordance with the requirements of clause 7.4.10.4 of the 2012 Ontario Building Code.

Please contact the undersigned should you have any questions or require further information.

Yours truly,

Ralph Siciliano, P.Eng.
Miriton Ltd.

voice: (613) 722 5486 ▣ fax: (613) 722 2817 ▣ web: www.miriton.com
200-1716 Woodward Drive, Ottawa, Ontario K2C 0P8

INLET CONTROL DEVICE (ICD) SIZING TABLE

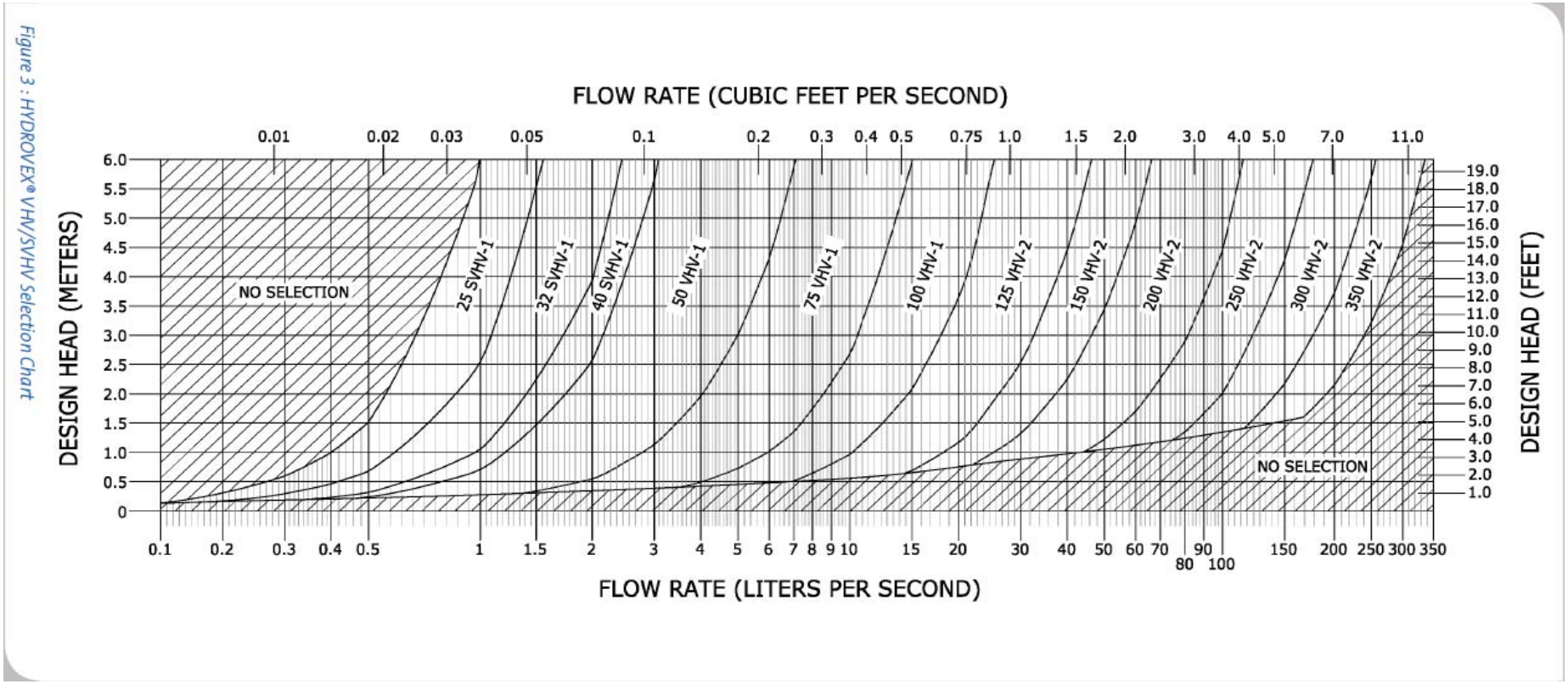


Figure 3 : HYDROVEX® VHV/SVHV Selection Chart

ICD TABLE							
ICD #	**OUTLET PIPE DIA. (mm)**	**Qr (L/s)**	**OUTLET INVERT (m)**	**TOP OF GRATE (m)**	**MAX PONDING (m)**	**DESIGN HEAD (m)**	**HYDROVEX MODEL #**
ICD 1 - CB 4	200	6.00	94.48	97.28	97.58	3.10	75 VHV-1
ICD 2 - CB 5	200	6.00	94.31	95.85	95.85	1.54	75 VHV-1

ORIFICE SIZING FOR TEMPORARY STORM SEWER ICD

JLR No.:	27296-01
Project:	Dymon Storage - 1375 Clyde Ave
Date:	February 25, 2019
Revised:	---
Designed by:	AW
Checked by:	BP

Notes: Values in blue are user variables
Values in red are calculated
Cells highlighted in Yellow reveal a condition not met.

User Notes: Temporary ICD used to control flow in storm sewer until all facilities are installed.

ICD in ST MH 2A

Q_{all} (L/s)	Outlet Pipe Dia. (mm)	Invert (m)	T/G (m)	Orifice Radius (m)	Head (m)
21.73	375	93.550	94.653	0.050	1.053

Solving for 'Q'

$$Q = CA\sqrt{2gh}$$

h=	1.053	Head (m) (input value calculated above)
C=	0.61	Coefficient of Discharge
D=	0.100	Diameter (m)
g=	9.81	Gravity (9.81 m/s^2)
A=	0.00784	Area of Flow (m^2)
Q=	0.0217	Discharge (m^3/s)
	21.73	Discharge (L/s)

Solving for 'r' (radius of pipe)

$$r = \sqrt{\frac{Q}{C\pi\sqrt{2gh}}}$$

Circular Orifice

Radius =	0.050	m
Diameter =	0.100	m
=	100	mm
=	3.93	in

Square Orifice

One side =	0.089	m
=	89	mm

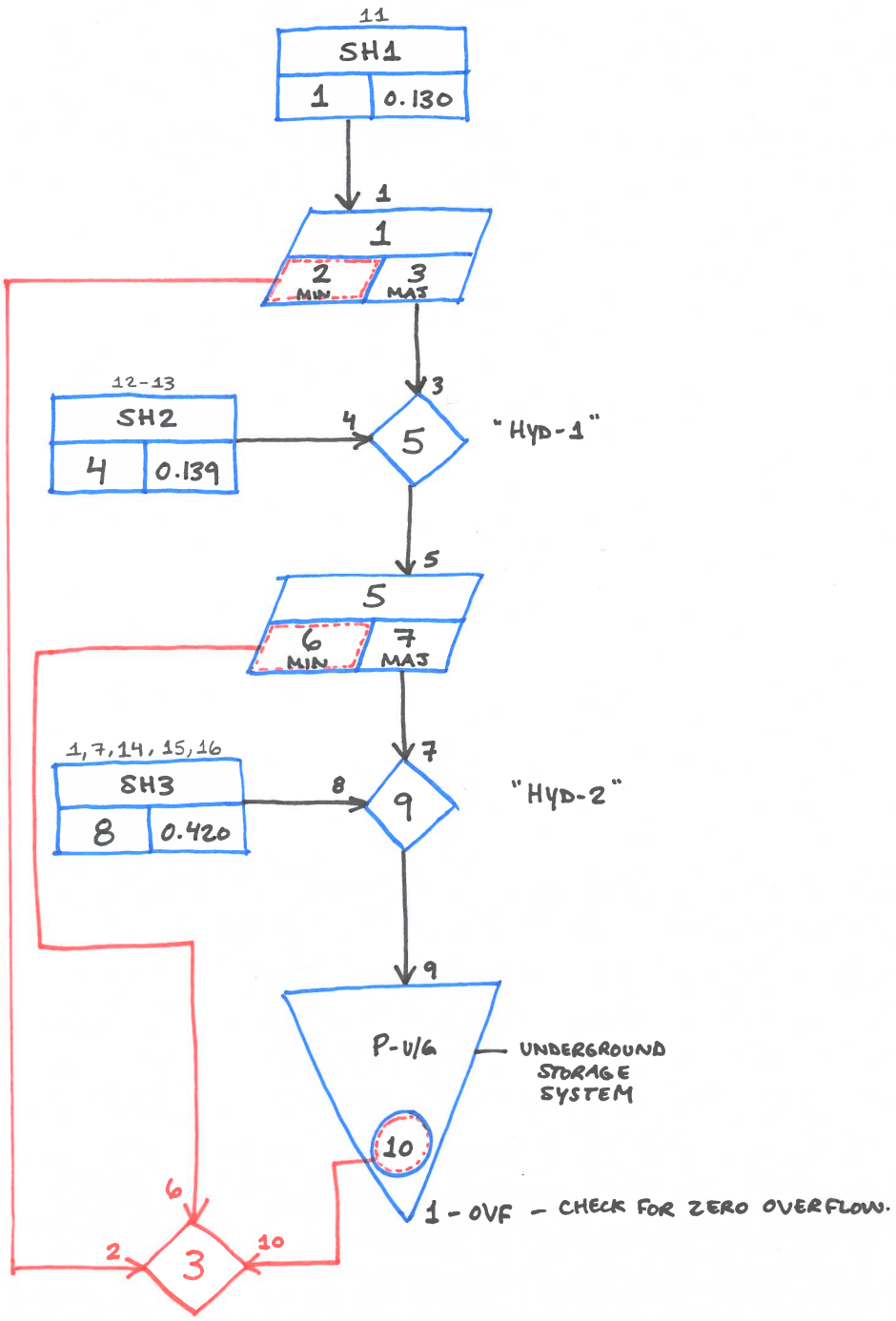
JOB NO. _____

PROJECT 1375 Clyde Ave

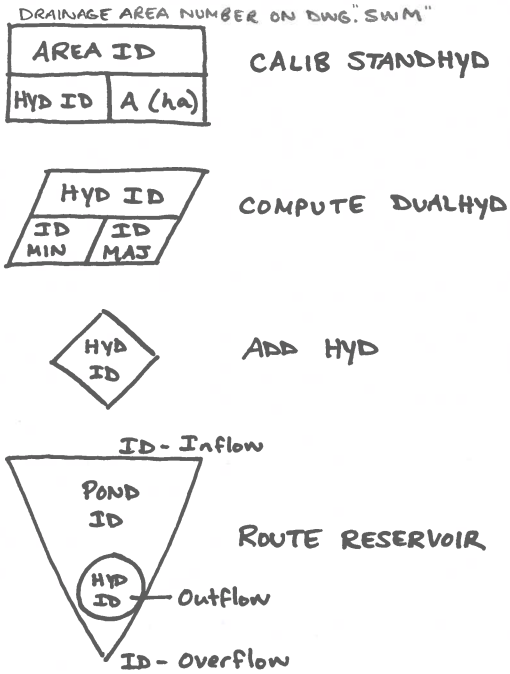
SWMHYMO Model Schematic

BY _____ DATE _____

J.L.Richards
ENGINEERS ARCHITECTS PLANNERS



• CONTROL HYDROGRAPH = 2 + 6 + 10
- CHECK SUM OF AREAS



CANADA'S BEST MANAGED COMPANIES

SHEET ____ OF ____

```
2     Metric units
*#*************************************************************************
*#  Project Name: [Dymon 1375 Clyde]    Project Number: [27296-01]
*#  Date        : 02-25-2019
*#  Modeller    : [AW]
*#  Company     : J. L. Richards & Associates Limited
*#  License #   :  4418403
*#*************************************************************************
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[100]
*%                   ["100yr3h.stm"]
*
READ STORM          STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
*
*"SH1"=DRAINAGE AREA 11
*
CALIB STANDHYD      ID=[1], NHYD=["SH1"], DT=[1](min), AREA=[0.130](ha),
                    XIMP=[0.89], TIMP=[0.89], DWF=[0](cms), LOSS=[1],
                    Horton: Fo=[76.2](mm/hr), Fc=[13.2](mm/hr),
                            DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[0.8](%),
                                         LGP=[20.2](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[3.6](%),
                                         LGI=[67.5](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
COMPUTE DUALHYD     IDin=[1], CINLET=[0.006](cms), NINLET=[1],
                    MAJID=[3], MajNHYD=["MASH1"],
                    MINID=[2], MinNHYD=["MISH1"],
                    TMJSTO=[22.83](cu-m)
*%-----------------|-------------------------------------------------------|
*
*"SH2"=DRAINAGE AREA 12-13
*
CALIB STANDHYD      ID=[4], NHYD=["SH2"], DT=[1](min), AREA=[0.139](ha),
                    XIMP=[0.87], TIMP=[0.87], DWF=[0](cms), LOSS=[1],
                    Horton: Fo=[76.2](mm/hr), Fc=[13.2](mm/hr),
                            DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[6.2](%),
                                         LGP=[14.5](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[3.1](%),
                                         LGI=[72.8](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
ADD HYD             IDsum=[5], NHYD=["HYD-1"], IDs to add=[3+4]
*%-----------------|-------------------------------------------------------|
COMPUTE DUALHYD     IDin=[5], CINLET=[0.006](cms), NINLET=[1],
                    MAJID=[7], MajNHYD=["MASH2"],
                    MINID=[6], MinNHYD=["MISH2"],
                    TMJSTO=[0](cu-m)
*%-----------------|-------------------------------------------------------|
*
*"SH3"=DRAINAGE AREAS 1,7,14,15,16
*
CALIB STANDHYD      ID=[8], NHYD=["SH3"], DT=[1](min), AREA=[0.420](ha),
                    XIMP=[0.89], TIMP=[0.89], DWF=[0](cms), LOSS=[1],
                    Horton: Fo=[76.2](mm/hr), Fc=[13.2](mm/hr),
                            DCAY=[4.14](/hr), F=[0](mm),
                    Pervious   surfaces: IAper=[4.67](mm), SLPP=[3.1](%),
                                         LGP=[71.3](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.57](mm), SLPI=[1.1](%),
                                         LGI=[65.7](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
```

```
*%-----------------|-------------------------------------------------------------|
ADD HYD             IDsum=[9], NHYD=["HYD-2"], IDs to add=[7+8]
*%-----------------|-------------------------------------------------------------|
*
*UNDERGROUND STORAGE SYSTEM
*CURVE BASED ON ORIFICE EQUATION AND CULTEC STORAGE TABLE
*
ROUTE RESERVOIR     IDout=[10],   NHYD=["UGSTO"],  IDin=[9],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                  [   0.0000 ,  0.0000 ]
                                  [   0.0125 ,  0.0034 ]
                                  [   0.0142 ,  0.0068 ]
                                  [   0.0157 ,  0.0102 ]
                                  [   0.0171 ,  0.0134 ]
                                  [   0.0183 ,  0.0166 ]
                                  [   0.0195 ,  0.0196 ]
                                  [   0.0206 ,  0.0224 ]
                                  [   0.0217 ,  0.0250 ]
                                  [   -1   ,   -1   ]  (max twenty pts)
                          IDovf=[1], NHYDovf=["OVF"]
*%-----------------|-------------------------------------------------------------|
PRINT HYD           ID=[1],   # OF PCYCLES=[1]
*%-----------------|-------------------------------------------------------------|
*
*CONTROL HYDROGRAPH = SUM OF MINOR SYSTEM HYDROGRAPHS
*
ADD HYD             IDsum=[3], NHYD=["TOT3"], IDs to add=[2+6+10]
*%-----------------|-------------------------------------------------------------|
FINISH
```

```
   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
                                                        9   9  9   9   # 4418403
         StormWater Management HYdrologic Model          999    999    =========

 ***************************************************************************
 ***************************** SWMHYMO Ver/4.05  *****************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
 ***************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.           *********
 *********                  Ottawa,  Ontario: (613) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 ***************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: J. L. Richards & Associates Limited          +++++++++
 +++++++++               Ottawa                SERIAL#:4418403        +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ***************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********           Maximum value for ID numbers  :     10           *********
 *********           Max. number of rainfall points: 105408           *********
 *********           Max. number of flow points    : 105408           *********
 ***************************************************************************


 **********************   D E T A I L E D   O U T P U T   **********************
 ***************************************************************************
 *         DATE: 2019-02-25     TIME: 11:14:24     RUN COUNTER: 000300         *
 ***************************************************************************
 * Input   filename: C:\SWMHYMO\27296-01\100YRR~1\FEB25-~1.DAT                 *
 * Output  filename: C:\SWMHYMO\27296-01\100YRR~1\FEB25-~1.out                 *
 * Summary filename: C:\SWMHYMO\27296-01\100YRR~1\FEB25-~1.sum                 *
 * User comments:                                                              *
 * 1:_____________________________________________________________________________*
 * 2:_____________________________________________________________________________*
 * 3:_____________________________________________________________________________*
 ***************************************************************************

-------------------------------------------------------------------------------
-
001:0001-------------------------------------------------------------------------
-
*#*************************************************************************
*#  Project Name: [Dymon 1375 Clyde]    Project Number: [27296-01]
*#  Date        : 02-25-2019
*#  Modeller    : [AW]
*#  Company     : J. L. Richards & Associates Limited
*#  License #   :  4418403
*#*************************************************************************
  ** END OF RUN :  99

*****************************************************************************
```

```
--------------------
| START            |  Project  dir.: C:\SWMHYMO\27296-01\100YRR~1\
--------------------  Rainfall dir.: C:\SWMHYMO\27296-01\100YRR~1\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 100
    NSTORM=   1
           #  1=100yr3h.stm
-------------------------------------------------------------------------------
-
100:0002----------------------------------------------------------------------
-
*#*****************************************************************************
*#  Project Name: [Dymon 1375 Clyde]    Project Number: [27296-01]
*#  Date        : 02-25-2019
*#  Modeller    : [AW]
*#  Company     : J. L. Richards & Associates Limited
*#  License #   :  4418403
*#*****************************************************************************
-------------------------------------------------------------------------------
-
100:0002----------------------------------------------------------------------
-
*
--------------------
| READ STORM       |    Filename: 100yr_3hr CHICAGO STORM - OTTAWA INT. AI
| Ptotal=  71.66 mm|    Comments: 100yr_3hr CHICAGO STORM - OTTAWA INT. AI
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   6.046 |   1.00 178.559 |   1.83  11.059 |   2.67   5.760
               .33   7.542 |   1.17  54.049 |   2.00   9.285 |   2.83   5.280
               .50  10.159 |   1.33  27.319 |   2.17   8.024 |   3.00   4.879
               .67  15.969 |   1.50  18.240 |   2.33   7.080 |
               .83  40.655 |   1.67  13.737 |   2.50   6.347 |

-------------------------------------------------------------------------------
-
100:0003----------------------------------------------------------------------
-
*
*"SH1"=DRAINAGE AREA 11
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .13
| 01:SH1    DT= 1.00 |   Total Imp(%)=   89.00   Dir. Conn.(%)=   89.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .12           .01
     Dep. Storage     (mm)=       1.57          4.67
     Average Slope     (%)=       3.60           .80
     Length            (m)=      67.50         20.20
     Mannings n             =      .013          .250

     Max.eff.Inten.(mm/hr)=     178.56        143.77
               over (min)        1.00          6.00
     Storage Coeff.  (min)=       1.09 (ii)     6.42 (ii)
```

Unit Hyd. Tpeak (min)=	1.00	6.00	
Unit Hyd. peak (cms)=	1.02	.18	
			TOTALS
PEAK FLOW (cms)=	.06	.00	.061 (iii)
TIME TO PEAK (hrs)=	1.00	1.03	1.000
RUNOFF VOLUME (mm)=	70.09	29.70	65.651
TOTAL RAINFALL (mm)=	71.66	71.66	71.665
RUNOFF COEFFICIENT =	.98	.41	.916

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 76.20 K (1/hr)= 4.14
Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

100:0004---

COMPUTE DUALHYD	TotalHyd 01:SH1

Average inlet capacities [CINLET] = .006 (cms)
Number of inlets in system [NINLET] = 1
Total minor system capacity = .006 (cms)
Total major system storage [TMJSTO] = 23.(cu.m.)

	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
TOTAL HYD.	01:SH1	.13	.061	1.000	65.651	.000
MAJOR SYST	03:MASH1	.04	.055	1.000	65.651	.000
MINOR SYST	02:MISH1	.09	.006	3.217	65.789	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Maximum MAJOR SYSTEM storage used = 23.(cu.m.)

100:0005---
*
*"SH2"=DRAINAGE AREA 12-13
*

CALIB STANDHYD	04:SH2 DT= 1.00

Area (ha)= .14
Total Imp(%)= 87.00 Dir. Conn.(%)= 87.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	.12	.02	
Dep. Storage	(mm)=	1.57	4.67	
Average Slope	(%)=	3.10	6.20	
Length	(m)=	72.80	14.50	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)=		178.56	145.29	
over (min)		1.00	4.00	
Storage Coeff. (min)=		1.19 (ii)	3.55 (ii)	
Unit Hyd. Tpeak (min)=		1.00	4.00	
Unit Hyd. peak (cms)=		.96	.31	
				TOTALS
PEAK FLOW (cms)=		.06	.01	.066 (iii)
TIME TO PEAK (hrs)=		1.00	1.00	1.000

```
     RUNOFF VOLUME    (mm)=      70.09        29.70         64.843
     TOTAL RAINFALL   (mm)=      71.66        71.66         71.665
     RUNOFF COEFFICIENT   =        .98          .41           .905

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 76.20          K  (1/hr)=  4.14
            Fc   (mm/hr)= 13.20     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0006--------------------------------------------------------------------------
-
------------------------
| ADD HYD (HYD-1     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 03:MASH1          .04      .055    1.00  65.65    .000

                      +ID2 04:SH2            .14      .066    1.00  64.84    .000

                       ============================================================
                       SUM 05:HYD-1          .18      .121    1.00  65.02    .000


   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
100:0007--------------------------------------------------------------------------
-
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .006  (cms)
| TotalHyd 05:HYD-1  |   Number of inlets in system [NINLET] =      1
----------------------   Total minor system capacity         =    .006  (cms)
                         Total major system storage [TMJSTO] =      0.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                  (ha)     (cms)     (hrs)     (mm)    (cms)
     TOTAL HYD.   05:HYD-1         .18      .121     1.000   65.016     .000
     ==========================================================================
     MAJOR SYST   07:MASH2         .12      .115     1.000   65.016     .000
     MINOR SYST   06:MISH2         .06      .006      .683   65.016     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
100:0008--------------------------------------------------------------------------
-
*
*"SH3"=DRAINAGE AREAS 1,7,14,15,16
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .42
| 08:SH3    DT= 1.00 |   Total Imp(%)=   89.00   Dir. Conn.(%)=   89.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .37          .05
     Dep. Storage     (mm)=       1.57         4.67
     Average Slope     (%)=       1.10         3.10
     Length            (m)=      65.70        71.30
```

Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)	=	178.56	141.20
over (min)		2.00	9.00
Storage Coeff. (min)	=	1.53 (ii)	9.16 (ii)
Unit Hyd. Tpeak (min)	=	2.00	9.00
Unit Hyd. peak (cms)	=	.66	.12
			TOTALS
PEAK FLOW (cms)	=	.19	.01 .193 (iii)
TIME TO PEAK (hrs)	=	1.00	1.08 1.000
RUNOFF VOLUME (mm)	=	70.09	29.70 65.651
TOTAL RAINFALL (mm)	=	71.66	71.66 71.665
RUNOFF COEFFICIENT	=	.98	.41 .916

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 76.20 K (1/hr)= 4.14
Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

100:0009

ADD HYD (HYD-2)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
ID1	07:MASH2	.12	.115	1.00	65.02	.000
+ID2	08:SH3	.42	.193	1.00	65.65	.000
SUM	09:HYD-2	.54	.308	1.00	65.51	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

100:0010

---

*
*UNDERGROUND STORAGE SYSTEM
*CURVE BASED ON ORIFICE EQUATION AND CULTEC STORAGE TABLE
*

ROUTE RESERVOIR
IN>09:(HYD-2)
OUT<10:(UGSTO)

Requested routing time step = 1.0 min.

OUTLFOW STORAGE TABLE

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.018	.1660E-01
.013	.3400E-02	.020	.1960E-01
.014	.6800E-02	.021	.2240E-01
.016	.1020E-01	.022	.2500E-01
.017	.1340E-01	.000	.0000E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >09: (HYD-2)	.54	.308	1.000	65.513
OUTFLOW<10: (UGSTO)	.54	.022	1.467	65.512
OVERFLOW<01: (OVF)	.00	.000	.000	.000

```
                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.032
                    TIME SHIFT OF PEAK FLOW        (min)=    28.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2492E-01

--------------------------------------------------------------------------------
-
100:0011--------------------------------------------------------------------------
-
--------------------
| PRINT HYD        |   AREA       (ha)=     .000
| ID=01 (OVF   )   |   QPEAK     (cms)=     .000 (i)
| DT= 1.00 PCYC= 1 |   TPEAK     (hrs)=     .000
--------------------   VOLUME     (mm)=     .000

     (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
      *** WARNING: This hydrograph is dry.
--------------------------------------------------------------------------------
-
100:0012--------------------------------------------------------------------------
-
*
*CONTROL HYDROGRAPH = SUM OF MINOR SYSTEM HYDROGRAPHS
*
-------------------------
| ADD HYD (TOT3      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 02:MISH1          .09     .006    3.22  65.79    .000

                     +ID2 06:MISH2          .06     .006     .68  65.02    .000

                     +ID3 10:UGSTO          .54     .022    1.47  65.51    .000

                      ============================================================
                      SUM 03:TOT3           .69     .034    1.47  65.51    .000


   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-
100:0013--------------------------------------------------------------------------
-
      FINISH
--------------------------------------------------------------------------------
-
********************************************************************************
*
     WARNINGS / ERRORS / NOTES
     -------------------------
 100:0011 PRINT HYD
      *** WARNING: This hydrograph is dry.
   Simulation ended on 2019-02-25     at 11:14:25
================================================================================
=
```

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

1375 Clyde Avenue

Dymon Self Storage

JLR No. 27296-01

STORM SEWER DESIGN SHEET

Designed by: R.M.
Checked by: A.W.
Date: Dec 2018

Manning's Coefficient n = 0.013
IDF CURVE = 2 year

Existing building to remain - Full 1:2 year flow assumed, unrestricted for analysis purpose
Restricted flow rate provided by rooftop restrictions (roof drains) combined with rooftop storage (refer to Drawing SWM and Appendix G)

M.H.		RUNOFF AREA			AREA		PEAK FLOW COMPUTATION					RESTRICTED ROOF FLOWS (L/s)	RESTRICTED ROOF FLOWS ACCUM (L/s)	TOTAL PEAK FLOWS (L/s)	SEWER DATA						UPSTREAM					DOWNSTREAM				
FROM	TO	0.20	0.40	0.90	Total Area (ha)	CUM. Area (ha)	2.78AR	2.78AR (CUM.)	TIME (min.)	INTENS. (mm/hr)	PEAK FL. (L/s)				DIA. (mm)	SLOPE (%)	CAPAC. (L/s)	VEL. (m/s)	LENGTH (m)	FL.TIME (min.)	Center Line	Obvert Drop	Obvert	Invert	Cover	Center Line	Obvert Drop	Obvert	Invert	Cover
BLDG 3	CBMH6			0.039	0.039	0.000	0.00	0.00	10.00	76.81	0.00	2.52	2.52	**2.52**	150	1.00	15.9	0.87	9.1	0.17	98.28		95.99	95.84	2.29	98.33	0.77	95.90	95.75	2.43
CBMH6	CBMH5	0.016		0.122	0.138	0.138	0.31	0.31	10.17	76.14	23.92		2.52	**26.44**	300	2.00	142.7	1.96	46.8	0.40	98.33		95.13	94.83	3.20	96.33	0.03	94.19	93.89	2.14
									10.57																				
BLDG 2	CBMH5			0.204	0.204	0.000	0.00	0.00	10.00	76.81	0.00	5.05	5.05	**5.05**	200	1.00	34.2	1.06	5.0	0.08	96.10		94.21	94.01	1.89	96.33		94.16	93.96	2.17
									10.08																				
CBMH5	MH4	0.009		0.076	0.085	0.223	0.20	0.51	10.57	74.67	38.03		7.57	**45.60**	300	0.35	59.7	0.82	25.2	0.51	96.33		94.16	93.86	2.17	95.86	0.03	94.08	93.78	1.78
MH4	MH3					0.223	0.00	0.51	11.09	72.87	37.11		7.57	**44.68**	300	0.35	59.7	0.82	8.6	0.18	95.86		94.05	93.75	1.81	95.77		94.02	93.72	1.75
									11.26																				
BLDG 1B	CBMH3A			0.116	0.116	0.000	0.00	0.00	10.00	76.81	0.00	5.05	5.05	**5.05**	200	1.00	34.2	1.06	4.4	0.07	96.06		94.51	94.31	1.55	95.83	0.03	94.46	94.26	1.37
CBMH3A	MH3	0.003		0.008	0.011	0.011	0.02	0.02	10.07	76.54	1.66		5.05	**6.71**	200	0.60	26.5	0.82	22.4	0.46	95.83		94.43	94.23	1.40	95.77	0.28	94.30	94.10	1.47
									10.53																				
MH3	MH2			0.005	0.005	0.239	0.01	0.54	11.26	72.28	39.28		12.62	**51.90**	375	0.25	91.5	0.80	39.7	0.82	95.77		94.02	93.64	1.75	95.59	0.03	93.92	93.54	1.67
									12.09																				
CBMH9	CBMH2C	0.007		0.091	0.098	0.098	0.23	0.23	10.00	76.81	17.79		0.00	**17.79**	250	0.45	41.6	0.82	21.9	0.44	95.50		94.08	93.84	1.42	95.59	0.00	93.99	93.74	1.60
									10.44																				
BIDG 1A	CBMH2C			0.147	0.147	0.147	0.37	0.37	10.00	76.81	28.25		0.00	**28.25**	250	0.45	41.6	0.82	11.9	0.24	96.06		94.32	94.07	1.74	95.59	0.28	94.27	94.02	1.32
									10.24																				
CBMH2C	MH2A			0.134	0.134	0.232	0.34	0.93	10.44	75.14	70.23		0.00	**70.23**	375	0.25	91.5	0.80	11.3	0.23	95.59		93.99	93.61	1.60	95.55	0.03	93.96	93.58	1.59
									10.68																				
CBMH11	MH2A	0.033	0.014	0.047	0.094	0.094	0.15	0.15	10.00	76.81	11.64		0.00	**11.64**	250	0.45	41.6	0.82	25.8	0.52	95.40		94.04	93.79	1.36	95.55		93.93	93.68	1.62
									10.52																				
MH2A	MH2					0.326	0.00	1.09	10.68	74.29	80.69		0.00	**80.69**	375	0.25	91.5	0.80	4.1	0.09	95.55		93.93	93.55	1.62	95.59	0.03	93.92	93.54	1.67
									10.76																				
MH2	WQU MH1					0.565	0.00	1.63	12.09	69.63	113.46		12.62	**126.08**	375	0.60	141.7	1.24	29.3	0.39	95.59		93.89	93.51	1.70	95.50	0.03	93.71	93.34	1.79
WQU MH 1	EX. ST MH					0.565	0.00	1.63	12.48	68.44	111.53		12.62	**124.15**	375	0.60	141.7	1.24	13.6	0.18	95.50		93.68	93.31	1.82	95.34		93.60	93.23	1.74
									12.66																			EX. INV =	93.23	
		1.071 ha																											

UNCONTROLLED AREAS TOTAL :

1: Baseline Road : 0.007 ha, Total Uncontrolled Flow = 0.87 L/s
2: Clyde Avenue: 0.026 ha, Total Uncontrolled Flow = 3.23 L/s

Total Unrestricted Area = 0.033, Total Offsite Uncontrolled 1:100 Yr Flow = 4.10 L/s

BUILDING FOOTPRINT AREAS :

Building 1A	0.147 ha	**UNRESTRICTED**
Building 1B	0.116 ha	**RESTRICTED**
Building 2	0.204 ha	**RESTRICTED**
Building 3	0.039 ha	**RESTRICTED**
TOTAL	**0.506 ha**	

***NOTE: CUMULATIVE AREAS DO NOT INCLUDE ROOF AREAS WITH RESTRICTED FLOW**

TOTAL POST DEVELOPMENT SITE AREA : Offsite Uncontrolled Flow Areas + Total Restricted Areas = + 0.033ha +1.071ha = 1.104 ha

CDS Average Annual Efficiency For TSS Removal & Total Annual Volume Treated

Project:	**1375 Clyde Avenue**			
Location:	**Ottawa, ON**			
Date:	**2/25/2019**			
By:	**PG**	**Upstream Storage:**	249	m3
PSD:	**Fine**	**Area:**	1.060	ha
CDS Model:	**PMSU20_15_4**	**C-Value**	0.86	
CDS Design Flow:	**20 l/s**	**IDF Data:**	Ottawa, ON	

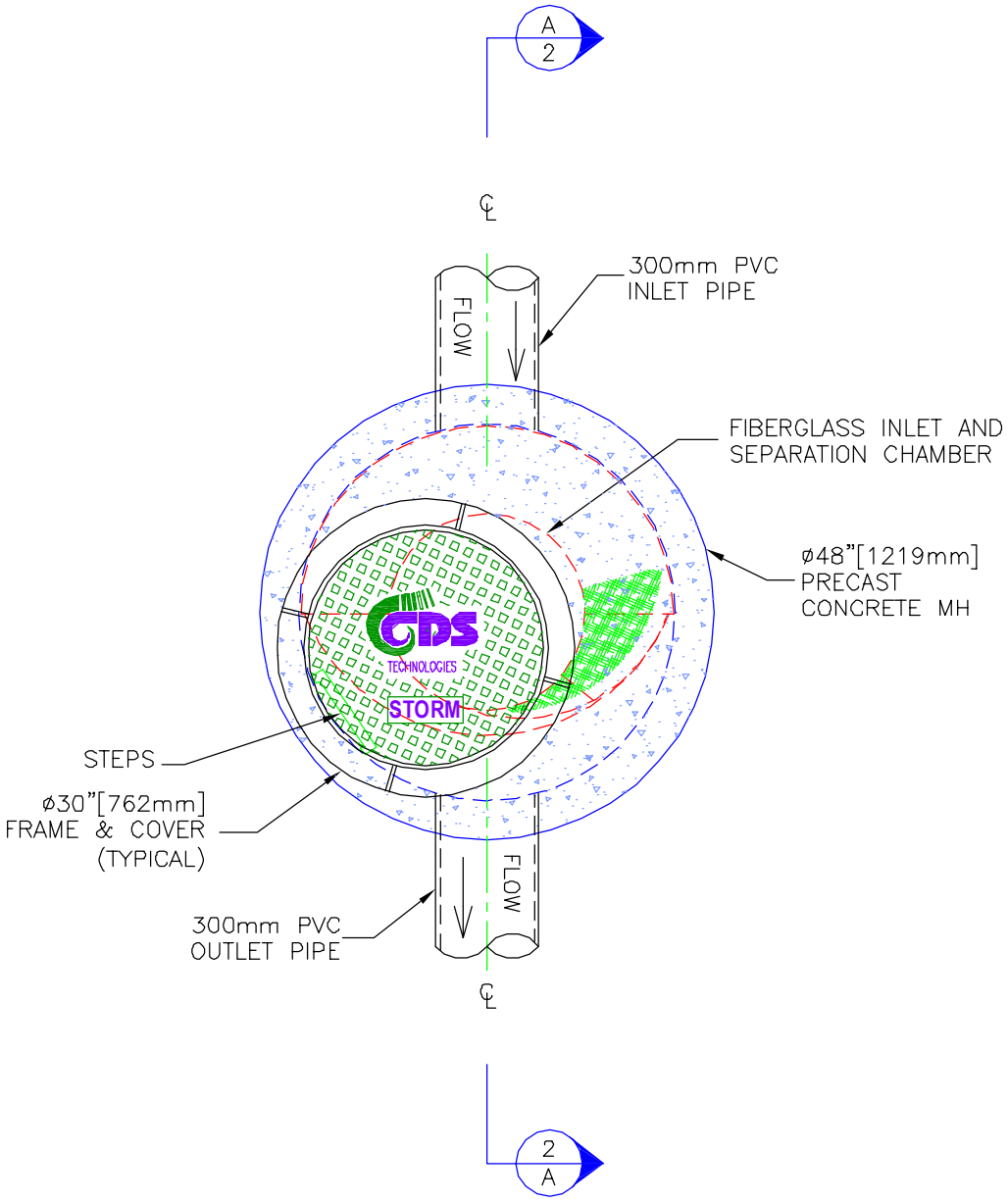
Return Period		Peak Flow	TSS Percentage Captured	Treated Flow Volume	Total Flow Volume	Annual Exceedance Probability	System Flow	CDS Flow	By-Pass Flow	Volume Percentage Treated
month / yr	Yr	l/s	%	litres	litres	%	l/s	l/s	l/s	%
1-M	0.08	5.29	93.80	11217	11217	**100.00**	5.29	5.29	0.00	100.00
2-M	0.17	9.63	89.64	20719	20719	**99.75**	9.63	9.63	0.00	100.00
3-M	0.25	8.83	90.41	18957	18957	**98.17**	8.83	8.83	0.00	100.00
4-M	0.33	12.76	86.63	27681	27681	**95.04**	12.76	12.76	0.00	100.00
5-M	0.42	14.31	85.15	31144	31144	**90.91**	14.31	14.31	0.00	100.00
6-M	0.50	15.86	83.66	34607	34607	**86.47**	15.86	15.86	0.00	100.00
7-M	0.58	17.05	82.52	37292	37292	**82.01**	17.05	17.05	0.00	100.00
8-M	0.67	18.23	81.38	39977	39977	**77.67**	18.23	18.23	0.00	100.00
9-M	0.75	19.42	80.24	42662	42662	**73.64**	19.42	19.42	0.00	100.00
10-M	0.83	23.72	74.46	48309	52588	**69.90**	23.72	19.82	3.90	94.09
11-M	0.92	28.02	68.68	53955	62513	**66.40**	28.02	19.82	8.19	88.19
1-Yr	1	32.31	62.91	59601	72438	**63.21**	32.31	19.82	12.49	82.28
2-Yr	2	43.95	51.94	69219	100420	**39.35**	43.95	19.82	24.12	68.93
5-Yr	5	62.45	40.66	80607	147300	**18.13**	62.45	19.82	42.63	54.72
10-Yr	10	86.83	31.48	91925	214337	**9.52**	86.83	19.82	67.01	42.89
25-Yr	25	107.78	26.14	99973	278395	**3.92**	107.78	19.82	87.96	35.91
50-Yr	50	124.26	22.84	105647	334420	**1.98**	124.26	19.82	104.44	31.59
100-Yr	100	140.63	20.06	110841	396691	**1.00**	140.63	19.82	120.81	27.94

Average Annual TSS Removal Efficiency [%]: **80.4** Ave. Ann. T. Volume [%]: **95.03%**

ECHELON ENVIRONMENTAL

CDS TECHNOLOGIES

PLAN VIEW

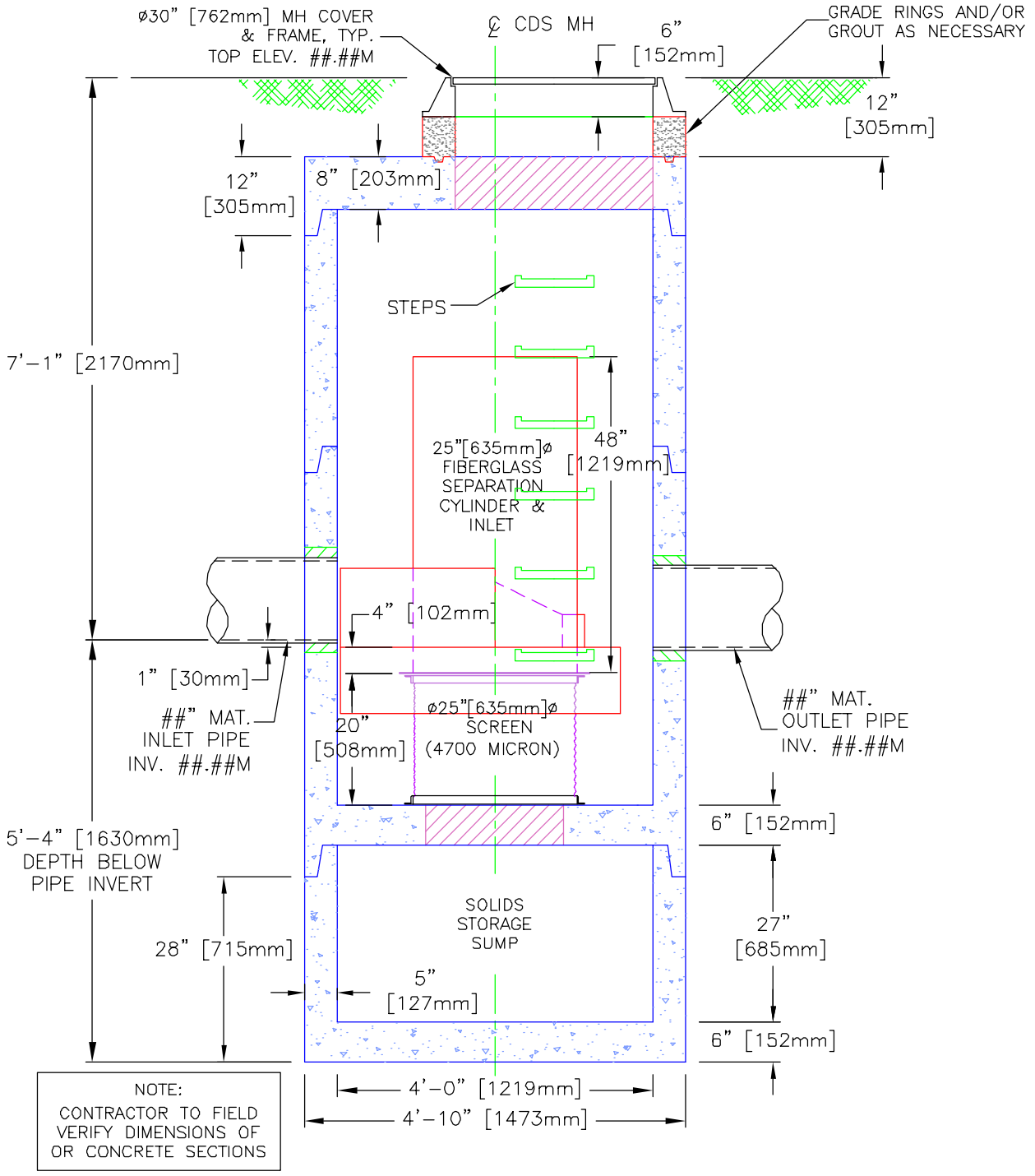


CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2'
		DATE ##/##/##	SHEET 1
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

SECTION A–A
ELEVATION VIEW



NOTE:
CONTRACTOR TO FIELD VERIFY DIMENSIONS OF OR CONCRETE SECTIONS

CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB#	XX–##–###	SCALE 1" = 2'
		DATE	##/##/##	SHEET 2
		DRAWN	INITIALS	
		APPROV.		

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

DYMON STORAGE

1375 CLYDE AVE

OTTAWA, ON

DRAWING INDEX

TITLE	SHEET NO.
SYSTEM LAYOUT SHEET	1 OF 4
SYSTEM CALCULATION SHEET	2 OF 4
SYSTEM OVERLAY SHEET	3 OF 4
DETAIL SHEET	4 OF 4

PROJECT INFORMATION	
PROJECT NO:	18-1460
CULTEC SALES REP:	KENT FRAME (GEOSTORM) 416-570-4676 KGFSTOR@GMAIL.COM
CULTEC TECHNICAL MANAGER:	DAN GERA 475-289-7064 DGERA@CULTEC.COM
CULTEC CAD TECH:	GORDON JOHNSON 475-289-7116 GJOHNSON@CULTEC.COM
COMMENTS:	REV. 02 - 11/29/18 - REVISE LAYOUT TO AVOID CB LEAD CONFLICT
	REV. 03 - 11/30/18 - REVISE LAYOUT TO AVOID CB LEAD CONFLICT. ROTATE CHAMBERS IN LINE WITH ADJACENT STM LINE
	REV. 04 - 12/3/18 - REVISE SIZE OF INLET/OUTLET PIPE TO 375mm

CULTEC, Inc.

Subsurface Stormwater Management Systems

P.O. Box 280
878 Federal Road
Brookfield, CT 06804
www.cultec.com

PH: (203) 775-4416
PH: (800) 4-CULTEC
FX: (203) 775-1462
tech@cultec.com

NOTE: THESE SHOP DRAWINGS MAY CONTAIN COMPONENTS INCLUDING BUT NOT LIMITED TO MANHOLES, CATCH BASINS, STORM PIPES AND FITTINGS, MANIFOLDS, CASTINGS AND OTHER NECESSARY APPURTENANCES THAT MAY NOT BE SUPPLIED BY CULTEC, INC. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND/OR SUPPLIER TO CONFIRM WITH CULTEC THE MATERIALS PROVIDED.

BEFORE YOU BEGIN - REQUIRED MATERIALS AND EQUIPMENT

1. PROPER GEOTECHNICAL SOIL EVALUATION BY A QUALIFIED ENGINEER OR SOIL SCIENTIST TO DETERMINE SUITABILITY OF STRUCTURAL INSTALLATION
2. OSHA COMPLIANCE
3. CULTEC WARNING TAPE, OR EQUIVALENT
4. ASSURANCES FROM LOCAL UTILITIES THAT NO UNDERGROUND GAS, ELECTRICAL OR OTHER POTENTIALLY DANGEROUS PIPELINES OR CONDUITS ARE ALREADY BURIED AT THE SITE
5. ACCEPTABLE 25 - 50mm WASHED, CRUSHED STONE AS DETAILED IN CULTEC'S INSTALLATION INSTRUCTIONS. CLEANLINESS OF STONE TO BE VERIFIED BY ENGINEER.
6. ACCEPTABLE FILL MATERIAL AS SHOWN IN CULTEC'S INSTALLATION INSTRUCTIONS.
7. ALL CULTEC CHAMBERS AND ACCESSORIES AS SPECIFIED IN THE ENGINEER'S PLANS INCLUDING CULTEC NO. 410 NON-WOVEN GEOTEXTILE, CULTEC STORMFILTER AND CULTEC NO. 4800 WOVEN GEOTEXTILE, WHERE APPLICABLE.
8. RECIPROCATING SAW OR ROUTER
9. STONE BUCKET
10. STONE CONVEYOR AND/OR TRACKED EXCAVATOR
11. TRANSIT OR LASER LEVEL MEASURING DEVICE
12. COMPACTION EQUIPMENT WITH MAXIMUM GROSS VEHICLE WEIGHT OF 5,440KGS. VIBRATORY ROLLERS MAY ONLY BE USED ON THE STONE BASE PRIOR TO THE INSTALLATION OF CHAMBERS.
13. CHECK CULTEC CHAMBERS FOR DAMAGE PRIOR TO INSTALLATION. DO NOT USE DAMAGED CULTEC CHAMBERS, CONTACT YOUR SUPPLIER IMMEDIATELY TO REPORT DAMAGE OR PACKING-LIST DISCREPANCIES.

REQUIREMENTS FOR CULTEC CHAMBER SYSTEM INSTALLATIONS

1. INSTALLING CONTRACTORS ARE EXPECTED TO COMPREHEND AND USE THE MOST CURRENT INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING A SYSTEM INSTALLATION. IF THERE IS ANY QUESTION AS TO WHETHER YOU POSSESS THE MOST CURRENT INSTRUCTIONS, CONTACT CULTEC AT (203) 775-4416 OR VISIT WWW.CULTEC.COM.
2. CONTACT CULTEC AT LEAST THIRTY DAYS PRIOR TO SYSTEM INSTALLATION TO ARRANGE FOR A PRE-CONSTRUCTION MEETING.
3. ALL CULTEC SYSTEM DESIGNS MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.
4. USE CULTEC INSTALLATION INSTRUCTIONS AS A GUIDELINE ONLY FOR MINIMUM/MAXIMUM REQUIREMENTS. ACTUAL DESIGN MAY VARY. REFER TO APPROVED CONSTRUCTION DRAWINGS FOR JOB-SPECIFIC DETAILS. BE SURE TO FOLLOW THE ENGINEER'S DRAWINGS AS YOUR PRIMARY GUIDE.
5. THE FOUNDATION STONE SHALL BE LEVEL AND COMPACTED PRIOR TO CHAMBER INSTALLATION.
6. OVERLAPPING RIB CONNECTIONS OF CHAMBERS SHALL BE FULLY SHOULDERED PRIOR TO STONE PLACEMENT.
7. CENTER-TO-CENTER SPACING SHALL BE CHECKED AND MAINTAINED THROUGHOUT INSTALLATION PROCESS.
8. ANY DISCREPANCIES WITH THE SYSTEM SUB-GRADE SOIL'S BEARING CAPACITY MUST BE REPORTED TO THE DESIGN ENGINEER.
9. NON-WOVEN GEOTEXTILE MUST BE USED AS SPECIFIED IN THE ENGINEER'S DRAWINGS.
10. CULTEC REQUIRES THE CONTRACTOR TO REFER TO CULTEC'S INSTALLATION INSTRUCTIONS CONCERNING VEHICULAR TRAFFIC. RESPONSIBILITY FOR PREVENTING VEHICLES THAT EXCEED CULTEC'S REQUIREMENTS FROM TRAVELING ACROSS OR PARKING OVER THE CHAMBER SYSTEM LIES SOLELY WITH THE CONTRACTOR THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS. THE PLACEMENT OF WARNING TAPE, TEMPORARY FENCING, AND/OR APPROPRIATELY LOCATED SIGNS IS HIGHLY RECOMMENDED. IMPRINTED WARNING TAPE IS AVAILABLE FROM CULTEC. FOR ACCEPTABLE VEHICLE LOAD INFORMATION, REFER TO CULTEC INSTALLATION INSTRUCTIONS.
11. TRAFFIC OF INSTALLATION EQUIPMENT OR OTHER VEHICULAR TRAFFIC OVER TOP OF THE CULTEC STORMWATER SYSTEM IS STRICTLY RESTRICTED AND PROHIBITED UNTIL SATISFACTORY COVER AND COMPACTION IS ACHIEVED ACCORDING TO CULTEC'S MANUFACTURER INSTALLATION INSTRUCTIONS.
12. EROSION AND SEDIMENT-CONTROL MEASURES MUST MEET LOCAL CODES AND THE DESIGN ENGINEER'S SPECIFICATIONS THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS.
13. CULTEC SYSTEMS MUST BE DESIGNED AND INSTALLED IN ACCORDANCE WITH CULTEC'S MINIMUM REQUIREMENTS. FAILURE TO DO SO WILL VOID THE LIMITED WARRANTY.
14. CONTACT CULTEC, INC. AT 203-775-4416 WITH ANY QUESTIONS OR FURTHER CLARIFICATION OF REQUIREMENTS.
15. PLACEMENT OF EMBEDMENT STONE MUST BE IN ACCORDANCE WITH CULTEC'S INSTALLATION INSTRUCTIONS. STONE COLUMN HEIGHT DEFERENTIAL MUST NEVER EXCEED 305mm BETWEEN CHAMBER ROWS, ADJACENT CHAMBERS OR STONE PERIMETER. STONE MUST BE PLACED OVER THE CROWN OF THE CHAMBERS TO ANCHOR THE CHAMBERS IN PLACE AND MAINTAIN ROW SPACING.
16. EMBEDMENT STONE MUST ONLY BE PLACED BY EXCAVATOR OR TELESCOPING CONVEYOR BOOM. PLACEMENT OF EMBEDMENT STONE WITH BULLDOZER IS NOT AN ACCEPTABLE METHOD OF INSTALLATION AND MAY CAUSE DAMAGE TO THE CHAMBERS. ANY CHAMBERS DAMAGED USING AN UNACCEPTABLE METHOD OF BACKFILL ARE NOT COVERED UNDER THE CULTEC LIMITED WARRANTY.

THIS DRAWING WAS PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE CULTEC SYSTEM'S DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. IT IS THE PROJECT ENGINEER OF RECORD'S RESPONSIBILITY TO ENSURE THAT THE CULTEC PRODUCTS ARE DESIGNED IN ACCORDANCE WITH CULTEC'S MINIMUM REQUIREMENTS. CULTEC DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS.

PROPOSED SYSTEM ELEVATIONS

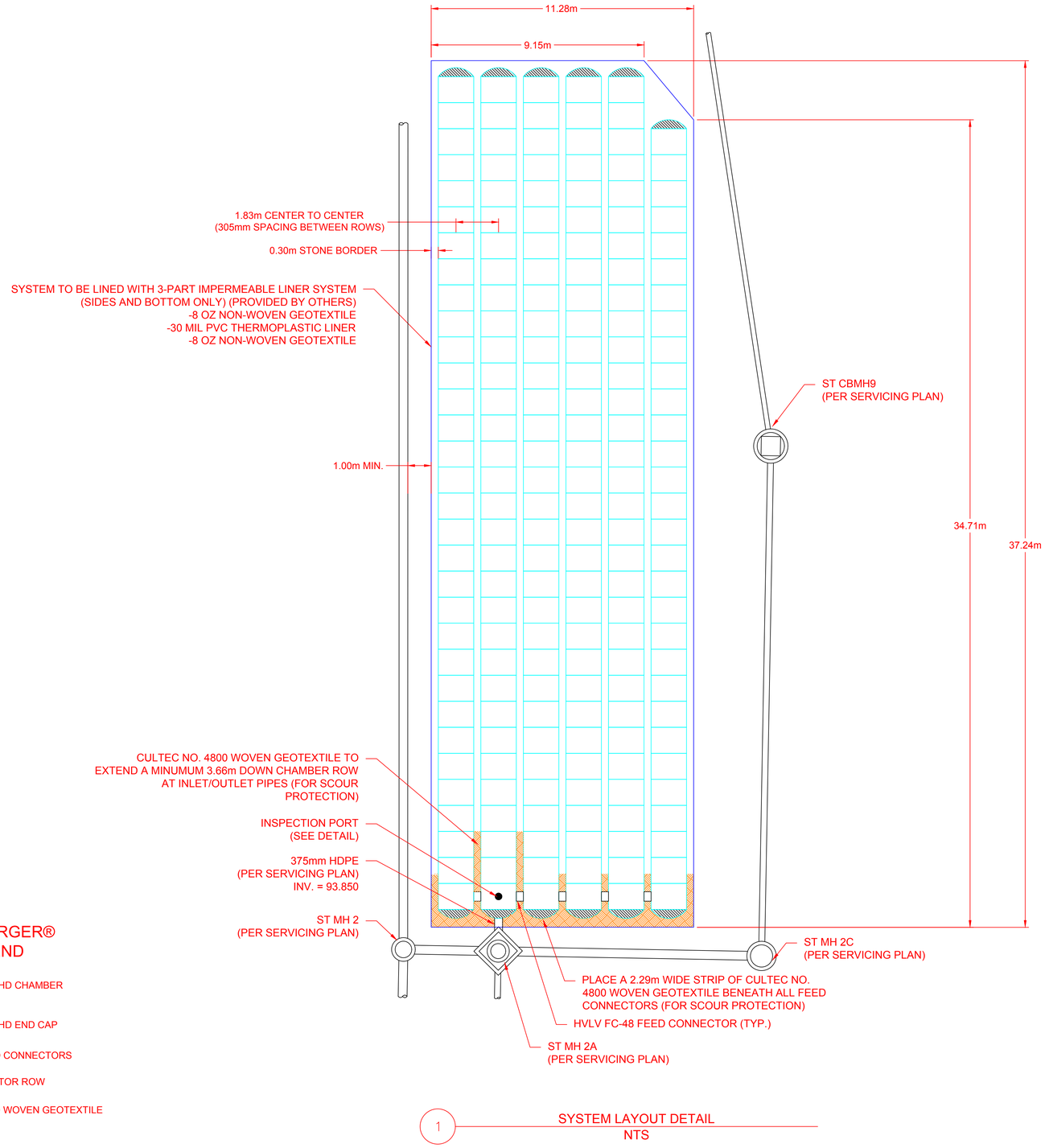
(TO BE APPROVED BY ENGINEER)
*ENGINEER TO CONFIRM MINIMUM AND MAXIMUM BURIAL REQUIREMENTS ARE MET
TOP OF STONE ELEVATION = 94.917
TOP OF CHAMBER ELEVATION = 94.765
375mm PIPE INV. = 93.850
BOTTOM OF CHAMBER ELEVATION = 93.850
BOTTOM OF STONE ELEVATION = 93.698

CULTEC STORMWATER MANAGEMENT SYSTEM

TOTAL STORAGE PROVIDED: 297.86 m³
BEDDING STONE NOT INCLUDED IN TOTAL STORAGE PROVIDED
STONE POROSITY: 40%
SYSTEM AREA: 418 m²
DEPTH OF EMBEDMENT STONE: 152mm
DEPTH OF BEDDING STONE: 152mm
STONE PERIMETER: 305mm
SPACING BETWEEN CHAMBER ROWS: 305mm

***NOTE: ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY ENGINEER. ALL SYSTEM ELEVATIONS PROVIDED MUST BE VERIFIED BY THE DESIGN ENGINEER AND THE DESIGN ENGINEER MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.**

MATERIALS LIST SUPPLIED BY CULTEC (SYSTEM MATERIALS LIST - SEE COVER SHEET FOR COMBINED PROJECT MATERIALS LIST)		
RECHARGER 360HD CHAMBER	190	PIECES
RECHARGER 360HD END CAP	12	PIECES
HVLV FC-48 FEED CONNECTORS	5	PIECES
CULTEC NO. 410 NON-WOVEN GEOTEXTILE	525	SQ. METERS
CULTEC NO. 4800 WOVEN GEOTEXTILE 2.29m x 30.48m ROLL	16	METERS
CULTEC INSPECTION PORT KIT	1	PIECES
MATERIALS LIST NOT SUPPLIED BY CULTEC		
1-2 INCH WASHED, CRUSHED STONE	309	CUBIC METERS
8 OZ. NON-WOVEN GEOTEXTILE	1175	SQ. METERS
30 MIL. PVC THERMOPLASTIC LINER	588	SQ. METERS



1 SYSTEM LAYOUT DETAIL
NTS

CULTEC RECHARGER® 360HD LEGEND

- RECHARGER 360HD CHAMBER
- RECHARGER 360HD END CAP
- HVLV FC-48 FEED CONNECTORS
- CULTEC SEPARATOR ROW
- CULTEC NO. 4800 WOVEN GEOTEXTILE
- STONE BORDER

CULTEC, Inc.
Subsurface Stormwater Management Systems
P.O. Box 280
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tech@cultec.com

DYMON STORAGE
1375 CLYDE AVE
OTTAWA, ON
SYSTEM LAYOUT SHEET

CULTEC STORMWATER CHAMBER

PROJECT NO:	18-1460.04	DATE:	12/3/18
DESIGNED BY:	DPG	CHECKED BY:	DPG
SCALE:	N.T.S.	SHEET NO:	1 OF 4

CULTEC Recharger 360HD Stormwater System Calculations

Consulting Engineer:

Project Information:

Dymon Storage
1375 Clyde Ave
Ottawa, ON

Date: 12/3/18

Project Number: 18-1460.04

Calculations Performed By:

Gordon Johnson
Cultec, Inc.
878 Federal Rd.
Brookfield, CT 06804
PH: 203-775-4416
FX: 203-775-5887

System Information

Proposed bed layout of 6 No. of Rows — 190 Total No. of Chambers

Area 4490 Sq. Ft. — **Perimeter** 315 Ft.

Given:

Storage required		CF	
No. 4800 Fabric For Internal/External Manifolds	35	feet	
Number of Inlet/Outlet Pipes	1		
Stone **Base**	6	inches	152 mm
Stone **Above**	6	inches	152 mm
Chamber Spacing	12	inches	305 mm
No. of HVLV FC-48 Feed Connectors	5	units	
No. CULTEC Inspection Ports	1	units	
Stone Porosity	40	%	
Stone Border Width	1	feet	0.305 m

☑ Discount stone base from Total storage provided (If Applicable)

☐ Discount stone above from Total storage provided (If Applicable)

Other Parameters:

Type of Lining: Sides & Bottom

☐

Assumptions

Model Name		Chamber Height (inches / mm)	Design Unit Height (feet / m)	Chamber Width (inches / mm)	Chamber Spacing (inches / mm)	Design Unit Width (feet / m)	Chamber Volume per Linear Foot (cu. ft/ft / cu. m/m)	Design Unit Volume (cu. ft/ft / cu. m/m)	Installed Chamber Length (feet / m)
Recharger® 360HD Chamber	English	36	4.000	60	12	6.00	10.00	15.599	3.670
	Metric	914	1.219	1524	305	1.83	0.929	1.449	1.119
Recharger® 360HD End Cap	English	36.5	4.000	60	12	6.00	5.168	12.701	1.250
	Metric	927	1.219	1524	305	1.83	0.480	1.180	0.381
HVLV™ FC-48 Feed Connectors	English	12	n/a	16	n/a	n/a	0.913	n/a	1.000
	Metric	305	n/a	406	n/a	n/a	0.085	n/a	0.305

Storage Provided within CULTEC Recharger 360HD Stormwater Chamber, End Caps and HVLV FC-48 Feed Connector Internal Manifold System - *not including stone*

Number of Recharger 360HD chambers by design			=	190 pcs		
190	pcs x	3.670	=	697.30 feet	212.54 m	
Number of Recharger 360HD end caps			=	12 pcs		
12	pcs x	1.250	=	15.00 feet	4.57 m	
Number of HVLV FC-48 Feed Connectors			=	5 pcs		
5	pcs x	1.000	=	5.00 feet	1.52 m	
Total footage of Recharger 360HD chambers			=	697.30 feet	212.54 m	
Total footage of Recharger 360HD end caps			=	15.00 feet		
Total footage of HVLV FC-48 Feed Connectors			=	5.00 feet	1.52 m	
Storage provided within Recharger 360HD chambers			=	6971.26 CF	197.43 m^3	
Storage provided within Recharger 360HD end caps				77.52 CF	2.20 m^3	
Storage provided within HVLV FC-48 Feed Connectors			=	4.57 CF	0.13 m^3	
Total Storage within chambers and feed connectors			=	**7053.34 CF**	**199.75 m^3**	

Storage Provided within Entire CULTEC Stormwater System - *including stone*

Bed Depth	4.00 feet	1.22 m	
Total Area	4490.00 sq. ft.	417.12 m^2	
Volume of Effective Excavation *(not including additional cover)*	17960.00 CF	508.63 m^3	
Perimeter of Bed	315.00 feet	96.01 m	
Total Storage within CULTEC Recharger 360HD chambers, end caps and feed connectors	7053.34 CF	199.75 m^3	
Total Stone Required	10906.66 CF	308.88 m^3	
	404 CY		
	566 tons		
Storage provided within stone	3464.66 CF	98.12 m^3	
Storage provided within Sand Filter (Calculated at 20% void)	0.00 CF	0.000 m^3	
Total Storage within CULTEC Stormwater System	= **10519 CF**	**297.86 m^3**	

Req. storage attained.

CULTEC MATERIALS LIST

Model	Model #	Quantity	Unit of Measure	Quantity	Unit of Measure
Recharger 360HD Heavy Duty Chamber	360HD	190	pcs		
Recharger 360HD End Cap	360HD EC	12	pcs		
HVLV FC-48 Feed Connectors	FC-48	5	pcs		
CULTEC No. 410 Non-Woven Geotextile	SY 410	623.61	Sq. Yards	521	m2
CULTEC No. 4800 Woven Geotextile 7.5' x 100' (2.29 m x 30.48 m)	7.5x100 4800	52	feet	16	m
CULTEC Inspection Port Kit	12x6 INS PRT	1	pcs		
Total Stone		566	tons	309	m^3
8 oz. Non-Woven Geotextile (Not provided by Cultec)		1406	Sq. Yards	1175	m2
30 mil. PVC Thermoplastic Liner (Not provided by Cultec)		703	Sq. Yards	588	m2

SYSTEM STORAGE CALCULATION

CULTEC Recharger 360HD Stormwater Incremental Storage

Date: December 3, 2018

Project Information

Dymon Storage
1375 Clyde Ave
Ottawa, ON

Project Number 18-1460.04

Base of Stone Elevation- 93.698

Recharger 360HD Incremental Storage Volumes

Height of System (in)	Height of System (mm)	End Cap Volume (ft^3)	End Cap Volume (m^3)	Chamber Volume (ft^3)	Chamber Volume (m^3)	HVLV FC-48 Feed Connector Volume (ft^3)	HVLV FC-48 Feed Connector Volume (m^3)	Stone Volume (ft^3)	Stone Volume (m^3)	Cumulative Storage Volume (ft^3)	Cumulative Storage Volume (m^3)	Total Cumulative Storage Volume (ft^3)	Total Cumulative Storage Volume (m^3)	Elevation (ft)	Elevation (m)	
48.00	1219	0.00	0.00	0.00	0.00	0.00	0.00	149.67	4.24	149.67	4.24	10517.33	297.82	97.70	94.917	**Top of Stone Elevation**
47.00	1194	0.00	0.00	0.00	0.00	0.00	0.00	149.67	4.24	149.67	4.24	10367.67	293.58	97.61	94.892	
46.00	1168	0.00	0.00	0.00	0.00	0.00	0.00	149.67	4.24	149.67	4.24	10218.00	289.34	97.53	94.866	
45.00	1143	0.00	0.00	0.00	0.00	0.00	0.00	149.67	4.24	149.67	4.24	10068.33	285.10	97.45	94.841	
44.00	1118	0.00	0.00	0.00	0.00	0.00	0.00	149.67	4.24	149.67	4.24	9918.67	280.86	97.36	94.816	
43.00	1092	0.00	0.00	0.00	0.00	0.00	0.00	149.67	4.24	149.67	4.24	9769.00	276.63	97.28	94.790	
42.00	1067	0.12	0.00	15.25	0.43	0.00	0.00	143.52	4.06	158.89	4.50	9619.33	272.39	97.20	94.765	**Top of Chamber Elevation**
41.00	1041	0.24	0.01	32.35	0.92	0.00	0.00	136.63	3.87	169.22	4.79	9460.44	267.89	97.11	94.739	
40.00	1016	0.36	0.01	48.09	1.36	0.00	0.00	130.28	3.69	178.74	5.06	9291.22	263.10	97.03	94.714	
39.00	991	0.48	0.01	81.47	2.31	0.00	0.00	116.89	3.31	198.84	5.63	9112.48	258.04	96.95	94.689	
38.00	965	0.60	0.02	102.88	2.91	0.00	0.00	108.27	3.07	211.76	6.00	8913.65	252.41	96.86	94.663	
37.00	940	0.72	0.02	118.93	3.37	0.00	0.00	101.81	2.88	221.46	6.27	8701.89	246.41	96.78	94.638	
36.00	914	0.84	0.02	132.27	3.75	0.00	0.00	96.42	2.73	229.53	6.50	8480.43	240.14	96.70	94.612	
35.00	889	0.96	0.03	143.79	4.07	0.00	0.00	91.77	2.60	236.52	6.70	8250.90	233.64	96.61	94.587	
34.00	864	1.08	0.03	153.98	4.36	0.00	0.00	87.64	2.48	242.70	6.87	8014.38	226.94	96.53	94.562	
33.00	838	1.20	0.03	163.13	4.62	0.00	0.00	83.93	2.38	248.26	7.03	7771.68	220.07	96.45	94.536	
32.00	813	1.32	0.04	171.44	4.85	0.00	0.00	80.56	2.28	253.32	7.17	7523.41	213.04	96.36	94.511	
31.00	787	1.44	0.04	179.01	5.07	0.00	0.00	77.49	2.19	257.94	7.30	7270.09	205.87	96.28	94.485	
30.00	762	1.68	0.05	185.97	5.27	0.00	0.00	74.61	2.11	262.26	7.43	7012.16	198.56	96.20	94.460	
29.00	737	1.80	0.05	192.40	5.45	0.00	0.00	71.99	2.04	266.19	7.54	6749.90	191.14	96.11	94.435	
28.00	711	1.92	0.05	198.33	5.62	0.00	0.00	69.57	1.97	269.82	7.64	6483.71	183.60	96.03	94.409	
27.00	686	2.04	0.06	203.87	5.77	0.00	0.00	67.30	1.91	273.21	7.74	6213.90	175.96	95.95	94.384	
26.00	660	2.16	0.06	209.04	5.92	0.00	0.00	65.19	1.85	276.39	7.83	5940.69	168.22	95.86	94.358	
25.00	635	2.28	0.06	213.89	6.06	0.00	0.00	63.20	1.79	279.37	7.91	5664.30	160.39	95.78	94.333	
24.00	610	2.40	0.07	218.43	6.19	0.00	0.00	61.33	1.74	282.17	7.99	5384.93	152.48	95.70	94.308	
23.00	584	2.40	0.07	222.73	6.31	0.00	0.00	59.61	1.69	284.74	8.06	5102.77	144.49	95.61	94.282	
22.00	559	2.52	0.07	226.76	6.42	0.00	0.00	57.95	1.64	287.24	8.13	4818.02	136.43	95.53	94.257	
21.00	533	2.64	0.07	230.58	6.53	0.00	0.00	56.38	1.60	289.60	8.20	4530.79	128.30	95.45	94.231	
20.00	508	2.76	0.08	234.18	6.63	0.00	0.00	54.89	1.55	291.83	8.26	4241.19	120.10	95.36	94.206	
19.00	483	2.88	0.08	237.56	6.73	0.00	0.00	53.49	1.51	293.93	8.32	3949.36	111.83	95.28	94.181	
18.00	457	2.88	0.08	240.76	6.82	0.02	0.00	52.21	1.48	295.86	8.38	3655.42	103.51	95.20	94.155	
17.00	432	3.00	0.08	243.78	6.90	0.12	0.00	50.91	1.44	297.81	8.43	3359.56	95.13	95.11	94.130	
16.00	406	3.12	0.09	246.64	6.98	0.23	0.01	49.67	1.41	299.65	8.49	3061.76	86.70	95.03	94.104	
15.00	381	3.12	0.09	249.34	7.06	0.27	0.01	48.57	1.38	301.30	8.53	2762.10	78.21	94.95	94.079	
14.00	356	3.24	0.09	251.86	7.13	0.30	0.01	47.50	1.35	302.91	8.58	2460.80	69.68	94.86	94.054	
13.00	330	3.36	0.10	254.26	7.20	0.32	0.01	46.49	1.32	304.43	8.62	2157.89	61.10	94.78	94.028	
12.00	305	3.48	0.10	256.50	7.26	0.33	0.01	45.54	1.29	305.86	8.66	1853.46	52.48	94.70	94.003	
11.00	279	3.48	0.10	258.63	7.32	0.35	0.01	44.68	1.27	307.14	8.70	1547.60	43.82	94.61	93.977	
10.00	254	3.60	0.10	260.61	7.38	0.36	0.01	43.84	1.24	308.41	8.73	1240.45	35.13	94.53	93.952	
9.00	229	3.60	0.10	262.48	7.43	0.36	0.01	43.09	1.22	309.53	8.76	932.05	26.39	94.45	93.927	
8.00	203	3.72	0.11	264.25	7.48	0.37	0.01	42.33	1.20	310.67	8.80	622.52	17.63	94.36	93.901	
7.00	178	4.08	0.12	265.82	7.53	0.40	0.01	41.55	1.18	311.85	8.83	311.85	8.83	94.28	93.876	**Bottom of Chamber Elevation**
6.00	152	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.20	93.850	
5.00	127	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.11	93.825	
4.00	102	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.03	93.800	
3.00	76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.95	93.774	
2.00	51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.86	93.749	
1.00	25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.78	93.723	
0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.70	93.698	**Bottom of Stone Elevation**

SYSTEM STAGE-STORAGE TABLE

CULTEC, Inc.
Subsurface Stormwater Management Systems
P.O. Box 280
878 Federal Road
Brookfield, CT 06804
www.cultec.com
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PH: (800) 4-CULTEC
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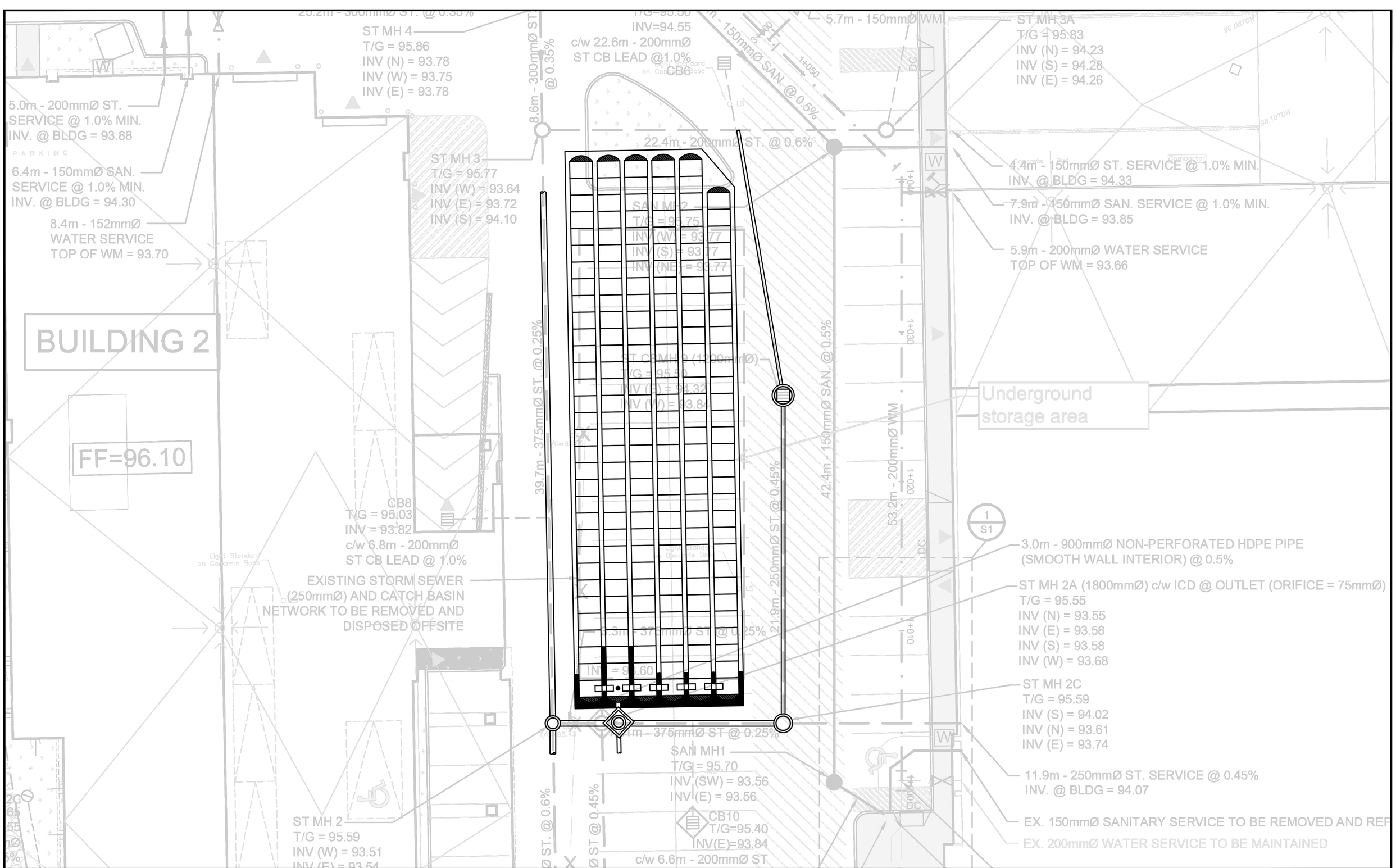
tech@cultec.com

DYMON STORAGE
1375 CLYDE AVE
OTTAWA, ON
SYSTEM CALCULATION SHEET

CULTEC STORMWATER CHAMBER

PROJECT NO:	18-1460.04	DATE:	12/3/18
DESIGNED BY:	DPG	CHECKED BY:	DPG
SCALE:	N.T.S.	SHEET NO:	2 OF 4



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DYMON STORAGE
1375 CLYDE AVE
OTTAWA, ON
SYSTEM OVERLAY SHEET

CULTEC STORMWATER CHAMBER

PROJECT NO:	18-1460.04	DATE:	12/3/18
DESIGNED BY:	DPG	CHECKED BY:	DPG
SCALE:	N.T.S.	SHEET NO:	3 OF 4

CULTEC RECHARGER® 360HD PRODUCT SPECIFICATIONS

GENERAL
CULTEC RECHARGER® 360HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS
1. THE CHAMBERS SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS.
3. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND THE AASHTO DESIGN TRUCK LOAD AND LIVE AND DEAD LOAD FACTORS AS DEFINED BY AASHTO LRFD SECTION 12.12 WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
4. THE CHAMBER SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
5. THE CHAMBER SHALL BE ARCHED IN SHAPE.
6. THE CHAMBER SHALL BE OPEN-BOTTOMED.
7. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
8. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER® 360HD SHALL BE 36 INCHES (914 mm) TALL, 60 INCHES (1524 mm) WIDE AND 50 INCHES (1275 mm) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER® 360HD SHALL BE 3.67 FEET (1.12 m).
9. MULTIPLE CHAMBERS MAY BE CONNECTED TO FORM DIFFERENT LENGTH ROWS. EACH ROW SHALL BEGIN AND END WITH A SEPARATELY FORMED CULTEC RECHARGER® 360HD END CAP. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.
10. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV™ FC-48 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. MAXIMUM ALLOWABLE PIPE SIZE IN THE SIDE PORTAL IS 10 INCH (250mm) HDPE OR 12 INCH (300mm) PVC.
11. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV™ FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1245 mm) LONG.
12. THE NOMINAL STORAGE VOLUME OF THE RECHARGER® 360HD CHAMBER SHALL BE 10.0 FT³ / FT (.928 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER® 360HD SHALL BE 36.66 FT³ / UNIT (1.038 m³ / UNIT) - WITHOUT STONE.
13. THE NOMINAL STORAGE VOLUME OF THE HVLV™ FC-48 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
14. THE RECHARGER® 360HD CHAMBER SHALL HAVE 7 CORRUGATIONS.
15. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES.
16. MAXIMUM ALLOWABLE COVER OVER THE TOP OF THE CHAMBER SHALL BE 12.0 FEET (3.66 m).

END CAP PARAMETERS
1. THE CULTEC RECHARGER® 360HD END CAP (REFERRED TO AS 'END CAP') SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE END CAP SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
3. THE END CAP SHALL BE ARCHED IN SHAPE.
4. THE END CAP SHALL BE OPEN-BOTTOMED.
5. THE END CAP SHALL BE JOINED AT THE BEGINNING AND END OF EACH ROW OF CHAMBERS USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
6. THE END CAP SHALL HAVE 5 CORRUGATIONS.
7. THE NOMINAL DIMENSIONS OF THE END CAP SHALL BE 36.5 INCHES (927 mm) TALL, 60 INCHES (1525 mm) WIDE AND 18 INCHES (458 mm) LONG. WHEN JOINED WITH A RECHARGER 360HD CHAMBER, THE INSTALLED LENGTH OF THE END CAP SHALL BE 15 INCHES (381 mm).
8. THE NOMINAL STORAGE VOLUME OF THE END CAP SHALL BE 5.17 FT³ / FT (0.48 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF AN INTERLOCKED END CAP SHALL BE 6.46 FT³ / UNIT (0.183 m³ / UNIT) - WITHOUT STONE.
9. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.
10. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES
11. THE END CAP SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12.

CULTEC HVLV FC-48 FEED CONNECTOR PRODUCT SPECIFICATIONS

GENERAL
CULTEC HVLV FC-48 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER MODEL 360HD STORMWATER CHAMBERS.

FEED CONNECTOR PARAMETERS
1. THE FEED CONNECTOR SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE FEED CONNECTOR SHALL BE VACUUM THERMOFORMED OF BLACK HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE).
3. THE FEED CONNECTOR SHALL BE ARCHED IN SHAPE.
4. THE FEED CONNECTOR SHALL BE OPEN-BOTTOMED.
5. THE NOMINAL DIMENSIONS OF THE CULTEC HVLV FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1245 mm) LONG.
6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-48 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
7. THE HVLV FC-48 FEED CONNECTOR SHALL HAVE 4 CORRUGATIONS.
8. THE HVLV FC-48 FEED CONNECTOR MUST BE FORMED AS A WHOLE UNIT HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
9. THE FEED CONNECTOR SHALL BE DESIGNED TO WITHSTAND AASHTO HS-25 DEFINED LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
10. THE FEED CONNECTOR SHALL BE MANUFACTURED IN AN ISO 9001:2008 CERTIFIED FACILITY.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

CULTEC NO. 4800™ WOVEN GEOTEXTILE

CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

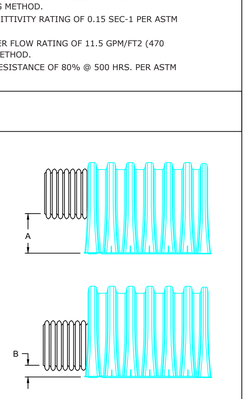
GEOTEXTILE PARAMETERS
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2, 740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT2 (470 LPM/M2) PER ASTM D4491 TESTING METHOD.
14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

360HD 1.0

GENERAL NOTES

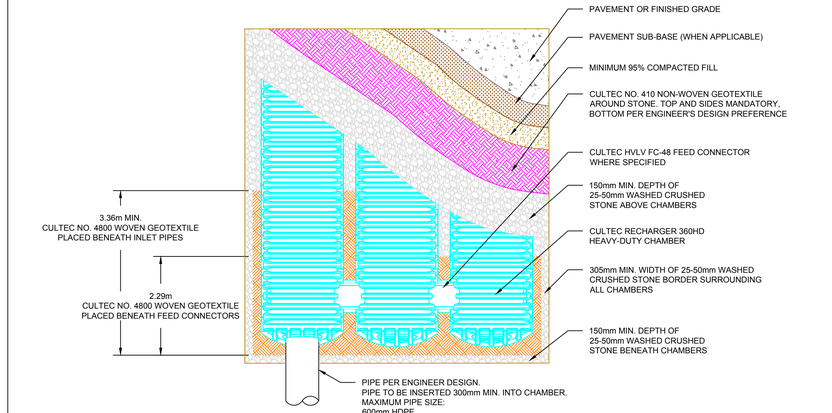
PIPE	A	B
150 mm	660 mm	20 mm
200 mm	600 mm	25 mm
250 mm	525 mm	32 mm
300 mm	450 mm	45 mm
375 mm	375 mm	50 mm
450 mm	300 mm	58 mm
600 mm	150 mm	64 mm

*THE TYPICAL INVERT TABLE ABOVE IS BASED ON THE INSIDE DIAMETER OF STANDARD CORRUGATED PLASTIC PIPE. THE HEAVY DUTY END CAP HAS PRE-MARKED TRIM LINES FOR PIPE DIAMETERS 12" (300mm), 15" (375mm), 18" (450mm) AND 24" (600mm). PIPES OF ANY SIZE AND MATERIAL UP TO 24" MAY BE PLACED AT CUSTOM LOCATIONS AND CUSTOM INVERTS. THE CROWN OF THE PIPE MUST REMAIN A MINIMUM OF 4" (100mm) FROM THE EDGE OF THE HEAVY DUTY END CAP.



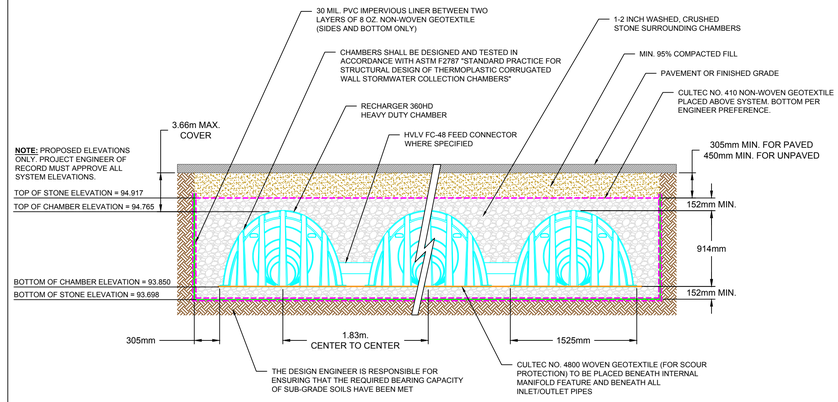
360HD 7.0

CULTEC RECHARGER 360HD TYPICAL PIPE INVERTS



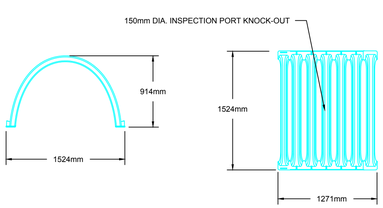
360HD 2.0

CULTEC RECHARGER 360HD HEAVY DUTY PLAN VIEW



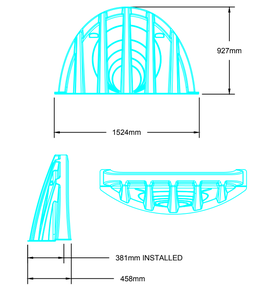
360HD 3.0

CULTEC RECHARGER 360HD HEAVY DUTY THREE VIEW



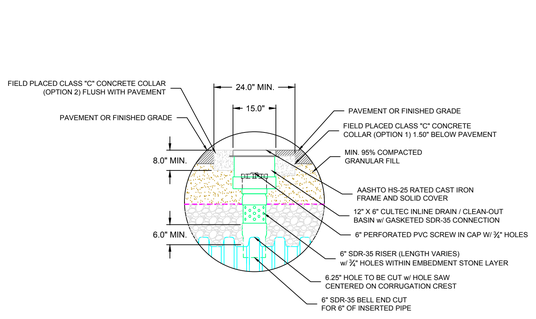
360HD 4.0

CULTEC RECHARGER 360HD HEAVY DUTY END CAP THREE VIEW



360HD 8.0

CULTEC HVLV FC-48 FEED CONNECTOR THREE VIEW

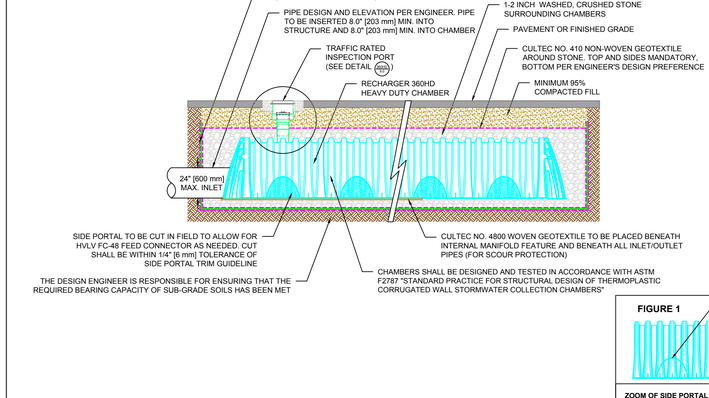


360HD 9.0

INSPECTION PORT - ZOOM DETAIL

360HD 5.0

CULTEC RECHARGER 360HD HEAVY DUTY CROSS SECTION



360HD 6.0

CULTEC RECHARGER 360HD HEAVY DUTY TYPICAL INTERLOCK

360HD 10.0

CULTEC INTERNAL MANIFOLD - INSPECTION PORT DETAIL

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RECHARGER 360HD
DETAIL SHEET
TRAFFIC APPLICATION

CULTEC STORMWATER CHAMBER

PROJECT NO:	18-1460.04	DATE:	12/3/18
DESIGNED BY:	DPG	CHECKED BY:	DPG
SCALE:	N.T.S.	SHEET NO:	4 OF 4

From: Cody Neath
To: Riley McGee
Cc: Michael Paquette
Subject: RE: Dymon Clyde - Cultec System
Date: Tuesday, February 5, 2019 12:46:27 PM
Attachments: image002.png
image001.png

Hi Riley,

Thanks for the email, we're always glad to help.

We have done many lined systems with a high groundwater elevation and typically see no issues and do not require any special considerations. The weight of the clearstone and granular cover is usually more than enough to counteract the buoyancy forces experienced. In some special instances (groundwater elevation at surface + minimum cover) we have utilized either a concrete pad or high-strength geosynthetic at the bottom of the system to provide further support.

I ran a quick calculation for this scenario, and assumed a worst-case scenario of groundwater being up to the surface. Even with that consideration, there is a safety factor of about 1.68, with the counter-buoyancy forces (weight of aggregates) far exceeding the buoyancy forces:

Cultec System (Recharger 902HD) - Buoyancy Calculation				
System Area:	417.12	m^2		
Founding Elevation:	93.85	m		
Top of System Elevation:	94.765	m		
Surface Elevation (min.):	95.55	m		
Cover:	0.78	m		
Clear Stone Volume:	309	m^3		
Weight of Clear Stone:	5759.5	kN (using ρ = 1.9 t/m^3)		
Unit Weight of Cover:	18	kN/m^3		
Weight of Chambers:	82.3	kN		
Buoyancy Force = (GW Head)•(γ)•(Area)				
GW Head (System Depth) =	1.70	m		
γ (water) =	9.81	kN/m^3		
Buoyancy Force =	**6,956.3**	**kN**		
Resisting Force = (Chamber Weight) + (Clear stone Weight) + (Weight of Cover)				
Chamber Weight =	82.3	kN	(49 chambers, total)	
Clear Stone Weight =	5759.5	kN	(309 m^3, ρ = 1.9 t/m^3)	
Weight of Cover =	5856.4	kN	(417.12m^2, ρ = 18 kN/m^3, h =0.78 m)	
Resisting Force =	**11,698.07**	kN		
Factor of Safety = (Resisting Force) / (Buoyancy Force)				
FoS =	**1.68**			

If you have any further questions, I'd be glad to help.

Thanks and regards,

Cody Neath, P.Eng
Regional Engineer – Stormwater Solutions
Armtec-Canada Culvert
p. (519) 546-4146

cody

From: Riley McGee [mailto:rmcgee@jlrichards.ca]
Sent: February 5, 2019 11:10 AM

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