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Site Servicing Report

Dymon Self Storage, 1375 Clyde Avenue

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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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.

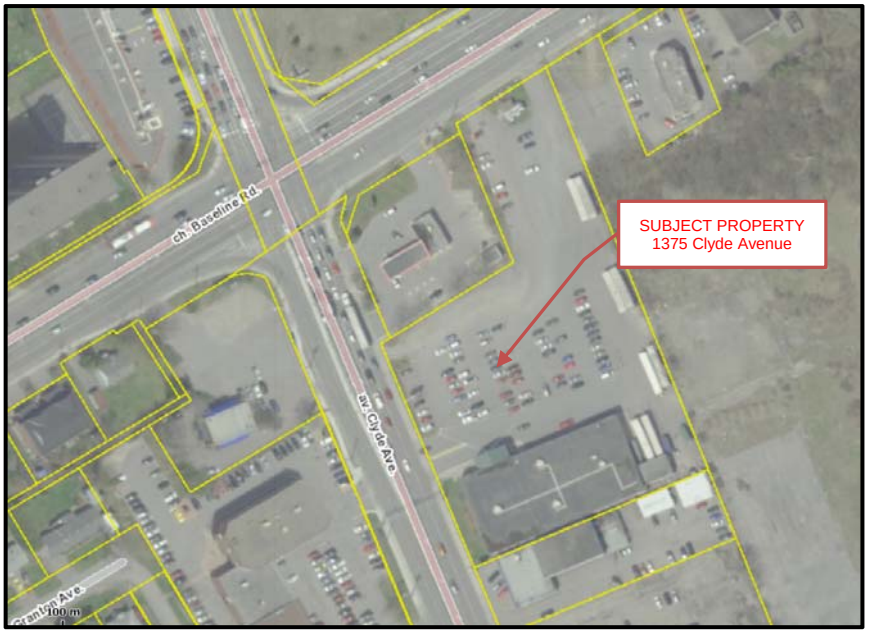


Figure 1: Site Location

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 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 the Pinecrest Creek, approximately 5.7 km downstream of the site.

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 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. 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

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):

Watermain

- 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 375mm 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 of 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) of 80%.

Similar to other Dymon sites within the City of Ottawa zoned Arterial Main Street which are not industrial lands nor an industrial zoned area (i.e. most recently in 2017 the 2583 & 2599 Carling Avenue Dymon Site); it is anticipated that this site would be 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.

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 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 both the City of Ottawa Design Guidelines for Water Distribution (July 2010) and Technical Bulletin ISDTB-2014-02. These documents have been referred to in this section as the Design Guidelines and TB-2014-02, 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, therefore, 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 figure included in Appendix E1. 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 Building1A 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	1.40	2.11	18.93	3.79
1B	0.47	0.70	31.55	1.26
2	0.59	0.88	31.55	1.58
3	1.40	2.10	14.19	3.78

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. 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 2,000 L/min (33 L/s) as per the FUS (refer to Appendix E2 for governing calculations).

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 that 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 set 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 for both connections. 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 585 kPa (84.8 psi) at Junction J-8 (i.e. near Building 3) under the peak hour demand, exceeding 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 5.79 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 FUS requirement of 167.07 L/s (183.00 L/s – 18.93 L/s (sprinkler Bldg 1A)) is required at proposed hydrants H-1 and H-2, while 18.81 L/s (33.00 L/s – 14.19 L/s (sprinkler Bldg 3)) is required at proposed hydrant H-3.

The simulation results indicate that a minimum fire flow of 184 L/s is available at hydrants H-1 and H-2 and a minimum fire flow of 131 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 636 kPa (92.2 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 above 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 1375 Clyde Avenue 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 reoccurrence.

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 specified by the City outlined in the pre-consultation meeting notes received May 8, 2017 as well as the email correspondence received from the City on June 14, 2017 (Appendix C), as summarized below:

- Storm runoff from the site to be restricted to the existing 1:2 year peak flow, which shall be calculated using the lesser of the existing runoff coefficient (C-Factor) or a C of 0.5;
- 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 review of the aerial photo, the subject site is virtually fully impervious with either asphalted parking surfaces or rooftops. Small landscaped areas and gravel areas exist adjacent Baseline Road and Clyde Avenue. The allowable 1:2 year peak flow has been calculated based on the existing condition surfaces summarized in Table 4 below:

Table 4: Existing Condition Surfaces

Area (ha)	Runoff Coefficient (C)
0.044	0.20
0.035	0.40
1.015	0.90
1.094	0.86

Based on the above weighted C-Factor calculation, the allowable peak flow has been estimated based on a C-Factor of 0.50 (refer to Appendix G for calculations). 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 system. Based on the SWM calculations included in Appendix G, a time of concentration of less than 10 minutes was estimated based on the existing flow paths; 107 m of sheet flow along existing asphalt areas and 62 m of pipe flow to the existing Clyde Avenue storm sewer system. Hence, an allowable release rate (1:2 year) of 116.80 L/s was calculated based on a time of concentration of 10 minutes (refer to Appendix G for details) using the Rational Method. Based on the above calculations, the 1:100 year post-development peak flows from the subject site must be restricted to the allowable peak flow of 116.80 L/s.

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 116.80 L/s. The following calculations demonstrate that the proposed servicing concept will have a total release rate of 116.06 L/s, which is less than the total allowable release rate of 116.80 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 116.80 L/s. In order to achieve this criterion, onsite 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 pipe storage. For the stormwater management calculations, the site was divided into sixteen (16) drainage areas based on the proposed grading of the site (refer to Drawing SWM include at the back of this Report). The drainage areas and associated runoff coefficients, the 1:100 year peak flows and the total release rates for each area has been summarized in Table 5 below:

Table 5: 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)
1	Rooftop - 1A	0.147	1.00	72.97	12.00		12.00
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
7	100 Year - CB 12&13	0.045	0.72	11.79		11.79	11.79
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 3	0.132	0.91	59.94	20.00		20.00
12	ICD2 - CB 5	0.083	0.89	36.73	20.00		20.00
13	ICD3 - CB 6	0.049	0.94	22.83	8.00		8.00
14	ICD4 - CB 10	0.184	0.99	90.22	6.00		6.00
15	ICD5 - CB 11	0.023	0.90	10.30	6.00		6.00
16	ICD6 - CB 14	0.026	0.68	8.81	6.00		6.00
	Total Area =	**1.104 ha**				**$Q_{(100\text{-}yr)}$ = (restricted)**	**116.06 L/s**

For each of these areas, the 1:5 year and 1:100 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, Area 7, 8, 9 and 10 were designed to capture the 1:100 year storm event (unrestricted) to avoid inconveniences due to surface ponding in these areas. As such, the 1:100 year peak flows for these areas were subtracted from the total allowable release rate.

Given the remaining allocated release rate, the minimum storage volume requirement was then calculated based on specified ICDs and rooftop restrictors using the Modified Rational Method (refer to SWM calculations in Appendix G). The storage volume provided by each ponding area (delineated on Drawing SWM) was designed to accommodate the minimum storage volume requirement as calculated by the Modified Rational Method. Consequently, the 1:100 year storm event will be stored on-site. The stormwater management concept for major storm flows was designed such that storm runoff in excess of the 1:100 year storm event will overflow away from the buildings and ultimately outlet off-site to the Clyde Avenue right-of-way. Details associated with each

ICD, drainage area and storage requirements are provided in the SWM calculations in Appendix G.

Stormwater runoff generated from building rooftops will be controlled by the implementation of rooftop restrictors on Buildings 1B, 2 and 3. Rooftop storage (i.e., ponding) will, therefore be provided for Buildings 1B, 2 and 3. At the time of detailed design of the buildings, the mechanical engineer is to comply with the maximum allowable release rate and the minimum storage volume requirements for each building. A memorandum sealed by the mechanical consultant 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 clause 7.4.10.4 of the 2012 Ontario Building Code. 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 rooftop storage. Consequently, to accommodate the stormwater runoff from the rooftop of Building 1A, an underground storage solution is proposed which consists of three (3) 900 mm diameter HDPE storm sewers, each 30 meters in length. This underground storage network outlets to the proposed storm sewer system at a controlled rate of 12.0 L/s through a custom 75 mm diameter ICD placed at the outlet pipe of STMH 2A. The SWMHYMO software platform was used to assess the storage volume requirements for this catchment. A rating was first developed at various stages that estimated the outflows at various elevations, which are dictated by the ICD, and associated incremental storage volumes were assessed. The various storage volumes consisting of 4.58 m^3 (2400mm dia. STMH 2B), 1.91 m^3 (3.0m – 900 mm dia. HDPE storage pipe) and 57.26 m^3 (3 x 30.0m – 900 mm dia. HDPE storage pipe) were incorporated in the outflow-storage relationship. Appendix G provides the model results and details associated with the rating curve used in SWMHYMO. Results of this simulation have shown that the overall storage volume of 63.75 m^3 is sufficient to contain the 3 hour Chicago Design Storm event (1:100 year) while releasing a maximum outflow of 12.0 L/s. To eliminate the risk of surcharging the foundation drains and roof drains of Building 1A during severe storm events (above the 1:100 year storm), a catch basin maintenance hole (STMH 2C) was placed upstream of the restriction to allow for emergency storm overflow to the surface of the parking lot.

With the exception of the underground pipe storage, the storm sewer system presented on the Site Servicing Plan (Drawing S1) was sized to accommodate peak flows generated during the 1:2 year storm event as shown in the Storm Sewer Design Sheet in Appendix G. Since rooftop restrictors are permanent, the storm sewers have been sized based on the restricted rooftop flows from the three (3) proposed buildings (i.e Buildings 1B, 2, and 3).

Based on the above controlled and uncontrolled areas, a 1:100 year peak flow of 116.06 L/s was calculated, which is below the allowable peak flow of 116.80 L/s. Consequently, the water quantity criterion provided by the City will be fulfilled.

4.4.2 Water Quality

Storm runoff generated by the proposed 1375 Clyde Avenue site will be collected and conveyed by an on-site storm sewer system that will eventually outlet into the Ottawa River via the Pinecrest Creek 5.7 km downstream via the Clyde Avenue storm sewer

system and other trunk storm sewers. 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 for the asphalted areas meet an enhanced level of protection (80% TSS removal). To fulfil this criterion, a CDS Unit (PMSU 20_25_5) is proposed 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 criteria specified by the City of Ottawa. In terms of quantity control, the proposed total release rate of 116.06 L/s for the 1:100 year peak flow is found to be below the allowable release rate of 116.80 L/s. For quality control, the minimum TSS removal of 80% will be achieved by a CDS Unit (PMSU 20_25_5) 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

Prepared by:

Julie White

Julie White, EIT.

Reviewed by:

LICENSED PROFESSIONAL ENGINEER
M. N. L. DALRYMPLE
May 24/18
PROVINCE OF ONTARIO

Lucie Dalrymple, P.Eng.

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

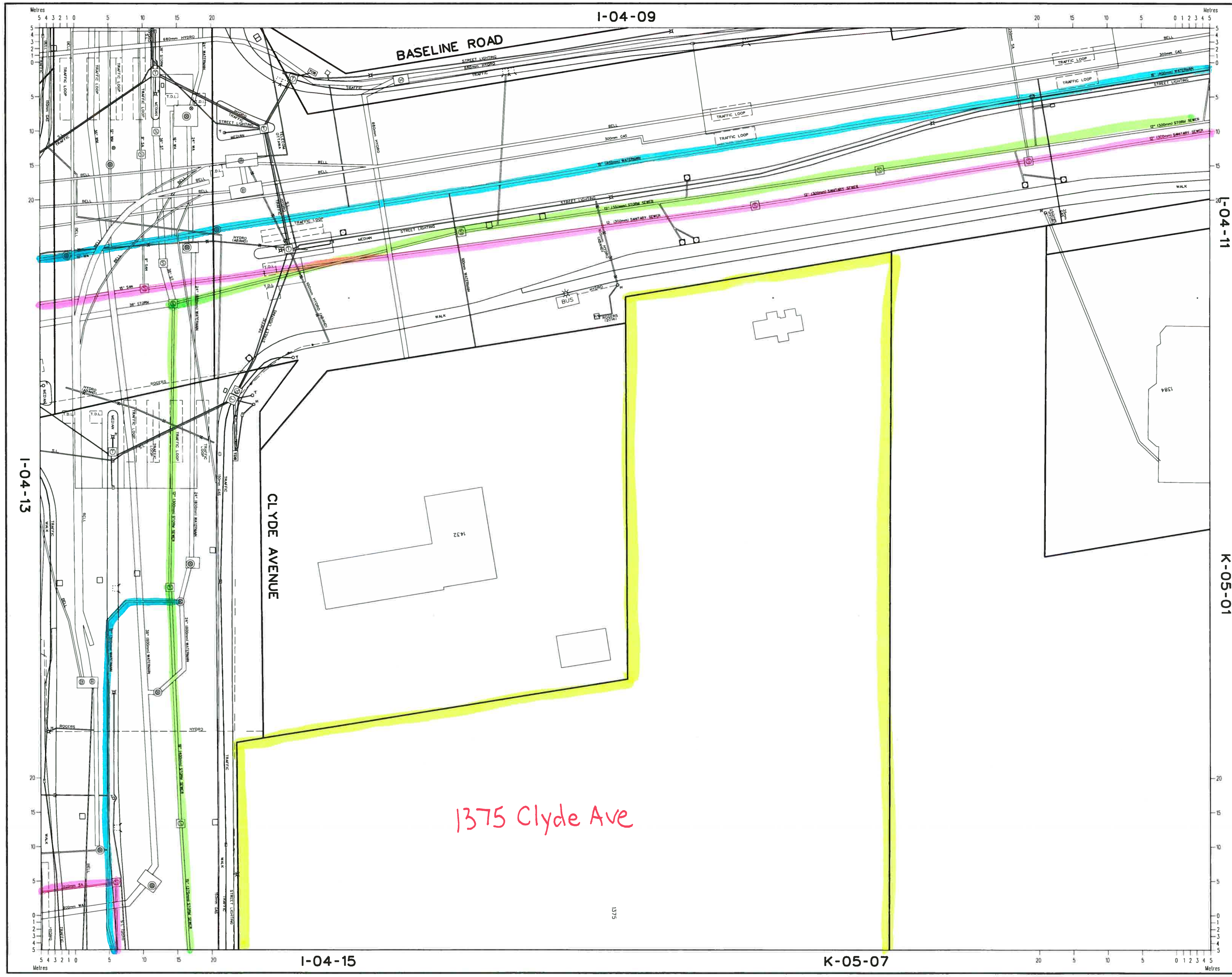
FARLEY, SMITH & DENIS SURVEYING LTD.
ONTARIO LAND SURVEYORS
CANADA LAND SURVEYORS
190 COLONNADE ROAD, OTTAWA, ONTARIO K2E 7J5
TEL. (613) 727-8226 FAX. (613) 727-1826

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
TOTAL STATION APPLIED CLYDE AND BASELINE	JUNE 2007	MH
TELECOM OTTAWA REVISION APPLIED	JUNE 2007	MH
ENG DRAWING APPLIED WAITING FOR AS-BUILT	JULY 2007	MH
TRAFFIC AS-BUILT APPLIED BASELINE AT CLYDE	JULY 2007	MH
STORM SEWER/CB's/WATER REVISED	MAY 2008	JW
WATERMAIN/SANITARY/CBs VERIFIED	MAY 2008	JW
CONDUIT & PANEL ADDED TO CLYDE	JULY 2012	DC
S.L. UPDATED ON BASELINE, CLYDE	SEP 2012	JM
CONDUIT AND P/S ADDED TO BASELINE	DEC 2016	JM
COMPILED/DIGITIZED FROM UTILITY/CITY DATA	DEC 2016	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, Water Valve, Meter, Wall Hydrant
- 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

UTILITY COORDINATING COMMITTEE UCC Ottawa CCSP COMITÉ DE COORDINATION DES SERVICES PUBLICS

N. SCHEPERS, P.Eng.
OCM, 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, Aths,
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, Aths, Bell, Hydro, Gas, Group Telecom,
Rogers, Telus, Videotron

Hand Holes: Allstream, Aths, 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

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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

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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. 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	

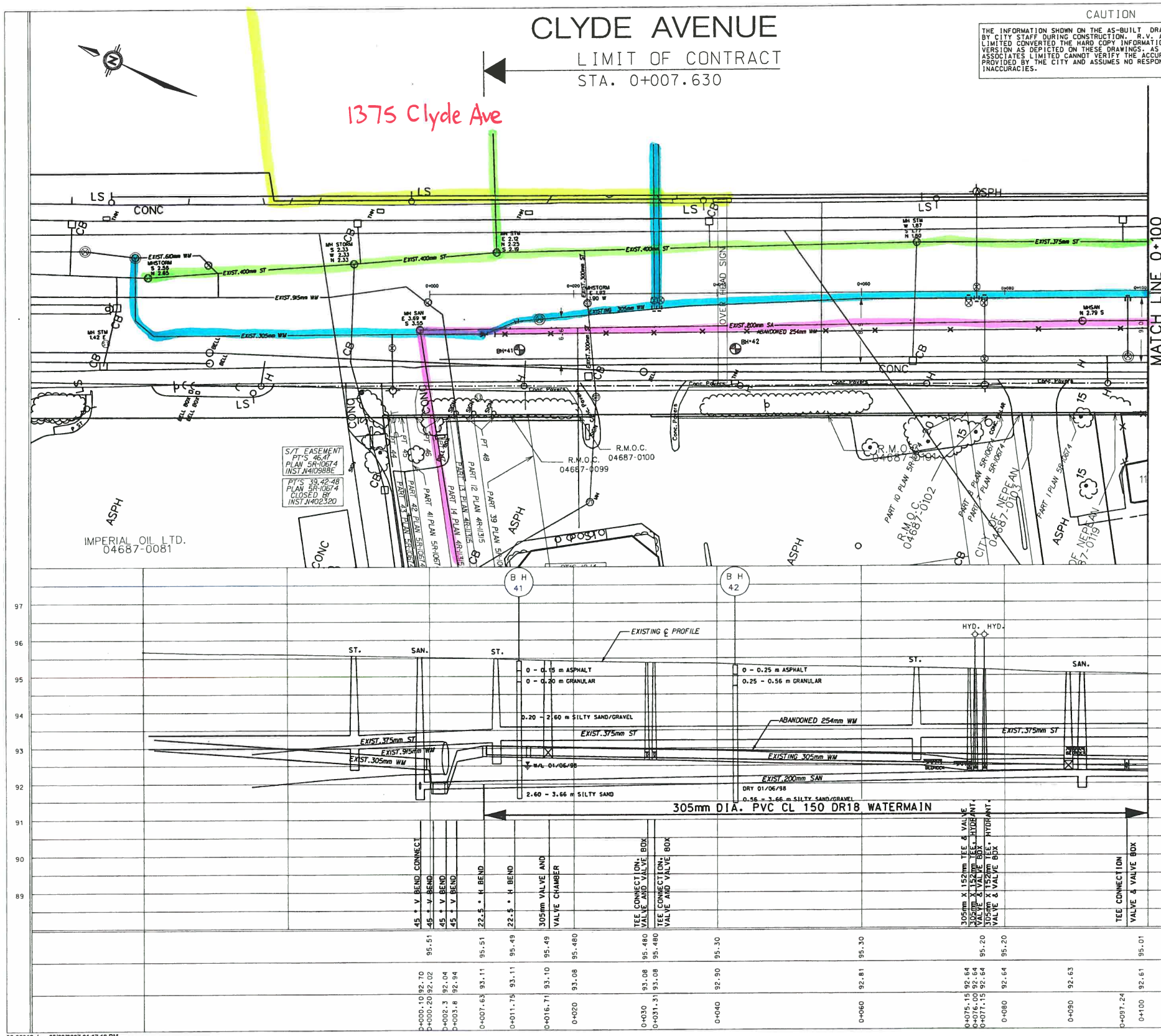
CLYDE AVENUE

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	95.20
0+077.15	92.64	
0+080	92.64	95.20
0+090	92.63	
0+097.24		95.01
0+100	92.61	

45 ° V BEND CONNECT; 45 ° V BEND; 45 ° V BEND; 45 ° V BEND; 22.5 ° H BEND; 22.5 ° H BEND; 305mm VALVE AND VALVE CHAMBER; TEE CONNECTION: VALVE AND VALVE BOX; TEE CONNECTION: VALVE AND VALVE BOX; 305mm X 152mm TEE & VALVE; 305mm X 152mm TEE, HYDRANT, VALVE & VALVE BOX; TEE CONNECTION: VALVE & VALVE BOX

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

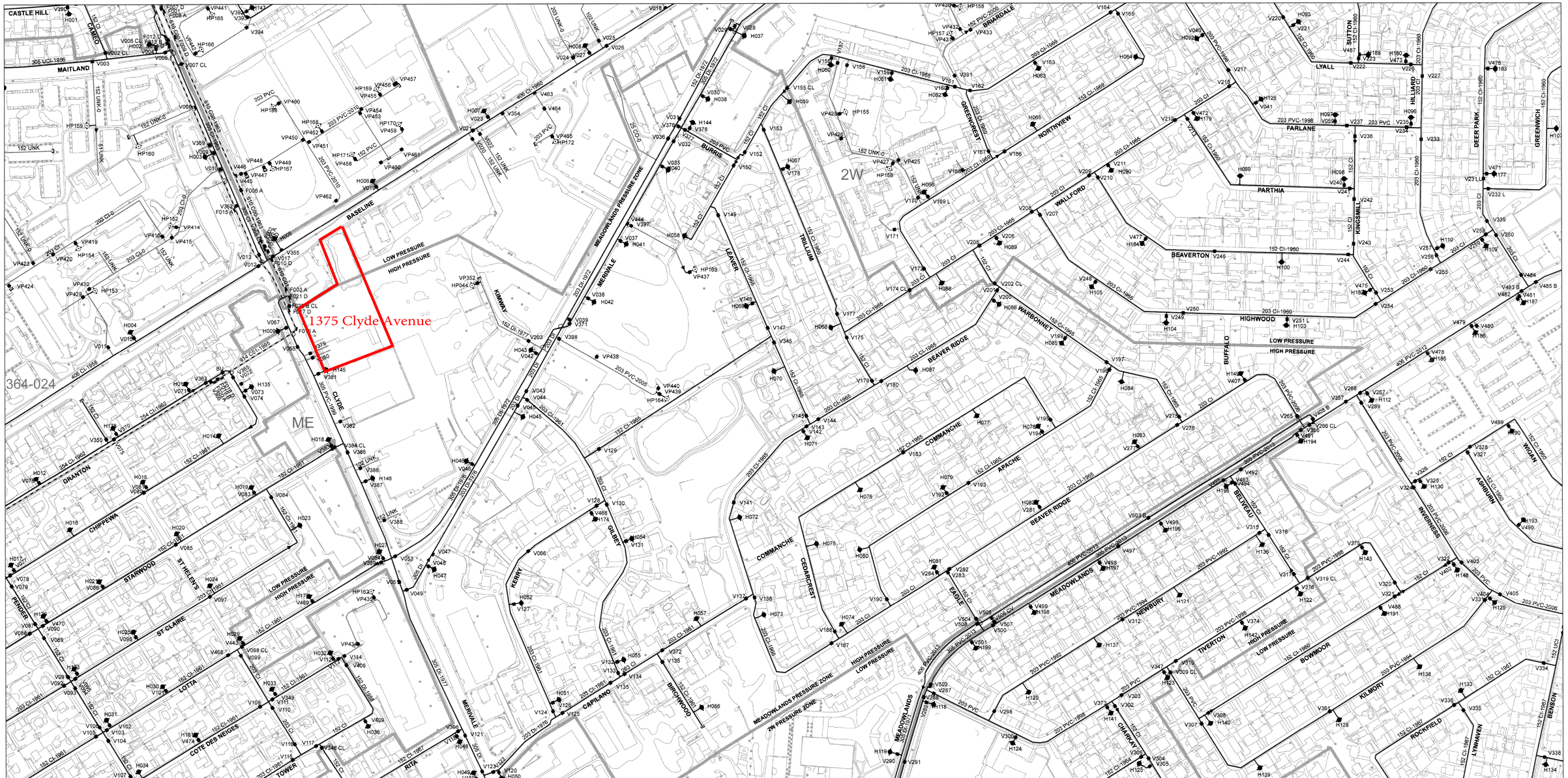
AS BUILT
305mm WATERMAIN

STA. 0+007.63
to
STA. 0+100.00

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

98-32912.dgn 08/03/2007 01:17:13 PM

9236



2014 Water Distribution System

Department of Infrastructure Services

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

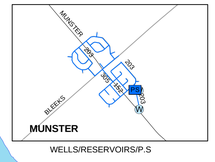
nominal (mm)	actual (inches)	nominal (mm)	actual (inches)	nominal (mm)	actual (inches)
100	4	675	27	1800	72
150	6	750	30	1950	78
200	8	825	33	2025	80
250	10	900	36	2100	84
300	12	975	39	2250	90
375	15	1050	42	2400	96
400	16	1200	48	2550	102
450	18	1350	54	2700	108
525	21	1500	60	2850	114
600	24	1650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

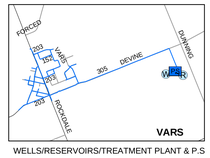
Pipe Materials

- 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

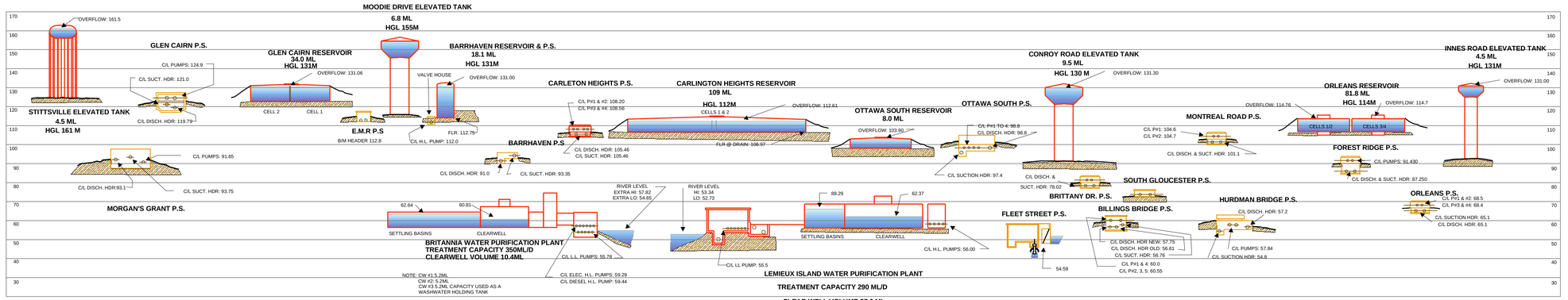
362-026	364-026	366-026
362-025	364-025	366-025
362-024	364-024	366-024
362-023	364-023	366-023
362-022	364-022	366-022

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



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

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

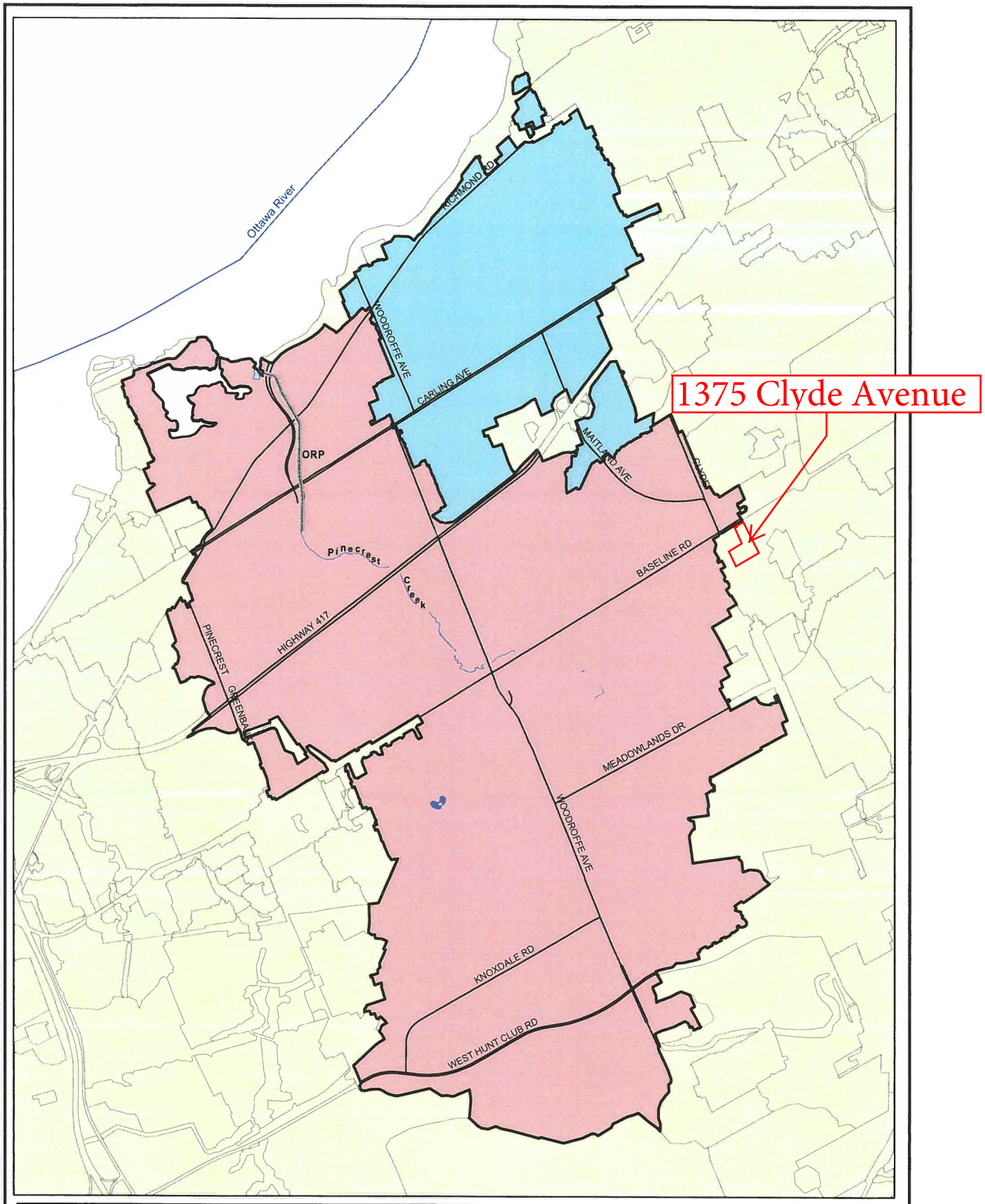
ottawa.ca/planning / ottawa.ca/urbanisme

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:



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

Julie White

From: Johnnie Chahwan <Johnnie.Chahwan@miriton.com>
Sent: May 23, 2018 4:28 PM
To: Julie White; Nicholas Caragianis at Nicholas Caragianis Architect Inc.
Cc: Tishaunna Harper at Nicholas Caragianis Architect Inc.; Santiago Guardia at Nicholas Caragianis Architect Inc.; Bliss Edwards; Lucie Dalrymple; Annie Williams
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
J.L. Richards & Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS

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

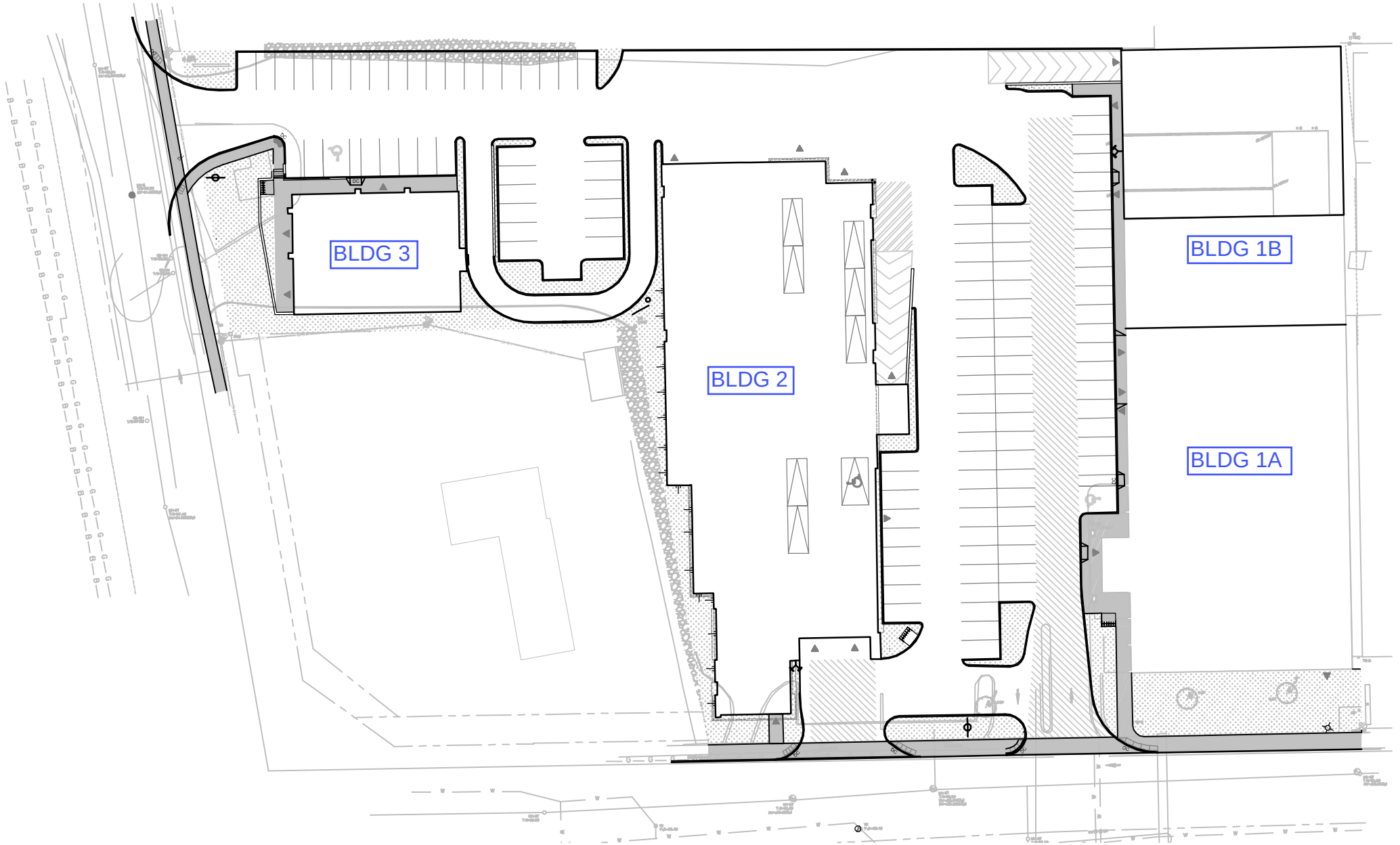
From: Julie White <jwhite@jlrichards.ca>
Sent: May 23, 2018 11:37 AM
To: Johnnie Chahwan <johnnie.chahwan@miriton.com>
Subject: RE: 375 Clyde Ave - Water Demands

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


BLDG 3
BLDG 2
BLDG 1B
BLDG 1A

Appendix E2

FUS Calculations

Fire Flow Calculation - BLDG 2
(per FUS Guidelines)

C=	Coefficient related to type of construction		0.8
	= Wood frame	1.5	
	=ordinary construction	1.0	
	=non-combustible construction	0.8	
	=fire resistive construction (< 2 hrs)	0.7	
	=fire resistive construction (> 2 hrs)	0.6	
	= interpolation		
A=	Area of structure considered (m^2)		9735 m^2

F= **= Required fire flow (litres/minute)** **Calculated:** 17365 L/min

= 220 $C(A)^{0.5}$ (25,000 L/min Max) **(1) Rounded:** 17000 L/min

Occupancy hazard reduction of surcharge **(2) Surcharge:** 0 L/min

* non-combustible	-25%	
* limited combustible	-15%	
* combustible	0%	0 L/min
* free burning	15%	
* rapid burning	25%	

(1) + (2) 17000 L/min

Sprinkler Reduction

* non-combustible -fire resistive -50%

(3) Reduction: -8500 L/min

Exposure surcharge (cumulative (% of 2)

* 0 - 3 m	25%		0	0%
* 3.1 - 10 m	20%		0	0%
* 10.1 - 20 m	15%		0	0%
* 20.1 - 30 m	10%		1	10%
* 30.1 - 45 m	5%		1	5%
				15%
* Number of Party Walls * 1000 L/min			0	0 L/min

(4) Surcharge: 2550 L/min

Fire Flow = Calculated: **11050 L/min**

Rounded: **11000 L/min**

183 L/s

Fire Flow Calculation - BLDG 3
(per FUS Guidelines)

C=	Coefficient related to type of construction		0.8
	= Wood frame	1.5	
	=ordinary construction	1.0	
	=non-combustible construction	0.8	
	=fire resistive construction (< 2 hrs)	0.7	
	=fire resistive construction (> 2 hrs)	0.6	
	= interpolation		
A=	Area of structure considered (m^2)		381 m^2

F= **= Required fire flow (litres/minute)** **Calculated:** 3435 L/min

= 220 $C(A)^{0.5}$ (25,000 L/min Max) **(1) Rounded:** 3000 L/min

Occupancy hazard reduction of surcharge **(2) Surcharge:** 0 L/min

* non-combustible	-25%	
* limited combustible	-15%	
* combustible	0%	0 L/min
* free burning	15%	
* rapid burning	25%	

(1) + (2) 3000 L/min

Sprinkler Reduction

* non-combustible -fire resistive -50%

(3) Reduction: -1500 L/min

Exposure surcharge (cumulative (% of 2)

* 0 - 3 m	25%		0	0%
* 3.1 - 10 m	20%		0	0%
* 10.1 - 20 m	15%		0	0%
* 20.1 - 30 m	10%		2	20%
* 30.1 - 45 m	5%		0	0%
				20%
* Number of Party Walls * 1000 L/min			0	0 L/min

(4) Surcharge: 600 L/min

Fire Flow = Calculated: **2100 L/min**

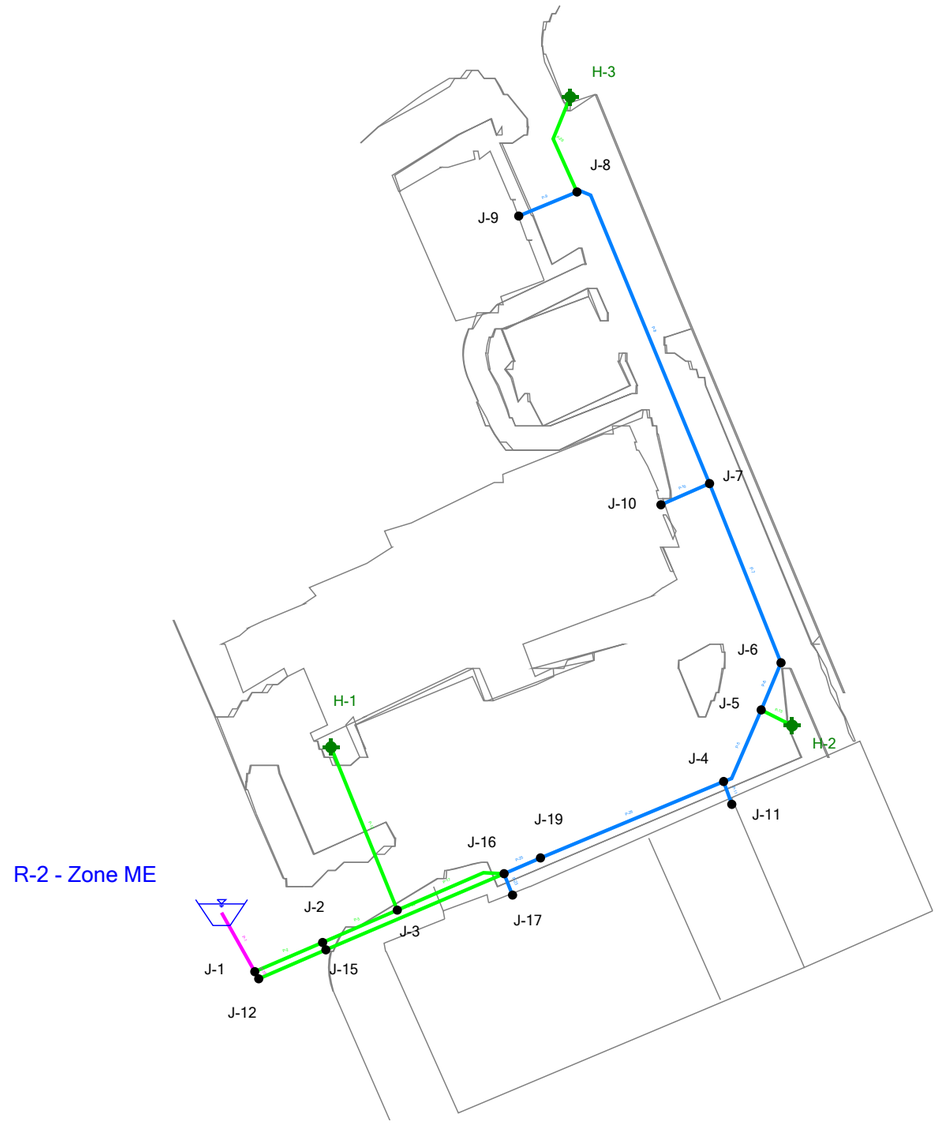
Rounded: **2000 L/min**

33 L/s

Appendix E3

Overall Schematic &
Watermain Layout

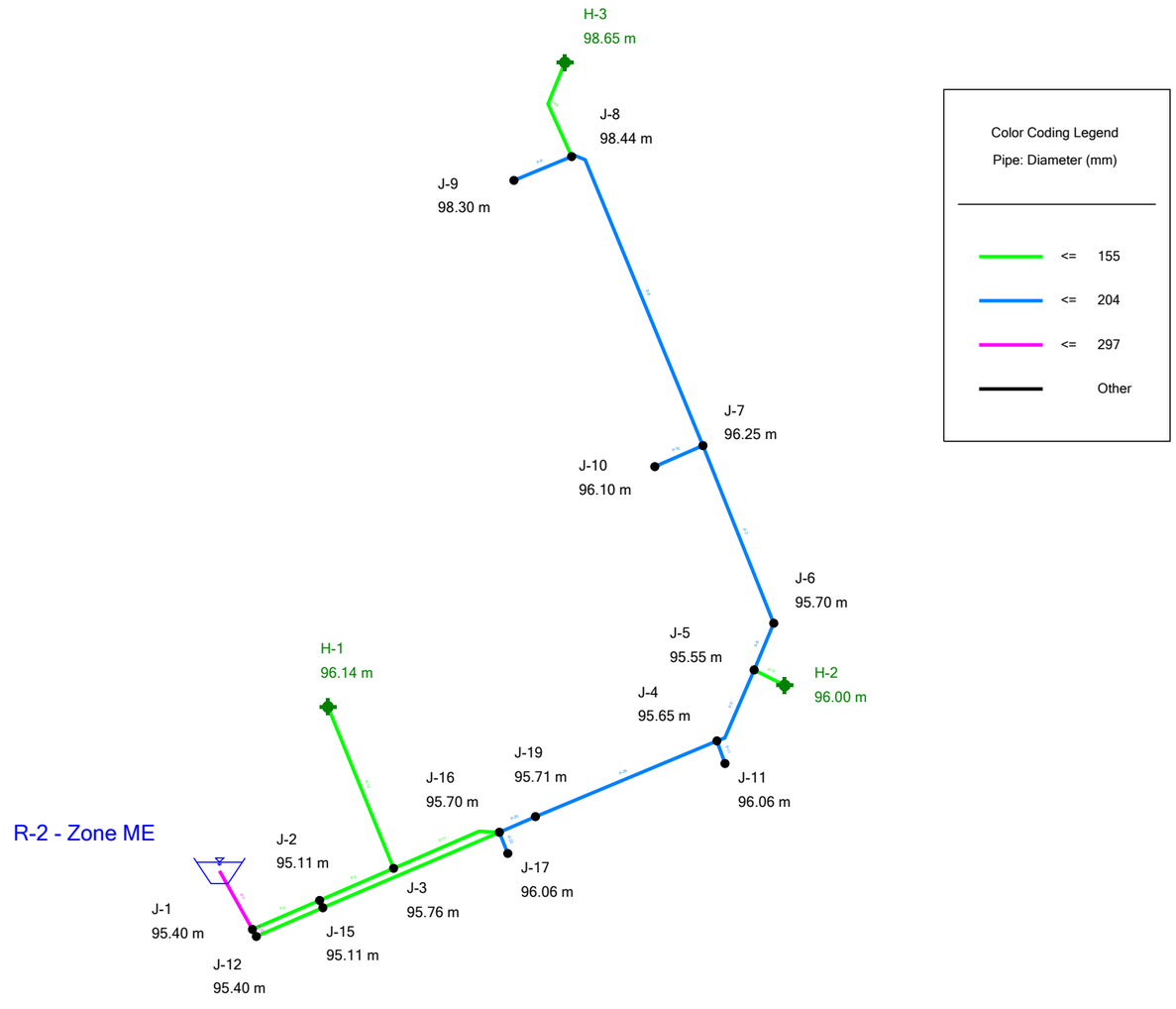
Dymon Storage - 1375 Clyde Avenue
Overall Schematic



Color Coding Legend
Pipe: Diameter (mm)

<= 155
<= 204
<= 297
Other

Dymon Storage - 1375 Clyde Avenue
Watermain Layout



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)

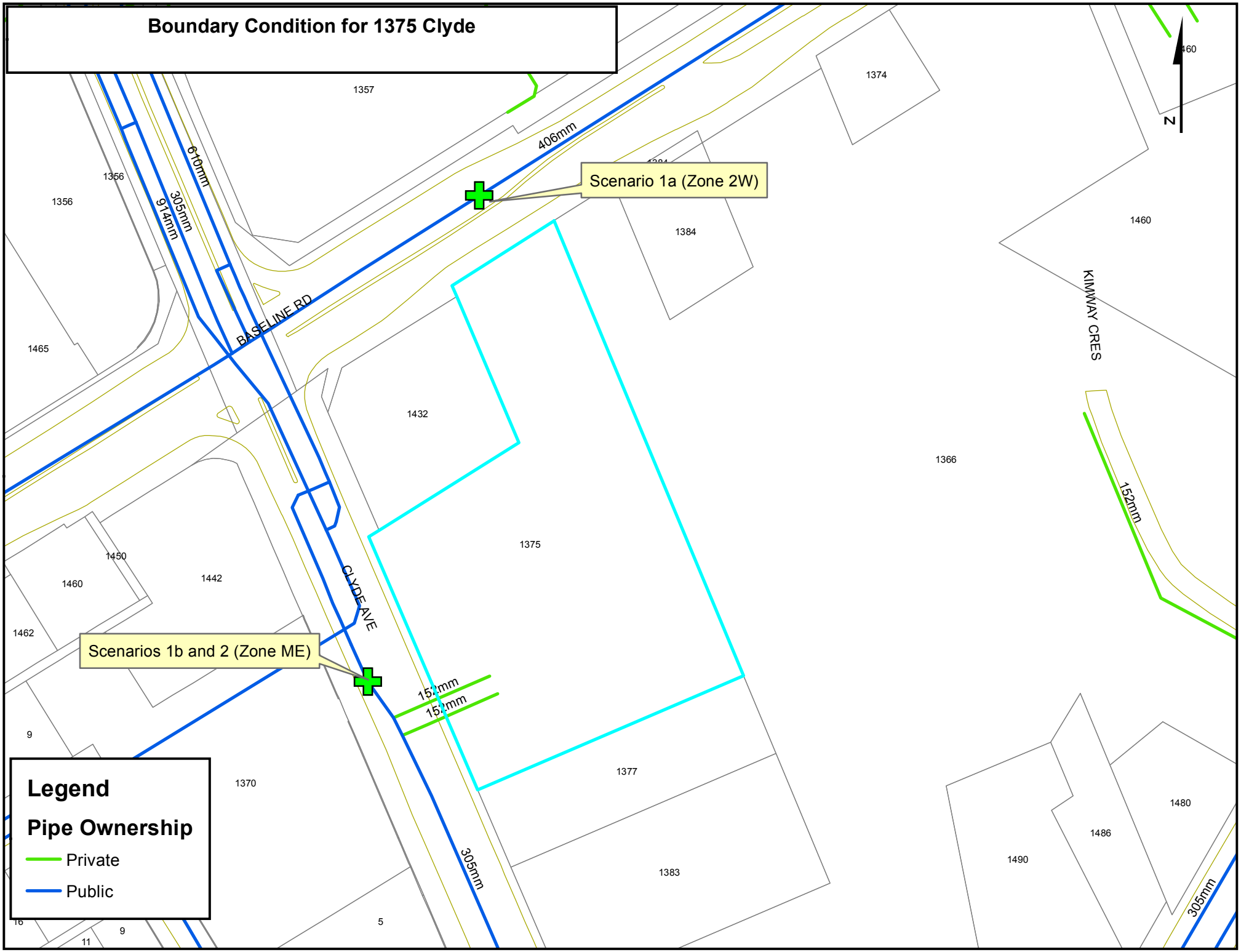
Scenario 1b – Retail/Storage service from Clyde 305Ø WM:
Combined (3 retail/storage buildings) Maximum Day = 2.11 L/s
Combined (3 retail/storage buildings) Peak Hour = 3.79 L/s
Required Fire Flow = 183 L/s (11,000 L/min)

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.

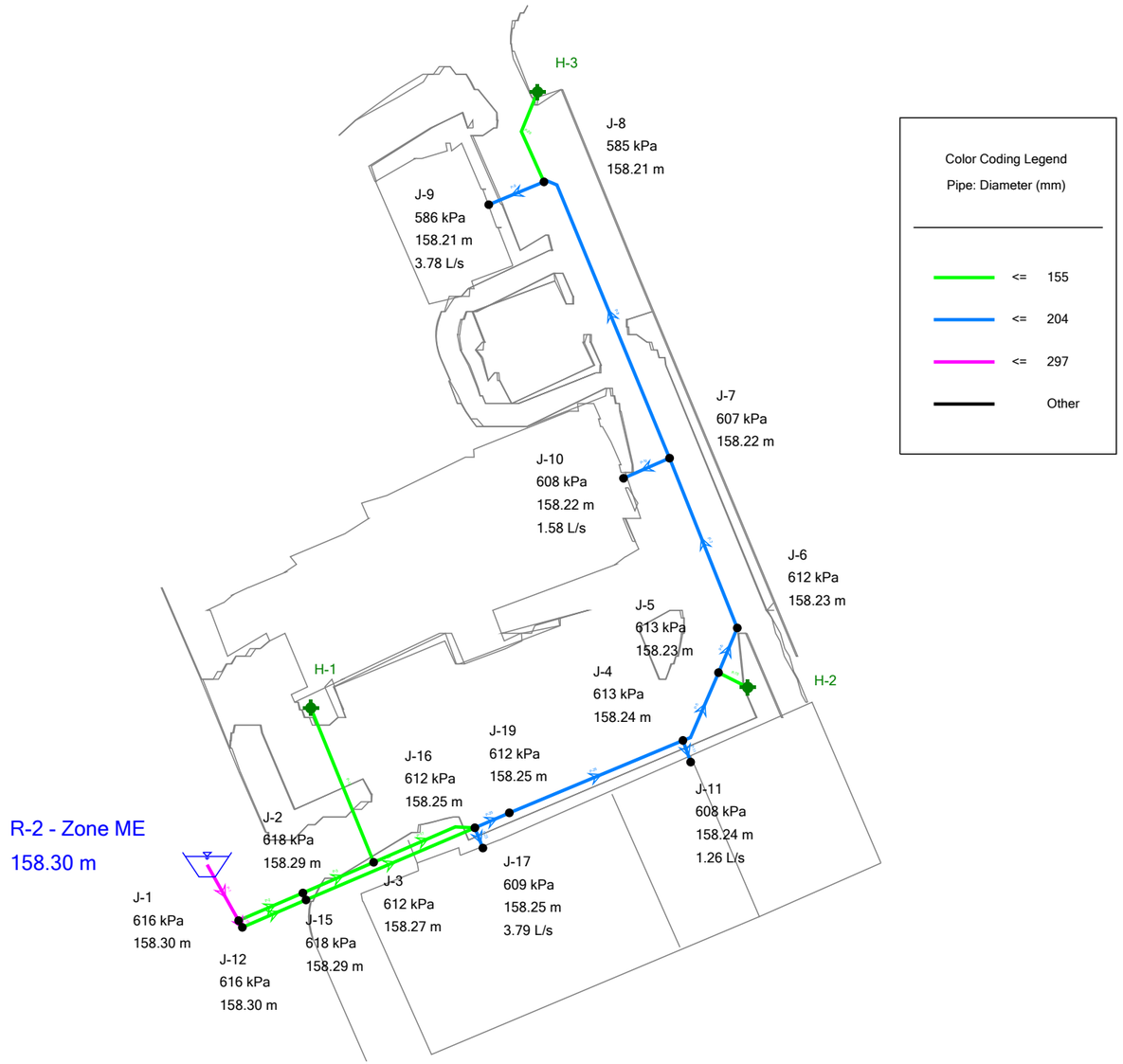
Thank you,


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	98.44	0.00	158.21	585
J-9	98.30	3.78	158.21	586
J-7	96.25	0.00	158.22	607
J-10	96.10	1.58	158.22	608
J-11	96.06	1.26	158.24	608
J-17	96.06	3.79	158.25	609
J-3	95.76	0.00	158.27	612
J-6	95.70	0.00	158.23	612
J-19	95.71	0.00	158.25	612
J-16	95.70	0.00	158.25	612
J-4	95.65	0.00	158.24	613
J-5	95.55	0.00	158.23	613
J-12	95.40	0.00	158.30	616
J-1	95.40	0.00	158.30	616
J-15	95.11	0.00	158.29	618
J-2	95.11	0.00	158.29	618

Dymon Storage - 1375 Clyde Avenue

Peak Hour Demand

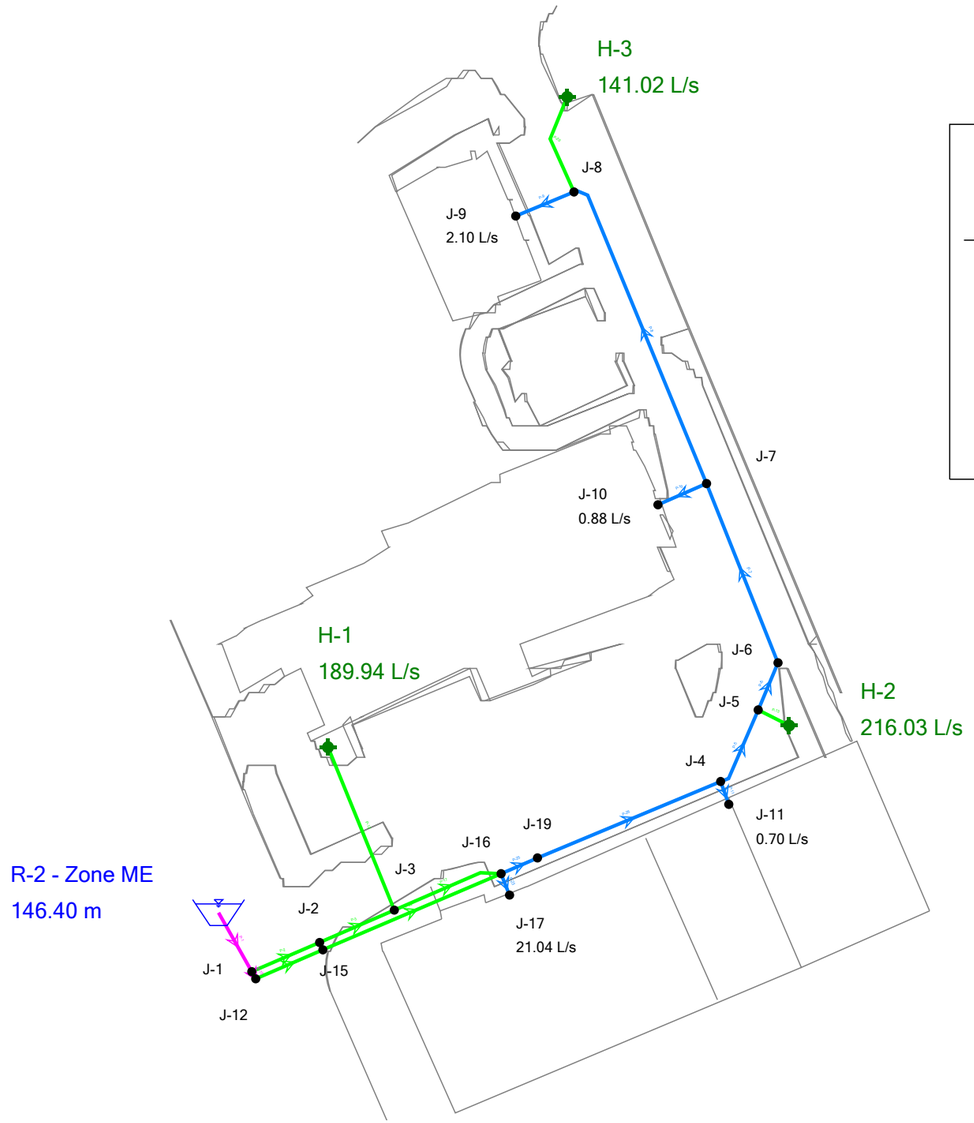
Pipe Table

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	0.15	10.41
P-2	12.2	155	PVC	100	158.30	158.29	0.28	5.19
P-3	13.5	155	PVC	100	158.29	158.27	0.28	5.19
P-5	13.8	204	PVC	110	158.24	158.23	0.16	5.36
P-6	8.5	204	PVC	110	158.23	158.23	0.16	5.36
P-7	31.9	204	PVC	110	158.23	158.22	0.16	5.36
P-8	54.1	204	PVC	110	158.22	158.21	0.12	3.78
P-9	10.4	204	PVC	110	158.21	158.21	0.12	3.78
P-10	8.8	204	PVC	110	158.22	158.22	0.05	1.58
P-11	4.0	204	PVC	110	158.24	158.24	0.04	1.26
P-12	29.1	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	1.4	297	PVC	120	158.30	158.30	0.08	5.22
P-17	19.0	155	PVC	100	158.27	158.25	0.28	5.19
P-20	17.1	155	PVC	100	158.21	158.21	0.00	0.00
P-21	12.1	155	PVC	100	158.30	158.29	0.28	5.22
P-22	32.1	155	PVC	100	158.29	158.25	0.28	5.22
P-23	3.8	204	PVC	110	158.25	158.25	0.12	3.79
P-25	6.6	204	PVC	110	158.25	158.25	0.20	6.62
P-26	32.9	204	PVC	110	158.25	158.24	0.20	6.62

Appendix E6

Maximum Day Plus Fire Flow
Simulation Results

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



Color Coding Legend
Pipe: Diameter (mm)

<=	155	
<=	204	
<=	297	
	Other	

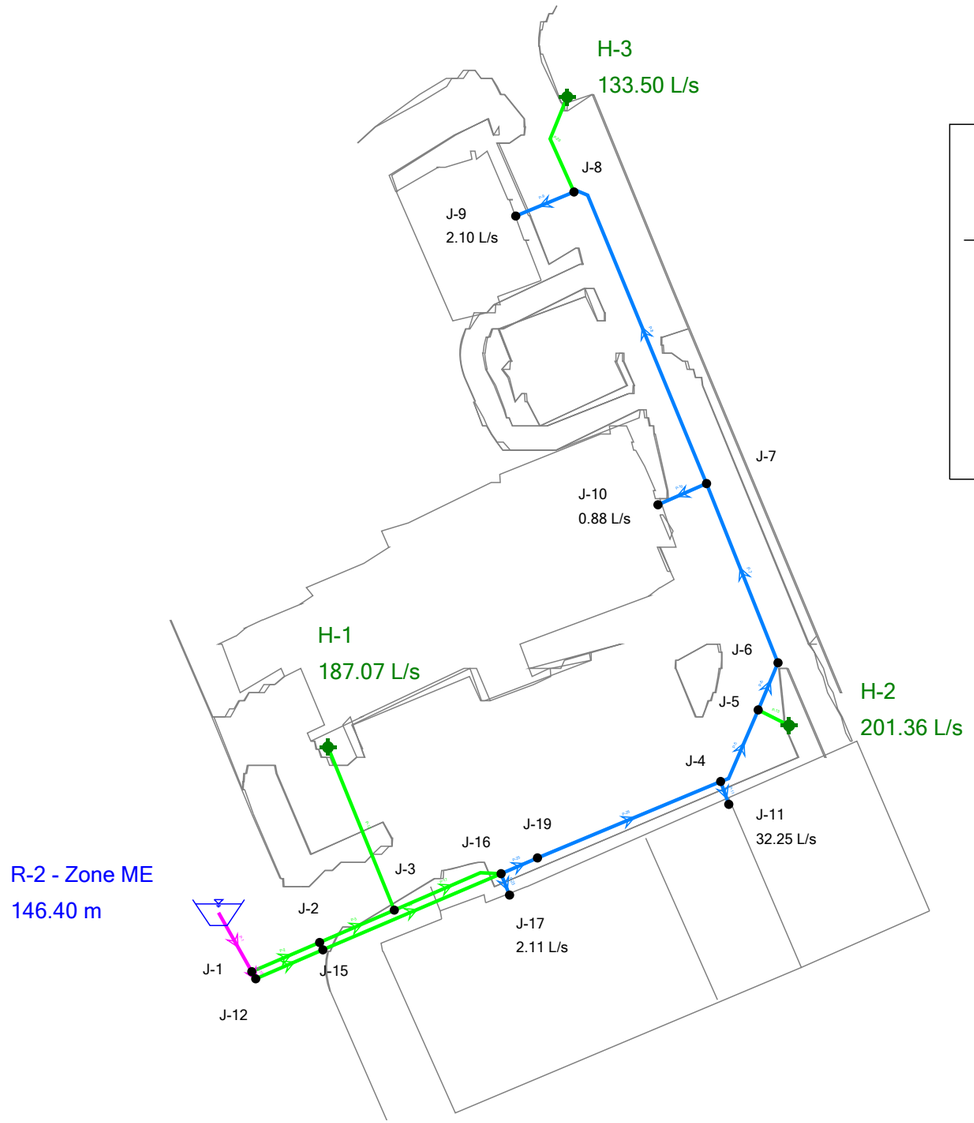
Dymon Storage - 1375 Clyde Avenue

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

Fire Flow Table

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)
H-3	33.00	141.02	141.02	True	140	140	J-8
H-1	183.00	189.94	189.94	True	140	140	H-3
H-2	183.00	216.03	216.03	True	140	140	H-3

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



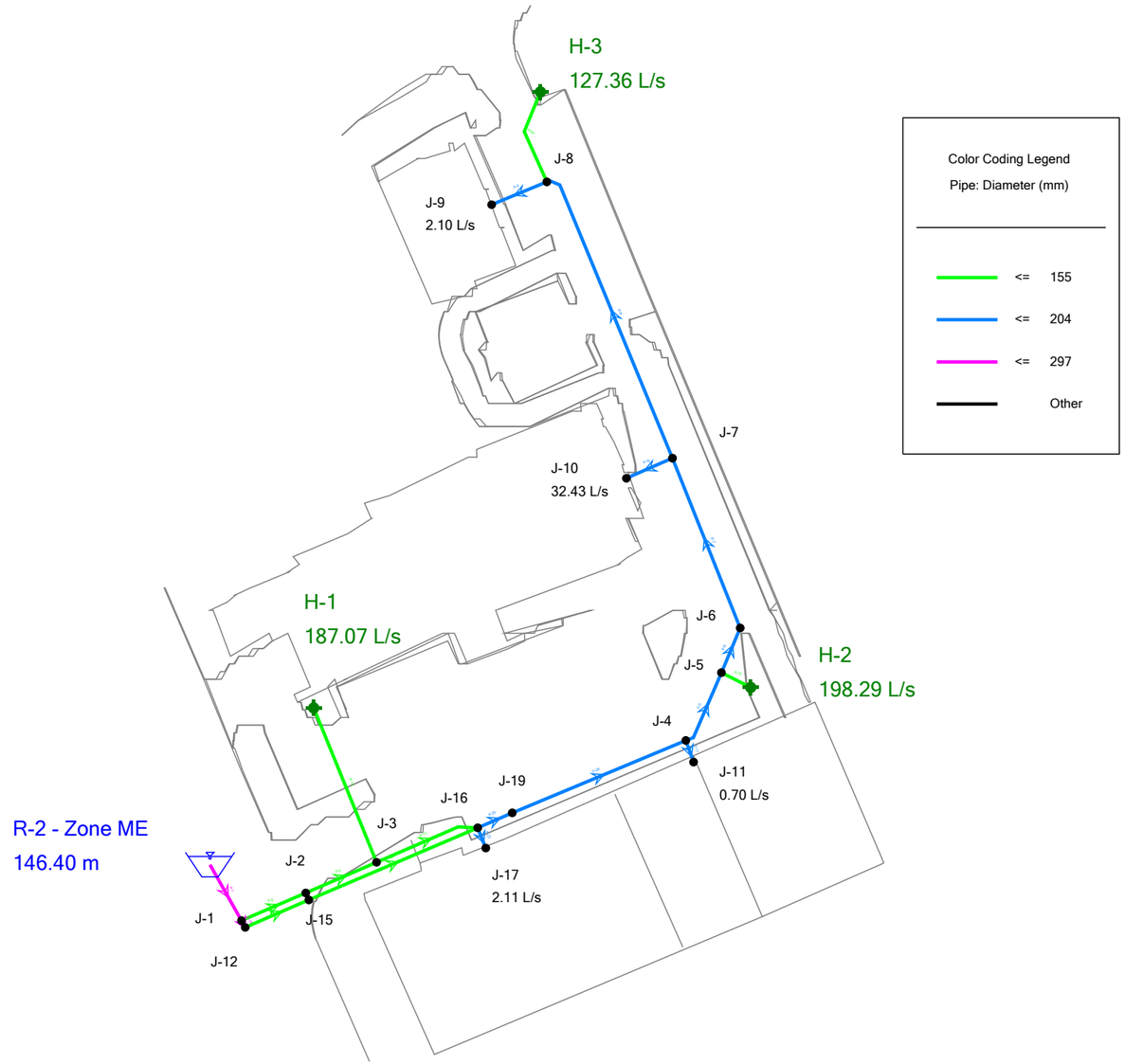
Dymon Storage - 1375 Clyde Avenue

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

Fire Flow Table

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)
H-3	33.00	133.50	133.50	True	140	140	J-8
H-1	183.00	187.07	187.07	True	140	140	H-3
H-2	183.00	201.36	201.36	True	140	140	H-3

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



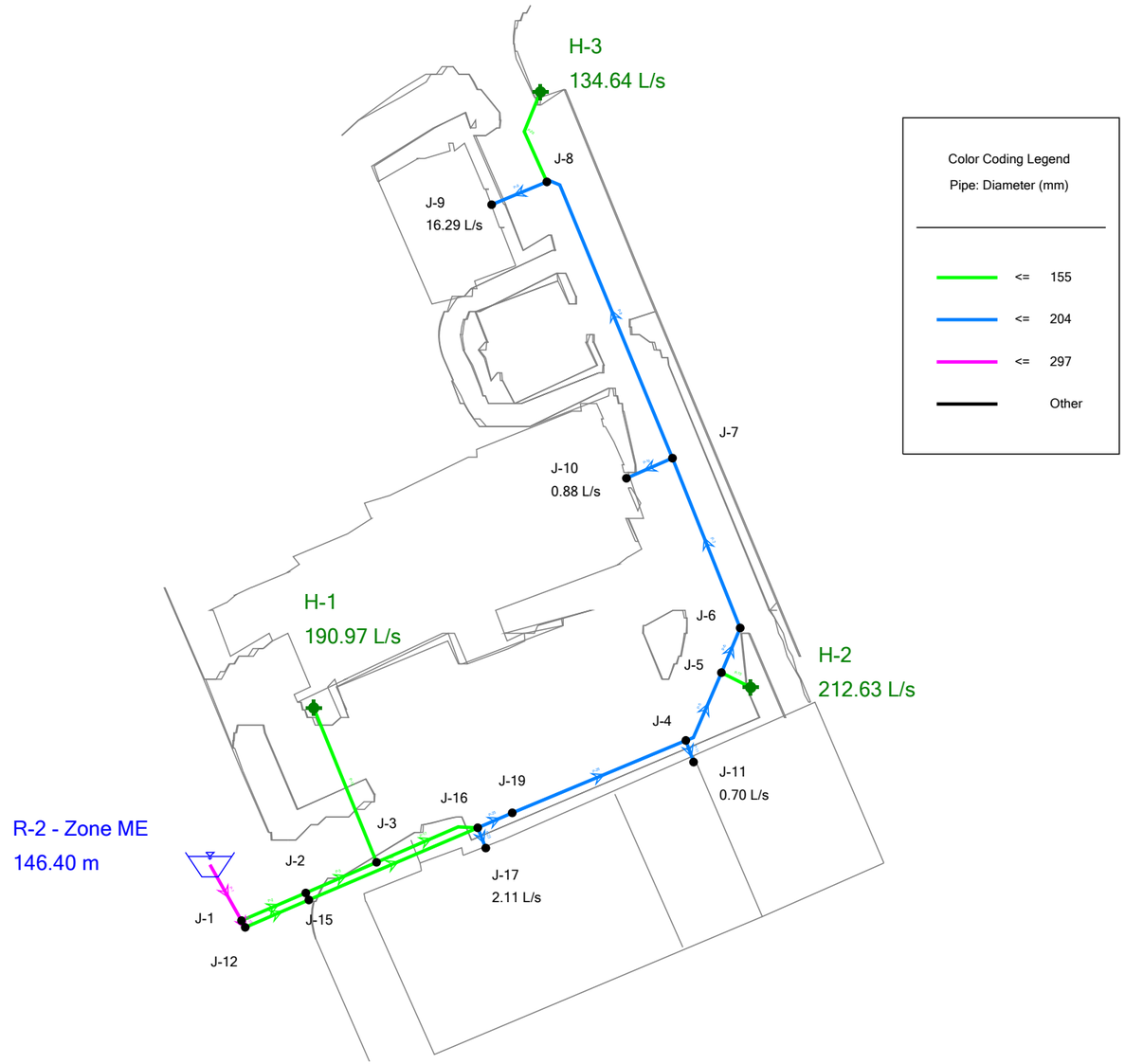
Dymon Storage - 1375 Clyde Avenue

Maximum Day + Fire Flow Demand (Sprinkler Bldg 2)

Fire Flow Table

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)
H-3	33.00	127.36	127.36	True	140	140	J-8
H-1	183.00	187.07	187.07	True	140	140	H-3
H-2	183.00	198.29	198.29	True	140	140	H-3

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)

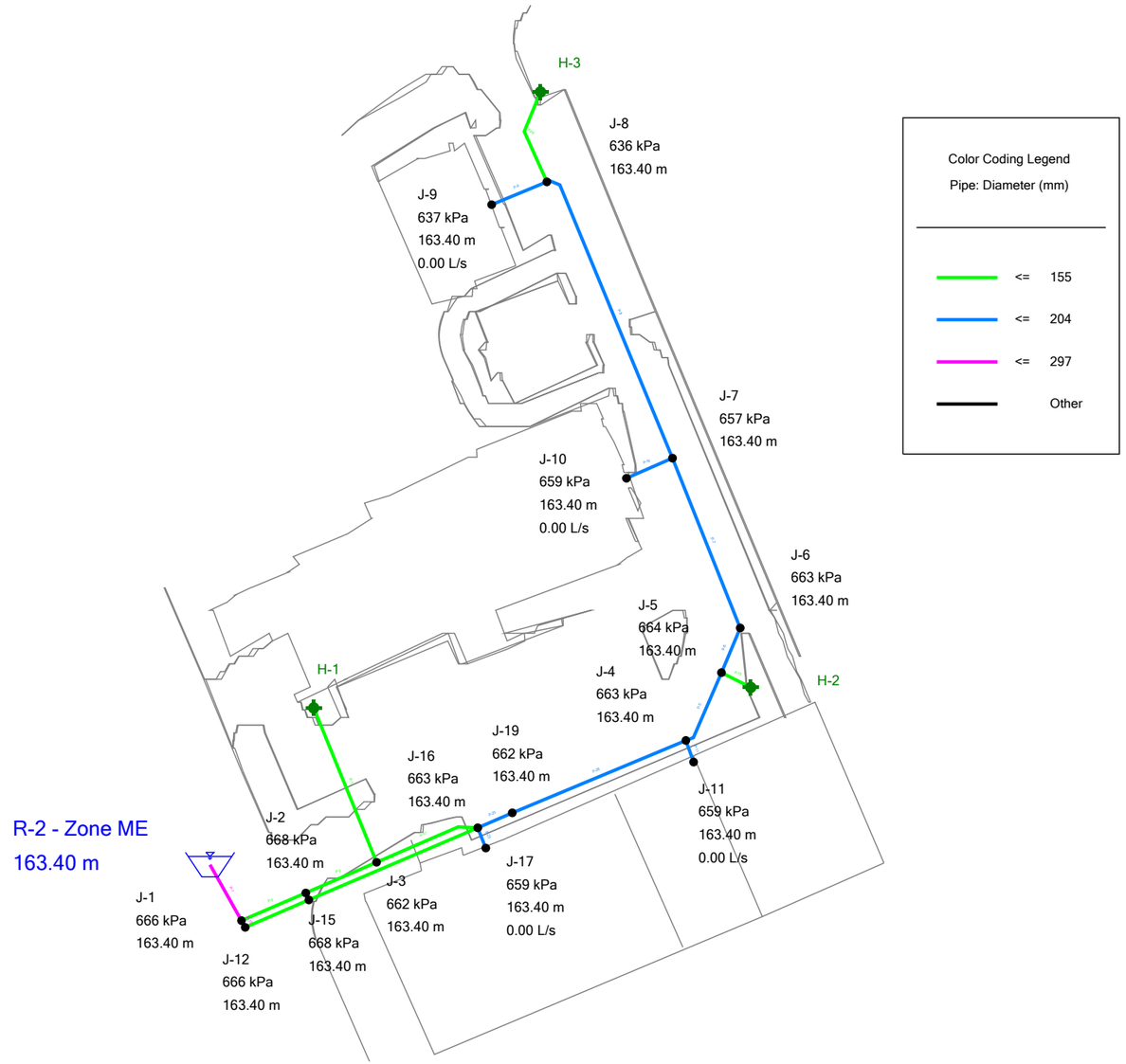
Fire Flow Table

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)
H-3	33.00	134.64	134.64	True	140	140	J-8
H-1	183.00	190.97	190.97	True	140	140	H-3
H-2	183.00	212.63	212.63	True	140	140	H-3

Appendix E7

Maximum Pressure Check

Dymon Storage - 1375 Clyde Avenue
Maximum Pressure



Color Coding Legend
Pipe: Diameter (mm)

<= 155
<= 204
<= 297
Other

Dymon Storage - 1375 Clyde Avenue
Maximum Pressure
Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-8	98.44	0.00	163.40	636
J-9	98.30	0.00	163.40	637
J-7	96.25	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-3	95.76	0.00	163.40	662
J-19	95.71	0.00	163.40	662
J-6	95.70	0.00	163.40	663
J-16	95.70	0.00	163.40	663
J-4	95.65	0.00	163.40	663
J-5	95.55	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	95.11	0.00	163.40	668
J-15	95.11	0.00	163.40	668

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	12.2	155	PVC	100	163.40	163.40	0.00	0.00
P-3	13.5	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-6	8.5	204	PVC	110	163.40	163.40	0.00	0.00
P-7	31.9	204	PVC	110	163.40	163.40	0.00	0.00
P-8	54.1	204	PVC	110	163.40	163.40	0.00	0.00
P-9	10.4	204	PVC	110	163.40	163.40	0.00	0.00
P-10	8.8	204	PVC	110	163.40	163.40	0.00	0.00
P-11	4.0	204	PVC	110	163.40	163.40	0.00	0.00
P-12	29.1	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	1.4	297	PVC	120	163.40	163.40	0.00	0.00
P-17	19.0	155	PVC	100	163.40	163.40	0.00	0.00
P-20	17.1	155	PVC	100	163.40	163.40	0.00	0.00
P-21	12.1	155	PVC	100	163.40	163.40	0.00	0.00
P-22	32.1	155	PVC	100	163.40	163.40	0.00	0.00
P-23	3.8	204	PVC	110	163.40	163.40	0.00	0.00
P-25	6.6	204	PVC	110	163.40	163.40	0.00	0.00
P-26	32.9	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
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
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.
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
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
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
NEW ADDRESS: 200-1716 Woodward Drive, Ottawa, ON K2C 0P8

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.	SEWER DATA					RESIDUAL	UPSTREAM					DOWNSTREAM				
		AREA	CUMM. AREA	PEAK FLOW	AREA	CUMM. AREA	PEAK EXTR.	l/s	DIA.	SLOPE	CAPAC.	VEL.	LENGTH	CAP.	Center	Obvert	Invert	Cover		Center	Obvert	Obvert	Invert	Cover
FROM	TO	ha	ha	l/s	ha	ha	l/s		mm	%	l/s	m/s	m	l/s	Line					Line	Drop			
BLDG 3	MH5	0.05	0.05	0.04	0.05	0.05	0.02	**0.06**	150	1.00	15.9	0.87	10.6	15.83	98.28	95.768	95.615	2.51		98.44		95.662	95.509	2.78
MH5	MH4	0.14	0.19	0.18	0.14	0.19	0.06	**0.24**	150	3.00	27.5	1.51	49.9	27.28	98.44	95.662	95.509	2.78		96.25		94.165	94.012	2.09
BLDG 2	MH4	0.20	0.20	0.20	0.20	0.20	0.07	**0.27**	150	1.00	15.9	0.87	6.4	15.62	96.08	94.449	94.296	1.63		96.25	0.220	94.385	94.232	1.87
MH4	MH3	0.08	0.47	0.46	0.08	0.47	0.16	**0.61**	150	0.50	11.2	0.62	31.9	10.62	96.25	94.165	94.012	2.09		95.70		94.005	93.853	1.69
MH3	MH2	0.06	0.53	0.52	0.06	0.53	0.18	**0.69**	150	0.50	11.2	0.62	16.0		95.70	94.005	93.853	1.69		95.75		93.925	93.773	1.82
BLDG 1B	MH2	0.12	0.12	0.11	0.12	0.12	0.04	**0.15**	150	1.00	15.9	0.87	7.9	15.74	96.04	94.004	93.852	2.04		95.75		93.925	93.773	1.82
MH2	MH1	0.21	0.86	0.84	0.21	0.86	0.28	**1.12**	150	0.50	11.2	0.62	42.4	10.11	95.75	93.925	93.773	1.82		95.70		93.713	93.561	1.99
MH1	EX. MH1A	0.00	0.86	0.84	0.00	0.86	0.28	**1.12**	150	0.50	11.2	0.62	4.2	10.11	95.70	93.713	93.561	1.99		95.95		93.692	93.540	2.26
BLDG 1A	EX. MH1A	0.15	0.15	0.14	0.15	0.15	0.05	**0.19**	150	1.00	15.9	0.87	8.0	15.70	96.04	93.772	93.620	2.27		95.95		93.692	93.540	2.26
EX. MH1A	MAIN - CLYDE	0.10	1.10	1.07	0.10	1.10	0.36	**1.44**	150	1.97	22.3	1.22	51.3	20.86	95.95	93.692	93.540	2.26		95.10		92.682	92.530	2.42
	Total Area =	**1.104**																				EX. MH	92.530	

Appendix G

Storm Calculations and E-mail Correspondences

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

STORMWATER MANAGEMENT CALCULATIONS

Existing Conditions:

C-Factor Calculation:

Total Area =	1.094 ha		
Landscaped Area =	0.044 ha	C = 0.20	(Pre-Development Drainage Areas = 5, 6, 8, 9, 11, 12)
Gravel Area =	0.035 ha	C = 0.40	(Pre-Development Drainage Areas = 7, 14)
Concrete/Paved/Rooftop area =	1.015 ha	C = 0.90	(Pre-Development Drainage Areas = 1, 2, 3, 4, 10, 13)

Calculation of Existing C-Factor:

Weighted C-Factor = {(0.044 ha x 0.20) + (0.035 ha x 0.40) + (1.015 ha x 0.90)} / 1.094 ha

Weighted C-Factor = 0.86

Per City standard, 1:2 year Qp to be calculated based on the lesser C-Factor of 0.50

Time of Concentration Calculation:

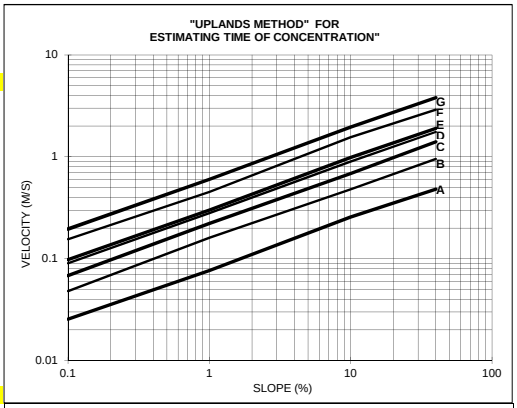
Flow Path to Clyde Avenue Sewer: (Sheet flow velocity based on asphalt slope using Uplands Method)
Tc (to Clyde Ave. Sewer) = Sheet Flow + Pipe Flow

Sheet Flow Asphalt Length = 107 m
Sheet Flow Elevation Difference = 99.55 m - 95.64 m = 3.91 m
Sheet Flow Slope = (3.91 m) / (107 m) = 3.65 %
Sheet Flow Velocity = 1.20 m/s (per Uplands Method)

Pipe Flow Length to Clyde Ave. Sewer = 62 m
Pipe Flow Slope = assumed 1.0 %
Pipe Flow Velocity = 1.22 m/s (using Manning's coefficient of 0.013 and existing 250mm pipe diameter)

Tc (to Clyde Ave. Sewer) = (107 m / 1.20 m/s) + (62 m / 1.22 m/s);
Tc = 1.49 min + 0.85 min = 2.34 min

Per City standard, 1:2 year Qp to be calculated based on a minimum Tc of 10 minutes



Curve Type:
A = Overland Flow: Forest (heavy litter) & hay meadow
B = Overland Flow: Woodland, fallow, controur or strip crop
C = Overland Flow: Pasture
D = Overland Flow: Cultivated straight row
E = Overland Flow: Nearly bare soil, untilled
F = Grassed waterway
G = Small upland gullies & paved areas (sheet flow)

Allowable 1:2 Year Peak Flow Calculation:

Qp = 2.78 x C x I x A, where :

Area =	1.094 ha
C =	0.50
1:2 Year Intensity (Tc = 10 min) =	76.81 mm/hr

Therefore, allowable 1:2 year Qp = 2.78 x 0.50 x 76.81 mm/hr x 1.094 ha

Qp(2yr) = 116.80 L/s

Storm servicing to be developed to limit the 1:100 year peak flows to the allowable 1:2 year peak flow of 116.80 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
1	Rooftop - 1A			0.147	1.00	27.00	72.97	12.00		12.00	N/A
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
7	100 Year - CB 12&13	0.019	0.014	0.012	0.72	5.85	11.79		11.79	11.79	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	0.015		0.117	0.91	31.37	59.94	20.00		20.00	100VHV-1
12	ICD2 - CB 5	0.012		0.071	0.89	19.20	36.73	20.00		20.00	125VHV-2
13	ICD3 - CB 6	0.004		0.045	0.94	11.96	22.83	8.00		8.00	100VHV-1
14	ICD4 - CB 10	0.003		0.181	0.99	47.36	90.22	6.00		6.00	75VHV-1
15	ICD5 - CB 11	0.003		0.020	0.90	5.39	10.30	6.00		6.00	100VHV-1
16	ICD6 - CB 14	0.011		0.015	0.68	4.55	8.81	6.00		6.00	100VHV-1
		Area (ha) = 1.104				$Q_{(100\text{-yr})}$ = (unrestricted)	505.45		$Q_{(100\text{-yr})}$ = (restricted)	116.06	

Area 1: Building 1A - Existing

Assumed Rooftop Properties:

Total Area Roof =	0.147 ha
Unusable roof (100%) =	0.147 ha
Usable roof (0%) =	0.000 ha
Depth of Storage =	0.000 m

Rooftop Area =	0.147
C-Factor (1:5 year) =	0.9
C-Factor (1:100 year) =	1.0

NOTE: Assumed no rooftop storage available on existing building. Storage requirement to be provided by HDPE detention system as detailed on Drawing S1 (HDPE detention system was modelled using SYMHYMO - refer to Appendix G for calculations and results)

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 0.152 m
Usable roof (75%) =	0.087	ha	Rooftop Volume (m^3) =	132 m^3
Depth of Storage =	0.152	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 0.152 m
Usable roof (75%) =	0.153	ha	Rooftop Volume (m^3) =	233 m^3
Depth of Storage =	0.152	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 0.152 m
Usable roof (75%) =	0.029 ha	Rooftop Volume (m^3) =	44 m^3
Depth of Storage =	0.152 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

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 7: CB No. 12 & No. 13 - Unrestricted (100 Year) (Total Area = 0.045)

	5 year	100 year
A gravel =	0.012	0.012
C-Factor =	0.900	1.000
A gravel =	0.014	0.014
C-Factor =	0.400	0.500
A landscape =	0.019	0.019
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.020	0.024

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	5.85	N/A	N/A	N/A	178.56	11.79	N/A	N/A	N/A
15	83.6	4.69	N/A	N/A	N/A	142.89	9.43	N/A	N/A	N/A
20	70.3	3.95	N/A	N/A	N/A	119.95	7.92	N/A	N/A	N/A
25	60.9	3.42	N/A	N/A	N/A	103.85	6.86	N/A	N/A	N/A
30	53.9	3.03	N/A	N/A	N/A	91.87	6.07	N/A	N/A	N/A
35	48.5	2.72	N/A	N/A	N/A	82.58	5.45	N/A	N/A	N/A
40	44.2	2.48	N/A	N/A	N/A	75.15	4.96	N/A	N/A	N/A
45	40.6	2.28	N/A	N/A	N/A	69.05	4.56	N/A	N/A	N/A
50	37.7	2.11	N/A	N/A	N/A	63.95	4.22	N/A	N/A	N/A
55	35.1	1.97	N/A	N/A	N/A	59.62	3.94	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

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

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

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

Area 11: CB No. 2, No. 3, No. 4 - ICD 1 (Total Drainage Area = 0.132)

	5 year	100 year
A asph =	0.117	0.117
C-Factor =	0.900	1.000
A landscape =	0.015	0.015
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.108	0.121

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	104.19	31.37	20.00	11.37	6.82	178.56	59.94	20.00	39.94	23.96
15	83.56	25.16	20.00	5.16	4.64	142.89	47.97	20.00	27.97	25.17
20	70.25	21.15	20.00	1.15	1.38	119.95	40.27	20.00	20.27	24.32
25	60.90	18.33	20.00	N/A	N/A	103.85	34.86	20.00	14.86	22.29
30	53.93	16.24	20.00	N/A	N/A	91.87	30.84	20.00	10.84	19.51
35	48.52	14.61	20.00	N/A	N/A	82.58	27.72	20.00	7.72	16.21
40	44.18	13.30	20.00	N/A	N/A	75.15	25.23	20.00	5.23	12.54
45	40.63	12.23	20.00	N/A	N/A	69.05	23.18	20.00	3.18	8.58
50	37.65	11.34	20.00	N/A	N/A	63.95	21.47	20.00	1.47	4.41
55	35.12	10.57	20.00	N/A	N/A	59.62	20.01	20.00	0.01	0.05
60	32.94	9.92	20.00	N/A	N/A	55.89	18.76	20.00	N/A	N/A
65	31.04	9.35	20.00	N/A	N/A	52.65	17.67	20.00	N/A	N/A

Minimum storage volume requirement = 25.17 m^3

Storage volume provided by design Ponding Area 1= 4.31 m^3
Storage volume provided by CB 2 = 0.6m x 0.6m x (96.93-95.70) 0.44 m^3
Storage volume provided by CB 3 = 0.6m x 0.6m x (96.93-94.88) 0.74 m^3
Storage volume provided by CB 4 = 0.6m x 0.6m x (96.93-94.93) 0.72 m^3
Storage volume provided by 20.8m - 200mm interconnected pipe = 2.61 m^3
Storage volume provided by 5.0m - 200mm interconnected pipe = 0.63 m^3
Total storage volume provided = 9.45 m^3

Volume cascading to downstream ponding area = **15.72** m^3

*** A spill-over volume of 15.72 m³ to CB No. 5 is expected for the 1:100 year storm.**

Area 12: CB No. 5 - ICD2 (Total Drainage Area = 0.083)

	5 year	100 year
A asph =	0.071	0.071
C-Factor =	0.900	1.000
A landscape =	0.012	0.012
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.066	0.074

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	104.19	19.20	20.00	N/A	N/A	178.56	36.73	20.00	16.73	10.04
15	83.56	15.40	20.00	N/A	N/A	142.89	29.40	20.00	9.40	8.46
20	70.25	12.95	20.00	N/A	N/A	119.95	24.68	20.00	4.68	5.61
25	60.90	11.22	20.00	N/A	N/A	103.85	21.36	20.00	1.36	2.05
30	53.93	9.94	20.00	N/A	N/A	91.87	18.90	20.00	N/A	N/A
35	48.52	8.94	20.00	N/A	N/A	82.58	16.99	20.00	N/A	N/A
40	44.18	8.14	20.00	N/A	N/A	75.15	15.46	20.00	N/A	N/A
45	40.63	7.49	20.00	N/A	N/A	69.05	14.21	20.00	N/A	N/A
50	37.65	6.94	20.00	N/A	N/A	63.95	13.16	20.00	N/A	N/A
55	35.12	6.47	20.00	N/A	N/A	59.62	12.27	20.00	N/A	N/A
60	32.94	6.07	20.00	N/A	N/A	55.89	11.50	20.00	N/A	N/A
65	31.04	5.72	20.00	N/A	N/A	52.65	10.83	20.00	N/A	N/A

Minimum storage volume requirement = 10.04 m³ + 15.72 m³ (spillover from CB No. 3) = **25.76 m³**

Storage volume provided by design Ponding Area 2 = 4.74 m^3
Storage volume provided by CB 5 = 0.6m x 0.6m x (96.00-94.00) 0.72 m^3
Total storage volume provided = 5.46 m^3

Volume cascading to downstream ponding area = **20.30** m^3

*** A spill-over volume of 20.30 m³ to CB No. 6 is expected for the 1:100 year storm.**

Area 13: CB No. 6 - ICD3 (Total Drainage Area = 0.049)

	5 year	100 year
A asph =	0.045	0.045
C-Factor =	0.900	1.000
A landscape =	0.004	0.004
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.041	0.046

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	104.19	11.96	8.00	3.96	2.38	178.56	22.83	8.00	14.83	8.90
15	83.56	9.59	8.00	1.59	1.43	142.89	18.27	8.00	10.27	9.25
20	70.25	8.07	8.00	0.07	0.08	119.95	15.34	8.00	7.34	8.81
25	60.90	6.99	8.00	N/A	N/A	103.85	13.28	8.00	5.28	7.92
30	53.93	6.19	8.00	N/A	N/A	91.87	11.75	8.00	3.75	6.75
35	48.52	5.57	8.00	N/A	N/A	82.58	10.56	8.00	2.56	5.38
40	44.18	5.07	8.00	N/A	N/A	75.15	9.61	8.00	1.61	3.86
45	40.63	4.66	8.00	N/A	N/A	69.05	8.83	8.00	0.83	2.24
50	37.65	4.32	8.00	N/A	N/A	63.95	8.18	8.00	0.18	0.54
55	35.12	4.03	8.00	N/A	N/A	59.62	7.62	8.00	N/A	N/A
60	32.94	3.78	8.00	N/A	N/A	55.89	7.15	8.00	N/A	N/A
65	31.04	3.56	8.00	N/A	N/A	52.65	6.73	8.00	N/A	N/A

Minimum storage volume requirement = 9.25 m^3 + 20.30 m^3 (spillover from CB No. 5) = **29.55 m^3**

Storage volume provided by design Ponding Area 3 =	7.45 m^3
Storage volume provided by CB 6 = 0.6m x 0.6m x (95.70-94.00)	0.61 m^3
Total storage volume provided =	8.06 m^3

Volume cascading to downstream ponding area = **21.48** m^3

*** A spill-over volume of 21.48 m^3 to CB No. 10 is expected for the 1:100 year storm.**

Area 14: CB No. 9 & No. 10 - ICD4 (Total Drainage Area = 0.184)

	5 year	100 year
A asph =	0.181	0.181
C-Factor =	0.900	1.000
A landscape =	0.003	0.003
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.164	0.182

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	104.19	47.36	6.00	41.36	24.82	178.56	90.22	6.00	84.22	50.53
15	83.56	37.98	6.00	31.98	28.78	142.89	72.20	6.00	66.20	59.58
20	70.25	31.93	6.00	25.93	31.12	119.95	60.61	6.00	54.61	65.53
25	60.90	27.68	6.00	21.68	32.52	103.85	52.47	6.00	46.47	69.71
30	53.93	24.51	6.00	18.51	33.32	91.87	46.42	6.00	40.42	72.75
35	48.52	22.05	6.00	16.05	33.71	82.58	41.72	6.00	35.72	75.02
40	44.18	20.08	6.00	14.08	33.80	75.15	37.97	6.00	31.97	76.72
45	40.63	18.47	6.00	12.47	33.66	69.05	34.89	6.00	28.89	78.00
50	37.65	17.11	6.00	11.11	33.34	63.95	32.31	6.00	26.31	78.94
55	35.12	15.96	6.00	9.96	32.88	59.62	30.13	6.00	24.13	79.62
60	32.94	14.97	6.00	8.97	32.31	55.89	28.24	6.00	22.24	80.07
65	31.04	14.11	6.00	8.11	31.63	52.65	26.60	6.00	20.60	80.34
70	29.37	13.35	6.00	7.35	30.87	49.79	25.16	6.00	19.16	80.46
75	27.89	12.68	6.00	6.68	30.04	47.26	23.88	6.00	17.88	80.44
80	26.56	12.07	6.00	6.07	29.15	44.99	22.73	6.00	16.73	80.32
85	25.37	11.53	6.00	5.53	28.21	42.95	21.70	6.00	15.70	80.09
90	24.29	11.04	6.00	5.04	27.21	41.11	20.77	6.00	14.77	79.77
95	23.31	10.59	6.00	4.59	26.18	39.43	19.92	6.00	13.92	79.37

Minimum storage volume requirement = 80.46 m^3 + 21.48 m^3 (spillover from CB No. 6) = **101.94 m^3**

Storage volume provided by design Ponding Area 4 =	103.48 m^3
Storage volume provided by CB 9 = 0.6m x 0.6m x (95.65-93.65)	0.72 m^3
Storage volume provided by CB 10 = 0.6m x 0.6m x (95.65-93.50)	0.77 m^3
Storage volume provided by 28.9m - 200mm interconnected pipe =	3.63 m^3
Total storage volume provided =	108.60 m^3

*** No spill-over volume is expected for the 1:100 year storm.**

Area 15: CB No. 11 - ICD5 (Total Drainage Area = 0.023)

	5 year	100 year
A asph =	0.020	0.020
C-Factor =	0.900	1.000
A landscape =	0.003	0.003
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.019	0.021

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	104.19	5.39	6.00	N/A	N/A	178.56	10.30	6.00	4.30	2.58
15	83.56	4.32	6.00	N/A	N/A	142.89	8.24	6.00	2.24	2.02
20	70.25	3.63	6.00	N/A	N/A	119.95	6.92	6.00	0.92	1.10
25	60.90	3.15	6.00	N/A	N/A	103.85	5.99	6.00	N/A	N/A
30	53.93	2.79	6.00	N/A	N/A	91.87	5.30	6.00	N/A	N/A
35	48.52	2.51	6.00	N/A	N/A	82.58	4.76	6.00	N/A	N/A
40	44.18	2.28	6.00	N/A	N/A	75.15	4.33	6.00	N/A	N/A
45	40.63	2.10	6.00	N/A	N/A	69.05	3.98	6.00	N/A	N/A
50	37.65	1.95	6.00	N/A	N/A	63.95	3.69	6.00	N/A	N/A
55	35.12	1.82	6.00	N/A	N/A	59.62	3.44	6.00	N/A	N/A
60	32.94	1.70	6.00	N/A	N/A	55.89	3.22	6.00	N/A	N/A
65	31.04	1.61	6.00	N/A	N/A	52.65	3.04	6.00	N/A	N/A

Minimum storage volume requirement = 2.58 m^3

Storage volume provided by design Ponding Area 5 =	4.09 m^3
Storage volume provided by CB 11 = 0.6m x 0.6m x (95.55-93.60)	0.70 m^3
Total storage volume provided =	4.79 m^3

*** No spill-over volume to Clyde Avenue is expected for the 1:100 year storm.**

Area 16: CB No. 14 & No. 15 - ICD6 (Total Drainage Area = 0.026)

	5 year	100 year
A asph =	0.015	0.015
C-Factor =	0.900	1.000
A landscape =	0.011	0.011
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.016	0.018

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	104.19	4.55	6.00	N/A	N/A	178.56	8.81	6.00	2.81	1.69
15	83.56	3.65	6.00	N/A	N/A	142.89	7.05	6.00	1.05	0.95
20	70.25	3.07	6.00	N/A	N/A	119.95	5.92	6.00	N/A	N/A
25	60.90	2.66	6.00	N/A	N/A	103.85	5.12	6.00	N/A	N/A
30	53.93	2.35	6.00	N/A	N/A	91.87	4.53	6.00	N/A	N/A
35	48.52	2.12	6.00	N/A	N/A	82.58	4.07	6.00	N/A	N/A
40	44.18	1.93	6.00	N/A	N/A	75.15	3.71	6.00	N/A	N/A
45	40.63	1.77	6.00	N/A	N/A	69.05	3.41	6.00	N/A	N/A
50	37.65	1.64	6.00	N/A	N/A	63.95	3.16	6.00	N/A	N/A
55	35.12	1.53	6.00	N/A	N/A	59.62	2.94	6.00	N/A	N/A
60	32.94	1.44	6.00	N/A	N/A	55.89	2.76	6.00	N/A	N/A
65	31.04	1.35	6.00	N/A	N/A	52.65	2.60	6.00	N/A	N/A

Minimum storage volume requirement = **1.69** m^3

Storage volume provided by design Ponding Area 6 =	0.21 m^3
Storage volume provided by CB 14 = 0.6m x 0.6m x (95.30-93.36)	0.70 m^3
Storage volume provided by CB 15 = 0.6m x 0.6m x (95.30-93.45)	0.67 m^3
Storage volume provided by 8.5m - 200mm interconnected pipe =	1.07 m^3
Total storage volume provided =	2.64 m^3

*** No spill-over volume to Clyde Avenue is expected for the 1:100 year storm.**

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

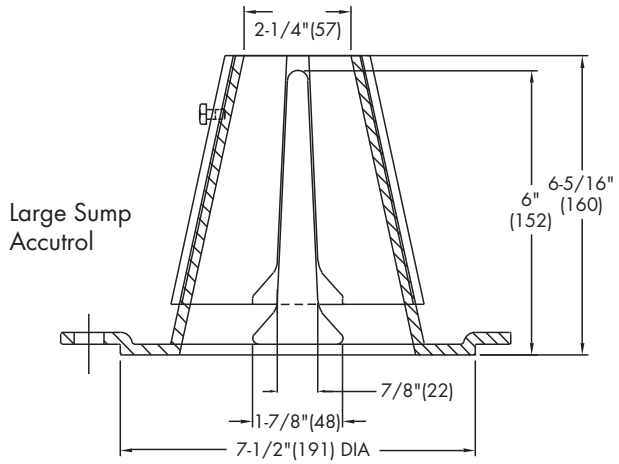
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

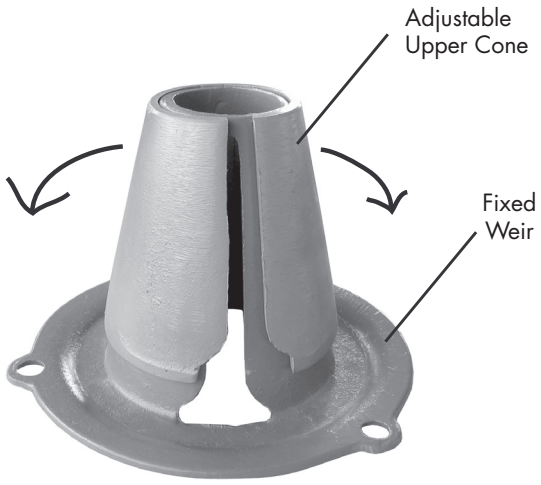
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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 _____

WATTS®
A Watts Water Technologies Company

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

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

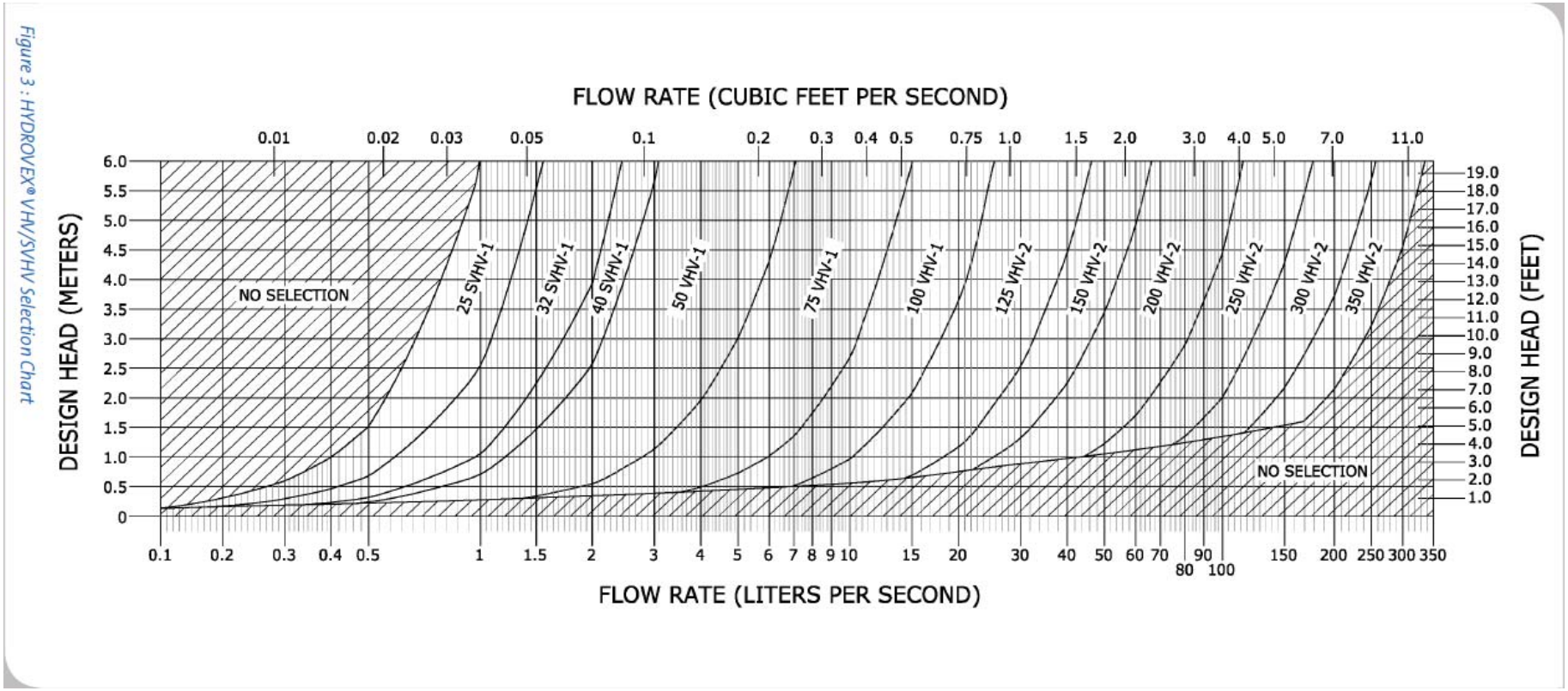


Figure 3 : HYDROVEX® VHV/SVHV Selection Chart

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 3	200	20.00	94.88	96.87	96.93	2.05	125 VHV-2
ICD 2 - CB 5	200	20.00	94.00	95.80	96.00	2.00	125 VHV-2
ICD 3 - CB 6	200	8.00	94.00	95.50	95.70	1.70	100 VHV-1
ICD 4 - CB 10	200	6.00	93.50	95.40	95.65	2.15	75 VHV-1
ICD 5 - CB 11	200	6.00	93.60	95.40	95.55	1.95	75 VHV-1
ICD 6 - CB 14	200	6.00	93.36	95.25	95.30	1.94	75 VHV-1
ICD 7 - ST MH 2A	250	12.00	93.93	95.57	--	1.01	CUSTOM 75mm ø ORIFICE

Outflow-Storage Curve for SWMHYMO Model

Building 1A Roof Area =	0.147	ha
Runoff Coefficient =	0.9	
U/G Storage = 3 x	900	mm diameter storm sewers
Single Pipe Length =	30	m
2400 mm dia. MH =	4.583	m3 storage volume
3.0 m Sewer (900 mm dia.)=	1.909	m3 storage volume

Head (m) [1]	Single Pipe		3 Pipes		Using Orifice Equation [3] $Q = CA\sqrt{2gh}$
	Area (m2)	Volume (m3)	Total Volume (m3) [2]	Total Volume (ha-m)	Q_{out} (cms)
0.000	0.000	0.000	0.000	0.00000	0.000
0.225	0.159	4.771	14.314	0.00143	0.006
0.488	0.318	9.543	28.628	0.00286	0.008
0.750	0.477	14.314	42.942	0.00429	0.010
1.013	0.636	19.085	63.747	0.00637	0.012

(1) Head above springline of outlet pipe, including 0.5% slope

(2) Total Volume at 1.013 m head includes 2400 mm dia. maintenance hole and 3.0 m - 900 mm dia. storm sewer

(3) Orifice Diameter = 0.075 m to achieve 12 L/s release rate at 1.013 m head

```
2     Metric units
*#************************************************************************
*#  Project Name: [DYMON STORAGE - 1375 CLYDE]    Project Number: [27296-01]
*#  Date        : 08-31-2017
*#  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"]
*%-----------------|-------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["ROOF-1A"], DT=[2.5]min, AREA=[0.147](ha),
                    XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2], CN=[98],
                    SLOPE=[1.0](%), RAINFALL=[ , , , , ](mm/hr), END=-1
*%-----------------|-------------------------------------------------------|
ROUTE RESERVOIR     IDout=[2],   NHYD=["STO-1"],  IDin=[1],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                     (cms) - (ha-m)
                                   [   0.0 ,  0.0 ]
                                   [0.006, 0.00143]
                                   [0.008, 0.00286]
                                   [0.010, 0.00429]
                                   [0.012, 0.00637]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[3], NHYDovf=["OVF-1"]
*%-----------------|-------------------------------------------------------|
PRINT HYD           ID=[3],   # OF PCYCLES=[1]
*%-----------------|-------------------------------------------------------|
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: 2018-05-22     TIME: 18:02:59     RUN COUNTER: 000275         *
 ***************************************************************************
 * Input   filename: C:\SWMHYMO\27296-01\27296-01.dat                          *
 * Output  filename: C:\SWMHYMO\27296-01\27296-01.out                          *
 * Summary filename: C:\SWMHYMO\27296-01\27296-01.sum                          *
 * User comments:                                                              *
 * 1:_____________________________________________________________________________*
 * 2:_____________________________________________________________________________*
 * 3:_____________________________________________________________________________*
 ***************************************************************************

-------------------------------------------------------------------------------
-
001:0001----------------------------------------------------------------------
-
*#*************************************************************************
*#  Project Name: [DYMON STORAGE - 1375 CLYDE]    Project Number: [27296-01]
*#  Date        : 08-31-2017
*#  Modeller    : [AW]
*#  Company     : J. L. Richards & Associates Limited
*#  License #   :  4418403
*#*************************************************************************
  ** END OF RUN :  99

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

```
--------------------
| START            |  Project  dir.: C:\SWMHYMO\27296-01\

--------------------  Rainfall dir.: C:\SWMHYMO\27296-01\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 100
    NSTORM=   1
           #  1=100yr3h.stm
-------------------------------------------------------------------------------
-
100:0002---------------------------------------------------------------------
-
*#*****************************************************************************
*#  Project Name: [DYMON STORAGE - 1375 CLYDE]    Project Number: [27296-01]
*#  Date        : 08-31-2017
*#  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---------------------------------------------------------------------
-
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .15
| 01:ROOF-1 DT= 2.50 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .15           .00
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       1.00          1.00
     Length            (m)=      31.30         40.00
     Mannings n             =      .013          .250

     Max.eff.Inten.(mm/hr)=     178.56        174.38
               over (min)         2.50          7.50
     Storage Coeff.  (min)=       1.01 (ii)     7.97 (ii)
     Unit Hyd. Tpeak (min)=       2.50          7.50
     Unit Hyd. peak  (cms)=        .62           .14
                                                      *TOTALS*
```

```
     PEAK FLOW       (cms)=        .07          .00          .073 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.04         1.000
     RUNOFF VOLUME    (mm)=      70.86        65.34        70.810
     TOTAL RAINFALL   (mm)=      71.66        71.66        71.665
     RUNOFF COEFFICIENT   =        .99          .91          .988
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-
100:0004--------------------------------------------------------------------------
-
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(ROOF-1)   |
| OUT<02:(STO-1 )   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .010  .4290E-02
                            .006  .1430E-02   |     .012  .6370E-02
                            .008  .2860E-02   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (ROOF-1)        .15      .073     1.000     70.810
     OUTFLOW<02: (STO-1 )        .15      .012     1.250     70.809
    OVERFLOW<03: (OVF-1 )        .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](%)=   15.839
                   TIME SHIFT OF PEAK FLOW         (min)=    15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.5856E-02

--------------------------------------------------------------------------------
-
100:0005--------------------------------------------------------------------------
-
--------------------
| PRINT HYD        |   AREA       (ha)=     .000
| ID=03 (OVF-1 )   |   QPEAK     (cms)=     .000 (i)
| DT=  .83 PCYC= 1 |   TPEAK     (hrs)=     .000
--------------------   VOLUME     (mm)=     .000

     (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
      *** WARNING: This hydrograph is dry.
--------------------------------------------------------------------------------
-
100:0006--------------------------------------------------------------------------
-
      FINISH
--------------------------------------------------------------------------------
-
********************************************************************************
```

```
*
     WARNINGS / ERRORS / NOTES
     -------------------------
 100:0003 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 100:0005 PRINT HYD
      *** WARNING: This hydrograph is dry.
   Simulation ended on 2018-05-22     at 18:02:59
================================================================================
=
```

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

1375 Clyde Avenue

Dymon Self Storage

JLR No. 27296-01

STORM SEWER DESIGN SHEET

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

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

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	MH 6			0.039	0.039	0.039	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		95.82	95.67	2.46	98.33	0.77	95.73	95.58	2.60
MH6	MH5	0.017		0.122	0.139	0.178	0.31	0.31	10.17	76.14	23.96		2.52	**26.48**	300	2.00	142.7	1.96	46.8	0.40	98.33		94.96	94.66	3.37	96.33		94.03	93.73	2.30
									10.57																				
BLDG 2	MH5			0.204	0.204	0.204	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	96.08		94.08	93.88	2.00	96.33		94.03	93.83	2.30
									10.08																				
MH5	MH4	0.012		0.071	0.083	0.465	0.18	0.50	10.57	74.67	37.26		7.57	**44.83**	300	0.35	59.7	0.82	25.2	0.51	96.33		94.03	93.73	2.30	95.86		93.94	93.64	1.92
MH4	MH3	0.007		0.053	0.060	0.525	0.14	0.64	11.09	72.87	46.31		7.57	**53.88**	300	0.35	59.7	0.82	8.6	0.18	95.86		93.94	93.64	1.92	95.77		93.91	93.61	1.86
									11.26																				
BLDG 1B	MH3A			0.116	0.116	0.116	0.00	0.00	10.00	76.81	0.00	5.05	5.05	**5.05**	150	1.00	15.9	0.87	4.4	0.08	96.04		94.37	94.22	1.67	95.83		94.32	94.17	1.51
MH3A	MH3				0.000	0.116	0.00	0.00	10.08	76.48	0.00		5.05	**5.05**	200	0.60	26.5	0.82	22.4	0.46	95.83		94.32	94.12	1.51	95.77	0.28	94.19	93.99	1.58
									10.54																				
MH3	MH2			0.005	0.005	0.646	0.01	0.65	11.26	72.28	46.84		12.62	**59.46**	375	0.35	108.2	0.95	39.7	0.70	95.77		93.91	93.53	1.86	95.59		93.77	93.39	1.82
									11.96																				
BLDG 1A	MH2A			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	12.5	0.25	96.04		94.23	93.98	1.81	95.57		94.18	93.93	1.39
MH2A	MH2				0.000	0.147	0.00	0.37	10.25	75.84	27.90		0.00	**27.90**	250	0.45	41.6	0.82	14.8	0.30	95.57		94.18	93.93	1.39	95.59	0.34	94.11	93.86	1.48
									10.55																				
MH2	WQU MH1	0.006		0.201	0.207	1.000	0.51	1.52	11.96	70.02	106.58		12.62	**119.20**	375	0.45	122.7	1.08	29.3	0.45	95.59		93.77	93.39	1.82	95.50		93.64	93.26	1.86
WQU MH 1	EX. MH	0.030	0.014	0.027	0.071	0.071	0.10	1.62	12.41	68.64	111.32		12.62	**123.94**	375	0.46	124.1	1.09	13.6	0.21	95.50		93.64	93.26	1.86	95.34		93.58	93.20	1.77
									12.62																			EX. INV =	93.20	
		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 = 4.11 L/s

BUILDING FOOTPRINT AREAS :

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

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

ECHELON ENVIRONMENTAL

505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

CDS sizing report

Date: Sept. 22, 2017 rev 0

Engineer: Ms. Karal Ferrey P.Eng.
J.L. Richards & Associates Limited
864 Lady Ellen Place, Ottawa, ON K1Z 5M2

Project: Dymon Storgae, 1375 Clyde Ave, Ottawa, ON

Design Parameters

The proposed CDS PMSU units were designed based on the following parameters:

Drainage Area:	1.06 Ha
Runoff Coefficient:	0.86
Time of Concentration:	10 Min (calculated, does not impact efficiency calculation)
Target Particle Size Distribution:	Fine PSD (see appendix I)
Rainfall Station:	6105976, Ottawa ON
Treatment Level:	TSS: 80%, Treated Volume: >90% (MOE LEVEL I)
Hydraulic capacity:	15 CFS (~ 360 L/Sec) under ideal application, hydraulic validation available upon request
Flow Limit:	122,9 l/sec (100 year event)

Unit: CDS PMSU 20_15_4

OGS data:

Unit	Sump Volume (L)	Treatment Chamber Volume (L)	Oil capacity (L)
PMSU 20_25_5	3335	3335	439

TSS Removal Calculation

The TSS removal calculation can be found in Appendix I.

Reference Drawing

PMSU 20_25_5 reference drawing is in Appendix III. Drawing is for general unit configuration only. Submittal drawing available upon request.

Structural Design

The proposed CDS PMSU unit has been is designed to Canadian Highway Bridge Design Code (CHBDC) loadings. All concrete components are manufactured at an OPS pre-qualified plant. Certification is attached, Appendix IV.

Approval Background

The CDS Stormwater Treatment System is an approved product in Ontario and is servicing various jurisdictions throughout the province. Introduction into Ontario was in 2002. Units installed in Ontario are approximately 2000 units as of 2017. Eastern Ontario volumes are approximately 25 units a year, approximately 300 units as of 2017. (CDS installation precedent available upon request)

Rev 0, 22-09-2017; initial release

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

APPENDIX I
CDS TSS REMOVAL CALCULATIONS
PSD VALIDATION

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name:	Dymon Storage	**Engineer:**	JL Richards
Location:	1375 Clyde Ave	**Contact:**	Ms. Julie White EIT
OGS #:		**Report Date:**	11-Sep-17

Area	1.06		**Rainfall Station #**		215	(select from Rainfall Data column D)
Imperviousness	-	%	**Flow Limit**	**122.9**	l/sec	
Weighted C	0.86	(calculated) C (from table)	#N/A			
Tc	10	minutes (assumed)	**Particle Size Distribution**		FINE	
CDS Model	2025	(select from pulldown)	**CDS Treatment Capacity**		45	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	1.3	1.3	2.8	98.1	9.0
1.0	10.6%	19.8%	2.5	2.5	5.6	97.3	10.3
1.5	9.9%	29.7%	3.8	3.8	8.4	96.5	9.5
2.0	8.4%	38.1%	5.1	5.1	11.2	95.7	8.0
2.5	7.7%	45.8%	6.3	6.3	14.0	94.8	7.3
3.0	5.9%	51.7%	7.6	7.6	16.8	94.0	5.6
3.5	4.4%	56.1%	8.9	8.9	19.6	93.2	4.1
4.0	4.7%	60.7%	10.1	10.1	22.4	92.4	4.3
4.5	3.3%	64.0%	11.4	11.4	25.2	91.6	3.0
5.0	3.0%	67.1%	12.7	12.7	28.0	90.8	2.7
6.0	5.4%	72.4%	15.2	15.2	33.6	89.2	4.8
7.0	4.4%	76.8%	17.7	17.7	39.2	87.6	3.8
8.0	3.5%	80.3%	20.3	20.3	44.7	86.0	3.0
9.0	2.8%	83.2%	22.8	22.8	50.3	84.4	2.4
10.0	2.2%	85.3%	25.3	25.3	55.9	82.8	1.8
15.0	7.0%	92.3%	38.0	38.0	83.9	74.8	5.2
20.0	4.5%	96.9%	50.7	45.3	100.0	62.8	2.9
25.0	1.4%	98.3%	63.4	45.3	100.0	50.2	0.7
30.0	0.7%	99.0%	76.0	45.3	100.0	41.8	0.3
35.0	0.5%	99.5%	88.7	45.3	100.0	35.9	0.2
40.0	0.5%	100.0%	101.4	45.3	100.0	31.4	0.2
45.0	0.0%	100.0%	114.0	45.3	100.0	27.9	0.0
50.0	0.0%	100.0%	112.9	45.3	100.0	28.2	0.0
							89.2

Removal Efficiency Adjustment[2] = 6.45%

Predicted Net Annual Load Removal Efficiency = 82.7%

Predicted % Annual Rainfall Treated = 91.4%

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

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

CDS Stormwater Treatment Unit Performance

Table 1. Fine Particle Size Distribution (PSD)

Particle Size (µm)	% of Particle Mass
< 20	20
20 – 40	10
40 – 60	10
60 – 130	20
130 – 400	20
400 – 2000	20

Removal Efficiencies – CDS Unit Testing Under Various Flow Rates

The following performance curves are based on controlled tests using a full scale CDS Model PMSU20_20 (2400 micron screen), 1.1-cfs (494-gpm) capacity treatment unit.

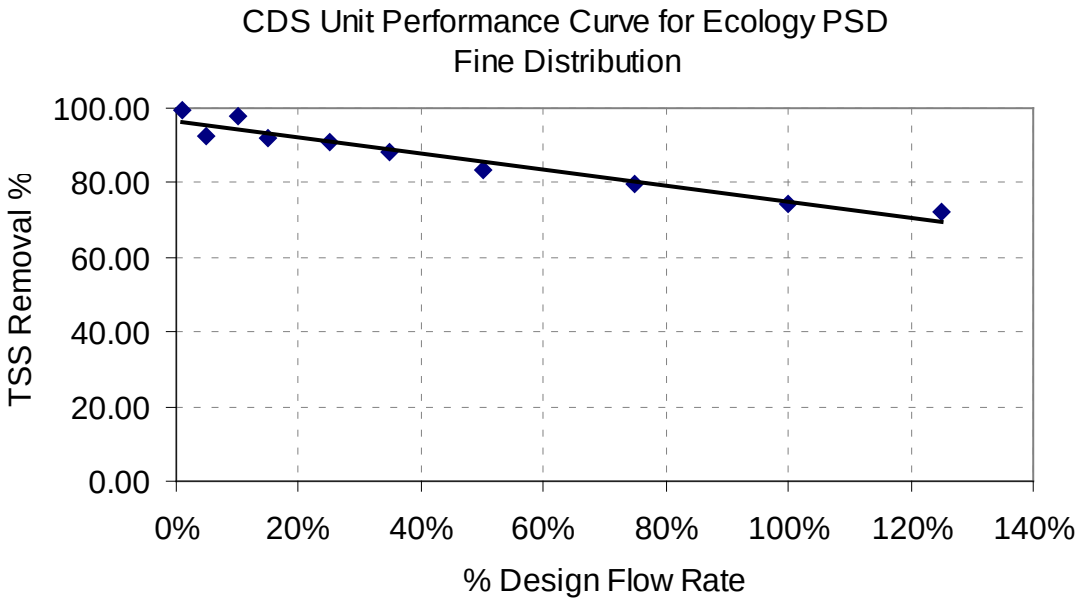


Figure 1. CDS Unit Performance for Fine PSD

Tests were conducted using two types of sand – U.S. Silica OK-110 and UF sediment (a mixture of U.S. Silica sands). Particle size gradations for the two types of sand are illustrated in Figure 2.

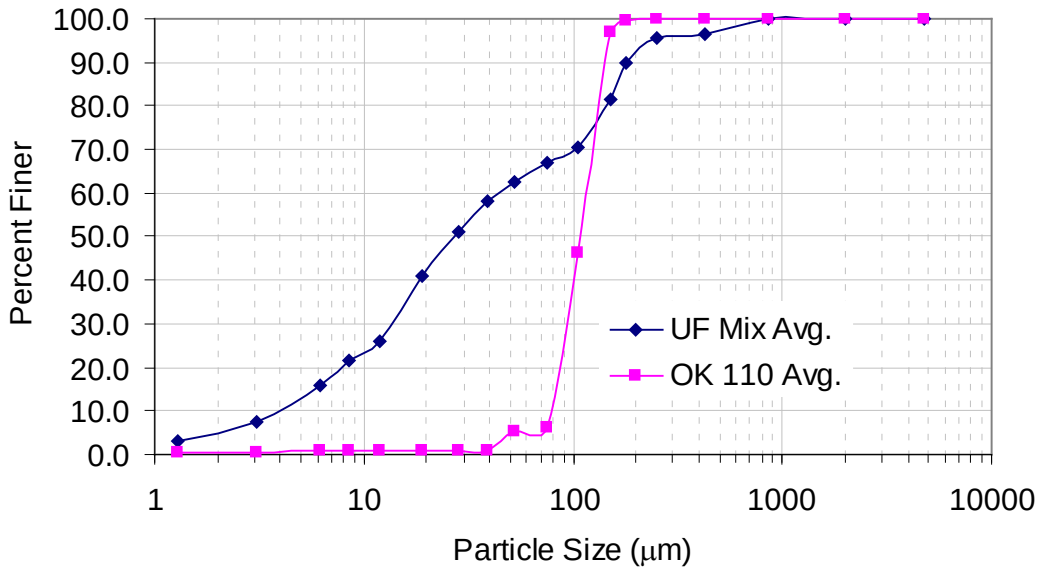


Figure 2. Test material particle size gradations - CDS Model PMSU20_20 test
(Analytical results provided by MACTEC Engineering and Consulting Inc. FL
ASTM D-422 with Hydrometer method)

The influent concentration (mg/L) for the test was set at 200-mg/L and verified from slurry feeding. Effluent samples were taken at fixed time intervals during each test run at various flow rates. The composite effluent samples were sent to Test American Analytical Testing Lab, OR for TSS analysis (ASTM D3977-97).

TSS removal rates for the specified PSD (d_{50} of 90 μm) under various flow rates were calculated from Figure 2 shows the removal efficiency as a function of operating flow rate. This removal efficiency curve as a function of percent flow rate can be applied to all CDS unit models.

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

APPENDIX II
ANTICIPATED GRIT LOAD/CLEANING CYCLE

ECHELON ENVIRONMENTAL

Phone: 905-948-0000
Fax: 905-948-0577
info@echelonenvironmental.ca
www.echelonenvironmental.ca

Estimate of Annual Grit Collection

Engineer:	JL Richards	**Project:**	Dymon Storage, Clyde Ave.
Contact:	Ms. J. White	**CDS Model:**	20_25_5
Report Date:	22-Sep-17	**OGS Location:**	Ottawa ON

Area :	1.06	ha
Imperviousness :	-	%
Runoff Coefficient :	0.86	

C from table #N/A

Assumptions:

1. Annual Rainfall	900	mm	Ottawa	(estimate)
2. Typical Grit Concentration	300	mg/l		
3. Apparent Grit Density	1.4	kg/l	(estimated)	
4. Grit Capture Efficiency	80%			

Runoff Volume = Area x Rainfall Depth x Runoff Coefficient = 8,204 cu.m

Grit Collected = Grit Concentration x Runoff Volume x Grit Capture Efficiency = 985 kg

Grit Volume = Mass / Apparent Density = 703 litres or 0.703 cu.m

Therefore it can be expected that this site will generate approximately 0.703cu.m of grit annually.

Sump Capacity of CDS unit = 1.749 cu.m

Therefore the design sump capacity will accommodate a cleaning frequency of one time per 12 to 14 months.

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505 Hood Road Unit 26 Markham ON L3R 5V6
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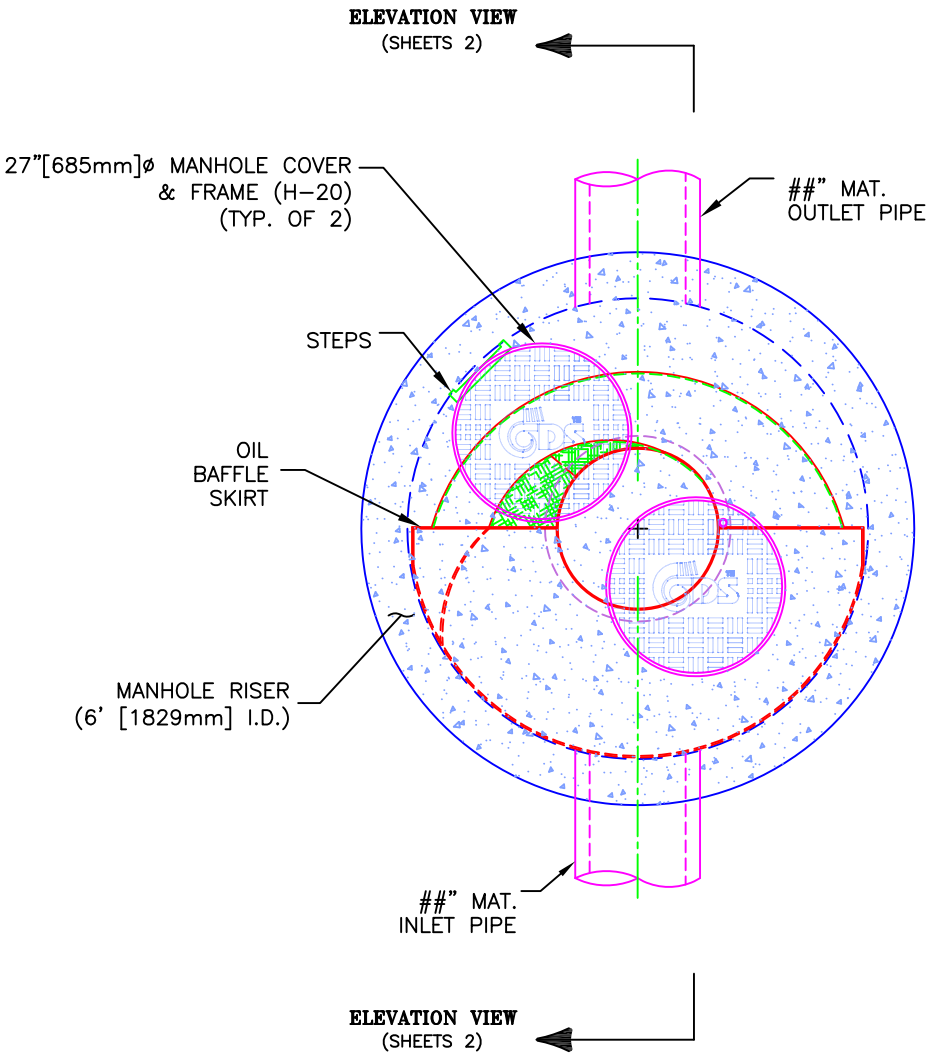
E-mail: info@echelonenvironmental.ca

APPENDIX III
CDS PMSU 20_25_5 DRAWING (reference only)

PLAN VIEW

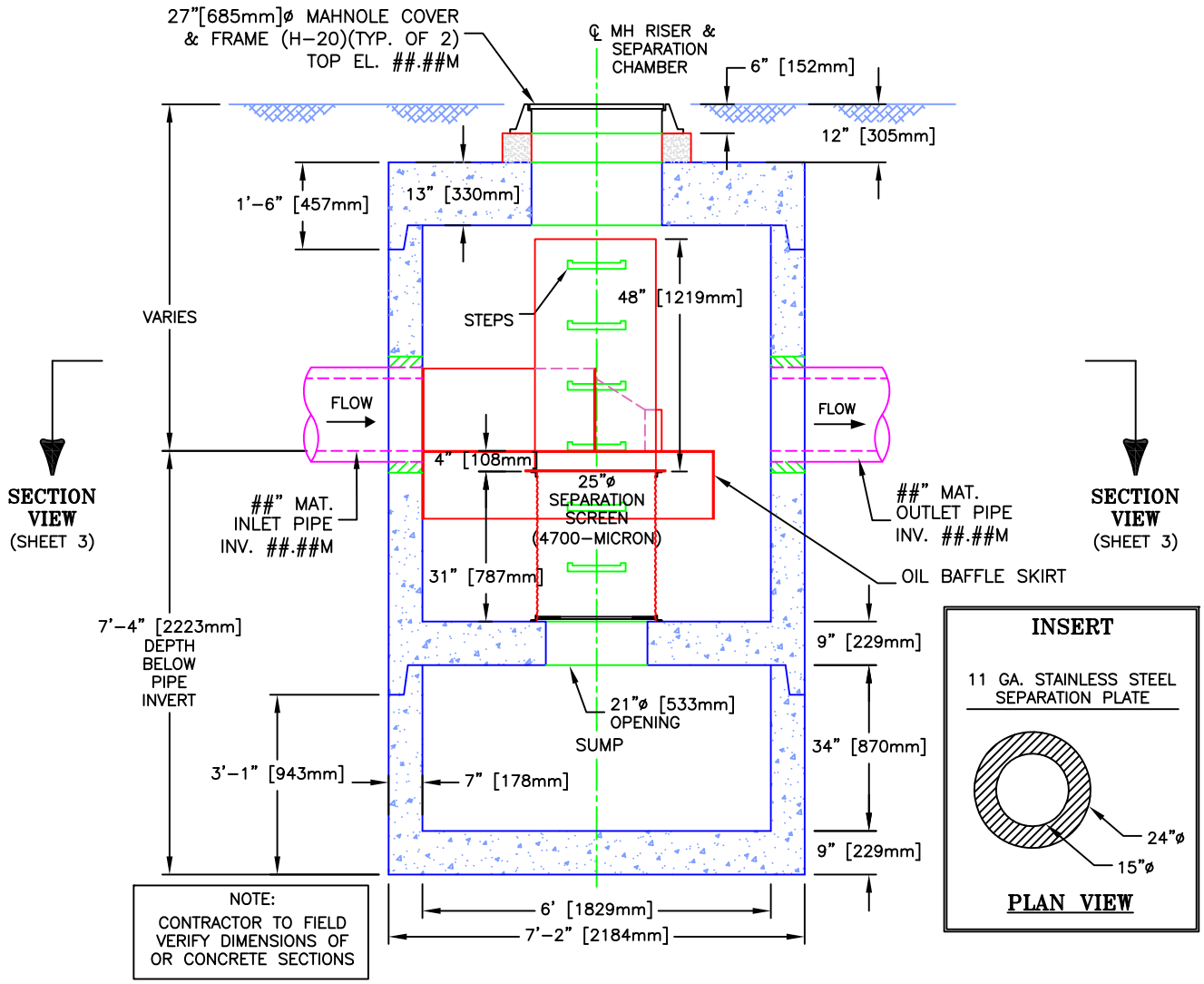


CDS MODEL PMSU20_25_6m, 1.6 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2.5'
		DATE ##/##/##	SHEET
		DRAWN INITIALS	1
		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

ELEVATION VIEW



CDS MODEL PMSU20_25_6m, 1.6 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 3'
		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

505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

APPENDIX IV
Ontario Provincial Standards Approval
MOE Certificate

TECHNOLOGY ASSESSMENT • TECHNOLOGY ASSESSMENT

CERTIFICATE

OF TECHNOLOGY ASSESSMENT

CDS™ Technologies

The Ontario Ministry of the Environment has reviewed the solid/liquid separation system developed by ***CDS™ Technologies****. Based on the review of the documentation submitted by the company (see the Notable Aspects section and Appendix), and data from pilot-scale testing and full-scale operations conducted by various agencies, the Ministry concludes that the continuous deflection separation (CDS™) system can provide useful removal of solids and floatables as part of a stormwater management system.*

The CDS™ Technologies may be able to provide "basic to enhanced" level of protection when used alone, maintained for effective operation, and when appropriately designed for the development area to be serviced. CDS™ units may also be used for pretreatment in combination with other non-proprietary technologies such as man-made wetlands, treatment ponds and infiltration basins.

John Mayes, (A) Director
Standards Development Branch
Ministry of the Environment
(September 2006)

New Environmental Technology Evaluation Program

Promoting the development and application of new environmental technologies

Ontario

TECHNOLOGY ASSESSMENT • TECHNOLOGY ASSESSMENT

150 - 07 - 2000

Echelon Environmental

Supplier of stormwater treatment systems
Category: **Distributor**

Contacts

Rob Rainford, P.Eng.
General Manager
Echelon Environmental
505 Hood Road, Unit #26
Markham, ON L3R 5V6
Phone: 905-948-0000 x225
Fax: 905-948-0577
Cellular: 416-899-0553
Email: **rob@echelonenvironmental.ca**
Web: **http://www.echelonenvironmental.ca**

Products

** For product details select the down arrow.*

Info **CDS Technologies Precast Manhole Stormwater Unit (PMSU)**

Info **ChamberMaxx**

Products Distributed

Contech Construction Products Inc.

CDS©

Using patented continuous deflective separation technology, the CDS® system, effectively screens, separates and traps debris, sediment, and oil from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material, without blinding. It is available in offline, inline, and grate inlet configurations. The unique inlet design provides more ways to receive stormwater in a single treatment unit. Its unique forebay design allows it to receive single or multiple pipes on a 170° arc. If needed, the system can perform as a catch basin or drop inlet and receive flow from the rest of the drainage collection system ? eliminating the need for additional structures. An oil baffle skirt surrounding the non-blocking screening process traps oil and grease. It separates previously captured oil and grease from high bypass flows, preventing re-entrainment. The CDS® system is available in precast or cast-in-place. Offline units can treat flows from 1 to 300 cfs (30 to 8500 L/s). Inline units can treat up to 7.5 cfs (170 L/s), and internally bypass larger flows in excess of 50 cfs (1420 L/s). The pollutant removal capability of the CDS system has been proven in the lab and field.

CANADA'S BEST MANAGED COMPANIES

www.jlrichards.ca

Ottawa

864 Lady Ellen Place
Ottawa ON Canada
K1Z 5M2
Tel: 613 728-3571

ottawa@jlrichards.ca

Kingston

203-863 Princess Street
Kingston ON Canada
K7L 5N4
Tel: 613 544-1424

kingston@jlrichards.ca

Sudbury

314 Countryside Drive
Sudbury ON Canada
P3E 6G2
Tel: 705 522-8174

sudbury@jlrichards.ca

Timmins

201-150 Algonquin Blvd. East
Timmins ON Canada
P4N 1A7
Tel: 705 360-1899
timmins@jlrichards.ca

North Bay

200-175 Progress Road
North Bay ON Canada
P1A 0B8
Tel: 705 495-7597

northbay@jlrichards.ca

Hawkesbury

326 Bertha Street
Hawkesbury ON Canada
K6A 2A8
Tel: 613 632-0287

hawkesbury@jlrichards.ca

Guelph

107-450 Speedvale Ave. West Guelph ON Canada
N1H 7Y6
Tel: 519 763-0713

guelph@jlrichards.ca

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS