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Site Servicing Report

Dymon Self Storage, 851 Industrial Avenue

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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

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1.0 INTRODUCTION

Dymon Group of Companies (Dymon) has retained the services of J.L. Richards & Associates Limited (JLR) to proceed with detailed design of municipal infrastructure for the redevelopment of the properties located at 851 Industrial 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 illustrated below, the subject site consists of one commercial building along the north limit of the property. As depicted on Figure 1, the subject site is bounded by Industrial Avenue to the west and existing commercial/retail developments to the north, east and south of the property.

Figure 1: Site Location

Based on the review of the aerial photo, the site is fully impervious with the exception of small portions of a strip of grass along the site limits. Currently, storm runoff generated by the 851 Industrial Avenue property sheet flows to on-site catch basins that outlet into the existing Industrial Avenue 675 mm diameter storm sewer, where flows eventually outlet to the Ottawa River.

1.2 Proposed Site Plan, Building Configuration and Zoning

Dymon wishes to redevelop the above-described properties totaling 0.80 ha in size as per the surveyor's area certificate (Appendix 'A') into a five (5) storey storage facility building with a covered drive-through garage, including access routes and parking areas as depicted on the attached Site Plan (see the back of the Report).

The subject property is currently zoned IL, Light Industrial Zone. The Il zone permits the proposed density of the property as well as the warehouse use. The Applicant is undertaking a Zoning By-law Amendment to permit the addition of retail use.

1.3 Existing Infrastructure and Existing Conditions Survey

This Report was prepared with sufficient details to demonstrate that the site redevelopment can be supported by the existing municipal infrastructure. The 851 Industrial Avenue property is bounded by existing municipal infrastructure, which consists of the following (refer to Appendix 'B' for copy of the Industrial Avenue Background Drawings):

Watermain

- existing 305 mm diameter PVC watermain (2016) located along Industrial Avenue within the 1E (Hurdman) pressure zone.

Sanitary

- existing 250 mm diameter sanitary sewer along Industrial Avenue; and

Storm

- existing 675 mm diameter concrete storm sewer along Industrial Avenue.

A topographical survey was completed by Annis, O'Sullivan, Vollebekk Ltd.on May 24, 2017. A copy of the topographical survey has been included at the back of the Report with the Surveyor's Area Certificate included in Appendix 'A'.

1.4 Pre-Consultation, Permits and Approvals

A pre-consultation meeting was held between the Owner's representatives and staff from the City on June 23, 2017. A copy of the pre-consultation meeting notes has been provided in Appendix 'C'. The following summarizes the expected requirements:

- It is anticipated that the RVCA would necessitate the provision of water quality control measures to meet a total suspended solids (TSS) of 80%; and

- It is anticipated that this site would require an Industrial Environmental Compliance Approval (ECA) under the Water Resources Act for the 851 Industrial Avenue site. However, pre-consultation has not yet been completed with the local MOECC office.

In addition, the redevelopment of the above-referenced properties is subject to the municipal site plan control approval process with the City of Ottawa. As a condition of Site Plan Approval, the City will need to approve the engineering documentation (Drawings and Report) prepared for the 851 Industrial Avenue Dymon site. The City of Ottawa Development Servicing Study Checklist has been included in this document (refer to Appendix 'D'), which provides all the details associated with this development and the approval and permit requirements.

1.5 Engineering Drawings

Engineering Drawings have been prepared in support of the redevelopment of the 851 Industrial Avenue property. The following three (3) drawings are included at the back of the Report:

- Site Servicing Grading Plan (Drawing SSG);
- 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 Dymon 851 Industrial Avenue Site to confirm that the existing watermain and proposed water service 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 Industrial Avenue via a proposed 200 mm diameter water service lateral. The HNA was completed to satisfy the above demand criteria.

2.2 System Pressures

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

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

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

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

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

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

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

2.3 Water Demands

To assess the performance of the existing water distribution system (refer to Drawing SSG at the back of the 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.

The theoretical domestic demand for the Dymon Self Storage facility was obtained from the Owner's mechanical engineer (Goodkey, Weedmark & Associates Limited (GWAL)). Based on an anticipated fixture count of 32.2, a peak hour demand of 1.58 L/s was estimated by the mechanical engineer (refer to Appendix 'E1' for a copy of the e-mail correspondence). Using the prescribed peaking factors of 1.8 and 1.5 (refer to Table 4.2 of the Design Guidelines), maximum day and average day demands of 0.88 L/s and 0.59 L/s were calculated, respectively. Table 1 summarizes the overall water demands used in the HNA.

Table 1: Calculated Water Demands

Average Day Demand	Maximum Day Demand	Peak Hourly Demand
0.59 L/s	0.88 L/s	1.58 L/s

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 fire flow requirement for the fully sprinklered facility, including risers up to the roof level, was estimated at 15,000 L/min (250 L/s) as per the FUS (refer to Appendix 'E2' for calculation).

2.5 Watermain Sizing and Roughness Coefficients

The existing and proposed watermain layout for the Dymon Self Storage facility is shown on the Site Servicing Grading Plan (Drawing SSG) at the back of the Report. The site water servicing consists of the following components:

- Domestic supply to the proposed facility will be provided by a proposed 200 mm diameter water service lateral that is connected to the Industrial Avenue 305 mm

diameter watermain. The proposed 200 mm diameter water service lateral will also supply the facility's sprinkler system, which has been estimated by the mechanical engineer to require 31.55 L/s (500 GPM). Refer to Appendix 'E1' for e-mail correspondence.

- In terms of fire protection, the sprinkler system will be supplemented by a proposed on-site hydrant located west of the building that will connect to the proposed 200 mm diameter watermain service lateral. This hydrant will have a 150 mm diameter lead. The proposed hydrant is located approximately 23 m from the proposed siamese connection of the Dymon Self Storage facility.

- The siamese connection will be located on the western face of the facility beside the proposed building entrance. Since the distance between the siamese connection and the existing hydrant on Industrial Avenue was found to exceed the maximum distance of 45 m, an on-site hydrant was required.

The WaterCAD® overall schematic 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). Boundary conditions were requested based on a single feed connection to the Industrial Avenue 305 mm diameter watermain.

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

Table 2: Hydraulic Boundary Conditions

Water Demands	Industrial Avenue HGL (m)
Peak Hour	109.8
Maximum Day + Fire Flow	102.3
High Pressure Check	118.2

The overall fire flow requirement for the subject site is 250 L/s and consists of the internal requirement of 31.55 L/s (sprinkler system) and the external requirement of 218.45 L/s (hydrant). The peak hour, maximum day plus fire flow and high pressure scenarios were simulated using a single supply reservoir at Industrial Avenue. For the maximum day plus fire flow scenario, the maximum day and sprinkler system demands were applied at one junction (Junction J-6), fed from the proposed 200 mm diameter water service.

2.7 Simulation Results

2.7.1 Peak Hour Demand

The proposed servicing as depicted on Drawing SSG was simulated under the peak hour demand based on the water demand summarized in Table 1 and the hydraulic boundary condition presented in Table 2. It should be noted that Junction J-6 was set to an elevation of 73.20 m, the finished floor elevation of the building at ground level, and that all proposed fixtures are located on the ground floor.

The simulation results show a residual pressure of 358 kPa (51.9 psi) at Junction J-6 (i.e., the finished floor) 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 less than 140 kPa (20 psi).

As noted above, the simulation was undertaken based on the maximum day demand of 0.88 L/s (per the fixture count) combined with the sprinkler system requirement of 31.55 L/s (500 GPM) for a total demand at Junction J-6 of 32.43 L/s. Consequently, to fulfil the FUS requirement of 250 L/s for the overall property, a minimum fire flow of 218.45 L/s should be available at the proposed Hydrant H-1 (i.e., 250 L/s – 31.55 L/s).

The simulation results (refer to Appendix 'E6' for WaterCAD® simulation schematic and results) indicate that a fire flow of 252 L/s is available at Hydrant H-1 while fulfilling the maximum day and sprinkler system demand of 32.43 L/s. Consequently, the distribution system can deliver fire flows in excess of 250 L/s.

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 demand at Junction J-6 was set to zero (0).

Simulation results for this scenario indicate that a residual pressure of 440 kPa (63.8 psi) is expected at Junction J-6 (i.e., the finished floor) (refer to Appendix 'E7' for WaterCAD® simulation schematic and results). Hence, the simulated pressure is below the maximum pressure constraint of 552 kPa (80 psi). Consequently, there is no need to incorporate a pressure reducing valve (PRV) as part of the building plumbing.

2.8 Internal Pumping

Simulation results have shown that there is no requirement to provide internal pumping during domestic usage as the minimum pressure of 276 kPa (40 psi) is exceeded for all of the proposed fixtures 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 this system is required.

2.9 Summary and Conclusions

Based on the HNA presented above, it is recommended that the water servicing shown on the Site Servicing Grading Plan (Drawing SSG) 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 facility are to be conveyed to the existing Industrial Avenue 250 mm diameter sanitary sewer via a proposed 150 mm diameter sanitary service as depicted on the Site Servicing Grading Plan (Drawing SSG).

3.2 Design Criteria

The proposed sanitary service for the Dymon Self Storage facility 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:

Table 3: Wastewater Servicing Design Criteria

Design Criteria	Design Value	Reference
Residential average flow	350 L/cap/day	City Section 4.4.1
Commercial/institutional average flow	50,000 L/gross ha/day	City Section 4.4.1
Industrial average flow	35,000 L/gross ha/day	City Section 4.4.1
Residential peaking factor	Harmon Formula	City Section 4.4.1
Commercial/institutional peaking factor	1.5	City Section 4.4.1
Industrial peaking factor	Varies (by area)	City Section 4.4.1, Appendix 4-B
Infiltration flow	0.28 L/s/effective gross ha	City Section 4.4.1
Minimum velocity	0.6 m/s	City Section 6.1.2.2

Design Criteria	Design Value	Reference
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 a proposed 150 mm diameter sanitary service. 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 50,000 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 3.15 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 3.15 L/s, the proposed 150 mm diameter sanitary service at a slope of 1.3% 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 Grading Plan (Drawing SSG) be implemented to provide wastewater servicing for the proposed development.

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

4.1 Background

Storm runoff generated by the proposed Dymon Self Storage Industrial Site will be collected by an on-site storm sewer system that will be discharged into the existing Industrial Avenue 675 mm diameter storm sewer system.

In regard to the storm criteria provided by the City, storm flows generated from the proposed facility will need to be controlled to the criterion described in the pre-consult meeting notes that have been provided by the City (refer to Appendix 'C' for meeting notes).

4.2 Storm Criteria

Storm servicing developed for the proposed Dymon site shall be designed to comply with the storm criteria provided by the City, which consists of the following (refer to Appendix 'C'):

- Storm runoff from the site to be limited to the existing 1:5 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 1:5 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 1:5 year peak flow and up to the 1:100 year recurrence shall be retained on site;

- Runoff generated by the subject site is collected by the Industrial Avenue 675 mm diameter storm sewer and ultimately conveyed to the Ottawa River. In terms of water quality requirements, it is anticipated that the RVCA will advise that the collected runoff for all asphalted areas shall meet an enhanced protection level (TSS removal of 80%) prior to leaving the site.

The storm servicing for the subject site has been developed to meet the above criteria.

4.3 Allowable Release Rate

Storm servicing and stormwater management for the subject site is to be controlled to the existing 1:5 year peak flow, which is to be calculated based on the lesser of the existing C-Factor or 0.5. Based on the review of the aerial photo, the subject site is virtually fully impervious with either asphalted parking surfaces or rooftops (landscaped areas account for ±0.160 ha). The allowable 1:5 year peak flow has been calculated based on the existing condition surfaces summarized in Table 4.

Table 4: Existing Condition Surfaces

Area (ha)	Runoff Coefficient (C)
0.160	0.20
0.046	0.40
0.593	0.90
0.799	0.73

Based on the above weighted C-Factor calculation, the allowable peak flow shall be estimated based on a C-Factor of 0.50 (refer to Appendix 'G' for calculations). Based on the existing servicing of the subject properties, runoff is currently collected by an on-site storm sewer system that outlets into the 675 mm diameter Industrial Avenue storm sewer system. Based on the calculations included in Appendix 'G', a time of concentration of less than 10 minutes was estimated based on the existing flow paths; 22 m of sheet flow along existing asphalt area and 66 m of pipe flow to the existing Industrial Avenue storm sewer system. Hence, an allowable release rate (1:5 year) of 115.7 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 limited to the allowable peak flow of 115.7 L/s.

4.4 Proposed Storm Servicing

The general storm and stormwater servicing constraints and targets used to develop detailed design for the Dymon Self Storage Industrial development are listed in Table 5 below.

Table 5: Storm Servicing Design Criteria

General Design Criteria
Storm sewers sized to accommodate the 1:2 year peak flows calculated with the Rational Method and the City of Ottawa Intensity-Duration-Frequency (IDF) curves. Sewer sized to convey the restricted rooftop flows.
Storm sewers designed based on an inlet time of ten (10) minutes, as per the Technical Bulletin ISDTB-2012-4.
Minor system storm flows to be controlled to the 1:5 year recurrence for a maximum C-Factor of 0.50. Captured storm flows to be discharged into the existing Industrial Avenue storm sewer.
The 1:100 year peak flows to be detained on-site by means of on-site storage designed to limit the total outflows to the calculated 1:5 year peak flow.
Minimum swale grades at 1.5% (with lower grades, a sub-drain must be provided).
Minimum roadway profile grades at 0.5%.
Minimum of 0.30 m clearance between the underside of footing and the 1:100 year HGL elevation.
Sanitary maintenance holes located away from ponding areas to minimize extraneous flows. In locations where sanitary maintenance holes need to be located in ponding areas, watertight manhole covers are provided.
Provide measures to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

4.5 Proposed Stormwater Management Solution and Calculations

4.5.1 Water Quantity

Storm servicing and stormwater management was developed to limit the 1:100 year post-development flows to 115.7 L/s. In order to achieve this criterion, on-site restrictions (i.e., inlet control devices (ICDs) and rooftop restrictors) were deemed necessary. Consequently, the storm servicing included the provision of storage via various types; rooftop storage, parking lot depressions and pipe storage.

The areas depicted on Drawing SWM were lumped into the following six (6) areas as presented in the stormwater management calculations in Appendix ‘G’:

Area 1 – Rooftop – Five (5) storey storage facility
Area 2 – 1:100 year (CB 1)
Area 3 - ICD1 – CB 2
Area 4 – ICD2 – CB 3
Area 5 – ICD3 – CB 4
Area 6 – ICD4 – CBMH1

For each of these areas, 1:5 year and 1:100 year peak flows were calculated with the Rational Method while the minimum storage volume requirement, if applicable, was calculated using the Modified Rational Method. A Storm Sewer Design Sheet was also prepared (refer to Appendix 'G' for further details), which demonstrates that the proposed sewers were sized based on the 1:2 year peak flows. Since rooftop restrictors are permanent, the storm sewer has been sized based on the restricted rooftop flow from the proposed building. Furthermore, ponding areas were depicted on Drawing SWM, which provides the available ponding based on the design. In addition, this Drawing also shows the ponding limits based on the Modified Rational Method calculations.

The proposed stormwater management solution presented on the attached drawings was formulated to ensure that the storm criterion is met. In light of the above, the proposed stormwater management system sized to meet the maximum peak flow of 115.7 L/s consists of the following measures (refer to Drawings SSG and SWM for further details):

Rooftop: Prior to the rooftop design being completed by the structural/mechanical engineers, levels of restrictions were assessed as part of the overall stormwater management servicing solution. It was assumed that 75% of the rooftop could be dedicated as rooftop storage and that a ponding depth of 0.152 mm could be used given that the roof needed to be designed as per the snow load described in the Ontario Building Code (OBC). Based on the above assumptions, an overall storage volume of 377 m^3 could be provided by the design. Based on an e-mail correspondence from the mechanical engineer (Appendix 'G'), rooftop runoff will be restricted using three (3) drains which will have the weir fully open (restricting to 1.89 L/s). Consequently, the overall release rate from the Building roof will be limited 5.67 L/s. Based on the Modified Rational Method calculations, the rooftop requires a minimum of 177.70m^3 to fully detain the 1:100 year storm event. Based on the assumption made (ponding depth of 152 mm and 75% of roof dedicated to storage), 377 m^3 can be provided by the design. Hence, the roof can meet the level of restrictions that were assumed.

Area 2 – 1:100 year: Drainage Area 2 consists of a drainage area associated with the drive-thru front entrance. Consequently, to prevent inconveniences from ponding, this area was provided with a 1:100 year level of service. Based on a total area of 0.059 ha, a total 1:100 year peak flow of 27.43 L/s was estimated at CB 1. Please note that CB1 and CB2 are interconnected and one ICD will be place at the outlet of CB 2 to accommodate flows from CB1 and CB2; (i.e. 27.43L/s +14L/s for a total 41.43L/s ICD)

Area 3 – ICD1 (CB2): Drainage Area 3 consists of an asphalted parking area totalling 0.061 ha. The overall AxC (100 year) for Area 3 was calculated to be 0.050. Based on the calculated 1:100 year peak flow of 27.70 L/s, storm runoff from Area 3 is proposed to be controlled by a Hydrovex Model 200 VHV-2 delivering a maximum of 14 L/s under a 2.09 m head. In light of the above, there is a need for 6.42 m^3 of storage in order to detain on-site the 1:100 year peak flows. Based on the ponding plan, Ponding Area 1 provides a total of 9.08 m^3 of storage; therefore sufficient storage has been provided by the design. Please note that CB1 and CB2 are interconnected and one ICD will be place at the outlet of CB 2 to accommodate flows from CB1 and CB2; (i.e. 27.43L/s +14L/s for a total 41.43L/s ICD)

Area 4 – ICD2 (CB3): Drainage Area 4 consists of an asphalted parking area totalling 0.112 ha. The overall AxC (100 year) for Area 4 was calculated to be 0.105. Based on the calculated 1:100 year peak flow of 41.81 L/s, storm runoff from Area 4 is proposed to be controlled by a Hydrovex Model 125 VHV-2 delivering a maximum of 20 L/s under a 2.09 m head. In light of the above, there is a need for 19.63 m^3 of storage in order to detain on-site the 1:100 year peak flows. Based on the ponding plan, Ponding Area 2 provides a total of 24.93 m^3 of storage; therefore sufficient storage has been provided by the design.

Area 5 – ICD3 (CB 4): Drainage Area 5 consists of an asphalted area totalling 0.156 ha. The overall AxC (100 year) for Area 5 was calculated to be 0.154. Based on the calculated 1:100 year peak flow of 76.32 L/s, storm runoff from Area 5 is proposed to be controlled by a Hydrovex Model 200 VHV-2 delivering a maximum of 38 L/s under a 1.48 m head. In light of the above, there is a need for 22.99 m^3 of storage in order to detain on-site the 1:100 year peak flows. Based on the ponding plan, Ponding Area 3 provides a total of 27.22 m^3 of storage; therefore sufficient storage has been provided by the design.

Area 6 – ICD4 (CBMH 1): Drainage Area 6 consists of an asphalted parking area totalling 0.080 ha. The overall AxC (100 year) for Area 6 was calculated to be 0.079. Based on the calculated 1:100 year peak flow of 26.43 L/s, storm runoff from Area 6 is proposed to be controlled by a Hydrovex Model 100 VHV-1 delivering a maximum of 10 L/s under a 2.15 m head. In light of the above, there is a need for 19.71 m^3 of storage in order to detain on-site the 1:100 year peak flows. Based on the ponding plan, Ponding Area 4 provides a total of 24.48 m^3 of storage for the 1:100 year storm. Hence, sufficient storage has been provided by the design.

Based on the above controlled areas, a 1:100 year peak flow of 115.1 L/s was calculated, which is below the allowable peak flow of 115.7 L/s. Consequently, the water quantity criterion provided by the City will be fulfilled.

4.5.2 Water Quality

Storm runoff generated by the proposed 851 Industrial Avenue site will be collected and conveyed by an on-site storm sewer system that will eventually outlet into the Ottawa River via the Industrial Avenue storm sewer system and other trunk sewers. Based on similar projects, it is anticipated that the RVCA will advise 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) is proposed at WQU ST MH101A as depicted on Drawing SSG. Coordination with the manufacturer of the CDS Unit will be completed in the future to confirm the net annual removal efficiency that the unit can achieve. The water quality unit will be designed to achieve a minimum TSS removal of 80% (Appendix 'G').

4.6 Summary and Conclusions

The storm and stormwater management solution presented in this Servicing Report (Drawings SSG and SWM) was found to fulfill the water quantity and quality criteria presented in Section 4.2. The calculated 1:100 year peak flow of 115.1 L/s is found to be below the allowable peak flow of 115.7 L/s while the minimum TSS removal of 80% will be achieved by a CDS Unit (PMSU 20_25) proposed at WQU ST MH101A) . In light of the above, it is recommended that the storm and stormwater management solution shown on the Site Servicing Grading Plan and Ponding Plan (Drawings SSG and SWM) be implemented to provide storm servicing for the proposed development.

5.0 EROSION AND SEDIMENTATION CONTROL

During construction of the proposed site, appropriate 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, will be implemented to trap sediment on site.

As a minimum, 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 catch basins and maintenance holes adjacent to the project area during construction, to prevent sediment from entering the sewer system. The filter fabric is to be inspected regularly and corrected as required;
- stockpiling of material during construction is to be located along flat areas away from drainage paths. For material placed on sloped areas, stockpiles are to be enclosed with a silt fence to protect watercourses;
- all 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.

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Appendix A

Surveyor Area Certificate

SURVEYOR'S REAL PROPERTY REPORT

PART 1 Plan of
PART OF LOT 14
CONCESSION JUNCTION GORE
Geographic Township of Gloucester
CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 300

12 9 6 3 0 6 12 Metres

Metric

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

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 Land Titles Act and the regulations made under them.
2. The survey was completed on the 24th day of May, 2017.

_____ Date

_____
Richard R. Gauthier
Ontario Land Surveyor

PART 2
THIS PLAN MUST BE READ IN CONJUNCTION WITH SURVEY REPORT DATED:_____

ANNIS, O'SULLIVAN, VOLLEBEKK LTD. grants to Dymon Group of Companies (the "Client"), their solicitors, mortgagees, and other related parties, permission to use original, signed, sealed copies of the Surveyor's Real Property Report in transactions involving The Client.

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2009989

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29 (3).

Notes & Legend

Denotes		
—□—	=	Survey Monument Planted
—■—	=	Survey Monument Found
SIB	=	Standard Iron Bar
SSIB	=	Short Standard Iron Bar
IB	=	Iron Bar
(WIT)	=	Witness
Meas.	=	Measured
(AOG)	=	Annis, O'Sullivan, Vollebekk Ltd.
(P1)	=	Plan 4R-28009
(P2)	=	Plan 5R-6405
(P3)	=	Plan (671) November 26, 1986
(P4)	=	Plan (AOG) February 11, 2013
	=	Deciduous Tree
	=	Coniferous Tree
FH	=	Fire Hydrant
WV	=	Water Valve
MH-ST	=	Maintenance Hole (Storm Sewer)
MH-S	=	Maintenance Hole (Sanitary)
MH-B	=	Maintenance Hole (Bell Telephone)
CB	=	Catch Basin
HH	=	Handhole
TWL	=	Traffic Warning Light - Post
B	=	Bollard
CLF	=	Chain Link Fence
BF	=	Board Fence
PO-W	=	Wood Pole
UP	=	Utility Pole
AN	=	Anchor
Ø	=	Diameter
+65.00	=	Location of Elevations
+65.00	=	Top of Concrete Curb Elevation
C/L	=	Centreline
BW	=	Brick Wall
OHW	=	Overhead Wires
	=	Property Line

Bearings are MTM grid, derived from the Southerly boundary of Plan 5R-8804 as shown on Plan 4R-28009, having a bearing of N67°41'50"E and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. 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. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

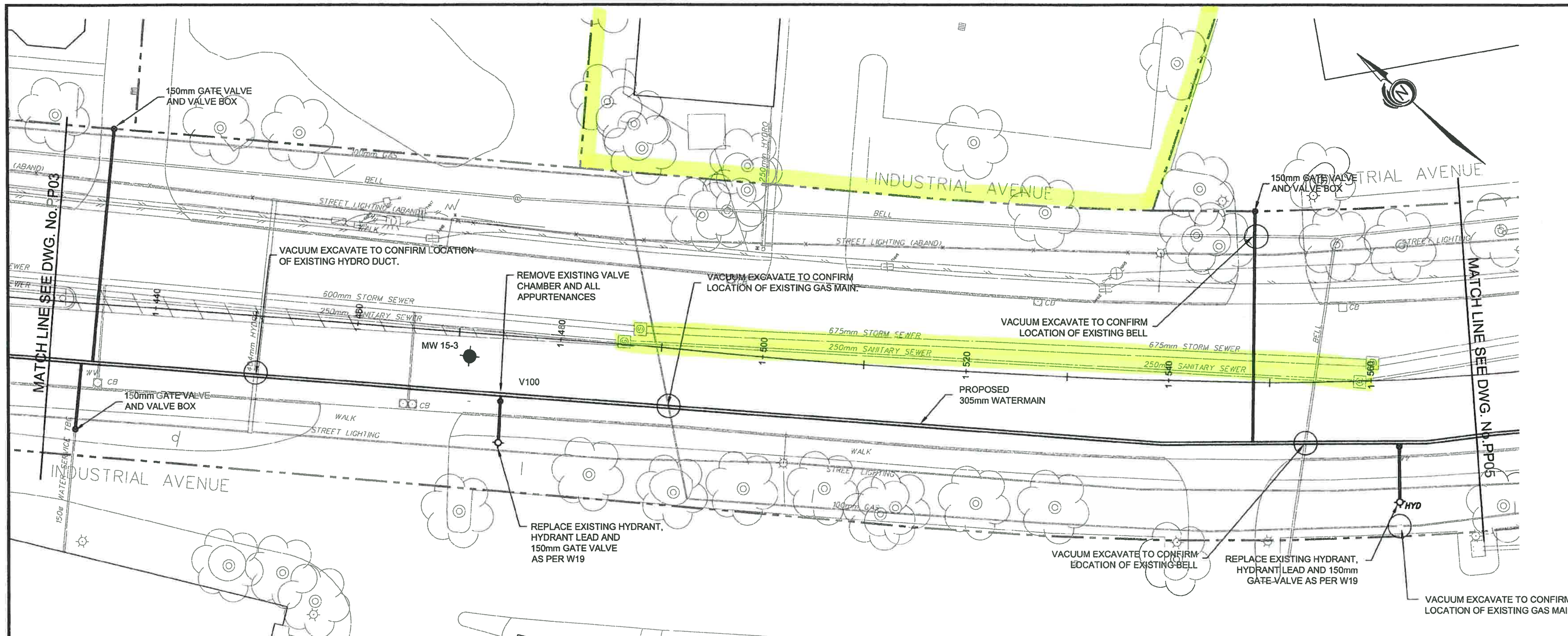
ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovls.com

Ontario Land Surveyors

Job No. 19528-I7 Dymon PT LT 14 JG T DI | A.M.

Appendix B

Abutting Municipal Services from GIS and Design Drawings



INDUSTRIAL AVENUE WATERMAIN REPLACEMENT

Ottawa

Contract No. ISD15-3017 | Dwg. No. PP04

INDUSTRIAL AVENUE

PLAN AND PROFILE
STA.1+430 TO STA.1+570

W. Newell, P.Eng. — *General Manager, Infrastructure Services Department*
C. Bonisteel, P.Eng. — *Senior Engineer, Infrastructure Services Department*

Stantec
400-1331 Clyde Avenue
Ottawa, Ontario
K2C 3G4

LICENSED PROFESSIONAL ENGINEER — G. CHOCHLINSKI — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — S.P. FRITSCH 100165599 — PROVINCE OF ONTARIO

Asset No.
Asset Group
Des. S.F. | Chk'd. G.R.C.
Dwn. E.C. / S.T. | Chk'd. G.R.C.
Utility Circ. No. | Index No.
Const. Inspector
Scale: HORIZONTAL 1:250 (0m 2.5 5 10); VERTICAL 1:50 (0m 1 2)

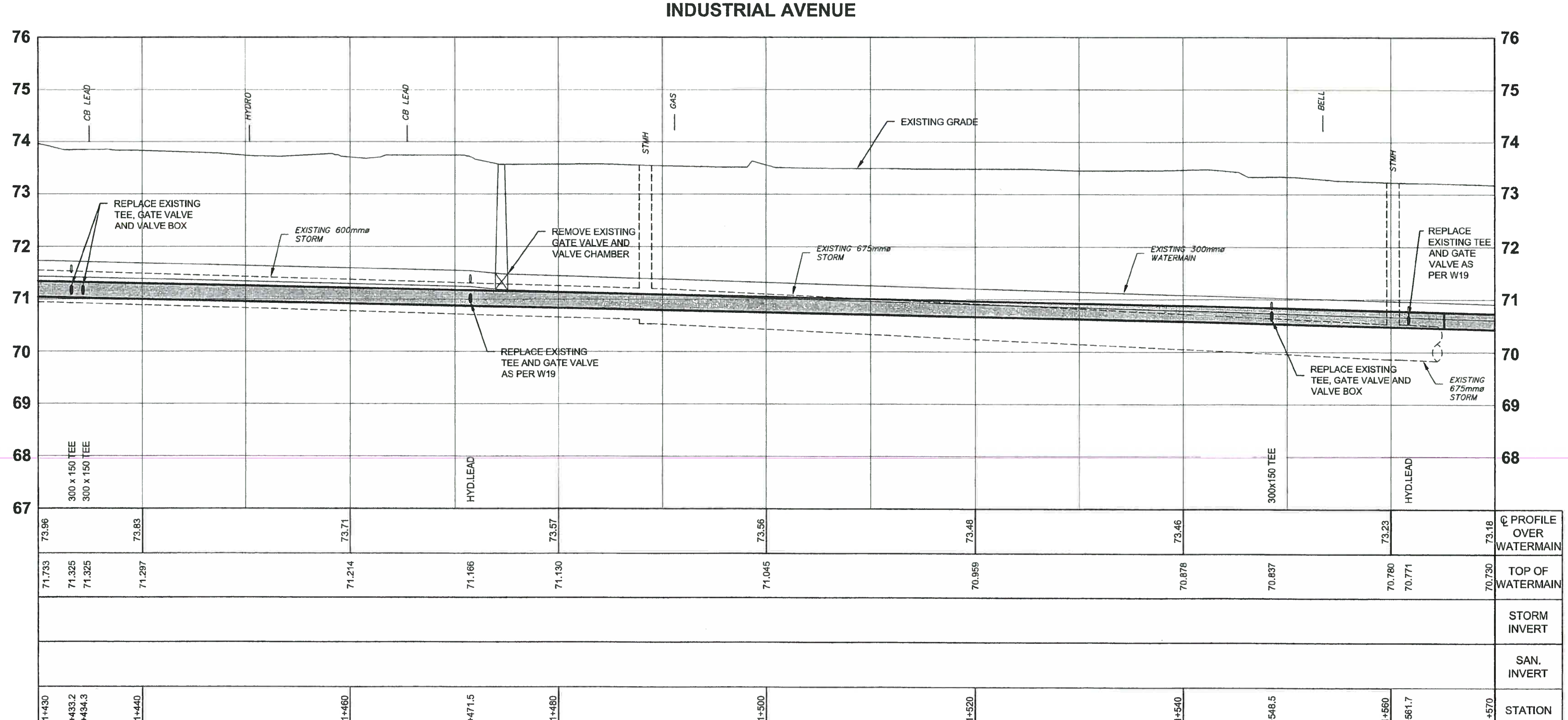
NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS No.	Description	By	Date (dd/mm/yyyy)
0	ISSUED FOR 60% REVIEW	G.R.C	31/03/2016
1	ISSUED FOR UTILITY CIRCULATION	G.R.C	01/04/2016
2	ISSUED FOR TENDER	G.R.C	04/05/2016
3	ISSUED FOR CONSTRUCTION	G.R.C	22/06/2016

NOTES:

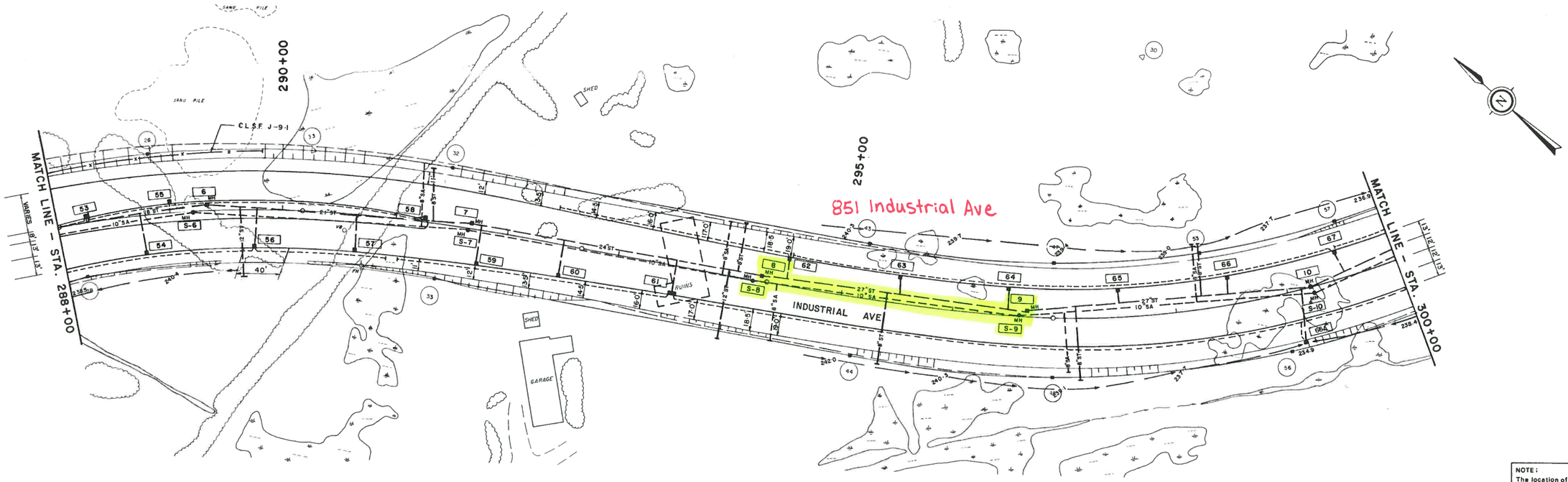
1. DEPTH OF COVER TO BE 2.4m MIN. INSULATE AS PER CITY STANDARD DRAWING W22 IF COVER IS LESS THAN 2.4m.
2. THRUST AND RESTRAINING LENGTHS TO BE LOCATED AND INSTALLED AS PER CITY STANDARDS.
3. PRE-CONSTRUCTION CCTV REPORTS ARE TO BE SUBMITTED A MINIMUM OF 15 DAYS PRIOR TO THE START OF CONSTRUCTION.
4. SUPPORT/PROTECTION OF EXISTING UTILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR. REFER TO DETAILS AND S.P. F-3017-09 FOR SUPPORT AND ENBRIDGE PROTECTION REQUIREMENTS.

INDUSTRIAL AVENUE

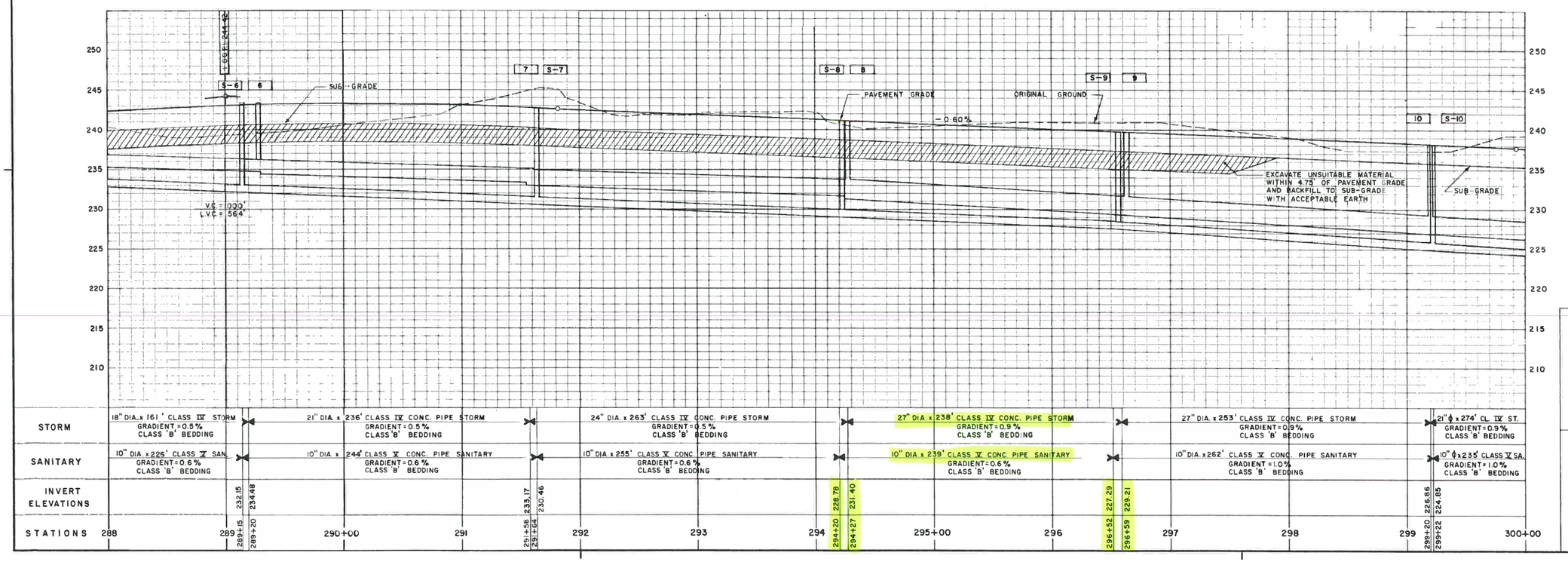


10111

R-626-12



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



AS BUILT

NO.	REVISION	BY	DATE
1.	GENERAL REDESIGN	O.H.S.	79.06.04

THE REGIONAL MUNICIPALITY OF
OTTAWA – CARLETON
Transportation Department

INDUSTRIAL AVENUE EXTENSION

GRADING AND DRAINAGE
STA. 288+00 TO STA. 300+00

Des: K.L.T.	Chkd: P.G.S.
Dwn: W.S.	Chkd: K.L.T.
Date: JUNE, 1979	
Scale: Horiz. 1" = 40' Vert. 1" = 6'	

Director Design & Construction
W. Greenidge
Chief Design Engineer

CONTRACT NO. 72-547

DWG. NO. R626-R-III

SHEET 12 OF 38

TYPE "A"

Julie White

From: Karla Ferrey
Sent: September 29, 2017 11:09 AM
To: Julie White
Subject: FW: 851 Industrial

Karla Ferrey, P.Eng.
Civil Engineer

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

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

CANADA'S BEST MANAGED COMPANIES

From: Baird, Natasha [mailto:Natasha.Baird@ottawa.ca]
Sent: September 29, 2017 10:29 AM
To: Annie Williams
Cc: Karla Ferrey
Subject: 851 Industrial

Hi Annie,

The GIS information shows 305mm PVC pipe in front of 851 Industrial. I would trust as-builts more because the GIS information is not always entered properly. You can contact the Information Centre at informationcentre@ottawa.ca to get the plans.

Thank you,

Natasha Baird, P.Eng. ing., LEED Green Associate
Project Manager | Gestionnaire de projets
Development Review, South Group | Examen des projets d'aménagement, groupe sud
Planning, Infrastructure and Economic Development Department | Services de la planification, de l'infrastructure et du développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 27995
Mail Code 01-14
ottawa.ca/planning / ottawa.ca/urbanisme
*Please consider your environmental responsibility before printing this e-mail

Appendix C

Pre-Consultation Correspondences

MEMO

Date: June 21, 2017

To / Destinataire	Mary Ellen Wood, Planner	
From / Expéditeur	Natasha Baird, Project Manager, Infrastructure Approvals	
Subject / Objet	**Pre-Application Consultation** **851 Industrial Avenue** **Ward 18**	File No. PC2017-

Please note the following information regarding the engineering design submission for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address: http://ottawa.ca/en/development-application-review-process-0/servicing-study-guidelines-development-applications

2. Servicing and site works shall be in accordance with the following documents:

   - ⇨ Ottawa Sewer Design Guidelines (October 2012)
   - ⇨ Ottawa Design Guidelines – Water Distribution (2010)
   - ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - ⇨ City of Ottawa Environmental Noise Control Guidelines (January, 2016)
   - ⇨ City of Ottawa Park and Pathway Development Manual (2012)
   - ⇨ City of Ottawa Accessibility Design Standards (2012)
   - ⇨ Ottawa Standard Tender Documents (latest version)
   - ⇨ Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

4. If possible provide existing studies and plans for the site in the submission.

5. If the proposed building will have sprinklers, the closest fire hydrant will have to be 45m away from the building entrance.

6. If the application will proceed with the option of demolishing the existing building, the development should be serviced with one trench and stormwater management is applicable for the whole site.

7. If the application proceeded with the option of renovating the existing building, the development could maintain connections given that these services were demonstrated to be up to standard. Stormwater management will be required for the changes to the site.

8. The Stormwater Management Criteria, for the subject site, is to be based on the following:

    i. The 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.

    ii. For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.

    iii. The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).

    iv. A calculated time of concentration (Cannot be less than 10 minutes).

    v. Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.

9. Deep Services (Storm, Sanitary & Water Supply)

i. Services should ideally be grouped in a common trench to minimize the number of road cuts.

ii. Monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).

iii. Sewer connections to be made above the springline of the sewermain as per:

a. Std Dwg S11.1 for flexible main sewers – *connections made using approved tee or wye fittings.*

b. Std Dwg S11 (For rigid main sewers) – *lateral must be less that 50% the diameter of the sewermain,*

c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – *for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,*

d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

e. No submerged outlet connections.

10. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

i. Location of service

ii. Type of development and the amount of fire flow required (as per FUS, 1999).

iii. Average daily demand: ___ l/s.

iv. Maximum daily demand: ___l/s.

v. Maximum hourly daily demand: ___ l/s.

11. Provide a geotechnical report for the proposed development.

12. Provide a noise and vibration study for the proposed development if near a residential area (within 50m).

13. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

14. Please pre-consult with the Ottawa MOECC Office.

15. Please pre-consult with RVCA.

16. Exterior Site Lighting:

    If the exterior Site Lighting is used, provide a certification and plan by a qualified engineer confirming the design complies with the following criteria needs to be provided:

    i. It must be designed using only fixtures that meet the criteria for Full Cut-Off (Sharp cut-off) Classification, as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and;

    ii. It must result in minimal light spillage onto adjacent properties. As a guideline, 0.5 foot-candle is normally the maximum allowable spillage.

    iii. The location of the fixtures, fixture types as in make, model and part number and the mounting heights must be shown on one of the approved plans.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x 27995 or by email at natasha.baird@ottawa.ca.

23 June 2017

RECORD OF DISCUSSIONS (ROD) -
PRECONSULTATION MEETING – 851 Industrial Avenue
City of Ottawa, City Hall Room 4102E – 23 June 2017

In attendance: Bliss Edwards, Dymon
Miguel Tremblay, Fotenn
Christopher Gordon, Parsons
Mary Ellen Wood, Planner, City of Ottawa
Christopher Moise, Urban Design, City of Ottawa
Wally Dubyk, Transportation, City of Ottawa

ITEM	TOPIC	ACTION
1	Introductory Remarks Project: The current proposal is to develop a 4 storey self-storage facility with associated surface parking and potentially include retail use at-grade.	Info
2	**Significant Discussion:** - Curent zone: IL, Light Industrial Zone - Warehouse is a permitted use. Retail is not a permit use. - Section 203(2) in the IL zone permits additional uses (*animal care establishment, automobile service station, bank, bank machine, car wash, convenience store, gas bar, instructional facility, personal service business, restaurant*) provided each use does not exceed 300 square metres of gross floor area. - Miguel Tremblay, advised typical retail footprint of 750 square metres. - Property is designated Employment. - OPA 180 permits a variety of ancillary uses, complementary-type uses to serve the employees of Urban Employment Area. Ancillary uses consisting of a single occupancy on an individual pad shall be limited to 750m^2 of gross floor area. - OPA 180 speaks to ancillary uses, retail is not captured under the ancillary uses.	

ITEM	TOPIC	ACTION
	- At the time of pre-consultation, it was unclear if a retail use would be proposed on the ground floor of the proposed building. - To pursue permitting retail use at this location, an OPA and Zoning would be required. - The purposed site plan to illustrate road widening for Industrial Road. - Include 2m concrete sidewalks along frontage, tie sidewalk into adjacent property. - Tree permit will be required prior to removal of trees. Investigate parking layout options to retain mature trees on-site. - Design layout/façade was insufficient at pre-consultation, no details where provided. The City will require a higher level of design/glazing/features to be incorporated into the proposal. - Provide a stronger pedestrian realm between the curb and the front door of the building.	

Mary Ellen Wood
Planner, Development Review – South Services

Appendix D

City of Ottawa Development
Servicing Checklist

DYMON SELF STORAGE, 851 INDUSTRIAL AVENUE

DEVELOPMENT SERVICING STUDY CHECKLIST

REFERENCED STUDIES AND REPORTS	REFERENCE
Site Servicing Report for Dymon Self Storage, 851 Industrial Avenue (J.L. Richards & Associates Limited, October 2017)	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 Grading Plan (SSG)
☐	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 Grading Plan (SSG)
☐	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) Site Servicing Grading Plan (SSG) Ponding 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 Grading Plan (SSG)
☒	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 Grading Plan (SSG)
☒	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 Grading Plan (SSG)
☒	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 Grading Plan (SSG)
☐	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 Grading Plan (SSG)

☐	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 Grading Plan (SSG)
☒	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) Ponding 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 Grading Plan (SSG) Ponding 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 Grading Plan (SSG) Ponding 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.	To be Reviewed/Submitted
☐	Changes to Municipal drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation, etc.).	N/A

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

Appendix E

Hydraulic Network Analysis (Water Distribution System)

Appendix E1

Water Demands

Annie Williams

From: Katelyn Lucas at Nicholas Caragianis Architect Inc. <klucas@ncarchitect.ca>
Sent: August 22, 2017 1:45 PM
To: 'Scott Vallier'; Annie Williams
Cc: 'Bliss Edwards'; 'Andrew Beyer'; Karla Ferrey; Julie White; Lucie Dalrymple; J. Santiago Guardia at Nicholas Caragianis Architect Inc.
Subject: RE: 851 Industrial Avenue - Dymon Storage

Follow Up Flag: Follow up
Flag Status: Completed

Hi Scott/Annie
Industrial is 5 storeys, no basement. The total GFA is 176,645 ft (16,412m2).
Katelyn

Katelyn Lucas nicholas**caragianis**architect inc.
MArch, MRAIC, OAA 137 Pamilla Street, Ottawa, ON K1S 3K9
Email: klucas@ncarchitect.ca (613) 237-6801 (t) (613) 237-8289 (f)
Ext: 228 www.ncarchitect.ca

From: Scott Vallier [mailto:svallier@gwal.com]
Sent: August 22, 2017 1:13 PM
To: Annie Williams <awilliams@jlrichards.ca>; Katelyn Lucas <klucas@ncarchitect.ca>
Cc: Bliss Edwards <bedwards@dymon.ca>; Andrew Beyer <abeyer@dymon.ca>; Karla Ferrey <kferrey@jlrichards.ca>; Julie White <jwhite@jlrichards.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>
Subject: RE: 851 Industrial Avenue - Dymon Storage

Hi Annie,

Please see my answers below in red.

Katelyn,

See question D below.

Thanks,

Scott Vallier, Mechanical Designer
Goodkey, Weedmark & Associates Limited
Consulting Engineers
1688 Woodward Drive, Ottawa, Ontario, K2C 3R8
Voice: 613-727-5111, ext. 259
Fax: 613-727-5115
Email: svallier@gwal.com
Web: www.gwal.com

From: Annie Williams [mailto:awilliams@jlrichards.ca]
Sent: August-11-17 11:51 AM
To: Scott Vallier <svallier@gwal.com>
Cc: Bliss Edwards <bedwards@dymon.ca>; Andrew Beyer <abeyer@dymon.ca>; Katelyn Lucas <klucas@ncarchitect.ca>; Karla Ferrey <kferrey@jlrichards.ca>; Julie White <jwhite@jlrichards.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>
Subject: 851 Industrial Avenue - Dymon Storage

Hi Scott,

We would like to send a request to the City of Ottawa for hydraulic boundary conditions for the Dymon site at 851 Industrial Ave. In order to do so, we require the following information for the proposed building:

a. The domestic peak hour demand based on the fixture count. Based on past projects it is estimated the new building will have 32.2 Fixture units - 25GPM. This does not include the irrigation system & fire suppression system.
b. The domestic maximum day demand along with the fire flow requirement for the sprinkler system. For the buildings sprinkler system we will require 500GPM. Requirement for the entire site shall be provided by civil.
c. The domestic average day demand. I suggest you ask Dymon Storage to provide a report of how much domestic water was used on other buildings using the water meter and base your calculations on these numbers.
d. The total floor area for the proposed building (including all storeys, but excluding basements at least 50% below grade). Katelyn is better suited to answer this question.

Please also confirm the watermain service size required at the building, as well as the pipe sizes for wastewater and stormwater.
8”dia Water, 6”dia Sanitary, 10”dia Storm.

Should you have any questions, please do not hesitate to contact me.

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

Appendix E2

FUS Calculations

Fire Flow Calculation
(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)		16412 m^2

F= = Required fire flow (litres/minute) **Calculated:** 22547 L/min

= 220 $C(A)^{0.5}$ (25,000 L/min Max) **(1) Rounded:** 23000 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) 23000 L/min

Sprinkler Reduction

* non-combustible -fire resistive -50%

(3) Reduction: -11500 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: 3450 L/min

Fire Flow = Calculated: **14950 L/min**

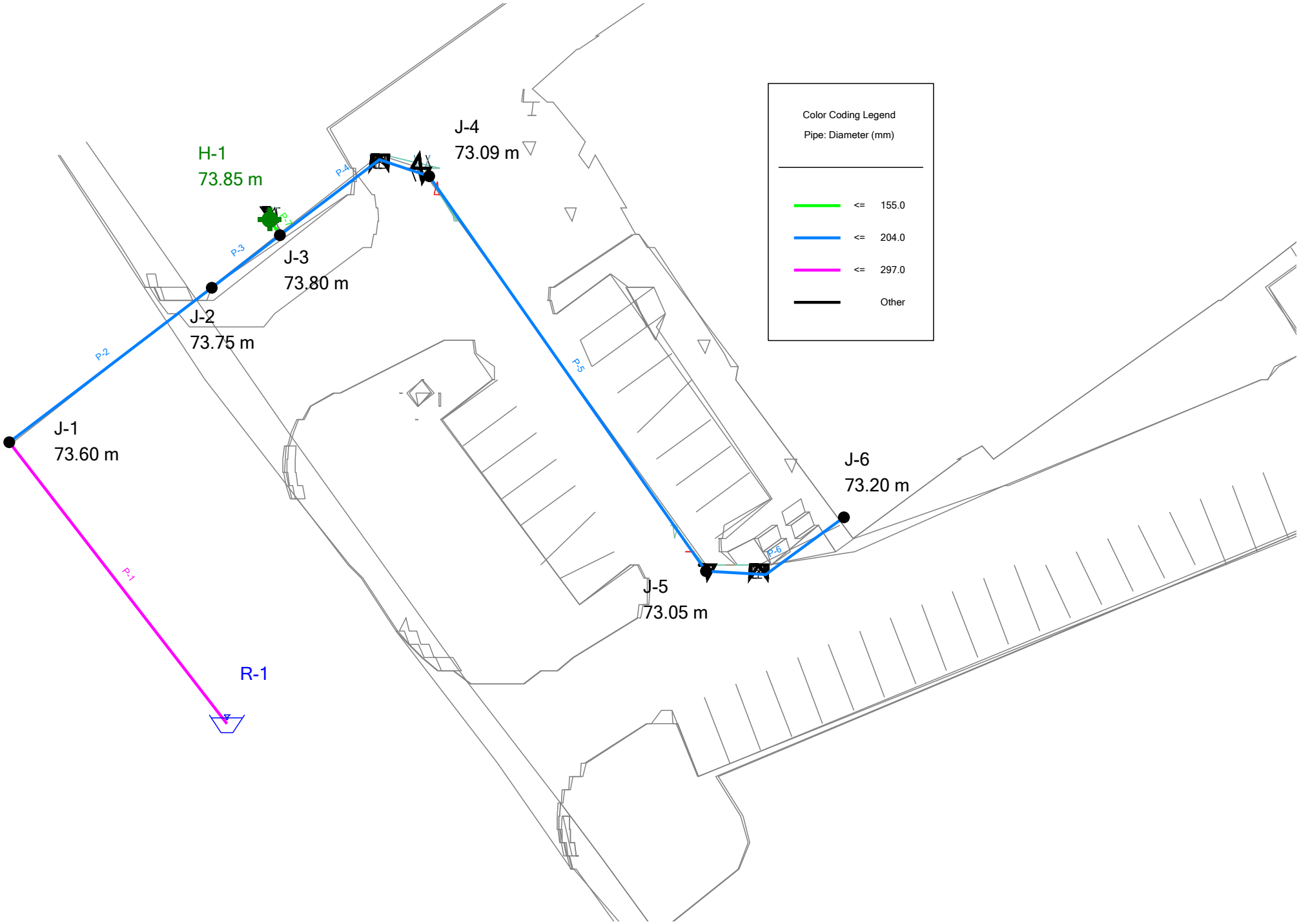
Rounded: **15000 L/min**

250 L/s

Appendix E3

Overall Schematic

Dymon Storage - 851 Industrial Avenue
Overall Schematic



Appendix E4

Hydraulic Boundary Conditions

Annie Williams

From: Baird, Natasha <Natasha.Baird@ottawa.ca>
Sent: September 15, 2017 4:09 PM
To: Annie Williams
Cc: Wood, Mary Ellen; Bliss Edwards; Andrew Beyer; Katelyn Lucas; Scott Vallier; Karla Ferrey; Lucie Dalrymple; Guy Forget; Julie White
Subject: RE: Dymon Storage - 851 Industrial - Request for Hydraulic Boundary Conditions
Attachments: 851 Industrial Aug 2017.pdf

Hi Annie,

Please find boundary conditions below for 851 Industrial:

The following are boundary conditions, HGL, for hydraulic analysis at 851 Industrial (zone 1E), assumed to be connected to a future 305mm on Industrial (see attached PDF for location).

Minimum HGL = 109.8m

Maximum HGL = 118.2m

MaxDay (0.88 L/s) + FireFlow (250 L/s) = 102.3m

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.

Thank you,

Natasha Baird, P.Eng. ing., LEED Green Associate
Project Manager | Gestionnaire de projets
Development Review, South Group | Examen des projets d'aménagement, groupe sud
Planning, Infrastructure and Economic Development Department | Services de la planification, de l'infrastructure et du développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 27995
Mail Code 01-14
ottawa.ca/planning / ottawa.ca/urbanisme

From: Annie Williams [mailto:awilliams@jlrichards.ca]
Sent: Thursday, August 24, 2017 12:42 PM
To: Baird, Natasha <Natasha.Baird@ottawa.ca>

Cc: Wood, Mary Ellen <MaryEllen.Wood@ottawa.ca>; Bliss Edwards <bedwards@dymon.ca>; Andrew Beyer <abeyer@dymon.ca>; Katelyn Lucas <klucas@ncarchitect.ca>; Scott Vallier <svallier@gwal.com>; Karla Ferrey <kferrey@jlrichards.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>; Julie White <jwhite@jlrichards.ca>
Subject: Dymon Storage - 851 Industrial - Request for Hydraulic Boundary Conditions

Hi Natasha,

We would like to obtain hydraulic boundary conditions for Dymon Storage's redevelopment of a site located at 851 Industrial Avenue (refer to attached Location Plan).

The proposed usage is commercial and consists of a five-storey storage facility building with a covered drive-through garage. A preliminary Site Plan is attached.

We request boundary conditions on the existing 305 mm diameter watermain along Industrial Avenue.

Based on the fixture count from the mechanical engineer, the following demands were calculated:

Average Day = 0.59 L/s
Maximum Day = 0.88 L/s
Peak Hour = 1.58 L/s

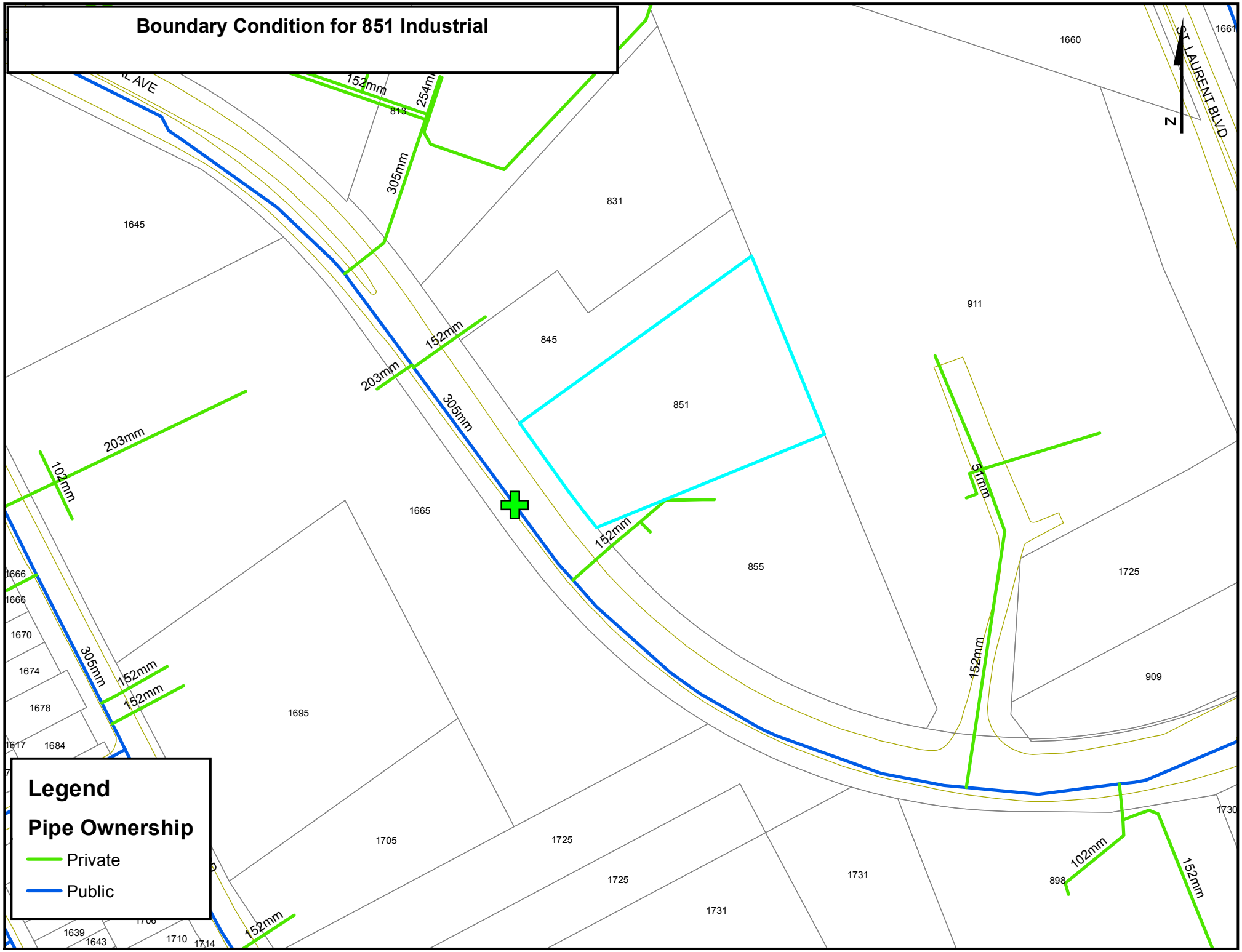
A fire flow requirement of 250 L/s (15,000 L/min) was calculated as per the FUS (attached) and the building will have a fire suppression system.

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

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

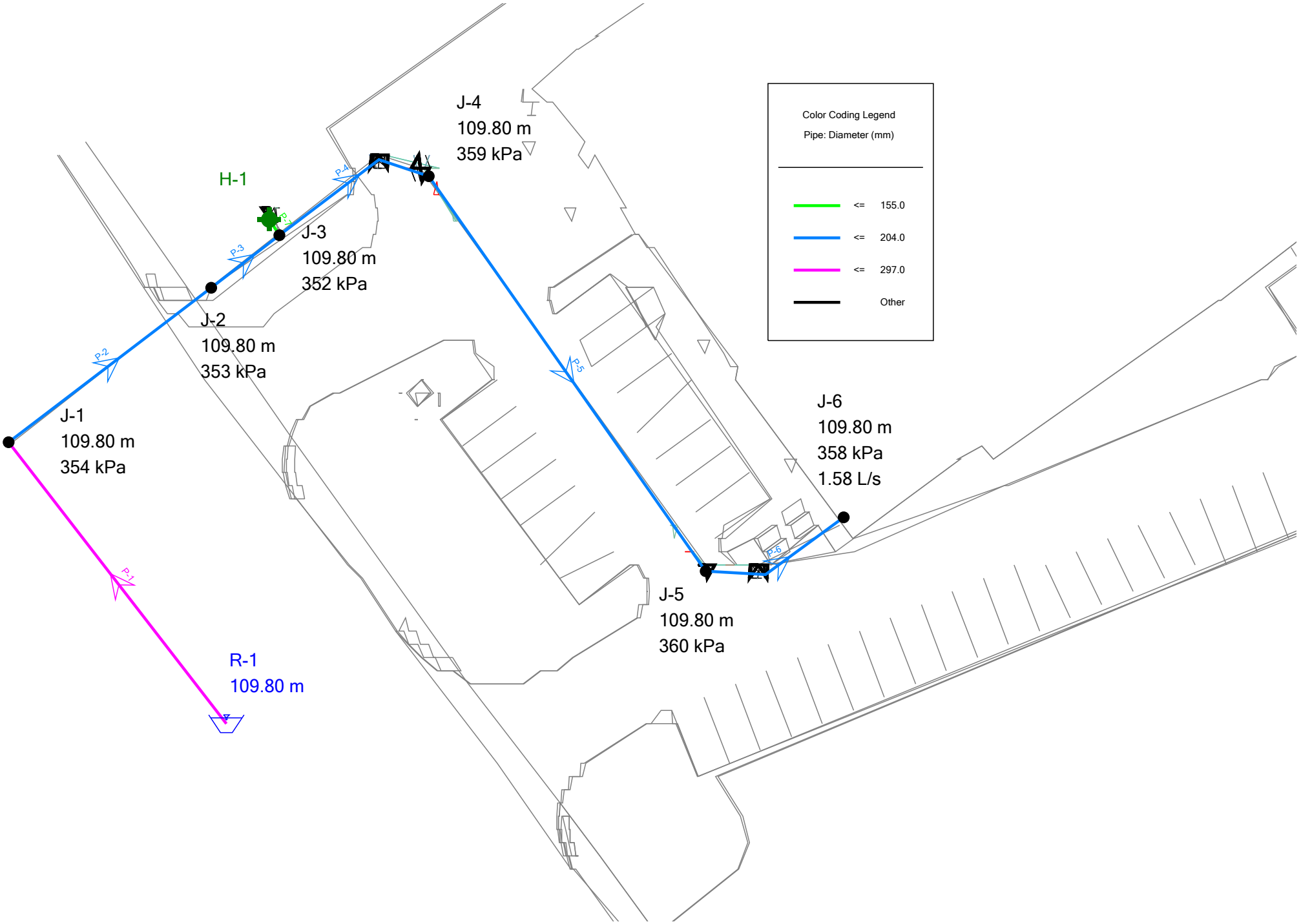

Boundary Condition for 851 Industrial
ST. LAURENT BLVD
N
1660
1661
813
831
1645
911
845
851
855
1665
1725
909
1695
1705
1731
1730
898
1666
1670
1674
1678
1617
1684
1639
1643
1710
1714
152mm
254mm
305mm
203mm
102mm
510mm
Legend
Pipe Ownership
Private
Public

Appendix E5

Peak Hour Simulation Results

Dymon Storage - 851 Industrial Avenue

Peak Hour Demand



Dymon Storage - 851 Industrial Avenue

Peak Hour Demand

Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-3	73.80	0.00	109.80	352
J-2	73.75	0.00	109.80	353
J-1	73.60	0.00	109.80	354
J-6	73.20	1.58	109.80	358
J-4	73.09	0.00	109.80	359
J-5	73.05	0.00	109.80	360

Dymon Storage - 851 Industrial Avenue

Peak Hour Demand

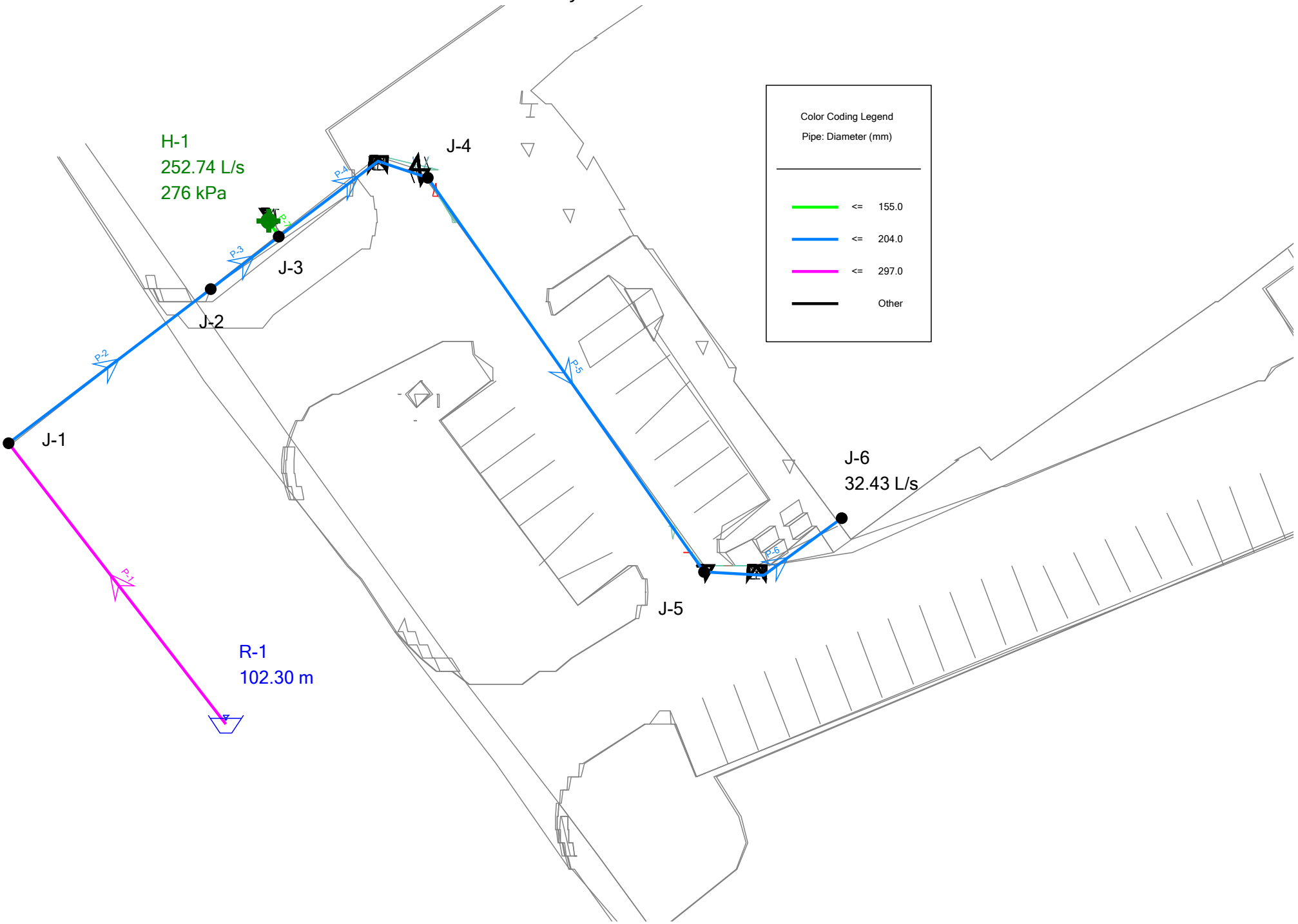
Pipe Table

Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)	Velocity (m/s)	Flow (L/s)
P-1	28	297.0	PVC	120.0	109.80	109.80	0.02	1.58
P-2	20	204.0	PVC	110.0	109.80	109.80	0.05	1.58
P-3	7	204.0	PVC	110.0	109.80	109.80	0.05	1.58
P-4	14	204.0	PVC	110.0	109.80	109.80	0.05	1.58
P-5	37	204.0	PVC	110.0	109.80	109.80	0.05	1.58
P-6	12	204.0	PVC	110.0	109.80	109.80	0.05	1.58
P-7	1	155.0	PVC	100.0	109.80	109.80	0.00	0.00

Appendix E6

Maximum Day Plus Fire Flow
Simulation Results

Dymon Storage - 851 Industrial Avenue
Maximum Day + Fire Flow Demand



Dymon Storage - 851 Industrial Avenue

Maximum Day + Fire Flow Demand

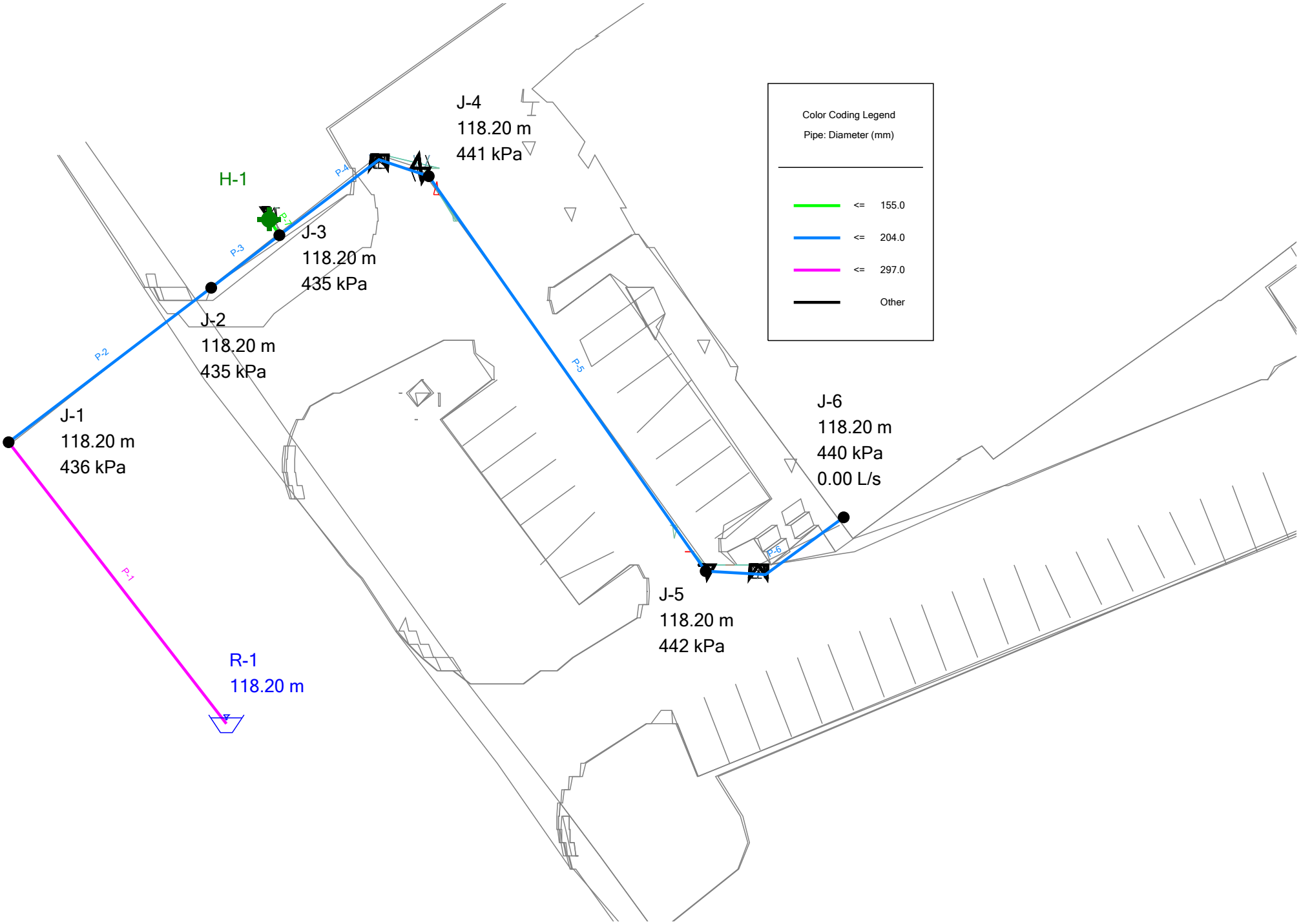
Fire Flow Table

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-1	218.45	252.74	252.74	True	140	140	J-3

Appendix E7

Maximum Pressure Check

Dymon Storage - 851 Industrial Avenue
Maximum Pressure



Dymon Storage - 851 Industrial Avenue

Maximum Pressure

Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-3	73.80	0.00	118.20	435
J-2	73.75	0.00	118.20	435
J-1	73.60	0.00	118.20	436
J-6	73.20	0.00	118.20	440
J-4	73.09	0.00	118.20	441
J-5	73.05	0.00	118.20	442

Dymon Storage - 851 Industrial Avenue

Maximum Pressure

Pipe Table

Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)	Velocity (m/s)	Flow (L/s)
P-1	28	297.0	PVC	120.0	118.20	118.20	0.00	0.00
P-2	20	204.0	PVC	110.0	118.20	118.20	0.00	0.00
P-3	7	204.0	PVC	110.0	118.20	118.20	0.00	0.00
P-4	14	204.0	PVC	110.0	118.20	118.20	0.00	0.00
P-5	37	204.0	PVC	110.0	118.20	118.20	0.00	0.00
P-6	12	204.0	PVC	110.0	118.20	118.20	0.00	0.00
P-7	1	155.0	PVC	100.0	118.20	118.20	0.00	0.00

Appendix F

Sanitary Sewer Calculations

Dymon Self Stroage - 851 Industrial Avenue

Wastewater Design Calculations

Calculation Method 1 (City of Ottawa Design Guidelines):

Total Gross Area =	0.799	ha
Theoritical Unit Rate =	50,000	L/ha/day - per City of Ottawa Design Guidelines
Average Wastewater Flow =	39950	L/day
Average Wastewater Volume =	0.92	L/s (assuming 12 hour operation)
Peaking Factor =	1.5	
Infiltration 0.28 L/s/ha=	0.22	L/s
Peak Design Flow =	1.61	L/s

Calculation Method 2 (Mechanical Fixture Count):

Proposed 5-Storey Building =	50 GPM	= 3.15 L/s
Peak Design Flow =	3.15	L/s

Use the most conservative method; Q = 3.15 L/s

The proposed 150 mm diameter sanitary service with a slope of ± 1.3% has a capacity of 18.1 L/s and a full flow velocity of 0.99 m/s. Therefore, the proposed sanitary service has sufficient capacity to accommodate the Peak Design Flow of 3.15 L/s.

Appendix G

Storm Calculations and E-mail Correspondences

Julie White

From: Scott Vallier <svallier@gwal.com>
Sent: October 3, 2017 1:59 PM
To: Julie White
Cc: Karla Ferrey; 'Bliss Edwards'
Subject: RE: 851 Industrial Ave - Dymon - Sanitary Flow Rate

Hey Julie,

Roof drains :
For 1 roof drain, 6" of head (depth of water) and our flow control device is "fully exposed" then our flow would be 1.89L/s. Therefore with 3 roof drains at the same conditions we would have a total flow rate of 5.67l/s.

Sanitary:
Based on past projects it is estimated that the new building will have 32.2 fixture units – 24.9GPM. If the new building has a retail section then we can double this to 50GPM.

Anything else you require please let me know.

Thanks,

Scott Vallier, Mechanical Designer
Goodkey, Weedmark & Associates Limited
Consulting Engineers
1688 Woodward Drive, Ottawa, Ontario, K2C 3R8
Voice: 613-727-5111, ext. 259
Fax: 613-727-5115
Email: svallier@gwal.com
Web: www.gwal.com

From: Julie White [mailto:jwhite@jlrichards.ca]
Sent: September-27-17 3:55 PM
To: Scott Vallier <svallier@gwal.com>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; 'Bliss Edwards' <bedwards@dymon.ca>
Subject: 851 Industrial Ave - Dymon - Sanitary Flow Rate

Scott,

Further to my previous email, can you please confirm the peak sanitary flow rate for the Dymon site at 851 Industrial.

Thank you,

Julie

Julie White, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
864 Lady Ellen Place, Ottawa, ON K1Z 5M2

Julie White

From: Julie White
Sent: September 27, 2017 3:40 PM
To: 'Scott Vallier'
Cc: 'J. Santiago Guardia at Nicholas Caragianis Architect Inc.'; Karla Ferrey; 'Katelyn Lucas'; rmunden@clelandjardine.com; 'Bliss Edwards'
Subject: 851 Industrial Ave - Dymon - Rooftop Restrictions and Storage
Attachments: Zurn Chart.pdf

Hi Scott,

With regards to the proposed Dymon facility located at 851 Industrial Avenue, JLR's stormwater management strategy includes parking lot retention with ICDs as well as rooftop restrictions combined with rooftop storage. We have assumed the following rooftop properties and release rates and will need your confirmation that you can fulfill our assumed controls.

Assumed Rooftop Properties:

Rooftop Area = 0.331 ha
Assumed rooftop area dedicated to storage = 75% x 0.331 ha = 0.248 ha or 2483 m2
Assumed depth of storage = 0.152m (per Zurn chart, attached)
Available rooftop volume = 2483 m2 x 0.152 m = 377 m3

Assumed Zurn drain at release rate of 113.5 L/m or 1.89 L/s
Area covered per drain = 929 m2
Number of drains = 2483 m2 / 929 m2 = 2.67
Assumed No. of drains = 3

Maximum 1:100 year rooftop flow = 3 drain x 1.89 L/s = **5.67 L/s**

Based on our calculations, a minimum rooftop storage of **178 m3** is required to fulfill the imposed storm discharge criterion. This calculated storage is found to be less than the above noted 377 m3 of available roof storage.

Scott, please confirm that the rooftop drains can be designed based on a maximum flow restriction of 5.67 L/s.

Ryan / Santiago, please confirm that a minimum rooftop storage volume of 178 m3 can be provided.

Please feel free to give me a call should you have any questions.

Julie

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

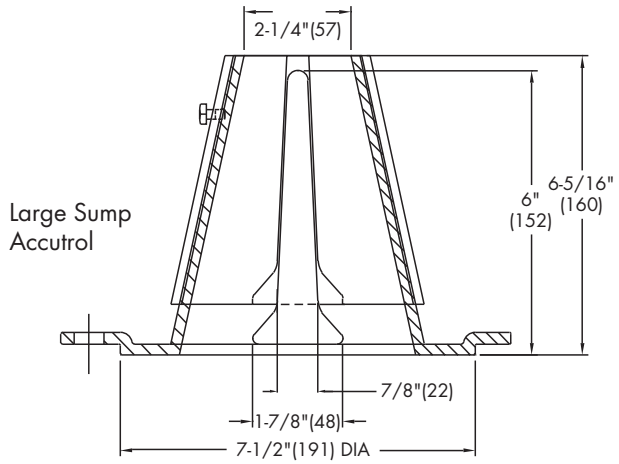
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

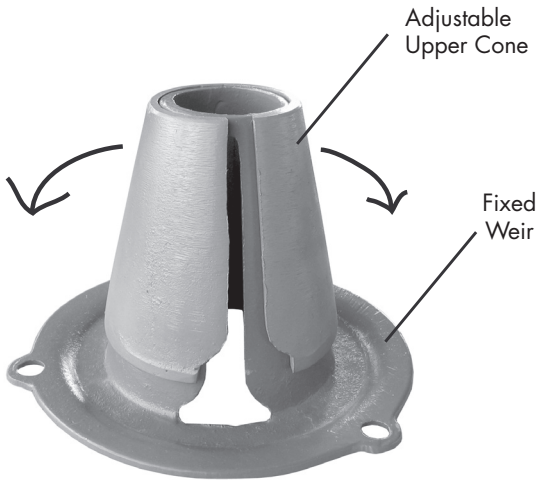
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the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

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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

Julie White

From: Scott Vallier <svallier@gwal.com>
Sent: August 22, 2017 1:13 PM
To: Annie Williams; Katelyn Lucas
Cc: Bliss Edwards; Andrew Beyer; Karla Ferrey; Julie White; Lucie Dalrymple
Subject: RE: 851 Industrial Avenue - Dymon Storage

Hi Annie,

Please see my answers below in red.

Katelyn,

See question D below.

Thanks,

Scott Vallier, Mechanical Designer
Goodkey, Weedmark & Associates Limited
Consulting Engineers
1688 Woodward Drive, Ottawa, Ontario, K2C 3R8
Voice: 613-727-5111, ext. 259
Fax: 613-727-5115
Email: svallier@gwal.com
Web: www.gwal.com

From: Annie Williams [mailto:awilliams@jlrichards.ca]
Sent: August-11-17 11:51 AM
To: Scott Vallier <svallier@gwal.com>
Cc: Bliss Edwards <bedwards@dymon.ca>; Andrew Beyer <abeyer@dymon.ca>; Katelyn Lucas <klucas@ncarchitect.ca>; Karla Ferrey <kferrey@jlrichards.ca>; Julie White <jwhite@jlrichards.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>
Subject: 851 Industrial Avenue - Dymon Storage

Hi Scott,

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a. The domestic peak hour demand based on the fixture count. Based on past projects it is estimated the new building will have 32.2 Fixture units - 25GPM. This does not include the irrigation system & fire suppression system.
b. The domestic maximum day demand along with the fire flow requirement for the sprinkler system. For the buildings sprinkler system we will require 500GPM. Requirement for the entire site shall be provided by civil.
c. The domestic average day demand. I suggest you ask Dymon Storage to provide a report of how much domestic water was used on other buildings using the water meter and base your calculations on these numbers.
d. The total floor area for the proposed building (including all storeys, but excluding basements at least 50% below grade). Katelyn is better suited to answer this question.

Please also confirm the watermain service size required at the building, as well as the pipe sizes for wastewater and stormwater.
8”dia Water, 6”dia Sanitary, 10”dia Storm.

Should you have any questions, please do not hesitate to contact me.

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

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

CANADA'S BEST MANAGED COMPANIES

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

STORMWATER MANAGEMENT CALCULATIONS

Existing Conditions

C-Factor Calculation:

Total Area =	0.799 ha		
Landscaped Area =	0.160 ha	C =	0.20
Gravel Area =	0.046 ha	C =	0.40
Paved/Rooftop area =	0.593 ha	C =	0.90

Note: Existing storm sewer system on Industrial Avenue was constructed in 1979, hence the oulet rate for the proposed Dymon site was restricted to the allowable 1:5 year predevelopment flow rate.

Calculation of Existing C-Factor:

Weighted C-Factor = {(0.160 ha x 0.20) + (0.046 ha x 0.40) + (0.593 ha x 0.90)} / 0.779 ha

Weighted C-Factor = 0.73

Per City Standard, 1:5 year Qp to be calculated based on the lesser C-Factor of 0.50

Time of Concentration Calculation:

Flow Path to Industrial Avenue Sewer:

Tc (to Industrial Ave. Sewer) = Sheet Flow + Pipe Flow

Tc = (22 m / 0.70 m/s) + (66 m / 0.75 m/s); Sheet flow velocity based on asphalt slope using Upland Method

Tc = 0.52 min + 1.47 min = 1.99 min

Per City Standard, 1:5 year Qp to be calculated based on a minimum Tc of 10 minutes

Allowable 1:5 Year Peak Flow Calculation:

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

Area =	0.799 ha
C =	0.50
1:5 Year Intensity (Tc = 10 min) =	104.19 mm/hr

Allowable 1:5 year Qp = 2.78 x 0.50 x 104.19 mm/hr x 0.799 ha

Qp(5yr) = 115.7 L/s

Storm servicing to be developed to limit the 1:100 year peak flows to the allowable 1:5 year peak flow of 115.7 L/s

Summary of Controlled and Uncontrolled Areas:

Drainage Area No.	Type or ID. No	Area (ha) C=0.20	Area (ha) C=0.90	C-Factor (5 year)	C-Factor (100 year, +25%)	$Q_{(5\text{-yr})}$ (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		0.331	0.90	1.00	86.29	164.31	5.67		5.67	N/A
2	CB 1 - 1:100 Year	0.005	0.054	0.84	0.94	14.37	27.43		27.43	27.43	N/A
3	CB 2 - ICD1	0.015	0.046	0.73	0.82	12.86	24.70	14.00		14.00	200 VHV-2
4	CB 3 - ICD2	0.009	0.103	0.84	0.94	27.37	52.25	20.00		20.00	125VHV-2
5	CB 4 - ICD3	0.003	0.153	0.89	0.99	40.06	76.32	38.00		38.00	200VHV-2
6	CBMH1 - ICD4	0.001	0.079	0.89	0.99	20.65	39.34	10.00		10.00	100VHV-1
		Area (ha) = 0.799				**$Q_{(100\text{-yr})}$ = (unrestricted)**	**384.33**		**$Q_{(100\text{-yr})}$ = (restricted)**	**115.10**	

NOTE: CB1 and CB2 are interconnected (Refer to Drawing SSG). The ICD will be placed at the outlet of CB 2 and have a total release rate of 41.43 L/s (27.43 L/s + 14.00 L/s)

Area 1: **Rooftop - Dymon Building**

Assumed Rooftop Properties:

Total Area Roof = 0.331 ha
Unusable roof (25%) = 0.083 ha
Usable roof (75%) = 0.248 ha
Depth of Storage = 0.152 m

Rooftop Volume (m^3) = Usable rooftop area (m^2) x storage depth (m)
Rooftop Volume (m^3) = 870 m^2 x 0.152 m
Rooftop Volume (m^3) = 377 m^3

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

3 drains - fully exposed = 5.67 L/s (each drain = 1.89 L/s)
Total release rate = 5.67 L/s

Rooftop Area =	0.331
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	86.29	5.67	80.62	48.37	178.56	164.31	5.67	158.64	95.18
15	83.56	69.20	5.67	63.53	57.18	142.89	131.49	5.67	125.82	113.24
20	70.25	58.18	5.67	52.51	63.01	119.95	110.38	5.67	104.71	125.65
25	60.90	50.43	5.67	44.76	67.14	103.85	95.56	5.67	89.89	134.83
30	53.93	44.66	5.67	38.99	70.18	91.87	84.54	5.67	78.87	141.96
35	48.52	40.18	5.67	34.51	72.47	82.58	75.99	5.67	70.32	147.67
40	44.18	36.59	5.67	30.92	74.21	75.15	69.15	5.67	63.48	152.35
45	40.63	33.65	5.67	27.98	75.54	69.05	63.54	5.67	57.87	156.25
50	37.65	31.18	5.67	25.51	76.54	63.95	58.85	5.67	53.18	159.54
55	35.12	29.09	5.67	23.42	77.28	59.62	54.86	5.67	49.19	162.34
60	32.94	27.28	5.67	21.61	77.81	55.89	51.43	5.67	45.76	164.75
65	31.04	25.71	5.67	20.04	78.15	52.65	48.44	5.67	42.77	166.82
70	29.37	24.32	5.67	18.65	78.35	49.79	45.82	5.67	40.15	168.61
75	27.89	23.10	5.67	17.43	78.42	47.26	43.48	5.67	37.81	170.16
80	26.56	22.00	5.67	16.33	78.37	44.99	41.40	5.67	35.73	171.50
85	25.37	21.01	5.67	15.34	78.23	42.95	39.53	5.67	33.86	172.66
90	24.29	20.11	5.67	14.44	78.00	41.11	37.83	5.67	32.16	173.66
95	23.31	19.30	5.67	13.63	77.70	39.43	36.29	5.67	30.62	174.52
100	22.41	18.56	5.67	12.89	77.32	37.90	34.88	5.67	29.21	175.25
105	21.58	17.87	5.67	12.20	76.88	36.50	33.58	5.67	27.91	175.86
110	20.82	17.24	5.67	11.57	76.39	35.20	32.39	5.67	26.72	176.37
115	20.12	16.66	5.67	10.99	75.85	34.01	31.29	5.67	25.62	176.78
120	19.47	16.12	5.67	10.45	75.26	32.89	30.27	5.67	24.60	177.11
125	18.86	15.62	5.67	9.95	74.62	31.86	29.32	5.67	23.65	177.36
130	18.29	15.15	5.67	9.48	73.95	30.90	28.43	5.67	22.76	177.54
135	17.76	14.71	5.67	9.04	73.24	30.00	27.60	5.67	21.93	177.65
140	17.27	14.30	5.67	8.63	72.50	29.15	26.83	5.67	21.16	177.70
145	16.80	13.91	5.67	8.24	71.73	28.36	26.09	5.67	20.42	177.69
150	16.36	13.55	5.67	7.88	70.92	27.61	25.41	5.67	19.74	177.63
155	15.95	13.21	5.67	7.54	70.09	26.91	24.76	5.67	19.09	177.52
160	15.56	12.88	5.67	7.21	69.24	26.24	24.14	5.67	18.47	177.36

Area 2: **CB No. 1 - Unrestricted (1:100 Yr)** (Total Drainage Area = 0.059)

	5 year	100 year
Area (paved) =	0.054	0.054
C-Factor =	0.900	1.000
Area (landscape) =	0.005	0.005
C-Factor =	0.200	0.250
(AxC)pav + (AxC)land =	0.050	0.055
C-Factor (overall) =	0.841	0.936

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	14.37	N/A	N/A	N/A	178.56	27.43	N/A	N/A	N/A
15	83.6	11.52	N/A	N/A	N/A	142.89	21.95	N/A	N/A	N/A
20	70.3	9.69	N/A	N/A	N/A	119.95	18.42	N/A	N/A	N/A
25	60.9	8.40	N/A	N/A	N/A	103.85	15.95	N/A	N/A	N/A

Area 3: **CB No. 2 - Ponding Area 1 - ICD 1** (Total Drainage Area = 0.061)

	5 year	100 year
Area (paved) =	0.046	0.046
C-Factor =	0.900	1.000
Area (landscape) =	0.015	0.015
C-Factor =	0.200	0.250
(AxC)pav + (AxC)land =	0.044	0.050
C-Factor (overall) =	0.728	0.816

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	12.86	14.00	N/A	N/A	178.56	24.70	14.00	10.70	6.42
15	83.56	10.31	14.00	N/A	N/A	142.89	19.76	14.00	5.76	5.19
20	70.25	8.67	14.00	N/A	N/A	119.95	16.59	14.00	2.59	3.11
25	60.90	7.52	14.00	N/A	N/A	103.85	14.36	14.00	0.36	0.54
30	53.93	6.66	14.00	N/A	N/A	91.87	12.71	14.00	N/A	N/A
35	48.52	5.99	14.00	N/A	N/A	82.58	11.42	14.00	N/A	N/A
40	44.18	5.45	14.00	N/A	N/A	75.15	10.39	14.00	N/A	N/A
45	40.63	5.01	14.00	N/A	N/A	69.05	9.55	14.00	N/A	N/A
50	37.65	4.65	14.00	N/A	N/A	63.95	8.85	14.00	N/A	N/A
55	35.12	4.34	14.00	N/A	N/A	59.62	8.25	14.00	N/A	N/A
60	32.94	4.07	14.00	N/A	N/A	55.89	7.73	14.00	N/A	N/A
65	31.04	3.83	14.00	N/A	N/A	52.65	7.28	14.00	N/A	N/A

Minimum storage volume requirement = 6.42 m^3

Storage volume provided by design Ponding Area 1 = 9.08 m^3

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

Area 4: **CB No. 3 - Ponding Area 2 - ICD 2** (Total Drainage Area = 0.112)

	5 year	100 year
Area (paved) =	0.103	0.103
C-Factor =	0.900	1.000
Area (landscape) =	0.009	0.009
C-Factor =	0.200	0.250
(AxC)pav + (AxC)land =	0.095	0.105
C-Factor (overall) =	0.844	0.940

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	27.37	20.00	7.37	4.42	178.56	52.25	20.00	32.25	19.35
15	83.56	21.95	20.00	1.95	1.76	142.89	41.81	20.00	21.81	19.63
20	70.25	18.46	20.00	N/A	N/A	119.95	35.10	20.00	15.10	18.12
25	60.90	16.00	20.00	N/A	N/A	103.85	30.39	20.00	10.39	15.58
30	53.93	14.17	20.00	N/A	N/A	91.87	26.88	20.00	6.88	12.38
35	48.52	12.75	20.00	N/A	N/A	82.58	24.16	20.00	4.16	8.74
40	44.18	11.61	20.00	N/A	N/A	75.15	21.99	20.00	1.99	4.77
45	40.63	10.67	20.00	N/A	N/A	69.05	20.20	20.00	0.20	0.55
50	37.65	9.89	20.00	N/A	N/A	63.95	18.71	20.00	N/A	N/A
55	35.12	9.23	20.00	N/A	N/A	59.62	17.45	20.00	N/A	N/A
60	32.94	8.65	20.00	N/A	N/A	55.89	16.35	20.00	N/A	N/A
65	31.04	8.16	20.00	N/A	N/A	52.65	15.40	20.00	N/A	N/A

Minimum storage volume requirement = 19.63 m^3

Storage volume provided by design Ponding Area 2 = 24.93 m^3

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

Area 5: **CB No. 4 - Ponding Area 3 - ICD 3** (Total Drainage Area = 0.156)

	5 year	100 year
Area (paved) =	0.153	0.153
C-Factor =	0.900	1.000
Area (landscape) =	0.003	0.003
C-Factor =	0.200	0.250
(AxC)pav + (AxC)land =	0.138	0.154
C-Factor (overall) =	0.887	0.986

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	40.06	38.00	2.06	1.24	178.56	76.32	38.00	38.32	22.99
15	83.56	32.13	38.00	N/A	N/A	142.89	61.08	38.00	23.08	20.77
20	70.25	27.01	38.00	N/A	N/A	119.95	51.27	38.00	13.27	15.92
25	60.90	23.41	38.00	N/A	N/A	103.85	44.39	38.00	6.39	9.58
30	53.93	20.73	38.00	N/A	N/A	91.87	39.27	38.00	1.27	2.28
35	48.52	18.65	38.00	N/A	N/A	82.58	35.30	38.00	N/A	N/A
40	44.18	16.99	38.00	N/A	N/A	75.15	32.12	38.00	N/A	N/A
45	40.63	15.62	38.00	N/A	N/A	69.05	29.51	38.00	N/A	N/A
50	37.65	14.48	38.00	N/A	N/A	63.95	27.34	38.00	N/A	N/A
55	35.12	13.50	38.00	N/A	N/A	59.62	25.48	38.00	N/A	N/A
60	32.94	12.67	38.00	N/A	N/A	55.89	23.89	38.00	N/A	N/A
65	31.04	11.94	38.00	N/A	N/A	52.65	22.50	38.00	N/A	N/A

Minimum storage volume requirement = 22.99 m^3

Storage volume provided by design Ponding Area 3 = 27.22 m^3

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

Area 6: **CBMH 1 - Ponding Area 4 - ICD 4** (Total Drainage Area = 0.080)

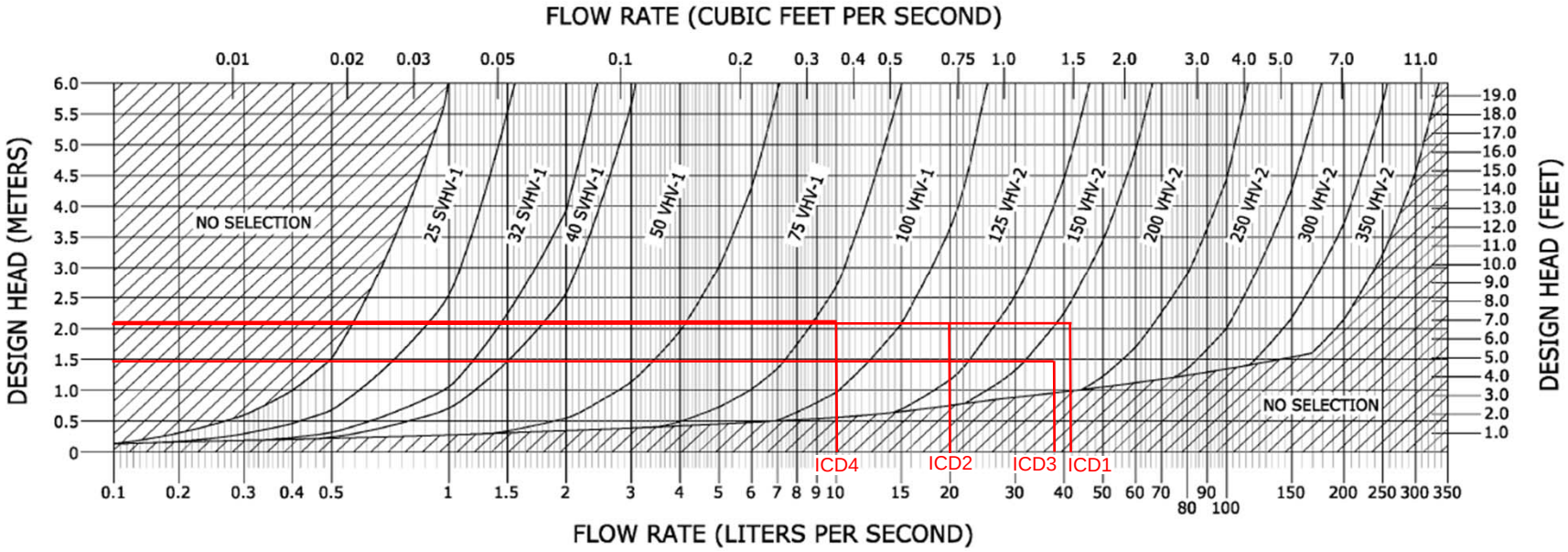
	5 year	100 year
Area (paved) =	0.079	0.079
C-Factor =	0.900	1.000
Area (landscape) =	0.001	0.001
C-Factor =	0.200	0.250
(AxC)pav + (AxC)land =	0.071	0.079
C-Factor (overall) =	0.891	0.991

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	20.65	10.00	10.65	6.39	178.56	39.34	10.00	29.34	17.60
15	83.56	16.56	10.00	6.56	5.91	142.89	31.48	10.00	21.48	19.33
20	70.25	13.92	10.00	3.92	4.71	119.95	26.43	10.00	16.43	19.71
25	60.90	12.07	10.00	2.07	3.11	103.85	22.88	10.00	12.88	19.32
30	53.93	10.69	10.00	0.69	1.24	91.87	20.24	10.00	10.24	18.43
35	48.52	9.62	10.00	N/A	N/A	82.58	18.19	10.00	8.19	17.21
40	44.18	8.76	10.00	N/A	N/A	75.15	16.56	10.00	6.56	15.73
45	40.63	8.05	10.00	N/A	N/A	69.05	15.21	10.00	5.21	14.07
50	37.65	7.46	10.00	N/A	N/A	63.95	14.09	10.00	4.09	12.27
55	35.12	6.96	10.00	N/A	N/A	59.62	13.14	10.00	3.14	10.35
60	32.94	6.53	10.00	N/A	N/A	55.89	12.31	10.00	2.31	8.33
65	31.04	6.15	10.00	N/A	N/A	52.65	11.60	10.00	1.60	6.24

Minimum storage volume requirement = 19.71 m^3

Storage volume provided by design Ponding Area 4 = 24.48 m^3

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



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 2	250	41.43	70.91	72.80	73.00	2.09	200 VHV-2
ICD 2 - CB 3	200	20.00	70.51	72.30	72.60	2.09	125 VHV-2
ICD 3 - CB 4	200	38.00	70.67	71.95	72.15	1.48	200 VHV-2
ICD 4 - CBMH1	300	10.00	70.80	72.65	72.95	2.15	100 VHV-1

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

851 Industrial Avenue

Dymon Self Storage

JLR No. 27296-002.1

STORM SEWER DESIGN SHEET

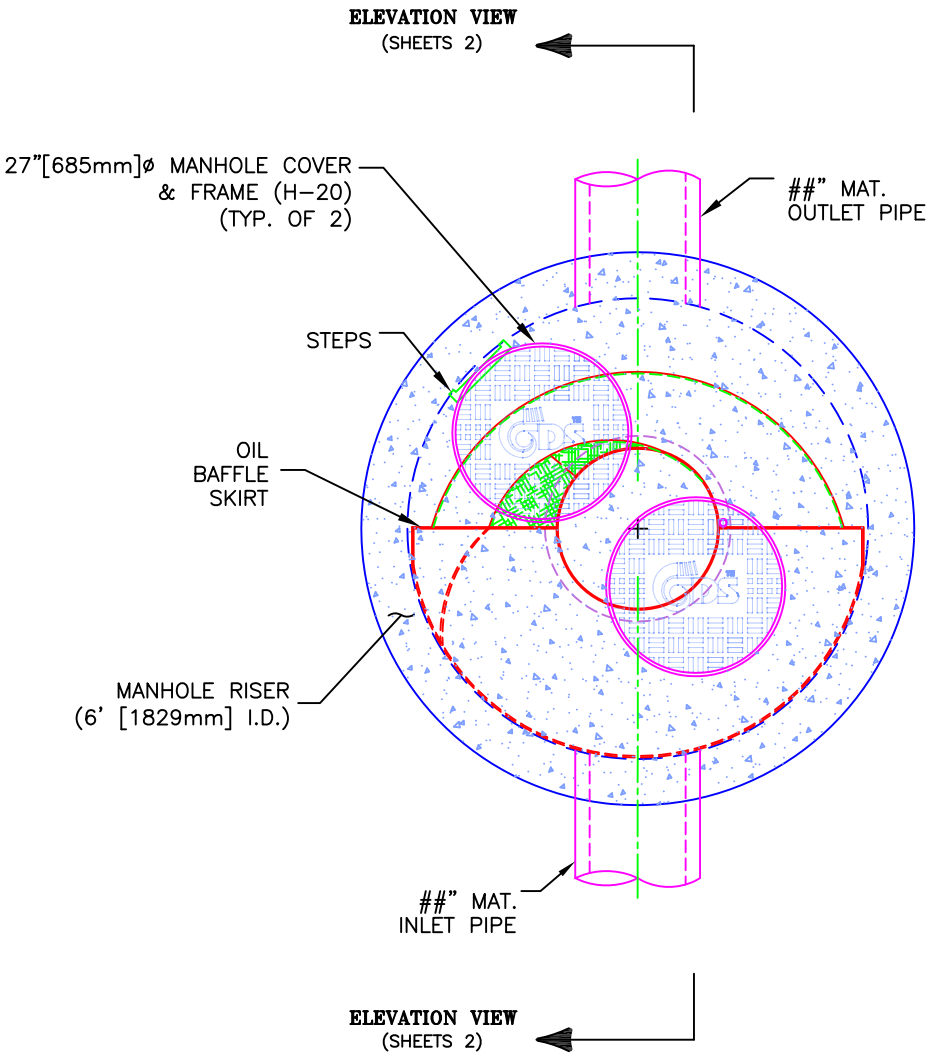
Manning's Coefficient	n =	0.013
IDF CURVE	=	2 year

Designed by:	J.W.
Checked by:	K.F.
Date:	October 2017

Restricted flow rate provided by rooftop restrictions (roof drains) combined with rooftop storage (refer to Drawing SWM)

M.H.		RUNOFF AREA		AREA		PEAK FLOW COMPUTATION					RESTRICTED	TOTAL PEAK	SEWER DATA						UPSTREAM				DOWNSTREAM				
FROM	TO	0.20	0.90	Total Area (ha)	CUM. Area (ha)	2.78AR	2.78AR (CUM.)	TIME (min.)	INTENS. (mm/hr)	PEAK FL. (L/s)	ROOF FLOW (L/s)	FLOWS (L/s)	DIA. (mm)	SLOPE (%)	CAPAC. (L/s)	VEL. (m/s)	LENGTH (m)	FL.TIME (min.)	Center Line	Obvert	Invert	Cover	Center Line	Obvert Drop	Obvert	Invert	Cover
CBMH1	MH 103	0.004	0.232	0.24	0.24	0.58	0.58	10.00	76.81	44.75		**44.75**	300	0.35	59.7	0.82	56.3	1.15	72.65	71.12	70.81	1.53	72.00		70.92	70.61	1.08
MH103	MH102	0.009	0.103	0.112	0.348	0.26	0.85	11.15	72.66	61.43		**61.43**	375	0.25	91.5	0.80	76.8	1.60	72.00	70.92	70.54	1.08	72.95		70.73	70.35	2.22
								12.74																			
BLDG	MH102		0.331	0.331	0.331	0.00	0.00	10.00	76.81	0.00	5.67	**5.67**	250	1.00	62.0	1.22	4.2	0.06	73.20	70.77	70.51	2.43	72.95		70.73	70.47	2.22
								10.06																			
MH102	MH101A	0.000	0.000	0.000	0.679	0.00	0.85	12.74	67.66	57.20		**62.87**	375	0.25	91.5	0.80	17.5	0.36	72.95	70.73	70.35	2.22	73.25		70.68	70.30	2.57
MH101A	MH101	0.020	0.100	0.120	0.799	0.26	1.11	13.11	66.63	73.74		**79.41**	450	0.20	133.0	0.81	22.9	0.47	73.25	70.68	70.23	2.57	73.18		70.64	70.18	2.54
								13.58																INV @ MAIN =	70.18		
		0.799 ha																									

PLAN VIEW

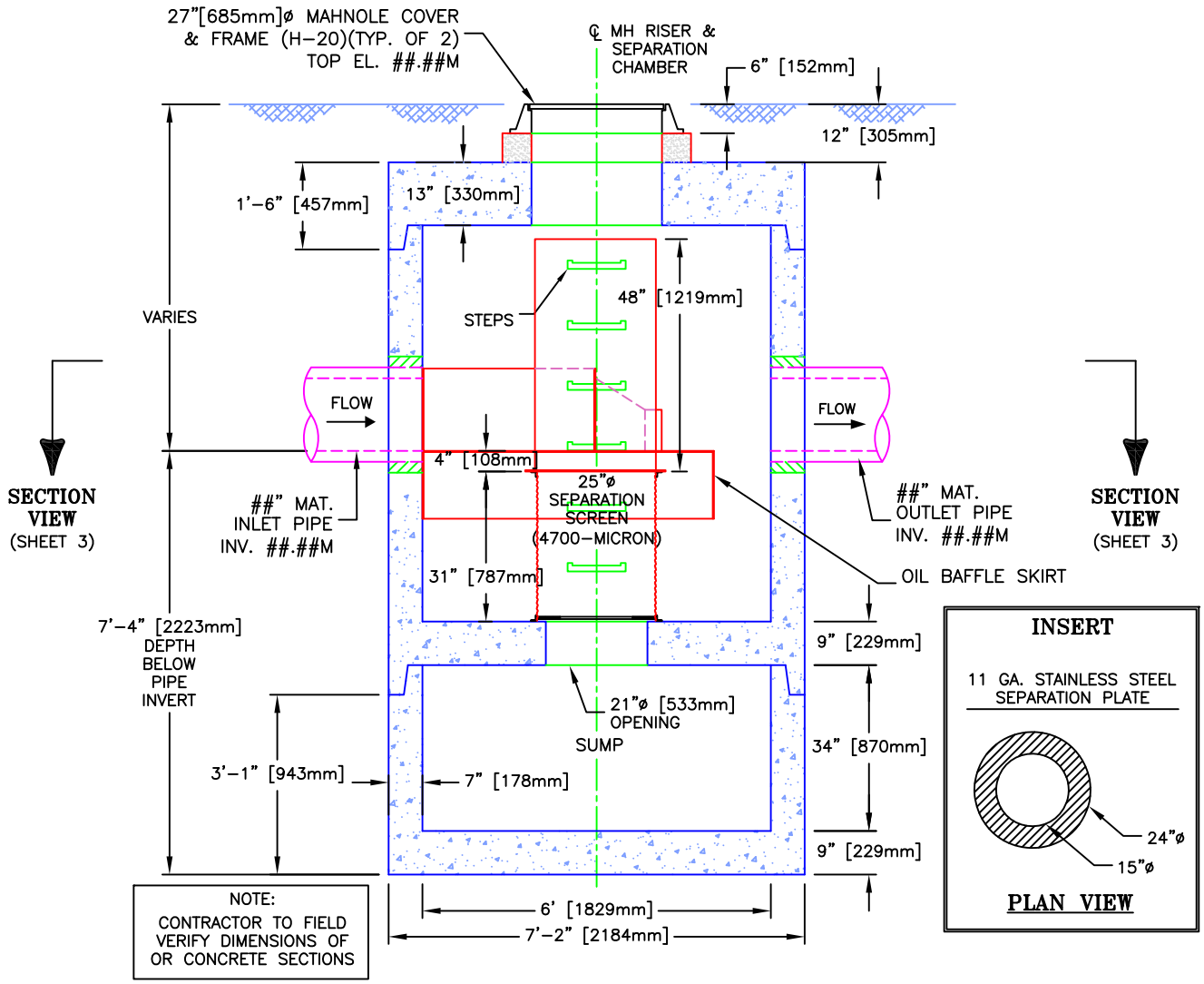


CDS MODEL PMSU20_25_6m, 1.6 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

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

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