

SERVICING BRIEF & STORMWATER MANAGEMENT REPORT

155 Iber Road
Ottawa, Ontario

Report No. 21024

August 3, 2021
Revised January 20, 2022
Revised October 14, 2022



NOT VALID UNLESS
SIGNED & DATED



Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

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SERVICING BRIEF & STORMWATER MANAGEMENT REPORT

155 Iber Road
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This report describes the services and addresses the stormwater management requirements of a 6,073 sq.m. property at 155 Iber Road in Ottawa. There is currently a 660 sq.m. office / warehouse building with asphalted driveway leading to an asphalted area to the rear of the existing building that will remain. Immediately adjacent to the rear property line there is a 10 m easement (525 sq.m. in area) that is naturally vegetated and will remain so. The useable area of the property, net of the easement, is 5,548 sq.m. in area. The area between the asphalted area and easement is currently used as outdoor storage which will be removed and replaced with a proposed 936 sq.m. warehouse building.

This report also forms part of the stormwater management design for the proposed development.

Refer to drawing C-1 to C-6 also prepared by D. B. Gray Engineering Inc.

WATER SUPPLY FOR FIREFIGHTING:

There is an existing municipal fire hydrant in the Iber Road ROW adjacent to the northwest corner of the subject property, 116 m from far end of the front façade of the proposed building. A private on-site fire hydrant is proposed. It will be located within 77 m of the far end of the front façade of the proposed addition; less than the maximum 90 m and, therefore, will provide adequate coverage for the proposed building.

The existing and proposed buildings are non-combustible construction. The existing building requires a fire flow of 100.0 L/s (6,000 L/min) and the proposed requires 116.7 L/s (7,000 L/min); both as calculated as per the Fire Underwriter Survey (FUS) "Water Supply For Fire Protection".

The boundary conditions for the 116.7 L/s fire flow (based on the city's computer model of the municipal water distribution system) were received from the City. They include a HGL (hydraulic grade line) of 156.1 m for the above flow rate in the 400 mm municipal watermain in Iber Road the subject location. This HGL calculates to be 499 kPa (72 psi). Since the pressure is above 138 kPa (20 psi) there is an adequate water supply for firefighting from the existing municipal water distribution system.

A 150 mm private watermain, connecting to the 400 mm municipal watermain, is proposed to serve the proposed private on-site fire hydrant. A model was created using

EPANET software to analyze the hydraulics of the private watermain. Using the provided HGL boundary conditions, and a 95 L/s demand, the pressure at fire hydrant is calculated to be 382 kPa (55.4 psi). Since the pressure is above 138 kPa (20 psi), the private watermain is adequately sized.

As per City of Ottawa Technical Bulletin ISTB-2018-02, the aggregate fire flow of all contributing fire hydrants within 150 m of a building can be used to supply the required fire flow. The existing municipal hydrant adjacent to the property is Class AA and the private on-site hydrant will be a Class AA, and since both are between 75 and 150 m, they can each contribute 3,800 L/min (63.3 L/s) (as per Table 1 of ISTB-2018-02). Therefore, the aggregate flow from both hydrants is 7,600 L/min (126.7 L/s); greater than the required fire flow of 7,000 L/min (116.7 L/s).

WATER SERVICE:

As per the City of Ottawa Design Guidelines the daily average consumption rate for a commercial development is 28,000 litres per day per hectare. Based on an 8-hour day the maximum daily demand for the subject property is calculated to be 0.5 L/s. Based on a maximum daily peaking factor of 1.5 times the daily average demand and a maximum hourly peaking factor of 1.8 times the maximum daily demand, the maximum daily demand is 0.8 L/s and maximum hourly demand is 1.5 L/s.

To determine water pressure under these demands, boundary conditions, based on the City of Ottawa computer simulation of the water distribution system, at the subject location, are required. The boundary conditions received from the City stated that the minimum HGL (hydraulic grade line) is 156.6 m, and the maximum is 161.2 m. Based on these HGLs the water pressure at the water meter is calculated to vary from 502 kPa to 547 kPa (73 psi to 79 psi). This is an acceptable range of water pressures for the proposed development. However, since it is calculated that the water pressure can be close to 80 psi at times, an on-site pressure check is recommended at the completion of construction to determine if a pressure reducing valve (PRV) is required. If required install the PRV immediately after the water meter.

Based on the AWWA water flow demand curve, and an average water pressure at the meter of 524 kPa (76 psi), the peak demand for the proposed addition is expected to be 3.6 L/s (215 L/min / 57 USgpm). The AWWA method calculates the instantaneous demand and is used to size the water service. This peak demand will produce an acceptable velocity of 1.8 m/s in the proposed 50 mm water service connection (up to 2.4 m/s is acceptable). The water service will connect to the proposed 150 mm private watermain. The existing water service connection serving the existing building will remain.

SANITARY SERVICE:

The existing sanitary sewer connection serving the existing building will remain. The proposed 150 mm sanitary connection serving the proposed addition will connect to a proposed private 150 mm sewer.

Based on the City of Ottawa Sewer Design Guidelines for a commercial property (28,000 L/ha/day; 1.5 peaking factor (and an 8-hour day); and a 0.33 L/s/ha infiltration flow) the existing development peak flow (based on the 3,520 sq.m. of property that is currently being used) is calculated to be 0.63 L/s. Similarly, the post development peak flow (based on the useable 5,548 sq.m. portion of the property) is calculated to be 0.99 L/s. This flow will be adequately handled by the private sanitary sewer with each pipe segment being only at about 2 to 3% of its capacity.

The proposed 150 mm private sanitary sewer will connect to an existing 375 mm municipal PVC sanitary sewer in Iber Road which, with a 0.17% slope, has a capacity of 75.42 L/s. The 0.36 L/s increase (= 0.99 L/s - 0.63 L/s) in sanitary flows contributing to the existing municipal sanitary sewer is expected to have an acceptable impact.

STORMWATER MANAGEMENT:

Water Quality Control:

The Mississippi Valley Conservation Authority (MVCA) has made the following comments:

1. *"The property is not regulated under Ontario Regulation 153/06 and does not contain any natural hazard or natural heritage features."*
2. *"The Carp River Watershed Subwatershed Study sets infiltration targets. The site falls between moderate to low recharge areas. We recommend a weighted average be used for the infiltration target."*
 - o *Moderate 104 mm/yr infiltration*
 - o *Low 73 mm/yr infiltration"*
3. *"Water quality 70% Total Suspended Solids removal."*

An infiltration trench that receives drainage from the hard surfaces, will drain to the roadside ditch. Based on an area that is 90% impervious, and as per the MOE Design Manual, an infiltration trench with a storage capacity of 11.0 cu.m. will remove 70% TSS. The proposed infiltration trench has a total storage volume 18.8 cu.m., 170% greater than minimum required for quality control (due to the infiltration trench being sized so that there is no surface ponding in the parking area – see page 7 under Quantity Control). Based on the geotechnical report the underlying soil is silty sand / sandy silt and has an estimated infiltration rate of 30 to 75 mm/hr. To be conservative 30 mm/hr is used; therefore, based on the depth of the infiltration trench being 0.50 m, it has a drawdown time of 16.7 hours (significantly less than the recommended 24 hours). As per the geotechnical report the long-term groundwater level is expected to be 2 to

3m depth or at least 1 to 2m below the bottom of the infiltration trench; and bedrock is estimated to be 3 to 4m deep or at least 2 to 3m below the bottom of the infiltration trench. Therefore, since bedrock and groundwater are at least 1 m below the bottom of the infiltration trench neither are expected to be an issue. Stormwater runoff from the parking area is conveyed via about 20 m of grassed swales prior to entering the infiltration trench. The grassed swale will be used as a pre-treatment measure for the infiltration trench. The grassed swale will have a minimal longitudinal slope (as recommended in the MOE Design Manual) that will keep flow velocities low making it effective for pre-treatment as it will tend to increase the removal of TSS and coarse sediment from runoff. The grass will also take up nutrients. The grass in the swale should be maintained at 75 mm or higher to enhance the filtration of suspended solids. For the swale to maintain its ability to infiltrate, in the spring, (more frequently as required) the accumulation of sand and grit should be removed (to reduce the chance of the sediment being re-suspended) and mulch added to the soil structure.

Based on water balance and infiltration calculations the pre-development (existing) condition of the property (including the 10 m easement that will remain in a natural vegetated state) has an annual infiltration of 65 mm/year. However, as per City staff's instruction the rear outdoor storage area (with a mostly granular surface) is required to be assumed as soft landscaping (with a runoff coefficient of 0.2). Based on this assumption the pre-development condition has an annual infiltration of 109 mm/year. Ignoring the infiltration trench, the post development the annual infiltration is about the same as the existing conditions (63 mm/year). However, the infiltration trench will promote water infiltration into the ground. In eastern Ontario, on hard surfaces, approximately 150 mm of the 943 mm annual precipitation (or 16%) is lost to evapotranspiration (Eastern Ontario Water Resources Management Study (2001) & Carp River Watershed / Subwatershed Study). Therefore, 84% of the precipitation on hard surfaces is available for infiltration. As per Environment Canada's records at the Ottawa International Airport (1981-2010), there are on average 58.4 days per year where the precipitation is greater than 5 mm. Assuming only 5 mm of precipitation on each of the 58.4 days (and assuming 84%), 910 cu.m. (15.6 cu.m. per day) is available for infiltration from the runoff from the 3,706 sq.m. of hard surfaces draining to the area above the infiltration trench. The infiltration trench, having a capacity of 18.8 cu.m., has the capacity to capture and infiltrate into the ground 100% of this volume or 910 cu.m. annually. Inserting the 910 cu.m. into the water balance calculations, the post development annual infiltration for the property is 213 mm/year, 328% greater than the existing conditions, 195% greater than the defined pre-development conditions, and 205 to 292% greater than the minimum 73 to 104 mm/year target.

An erosion and sediment control plan has been developed to be implemented during construction, (see drawing C-3 and notes 2.1 to 2.6 on drawing C-5). In summary: to filter out construction sediment a silt fence barrier will be installed around the perimeter of the site where runoff will drain off the site; straw bale check dams will be installed at the proposed culvert; and any material deposited on a public road will be removed.

Water Quantity Control:

The stormwater management criteria for quantity control are to control the post development peak flows to pre-development flow rates (assuming, as required by the City, that the rear outdoor storage area is soft landscaping, and excluding the 10 m easement). It is calculated that the pre-development conditions reflect a 5-year runoff coefficient of 0.45, therefore, based on a 10-minute time of concentration; and using the Rational Method; the maximum allowable release rate is 143.98 L/s for the 100-year storm event, and 73.06 L/s for the 5-year. The Modified Rational Method is used to calculate the required storage volume. The runoff coefficients for the 100-year event are increased by 25% to maximum 1.00.

Stormwater will be stored on-site above the asphalted area, grassed swales and in the infiltration trench.

Drainage Area I (Uncontrolled Flow Off Site – Draining to Iber Rd – 545 sq.m.):

The runoff from the existing landscape area in the front yard of the property will be allowed to continue to flow uncontrolled off the site towards the Iber Road roadside ditch.

	100-year	5-year
The maximum flow rate:	6.76 L/s	3.16 L/s

Drainage Area II (Uncontrolled Flow Off Site – Draining to Rear – 1,516 sq.m.):

The runoff from the rear of the property will be allowed to flow uncontrolled off the site to the existing ditch in the easement at the rear of the property.

	100-year	5-year
The maximum flow rate:	40.00 L/s	20.32 L/s

Drainage Area III (3,487 sq.m.):

An inlet control device (ICD) will control the release of stormwater from the property. The ICD will be located in the inlet of the culvert that discharges site drainage to the Iber Road roadside ditch. The ICD will restrict the flow and force the stormwater to back up a grassed swale and onto the asphalted area. (The available storage of the infiltration trench is also included in the calculations.) The ICD will discharge to the roadside ditch near the northwest corner of the property. A broad-crested weir (a concrete retaining wall with a 3.0 m long depressed section with a release rate of 30 L/s at 0.03 m above the weir) will ensure that the ponding elevation will not exceed 104.24. The ICD shall be a plug style with a round orifice design manufactured by Pedro Plastics (or approved equal) and shall be sized by the manufacturer for a discharge rate of 28.61 L/s at 0.34 m head. It is calculated that an orifice area of 18,050 sq.mm. (± 152 mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 28.61 L/s at a head of 0.34 m. Based on this orifice the maximum outflow rate for the 5-year storm event is calculated to be 22.53 L/s at 0.21 m.

	100-year	5-year
Maximum release rate:	28.61 L/s	22.53 L/s
Maximum ponding elevation:	104.21 m	104.08 m

Maximum ponding depth: (in asphalted area)	0.21 m	0.08 m
Maximum stored volume:	96.73 cu.m.	40.77 cu.m.

The storage capacity of the infiltration trench is sized so that there will be no surface ponding within the parking area during the 2-year event. During the 2-year event the maximum ponding elevation is 103.99 and the required storage volume is 29.26 cu.m. The capacity of the grassed swale and infiltration trench is about 29.8 cu.m. and the lowest elevation of the parking area is 104.00. Therefore, there will be no surface ponding during the 2-year event within the parking area, as is required by City of Ottawa Technical Bulletin PIEDTB-2016-01.

The Entire Site:

	100-year	5-year
Maximum allowable release rate:	143.98 L/s	73.06 L/s
Maximum release rate:	75.37 L/s	46.01 L/s
Maximum stored volume:	96.73 cu.m.	40.77 cu.m.

Therefore, the maximum post development release rate for the 100-year storm event is calculated to be 48% less than the maximum allowable; and during the 5-year 37% less. Therefore, the stormwater flow off the site is expected to have an acceptable impact.

DRAINAGE:

Existing (Pre-development) Conditions:

Currently 575 sq.m. of the property drains uncontrolled to the Iber Road roadside ditch (Drainage Area A – see drawing C-6). The remainder of the property drains (via swales located in the north side yard of the subject and in the side yard of the adjacent property to the south) to a ditch in an easement located at the rear of the property (which drains south in the rear yards from 139 to 185 Iber Road). The drainage area upstream (north) of the roadside ditch at 155 Iber Road is approximately 3.2 ha generating about 0.69 m³/s during the 100-year event and 0.32 m³/s during the 5-year. The Iber Road roadside ditch drains to a ditch located between 185 and 201 Iber Road, which drains east and converges with rear yard ditch at the southeast corner of 185 Iber Road. The drainage area upstream (north) of where these ditches meet is approximately 9.8 ha generating about 1.53 m³/s during the 100-year event and 0.72 m³/s during the 5-year.

Proposed:

The proposed grading and stormwater management design the property will drain 545 sq.m. uncontrolled (Drainage Area I) and 3,487 sq.m. controlled (Drainage Area III) to the Iber Road roadside ditch. This calculates to an increase of 0.07 m³/s during the 100-year event and 0.02 m³/s during the 5-year; or an increase of only 4% during the 100-year event and 6% during the 5-year. These increases in flows are insignificant

compared to the capacity of the roadside ditch (approximately 2.2 m³/s); and during the 5-year event the increase will be adequately handled by the existing culvert at the entrance of the subject property (having a capacity of 0.35 m³/s before overtopping).

The proposed grading and stormwater management design will decrease the water draining from the site by about 0.07 m³/s during 100-year event and 0.03 m³/s during the 5-year; or a decrease of 4% during both the 100-year and 5-year events. Therefore, no issues are expected downstream of where the ditches converge at the southeast corner of 185 Iber Road

Ministry of Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA):

The proposed addition is a warehouse building; therefore, MECP may consider the property “industrial lands” and a MECP ECA may be required for the proposed stormwater management facility.

CONCLUSIONS:

1. The proposed private on-site fire hydrant will provide adequate coverage for the proposed building.
2. There is an adequate water supply for firefighting from the existing municipal water distribution system.
3. The pressure at the proposed on-site private fire hydrant is calculated to be above 138 kPa (20 psi) and, therefore, the private watermain is adequately sized.
4. The aggregate flow from both hydrants is greater than the required fire flow.
5. There is an acceptable range of water pressures in the municipal watermain for the proposed development. However, since it is calculated that the water pressure can be close to 80 psi at times, an on-site pressure check is recommended to determine if a pressure reducing valve (PRV) is required.
6. The expected sanitary sewage flow rate will be adequately handled by the proposed sanitary sewer service connection.
7. The sanitary flow contributing to the existing municipal sanitary sewer is expected to have an acceptable impact.
8. To meet the water quality target an infiltration trench has 170% greater capacity than what is required to remove 70% TSS.

9. An erosion and sediment control plan has been developed to be implemented during construction.
10. The post development annual infiltration for the property is 213 mm/year, 328% greater than the existing conditions, 195% greater than the defined pre-development conditions, and 205 to 292% greater than the minimum 73 to 104 mm/year target.
11. There will be no surface ponding during the 2-year event within the parking area.
12. The maximum post development release rate for the 100-year storm event is calculated to be 48% less than the maximum allowable; and during the 5-year 37% less, therefore, the stormwater flow off the site is expected to have an acceptable impact.
13. The proposed grading and stormwater management design the property will increase the drainage to the Iber Road roadside by only 4% during the 100-year event and 6% during the 5-year. These increases in flows are insignificant compared to the capacity of the roadside ditch; and during the 5-year event the increase will be adequately handled by the existing culvert at the entrance.
14. The proposed grading and stormwater management design will decrease the water draining from the site by 4% during both the 100-year and 5-year events, therefore, no issues are expected downstream of where the ditches converge at the southeast corner of 185 Iber Road
15. The proposed building is a warehouse building; therefore, the MECP may consider the property "industrial lands" and a MECP ECA may be required for the proposed stormwater management facility.

KEY PLAN



Pre-application Consultation Meeting Notes

Property Address: 155 Iber Road

File No: PC2020-0313

Date: December 8, 2020, 1:00 - 2:00 PM, Held via Microsoft Teams

Subject: Pre-application Consultation Meeting Minutes
155 Iber Road

Attendees: Colette Gorni – Planner, City of Ottawa
Josiane Gervais – Project Manager (Transportation), City of Ottawa
Rubina Rasool – Project Manager (Infrastructure), City of Ottawa
Mark Young – Planner (Urban Design), City of Ottawa
Erica Ogden, Mississippi Valley Conservation Authority (MVCA)
Jacob Bolduc – Planning Consultant, Fotenn Planning + Design
Emilie Coyle – Planning Consultant, Fotenn Planning + Design
Joseph Pamic – Property Owner

Regrets: Justyna Garbos – Planner (Parks), City of Ottawa
Matthew Hayley – Planner (Environment), City of Ottawa
Mark Richardson – Forester (Planning), City of Ottawa
Krishon Walker – Planner (Committee of Adjustment), City of Ottawa

Comments from the Applicant:

1. The owner is seeking to construct a one-storey light industrial use building at the rear of the subject property, which is currently being used as outdoor storage.
2. There is an existing light industrial use building at the front of the site. The proposed building is to be leased out to other tenants; it will not be used by the tenant of the existing building.
3. The proposed development requires relief from two setback requirements of the IL zone:
 - a. Reduce the rear yard setback, where it abuts an institutional use, from 15 metres to 11.4 metres; and,
 - b. Reduce the south side interior setback from 7.5 metres to 3.5 metres.

Staff Comments:

Planning

1. Please ensure that vehicle parking is provided in accordance with the rates set out in Section 101 of the Zoning By-law for Area C on [Schedule 1A](#):
 - Light Industrial Use - 0.8 per 100 m² of gross floor area

2. Please ensure that bicycle parking is provided in accordance with the rates set out in Section 111 of the Zoning By-law for Area C on [Schedule 1A](#):
 - Light Industrial Use - 1 per 1000 m² of gross floor area
3. Please ensure that aisle widths are provided in accordance with Section 107 of the Zoning By-law.
 - In cases where parking spaces sharing the same aisle are provided at different angles (See Table 107 in the Zoning By-law), please provide the greater minimum required aisle width.
 - An aisle providing access to parking spaces in a parking lot must comply with the minimum required width in Table 107, as per Section 107(c)(i). The aisle width for the parking area at the front of the site (6m) is not sufficient; 6.7 metres is required.
4. Rear yard setback relief – The rationale for the requested relief should clearly identify how the reduced setback would have no undue adverse impact on the abutting institutional use if they were to redevelop in the future.
5. South side yard setback relief – The applicant is encouraged to develop in a manner that does not require relief from the Zoning By-law. It is understood that the current plans are likely motivated by a desire to align the proposed building with the existing building. However, the existing building likely has legal non-conforming rights. New development should not bring the site further out of conformity with the Zoning By-law, if not necessary.
6. The requested relief from the Zoning By-law can be attained either through a minor variance or minor rezoning. Should you choose to pursue a minor variance, feel free to contact Krishon Walker at Krishon.walker@ottawa.ca to discuss further.
7. Please note that Minor Variances are handled by the Committee of Adjustment. The Planning Department provides comments on Committee of Adjustment applications; however, the Committee of Adjustment makes the decision. For more information on the Committee of Adjustment, including application forms and fees, please visit: <https://ottawa.ca/en/city-hall/planning-and-development/committee-adjustment>. For questions pertaining to forms and fees, please contact the Committee of Adjustment directly at cofa@ottawa.ca or at (613)-580-2436.
8. Parks will collect cash-in-lieu of parkland (CILP) calculated at 2% of the gross land area of the site being developed and a \$565 (including HST) fee for appraisal services, unless the applicant can demonstrate that CILP was collected in 2002 through site plan OSP2001-0274.

9. The proposed development is subject to Site Plan Control and will be a “New – Site Plan Control – Standard” application. Application form, timeline and fees can be found [here](#).
10. The proposed development also requires relief from the Zoning By-law, which can be achieved through either a Minor Zoning By-law Amendment application or a Minor Variance application. Should you wish to proceed with a Minor Zoning By-law Amendment application, the application form, timeline and fees can be found [here](#).
11. You are encouraged to contact the Ward Councillor, Councillor Glen Gower, at Glen.Gower@ottawa.ca about the proposal.

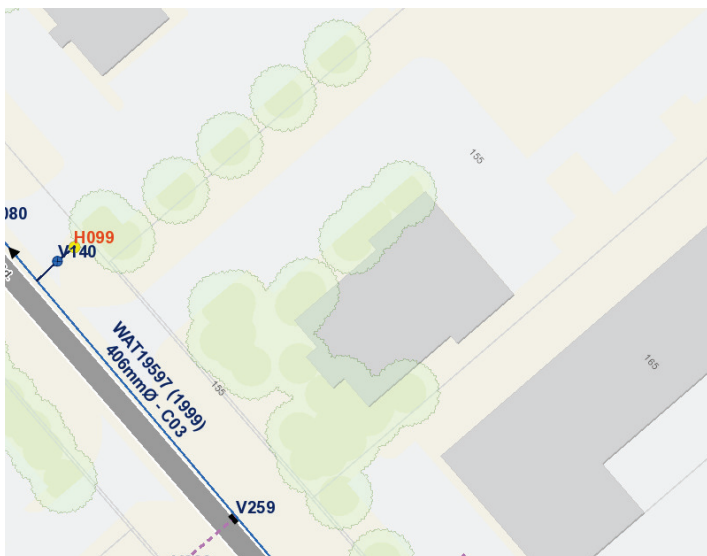
Urban Design

1. Please ensure that as many trees as possible are retained on site.
2. Please consider flipping the parking stalls and drive aisle to ensure adequate throat length.
3. Please provide landscaping around the perimeter of the site in the vicinity of the proposed building.
4. Please ensure the building design is in keeping with the existing building on-site.
5. A design brief is required and can be combined with a planning rationale. Please see attached terms of reference.

Engineering

Water

1. The existing public services (water) for the site are located along Iber Road (406mm DI) – see below.



2. Watermain frontage fees will be required for this site (\$190.00 per metre).
3. Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission.
 - a. Water boundary condition requests must include the location of the service(s) and the expected loads required by the proposed developments. Please provide all the following information:
 - i. Location of service(s)
 - 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.
 - b. Fire protection (Fire demand, Hydrant Locations)
4. Where achievable the existing water service should be used to limit the connections to the 406mm watermain.

Sanitary Sewer

5. The existing public services (sanitary) are located along Iber Road (375 mm PVC) – see below.



6. A monitoring manhole is required on private property.

Stormwater Management

7. Quality Control: Rideau Valley Conservation Authority to confirm quality control requirements.

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8. Quantity Control: The post-development flows to be controlled to pre-development flows for the 100-year and 5-year storm events. The pre-development condition will include the existing building and front and side paved areas, all other areas must be taken as soft landscaping
9. All development applications should be considered for an Environmental Compliance Approval, under MECP regulations.
 - a. An ECA application would be required as part of the approval process or an amendment to the existing ECA. The new ECA application may qualify for Transfer of Review program. Please provide the following information:
 - i. is designed to service one lot or parcel of land;
 - ii. discharges into a storm sewer that is not a combined sewer;
 - iii. does not service industrial land or a structure located on industrial land; and (i.e. storage of fuel or vehicle repair as per MECP definition)
 - iv. is not located on industrial land
 - b. Pre-consultation is not required if applying for standard or additional works (Schedule A of the Agreement) under Transfer Review.
 - c. Pre-consultation with local District office of MECP is recommended for direct submission.
 - d. Consultant completes an MECP request form for a pre-consultation. Sends request to moeccottawasewage@ontario.ca
 - e. ECA applications are required to be submitted online through the MECP portal. A business account required to submit ECA application. For more information visit <https://www.ontario.ca/page/environmental-compliance-approval>

NOTE: Site Plan Approval, or Draft Approval, is required before any Ministry of the Environment and Climate Change (MOECC) application is sent

General

10. The City of Ottawa requests that all new services be located within the existing service trench to minimize necessary road cuts. Where achievable the existing service should be used to limit the connections to the City mains.
11. Where service length is greater than 30 m between the building and the first maintenance hole / connection, a cleanout is required.
12. As per section 53 of the Professional Engineers Act, O. Reg 941/40, R.S.O. 1990, all documents prepared by engineers must be signed and dated on the seal.

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13. All required plans are to be submitted on standard A1 size sheets (594mm x 841mm) sheets, utilizing a reasonable and appropriate metric scale as per City of Ottawa Servicing and Grading Plan Requirements: title blocks are to be placed on the right of the sheets and not along the bottom. Engineering plans may be combined, but the Site Plans must be provided separately. Plans shall include the survey monument used to confirm datum. Information shall be provided to enable a non-surveyor to locate the survey monument presented by the consultant.
14. All required plans & reports are to be provided in *.pdf format (at application submission and for any, and all, re-submissions)
15. Please find relevant City of Ottawa Links to Preparing Studies and Plans below:
<https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#standards-policies-and-guidelines>
16. To request City of Ottawa plan(s) or report information please contact the City of Ottawa Information Centre:
InformationCentre@ottawa.ca<<mailto:InformationCentre@ottawa.ca>>
(613) 580-2424 ext. 44455

Transportation

1. Follow Traffic Impact Assessment Guidelines:
 - Submit a screening form to start, full Traffic Impact Assessment if any of the triggers on the screening form are satisfied.
 - Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
 - Request base mapping asap if RMA is required. Contact Engineering Services (<https://ottawa.ca/en/city-hall/planning-and-development/engineering-services>).
2. Providing parking in front of the existing structure affects the available clear throat length:
 - Clear throat requirements for a light industrial use under 10,000 m² on a major collector is 8m. This is measured from the ends of the driveway curb radii at the roadway and the point of first conflict on-site.
 - This dimension must be shown on the site plan.
 - Consider changing the parking and drive aisles to provide for a longer clear throat length.

3. On site plan:

- Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
 - Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.
 - Turning movement diagrams required for internal movements (loading areas, garbage).
 - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible.
 - Show pedestrian pathway to the building entrance.
 - Show lane/aisle widths.
 - Grey out any area that will not be impacted by this application.
4. The City recommends development on private property be in accordance with the City's Accessibility Design Standards (see attached Site Plan Checklist, which summarizes AODA requirements). As the proposed site is commercial/institutional/industrial and for general public use, AODA legislation applies.

Environment

1. No trigger for an Environmental Impact Statement (EIS).

Forestry

1. A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan approval.
2. Any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. Any removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
 - a. After January 1, 2021, permission to remove City trees will be included in the tree permit for the site
 - b. Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
4. The TCR must list all trees on site by species, diameter and health condition

January 4, 2021

5. The TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site
6. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
7. The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
8. Please ensure newly planted trees have an adequate soil volume for their size at maturity. Here are the recommended soil volumes:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

9. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

Mississippi Valley Conservation Authority (MVCA)

1. The property is not regulated under Ontario Regulation 153/06 and does not contain any natural hazard or natural heritage features.
2. The Carp River Watershed Subwatershed Study sets infiltration targets. The site falls between moderate to low recharge areas. We recommend a weighted average be used for the infiltration target.
 - Moderate 104 mm/yr infiltration
 - Low 73 mm/yr infiltration
3. Water quality 70% Total Suspended Solids removal.

File No. PC2020-0313

January 4, 2021

Next Steps:

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

These pre-application consultation comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are also encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me prior to submitting a formal application to confirm whether hardcopies are required. At the time of this letter, the City of Ottawa is not requiring hardcopies due to COVID-19.

Feel free to contact Colette Gorni at colette.gorni@ottawa.ca if you have any questions.



Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains
 700 Long Point Circle 613-425-8044
 Ottawa, Ontario K1T 4E9 d.gray@dbgrayengineering.com

24-Jun-21
 REVISED 30-Jul-21

155 Iber Road
 Ottawa, Ontario

Fire Flow Requirements

Existing One-Storey Office / Warehouse Building

Fire flow requirement as calculated as per Fire Underwriter Survey "Water Supply For Fire Protection".

$F = 220 C A^{0.5}$ = the required fire flow in litres per minute

C = coefficient related to the type of construction
 = 0.8 Non-Combustible Construction (Unprotected structural components)

A = total floor area (all storeys excluding basements at least 50% below grade)

Existing Building:	Office	365	
	Warehouse	295	sq.m.

TOTAL FIRE AREA: 660 sq.m.

F = 4,522 L/min
 = 5,000 L/min (rounded off to the nearest 1,000 L/min)

-15% Charge for Limited-combustible Occupancy (Office)
 15% Charge for Free-burning Occupancy (Warehouse)

-1.6% (weighted average)

= 4,920 L/min

0% Reduction: No Sprinkler System

= - L/min

Increase for Separation Exposed Buildings

		Adjacent Building		Length-Height Factor
		Constuction	Length m	
5% NE	30.1 to 45m	N-C		0
12% SE	10.1 to 20m	N-C	27	1
0% SW	>45m			0
0% NW	>45m			0

17% Total Increase for Exposure (maximum 75%)

= 836 L/min Increase

= 5,757 L/min

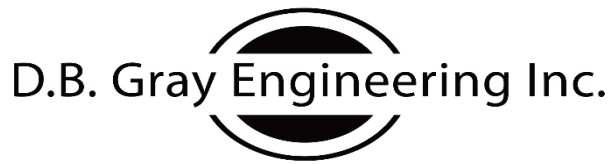
F = 6,000 L/min (rounded off to the nearest 1,000 L/min)

= 100.0 L/s

Elevation at Existing Fire Hydrant 105.18 m ASL

Static Pressure at Fire Hydrant

117 L/s FIRE FLOW: 156.1 m ASL 72 psi 499 kPa



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24-Jun-21
 REVISED 30-Jul-21

155 Iber Road
 Ottawa, Ontario

Fire Flow Requirements

Proposed One-Storey Warehouse Building

Fire flow requirement as calculated as per Fire Underwriter Survey "Water Supply For Fire Protection".

$F = 220 C A^{0.5}$ = the required fire flow in litres per minute

C = coefficient related to the type of construction
 = 0.8 Non-Combustible Construction (Unprotected structural components)

A = total floor area (all storeys excluding basements at least 50% below grade)

Proposed Building: 936 sq.m.

TOTAL FIRE AREA: 936 sq.m.

F = 5,385 L/min
 = 5,000 L/min (rounded off to the nearest 1,000 L/min)

15% Charge for Free-burning Occupancy

= 5,750 L/min

0% Reduction: No Sprinkler System

= - L/min

Increase for Separation Exposed Buildings

		Adjacent Building			Length-Height Factor
		Constuction	Length m	Storeys	
0% NE	>45m				0
12% SE	10.1 to 20m	N-C	25	1	25
5% SW	30.1 to 45m				0
5% NW	30.1 to 45m				0
<u>22%</u> Total Increase for Exposure (maximum 75%)					
=	<u>1,265</u>	L/min Increase			

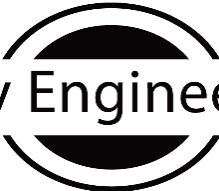
= 7,015 L/min

F = 7,000 L/min (rounded off to the nearest 1,000 L/min)

= 116.7 l/s

Elevation at Existing Fire Hydrant 105.18 m ASL

117 l/s FIRE FLOW: 156.1 m ASL Static Pressure at Fire Hydrant 72 psi 499 kPa



D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

24-Jun-21

REVISED 30-Jun-21

155 Iber Road Ottawa, Ontario

Water Demand

DAILY AVERAGE

COMMERCIAL: 28,000 L / gross ha / day (as per Ottawa Design Guidelines)
0.55 ha (land area)
15534 L / day
8 hour day
32.4 L / min 0.5 L/s 8.6 USgpm

MAXIMUM DAILY DEMAND

1.5 (Peaking Factor as per Ottawa Design Guidelines)
48.5 L / min 0.8 L/s 12.8 USgpm

MAXIMUM HOURLY DEMAND

1.8 (Peaking Factor as per Ottawa Design Guidelines)
87.4 L / min 1.5 L/s 23.1 USgpm

Elevation of Water Meter: 105.39 m ASL
Finish Floor Elevation: 104.49 m ASL

Static Pressure at Water Meter

MINIMUM HGL: 156.6 m ASL 73 psi 502 kPa
MAXIMUM HGL: 161.2 m ASL 79 psi 547 kPa

155 Iber Road Ottawa, Ontario Peak Water Demand

WATER FIXTURE VALUE
(AWWA Manual M22 - Sizing Water Service Lines and Meters)

	No.	F.V.		Total
Bathtub	0	8		0
Tiolet - tank	10	6		60
Tiolet - flush valve	0	24		0
Lavs.	10	1.5		15
Bidet	0	2		0
Urinal - wall flush valve	0	10		0
Shower	0	2.5		0
K. Sink	0	1.8		0
Dishwasher	0	1.3		0
Clothes Washer	0	3		0
Commercial Sink	0	4		0
J. Sink	0	4		0
Commercial Dishwasher	0	4		0
Commercial Washer	0	4		0
Hose 1/2 in	5	5		25
Hose 3/4 in	0	12		0
				100
Peak Demand (fig 4-2 or 4-3 AWWA M22)			50	USgpm
Pressure @ Meter	524	kPa	76	psi.
Pressure Factor (table 4-1 AWWA M22)			1.14	
Peak Demand			57	USgpm
Irrigation - hose 1/2 in	0		0	USgpm (includes pressure factor)
TOTAL PEAK DEMAND	215	L/min	57	USgpm
			3.6	L/s
		Nominal Size	2.0	in
			6.0	ft/s
			50	mm
			1.8	m/s

FW: 155 Iber Rd - Boundary Condition Request

1 message

Elsayed, Ahmed <ahmed.elsayed@ottawa.ca>
To: Douglas Gray <d.gray@dbgrayengineering.com>
Cc: "Schaeffer, Gabrielle" <gabrielle.schaeffer@ottawa.ca>

Mon, Jul 19, 2021 at 10:36 AM

Hi Douglas,

Attached is the B.C. as requested.

Thanks,

Ahmed

From: Douglas Gray <d.gray@dbgrayengineering.com>
Sent: June 24, 2021 1:37 PM
To: Rasool, Rubina <Rubina.Rasool@ottawa.ca>
Cc: Caoimhin Kennedy <c.kennedy@dbgrayengineering.com>
Subject: 155 Iber Rd - Boundary Condition Request

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Hi Rubina

Please provide the boundary conditions at [155 Iber Rd](#). We have calculated the following expected demands based on an existing office / warehouse building and a proposed warehouse building.

Average daily demand: 0.5 L/s.

Maximum daily demand: 0.8 L/s.

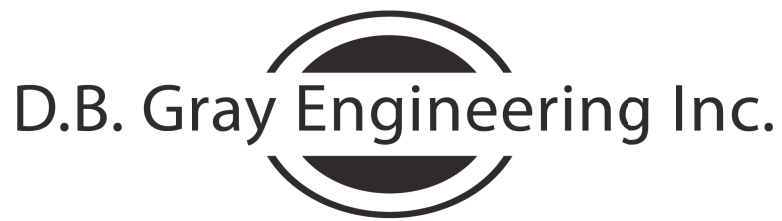
Maximum hourly daily demand: 1.4 L/s

Fire Flow demand: 116.7 L/s

Fire Flow + Max Day: 117.5 L/s

Our calculations are attached.

Thanks, Doug



Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle

Tel: 613-425-8044

Ottawa, Ontario K1T 4E9

d.gray@dbgrayengineering.com

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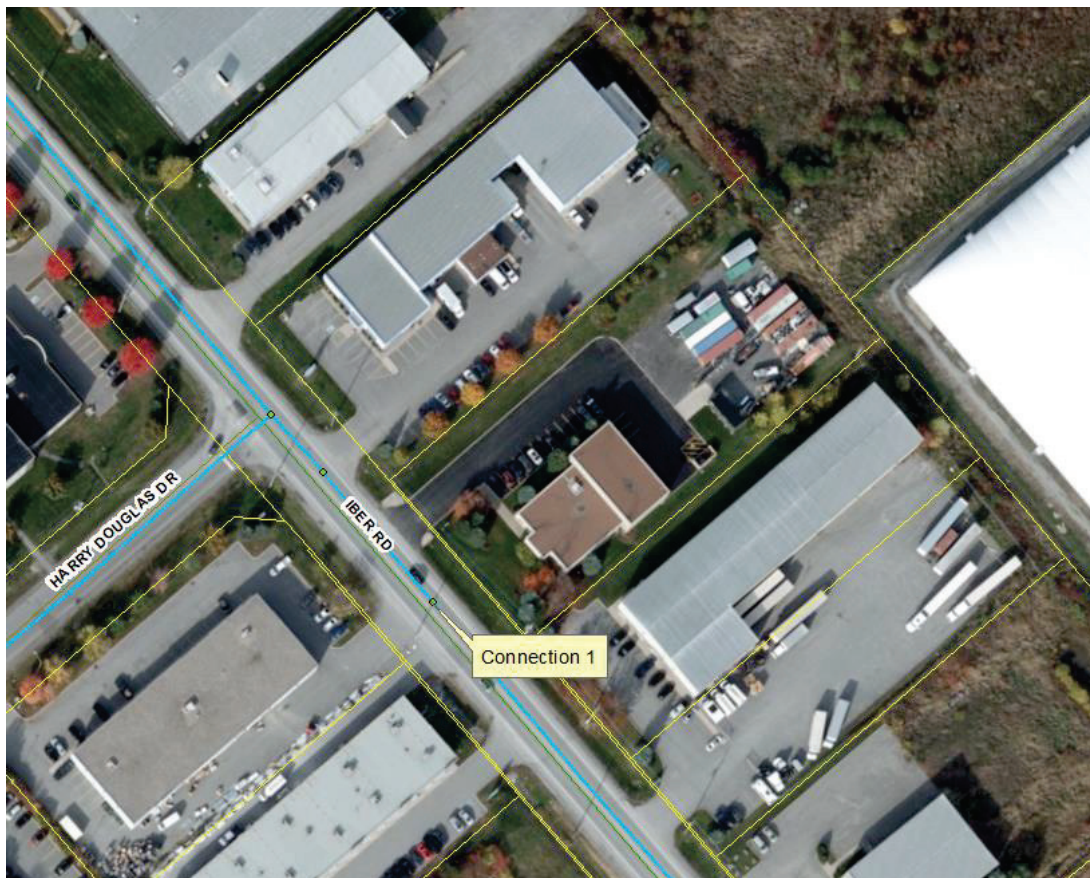
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869K

Boundary Conditions 155 Iber Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	30	0.50
Maximum Daily Demand	48	0.80
Peak Hour	84	1.40
Fire Flow Demand #1	7,000	116.67

Location



Results

Connection 1 – Iber Rd.

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	161.2	80.6
Peak Hour	156.6	74.0
Max Day plus Fire 1	156.1	73.3

Ground Elevation = 104.5 m

Notes

1. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
 - a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
 - b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

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. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

155 Iber Road Ottawa, Ontario

EPANET HYDRAULIC MODELLING RESULTS

Node ID	Demand	Head	Elevation	Pressure		
	L/s	m	m	m	psi	kPa
1 Reservoir (400 WM - Iber Rd)	-95.00	156.10	104.49	51.61	73.4	506
2 Proposed FH	95.00	143.25	104.28	38.97	55.4	382

Link ID	Diameter	Length	Roughness	Loss Coeff.	Flow	Velocity
	mm	m			L/s	m/s
Pipe 1	150	25.3	100	3.95	95.0	5.38



Network Table - Nodes

Node ID	Elevation m	Demand LPS	Head m	Pressure m
Junc 2	104.28	95.00	143.25	38.97
Resvr 1	156.1	-95.00	156.10	0.00

Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s
Pipe 1	25.3	150	100	95.00	5.38



Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains
 700 Long Point Circle
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 d.gray@dbgrayengineering.com

SANITARY SEWER DESIGN FORM

Average Daily Flows
 Residential: 280 L / capita / day
 Commercial: 28000 L / ha / day
 Institutional: 28000 L / ha / day
 Light Industrial: 35000 L / ha / day
 Heavy Industrial: 55000 L / ha / day

Peaking Factor:
 Residential (Harmon Equation): $1 + \frac{14}{4 + P^{0.5}}$
 P = Population / 1000
 Harmon Correction Factor: 0.8
 Commercial & Institutional: 1.5 If contribution > 20%
 Commercial & Institutional: 1 If contribution < 20%
 Industrial: As per Ottawa Guidelines Appendix 4-B

Project: 155 Iber Road

Designed By: D.B.G

October 29, 2021

Page: 1 of 1

Infiltration Allowance: 0.33 l / s / ha

n = 0.013

Location		Section								Cumulative		Section				Cumulative				Sewer Data							Comments																			
		Single Family ppu = 3.4	Semi / townhouse ppu = 2.7	Duplex / Triplex ppu = 2.3	Apartment (average) ppu = 1.8	Apartment (1 Bed) ppu = 1.4	Apartment (2 Bed) ppu = 2.1	Apartment (3 Bed) ppu = 3.1	Area (ha)	Residential Pop.	Peaking Factor	Area (ha)	Flow L/ha/day	Peaking Factor	Flow (L/s)	Area (ha)	Sewage Flow (L/s)	Infiltration Flow (L/s)	Total Flow (L/s)	Material	Actual Diameter (mm)	Nominal Diameter (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)		Ratio Q/Qfull																		
From	To	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	No. of Units	Area (ha)	Pop.	Peaking Factor	Area (ha)	Flow L/ha/day	Peaking Factor	Flow (L/s)	Area (ha)	Sewage Flow (L/s)	Infiltration Flow (L/s)	Total Flow (L/s)	Material	Actual Diameter (mm)	Nominal Diameter (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Ratio Q/Qfull																			
Pre-Development																																														
Existing Commercial Building																																														
Existing Building	Existing 375 SAN											0.3520	28000	4.5	0.51	0.352	0.51	0.12	0.63																											
Post-Development																																														
Existing Commercial Building																																														
												0.3520	28000	4.5	0.51	0.352	0.51	0.12	0.63																											
Proposed Commercial Warehouse																																														
Proposed Building	MH-SA.1											0.2028	28000	4.5	0.30	0.2028	0.30	0.07	0.36	PVC	152.4	150	1.00	5.3	15.89	0.87	0.02																			
MH-SA.1	MH-SA.2														0.30	0.2028	0.30	0.07	0.36	PVC	203.2	200	0.32	73.8	19.36	0.60	0.02																			
MH-SA.2	Existing 375 SAN														0.30	0.2028	0.30	0.07	0.36	PVC	203.2	200	0.32	13.8	19.36	0.60	0.02																			
												Total Area:		0.5548														Total Flow:		0.99																
Existing 375 SAN in Iber Road																																														
																					381.0	375	0.17																					75.42	0.66	

30-Jul-21

REVISED 12-Jan-22

REVISED 14-Oct-22

155 Iber Road Ottawa, Ontario

INFILTRATION CALCULATIONS

DRAINAGE AREA III

Roof Area: 1134 sq.m
 Asphalt/Concrete Area: 2003 sq.m
 Gravel Area: 0 sq.m
 Landscaped Area: 350 sq.m

Total Catchment Area 3487 sq.m.

Pervious(Landscaped) Area: 350 sq.m.
 Total Catchment Area: 3487 sq.m.
 Percentage Pervious: 10%
 Percentage Impervious: 90%

Require Storage Volume *: 90% Impervious Level 31.7 cu.m./ha (extrapolated from Table 3.2 *)
 (for 70% TSS removal) 11.0 cu.m. (3487) sq.m.

* As per MOE Stormwater Management Planning and Design Manual, March 2003

Infiltration Trench

Depth m	Width m	Length m	Total Volume cu.m.	Void
				Volume 40% cu.m.
0.50	2.0	28.5	28.5	11.4
0.50	2.4	15.5	18.6	7.4

18.8

Percolation Rate: 30 mm/hr (silty sand / sandy silt)

Time to Draw Down: 16.7 Hours

155 Iber Road Ottawa, Ontario

INFILTRATION CALCULATIONS

DRAINAGE AREA III

			C
Roof Area:	1134	sq.m.	0.90
Asphalt/Concrete Area:	2003	sq.m.	0.90
Gravel Area:	0	sq.m.	0.70
Landscaped:	<u>350</u>	<u>sq.m.</u>	<u>0.25</u>
Total Catchment Area	3487	sq.m.	0.83

Required Volume Required to Capture: 5 mm rain event: 14.6 cu.m.

64% of days with precipitation are less than 5mm *

* Ottawa International Airport (1981-2010)

Infiltration Trench				
Depth	Width	Length	Total Volume	Void Volume 40%
m	m	m	cu.m.	cu.m.
0.50	2.0	28.5	28.5	11.4
0.50	2.4	15.5	18.6	<u>7.4</u>

18.8

Percolation Rate: 30 mm/hr (as per Geotechnical recommendations)

Time to Draw Down: 16.7 Hours

155 Iber Road
Ottawa, Ontario

Water Balance and Infiltration Calculations

Water Balance is based on the equation: Mean Annual Precipitation - Change in Groundwater Storage - Evapotranspiration = Runoff + Infiltration

Where: Long term changes to groundwater storage are assumed to be negligible
and
Short term or seasonal changes to groundwater are assumed to balance out over the year.

Therefore: Mean Annual Precipitation - Evapotranspiration = Runoff + Infiltration

Infiltration is based on the equations: Surplus (available for infiltration) = Mean Annual Precipitation - Evapotranspiration
and
Infiltration = Surplus x Infiltration Coefficient
and
Infiltration Coefficient = Topography Factor + Soil Factor + Vegetation Factor
(as per the MOE SWM Planning & Design Manual, 2003 - see below)

Pre (Existing) Development

	Area (sq.m.)	Precipitation + (mm/yr)	Evapo-transpiration ++ (mm/yr)	Surplus (mm/yr)	Topography Factor *	Soil Factor **	Vegetation Factor ***	Infiltration Coefficient	Infiltration (mm/yr)	
10m Easement	525	943	575	368	0.1	0.15	0.1	0.35	129	
Landscape	2218	943	575	368	0.15	0.15	0.1	0.40	147	
Hard Surfaces	3330	943	150	793				0.00	0	
Total:	6073									
									Weighted Average:	65

Pre (Existing) Development
(rear outdoor storage area is assumed to be soft landscaping)

	Area (sq.m.)	Precipitation + (mm/yr)	Evapo-transpiration ++ (mm/yr)	Surplus (mm/yr)	Topography Factor *	Soil Factor **	Vegetation Factor ***	Infiltration Coefficient	Infiltration (mm/yr)	
10m Easement	525	943	575	368	0.1	0.2	0.10	0.40	147	
Landscape	3530	943	575	368	0.15	0.2	0.10	0.45	166	
Hard Surfaces	2018	943	150	793				0.00	0	
Total:	6073									
									Weighted Average:	109

Post Development

	Area (sq.m.)	Precipitation + (mm/yr)	Evapo-transpiration ++ (mm/yr)	Surplus (mm/yr)	Topography Factor *	Soil Factor **	Vegetation Factor ***	Infiltration Coefficient	Infiltration (mm/yr)	Infiltration Trench (cu.m.)	Infiltration (mm/yr)
10m Easement	525	943	575	368	0.1	0.2	0.1	0.40	147	77	147
Landscape	1842	943	575	368	0.15	0.2	0.1	0.45	166	305	166
Hard Surfaces	3706	943	150	793				0.00	0	910	246
Total:	6073									1292	
									Weighted Average:	63	213

	mm	Days with Precipitation +	Hard Surfaces Surplus / Precipitation	Hard Surfaces Area (sq.m.)	Hard Surfaces Available Annual Volume (cu.m.)	Hard Surfaces Annual Percentage Captured	Hard Surfaces Annual Volume Captured (cu.m.)	Required Volume of Infiltration Trench (cu.m.)
>=	0.2	163.6	0.84	3706	102	100%	102	0.6
>=	5	58.4	0.84	3706	910	100%	910	15.6
>=	10	30.0	0.84	3706	935	100%	935	31.2
>=	25	5.5	0.84	3706	429	100%	429	77.9

+ Ottawa International Airport (1981-2010)
++ Eastern Ontario Water Resources Management Study (2001) & Carp River Watershed / Subwatershed Study

* Topography: Flat Land, average slope < 0.6m/km (<.06%)
Rolling Land, average slope 2.8 to 3.8m/km (0.28% to 0.38%)
Hilly Land, average slope 28 to 47m/km (2.8 to 4.7%)

** Soil: Tight impervious clay
Medium combination of clay and loam
Open sandy loam

*** Cover: Cultivated Lands
Woodland

Factor	Subject Property
0.3	
0.2	= 0.15 (+/- 2% ave. slope except easement)
0.1	= 0.1 for 10m easement
0.1	
0.2	= 0.2 for silty sand / sandy silt
0.4	
0.1	= 0.1 (soft landscaping)
0.2	

As per MOE SWM Planning & Design Manual, 2003

Summary Tables

ONE HUNDRED YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	6.76	-	-
AREA II (Uncontrolled Flow Off Site)	-	40.00	-	-
AREA III	-	28.61	96.73	96.73
TOTAL	143.98	75.37	96.73	96.73
TOTAL DRAINING TO IBER RD ROADSIDE DITCH (AREA I + III)	-	35.38	-	-

FIVE YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	3.16	-	-
AREA II (Uncontrolled Flow Off Site)	-	20.32	-	-
AREA III	-	22.53	40.77	40.77
TOTAL	73.06	46.01	40.77	40.77
TOTAL DRAINING TO IBER RD ROADSIDE DITCH (AREA I + III)	-	25.69	-	-

155 Iber Road
 Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS
 Rational Method

ONE HUNDRED-YEAR EVENT

Pre-Development Conditions

			C
Roof Area:	661	sq.m	1.00
Asphalt/Concrete Area:	1357	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	<u>3530</u>	<u>sq.m</u>	<u>0.25</u>
Total Catchment Area:	5548	sq.m	0.52

Bransby William Formula

$$T_c = \frac{0.057 \cdot L}{S_w^{0.2} \cdot A^{0.1}} \text{ min}$$

Sheet Flow Distance (L):	105	m
Slope of Land (Sw):	1	%
Area (A):	0.5548	ha

Time of Concentration (Sheet Flow): 6.3 min

Area (A):	5548	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
Runoff Coefficient (C):	0.52	

100-Year Pre-Development Flow Rate (2.78AiC): 143.98 L/s
 (Maximum 100-Year Release Rate)

DRAINAGE AREA I (Uncontrolled Flow Off Site - Draining to Iber Rd)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	<u>545</u>	<u>sq.m</u>	<u>0.25</u>
Total Catchment Area:	545	sq.m	0.25
Area (A):	545	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coefficient (C):	0.25		
Release Rate (2.78AiC):	6.76	L/s	

DRAINAGE AREA II (Uncontrolled Flow Off Site - Draining to Rear)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	473	sq.m	1.00
Asphalt/Concrete Area:	96	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	<u>947</u>	<u>sq.m</u>	<u>0.25</u>
Total Catchment Area:	1516	sq.m	0.53
Area (A):	1516	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coefficient (C):	0.53		
Release Rate (2.78AiC):	40.00	L/s	

FIVE-YEAR EVENT

Pre-Development Conditions

			C
Roof Area:	661	sq.m	0.90
Asphalt/Concrete Area:	1357	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	<u>3530</u>	<u>sq.m</u>	<u>0.20</u>
Total Catchment Area:	5548	sq.m	0.45
Area (A):	5548	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coefficient (C):	0.45		
5-Year Pre-Development Flow Rate (2.78AiC):	73.06	L/s	
(Maximum 5-Year Release Rate)			

DRAINAGE AREA I (Uncontrolled Flow Off Site - Draining to Iber Rd)

(FIVE-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	<u>545</u>	<u>sq.m</u>	<u>0.20</u>
Total Catchment Area:	545	sq.m	0.20
Area (A):	545	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coefficient (C):	0.20		
Release Rate (2.78AiC):	3.16	L/s	

DRAINAGE AREA II (Uncontrolled Flow Off Site - Draining to Rear)

(FIVE-YEAR EVENT)

			C
Roof Area:	473	sq.m	0.90
Asphalt/Concrete Area:	96	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	<u>947</u>	<u>sq.m</u>	<u>0.20</u>
Total Catchment Area:	1516	sq.m	0.46
Area (A):	1516	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coefficient (C):	0.46		
Release Rate (2.78AiC):	20.32	L/s	

TWO YEAR EVENT

DRAINAGE AREA III

(TWO-YEAR EVENT)

			C	
Roof Area:	1134	sq.m	0.90	
Asphalt/Concrete Area:	2003	sq.m	0.90	
Gravel Area:	0	sq.m	0.70	
Landscaped Area:	<u>350</u>	sq.m	<u>0.20</u>	
Total Catchment Area:	3487	sq.m	0.83	
Water Elevation:	103.99	m		Volume
Invert of Inlet of Culvert:	103.79	m	Vol. of Infiltration Trench	18.80 cu.m
Centroid of ICD Orifice: (ICD in Inlet of Culvert)	103.87	m	Ponding. above Swale (Narrow Part)	3.35 cu.m
Head:	0.13	m		
Orifice Diameter:	152	mm	Ponding above Swale (Wide Part)	7.11 cu.m
Orifice Area:	18050	sq.mm	Ponding above Asphalt	
Coefficient of Discharge:	0.61		Top Area Depth (sq.m) (m)	
			0 0.00	<u>0.00</u> cu.m
Maximum ICD Release Rate:	17.47	L/s		
Maximum Weir Release Rate:	<u>0.00</u>	L/s	Achieved Volume:	29.26 cu.m
Total Maximum Release Rate:	17.47	L/s	Maximum Volume Required:	29.26 cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	ICD Release Rate (L/s)	Weir Release Rate (L/s)	Total Release Rate (L/s)	Stored Rate (L/s)	Stored Volume (cu.m)
5	104	83.31	17.47	0.00	17.47	65.83	19.75
10	77	61.78	17.47	0.00	17.47	44.31	26.58
15	62	49.68	17.47	0.00	17.47	32.21	28.99
20	52	41.85	17.47	0.00	17.47	24.38	29.26
25	45	36.33	17.47	0.00	17.47	18.86	28.29
30	40	32.21	17.47	0.00	17.47	14.74	26.53
35	36	29.00	17.47	0.00	17.47	11.53	24.22
40	33	26.43	17.47	0.00	17.47	8.96	21.51
45	30	24.32	17.47	0.00	17.47	6.85	18.50
50	28	22.55	17.47	0.00	17.47	5.08	15.25
55	26	21.05	17.47	0.00	17.47	3.58	11.81
60	25	19.75	17.47	0.00	17.47	2.28	8.21
65	23	18.62	17.47	0.00	17.47	1.15	4.48
70	22	17.63	17.47	0.00	17.47	0.15	0.65
75	21	16.74	16.74	0.00	16.74	0.00	0.00
80	20	15.95	15.95	0.00	15.95	0.00	0.00
85	19	15.24	15.24	0.00	15.24	0.00	0.00
90	18	14.59	14.59	0.00	14.59	0.00	0.00
95	17	14.01	14.01	0.00	14.01	0.00	0.00
100	17	13.47	13.47	0.00	13.47	0.00	0.00
105	16	12.98	12.98	0.00	12.98	0.00	0.00
110	16	12.52	12.52	0.00	12.52	0.00	0.00
115	15	12.10	12.10	0.00	12.10	0.00	0.00
120	15	11.71	11.71	0.00	11.71	0.00	0.00

155 Iber Road Ottawa, Ontario

BROAD CRESTED WEIR CALCULATIONS

Capacity of Weir (at 0.05m depth of water above weir)

DRAINAGE AREA II

Length of Weir based on an assumed coefficient of discharge (Cd):

if Q =	30	L/s (maximum permitted flow)	assumes Cd= 0.577
=	0.030	cu.m/s	(assumes P/H is large)
& H =	0.03	m (max. depth of water above top of weir)	
then L =	3.0	m (length of weir) $L = Q / ((1.705) \times H^{3/2})$	

Length of Weir based on a calculated coefficient of discharge (Cd):

if P =	0.37	m (depth of pond)	
& Lp =	5.0	m (width of pond perpendicular to direction of flow)	
then Vp =	0.01	m/s (velocity in pond) $Vp = Q / ((P+H) / Lp)$	
& E =	0.03	m (energy) $E = H + V^2/2g$	
& Cd =	0.578	$= 0.577 \times (E/H)^{3/2}$	
if Q =	30	L/s (maximum permitted flow)	
=	0.0300	cu.m/s	
& H =	0.03	m (depth of water above top of weir)	
then L =	3.0	m (length of weir) $L = Q / (Cd^{2/3} \times (2 \times 9.81)^{1/2} \times H^{3/2})$	

Flow Rates to Existing Ditches Rational Method

ONE HUNDRED-YEAR EVENT

Approximate area draining to Iber Rd roadside ditch (upstream of 155 Iber Rd)

(Includes parts of 113, 119, 135, 139, 145 & 149 Iber Rd)

Catchment Area:	3.2	ha
Runoff Coefficient (C):	0.94	(1.25 x 0.75)
Time of Concentration:	35	min
Rainfall Intensity (i):	83	mm/hr
Flow Rate (2.78AiC):	0.69	cms

Approximate area draining to Iber Rd roadside ditch (at SW corner of 185 Iber Rd)

(Includes parts of 113, 119, 135, 139, 145, 149, 155, 165 & 185 Iber Rd)

Catchment Area:	3.8	ha
Runoff Coefficient (C):	0.94	(1.25 x 0.75)
Time of Concentration:	40	min
Rainfall Intensity (i):	75	mm/hr
Flow Rate (2.78AiC):	0.74	cms

DRAINAGE AREA A (Pre-development Flow Rate)

Total Catchment Area:	575	sq.m.
Runoff Coefficient (C):	0.25	(1.25 x 0.20)
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
Flow Rate (2.78AiC):	7.14	L/s
	0.007	cms

DRAINAGE AREA I +III (Post Development Flow Rate)

TOTAL DRAINING TO IBER RD	35.38	L/s
ROADSIDE DITCH	0.035	cms
INCREASE DRAINING TO IBER RD	28.24	L/s
ROADSIDE DITCH	0.028	cms

% Flow Increase to Iber Rd Roadside Ditch: 4%

Approximate Drainage Area (upstream of SE corner of 185 Iber Road)

(Includes parts of 113 and 119, 135, 139, 145, 149, 155, 165, 185 & 201 Iber Rd)

Total Catchment Area:	9.8	ha
Runoff Coefficient (C):	0.81	(1.25 x 0.65)
Time of Concentration:	45	min
Rainfall Intensity (i):	69	mm/hr
Flow Rate (2.78AiC):	1.53	cms

155 Iber Rd - 100-Year Pre-Development Flow Rate

TOTAL DRAINING OFF SITE	143.98	L/s
	0.144	cms

155 Iber Rd - 100-Year Post Development Flow Rate

TOTAL DRAINING OFF SITE	75.37	L/s
	0.08	cms
DECREASE DRAINING TO SE	68.61	L/s
CORNER OF 185 BER RD	0.07	cms

% Flow Decrease at SE corner of 185 Iber Rd: 4%

FIVE-YEAR EVENT

Approximate area draining to Iber Rd roadside ditch (upstream of 155 Iber Rd)

(Includes parts of 113, 119, 135, 139, 145 & 149 Iber Rd)

Catchment Area:	3.2	ha
Runoff Coefficient (C):	0.75	
Time of Concentration:	35	min
Rainfall Intensity (i):	49	mm/hr
Flow Rate (2.78AiC):	0.32	cms

Approximate area draining to Iber Rd roadside ditch (at SW corner of 185 Iber Rd)

(Includes parts of 113, 119, 135, 139, 145, 149, 155, 165 & 185 Iber Rd)

Catchment Area:	3.8	ha
Runoff Coefficient (C):	0.75	
Time of Concentration:	40	min
Rainfall Intensity (i):	44	mm/hr
Flow Rate (2.78AiC):	0.35	cms

DRAINAGE AREA A (Pre-development Flow Rate)

Total Catchment Area:	575	sq.m.
Runoff Coefficient (C):	0.20	
Time of Concentration:	10	min
Rainfall Intensity (i):	104	mm/hr
Flow Rate (2.78AiC):	3.33	L/s
	0.003	cms

DRAINAGE AREA I +III (Post Development Flow Rate)

TOTAL DRAINING TO IBER RD ROADSIDE DITCH	25.69	L/s
	0.03	cms
INCREASE DRAINING TO IBER RD ROADSIDE DITCH	22.36	L/s
	0.02	cms

% Flow Increase to Iber Rd Roadside Ditch: 6%

Approximate Drainage Area (upstream of SE corner of 185 Iber Road)

(Includes parts of 113 and 119, 135, 139, 145, 149, 155, 165, 185 & 201 Iber Rd)

Total Catchment Area:	9.8	ha
Runoff Coefficient (C):	0.65	
Time of Concentration:	45	min
Rainfall Intensity (i):	41	mm/hr
Flow Rate (2.78AiC):	0.72	cms

155 Iber Rd - 5-Year Pre-Development Flow Rate

TOTAL DRAINING OFF SITE	73.06	L/s
	0.07	cms

155 Iber Rd - 5-Year Post Development Flow Rate

TOTAL DRAINING OFF SITE	46.01	L/s
	0.05	cms
DECREASE DRAINING TO SE CORNER OF 185 BER RD	27.05	L/s
	0.03	cms

% Flow Decrease at SE corner of 185 Iber Rd: 4%

155 Iber Road Ottawa, Ontario

Capacity Flow Rate: 2.2 cms

Ditch Slope: 0.2%

Ditch Manning Roughness Coefficient n: 0.04 mowed grass

Side Slope: 3.20 :1

Lot Side Slope: 3.20 :1

Ditch Bottom Width: 0.8 m

Water Depth: 0.88 m

Water Top Width: 6.43

(Adjacent to Building)

Water Cross-Section Area: 3.18 sq.m.

Wetted Perimeter: 6.70 m

Hydraulic Radius: 0.47 m

Velocity: 0.68 m/s

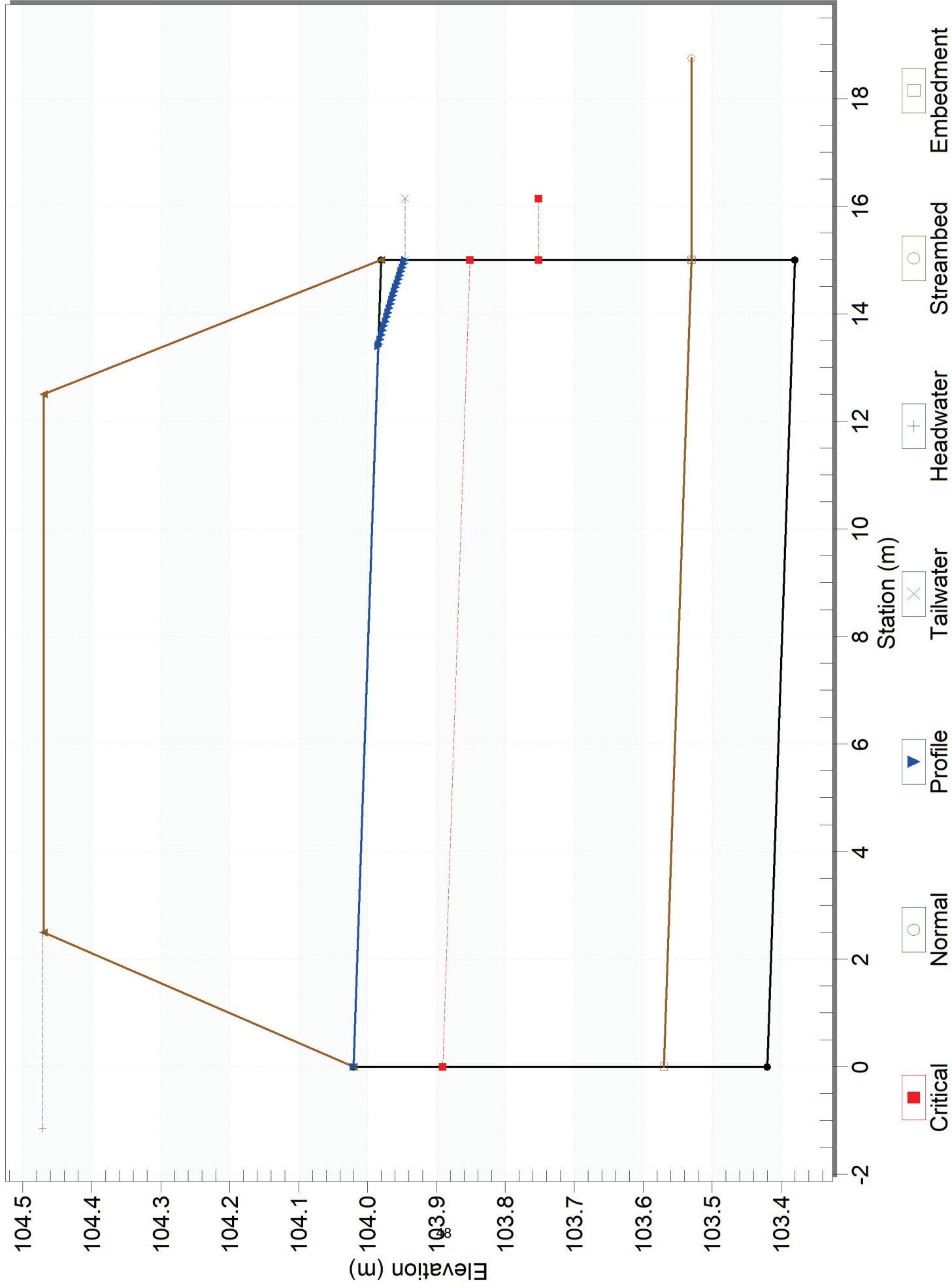
Based on water depth

Velocity: 0.68 m/s

Using Manning's Formula:

Crossing - 155 Iber Rd, Design Discharge - 0.35 cms

Culvert - Existing 15m - 600mm, Culvert Discharge - 0.35 cms



Culvert Crossing: 155 Iber Rd

Culvert Summary Table - Existing 15m - 600mm

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth(m)	Outlet Control Depth(m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	103.57	0.00	0.0	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
0.03	0.03	103.73	0.13	0.16	3-M1t	0.14	0.08	0.14	0.14	0.44	0.23
0.07	0.07	103.81	0.20	0.24	3-M2t	0.22	0.12	0.20	0.20	0.61	0.28
0.10	0.10	103.88	0.26	0.31	3-M2t	0.31	0.15	0.24	0.24	0.75	0.31
0.14	0.14	103.94	0.31	0.37	3-M2t	0.45	0.18	0.27	0.27	0.88	0.34
0.17	0.17	104.00	0.36	0.43	3-M2t	0.45	0.21	0.30	0.30	1.01	0.36
0.21	0.21	104.06	0.41	0.49	3-M2t	0.45	0.24	0.33	0.33	1.12	0.38
0.24	0.24	104.15	0.47	0.58	7-M2t	0.45	0.26	0.35	0.35	1.24	0.39
0.28	0.28	104.25	0.52	0.68	7-M2t	0.45	0.28	0.38	0.38	1.35	0.40
0.31	0.31	104.36	0.58	0.79	7-M2t	0.45	0.30	0.40	0.40	1.47	0.42
0.35	0.35	104.47	0.65	0.90	7-M2t	0.45	0.32	0.42	0.42	1.58	0.43

City of Ottawa Servicing Study Checklist

General Content

Executive Summary (for large reports only): not applicable

Date and revision number of the report: see page 1 of Servicing Brief and Stormwater Management Report

Location map and plan showing municipal address, boundary, and layout of proposed development: see drawings C-1 to C-6

Plan showing the site and location of all existing services: see drawings C-1 to C-6

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: not applicable

Summary of Pre-consultation Meetings with City and other approval agencies: not available

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 defensible design criteria: not applicable

Statement of objectives and servicing criteria: see page 2 of Servicing Brief and Stormwater Management Report

Identification of existing and proposed infrastructure available in the immediate area: see drawings C-1 to C-6

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). see drawings C-1 to C-6

Concept level master grading plan to confirm existing and proposed grades in the development 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: not applicable

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: not applicable

Proposed phasing of the development, if applicable: not applicable

Reference to geotechnical studies and recommendations concerning servicing: see note 1.5 on drawing C-5

All preliminary and formal site plan submissions should have the following information:

- **Metric scale:** included
- **North arrow:** included
 - **(including construction North):** not included
- **Key Plan:** included

- **Name and contact information of applicant and property owner:** not available
- **Property limits:** included
 - **including bearings and dimensions:** not included
- **Existing and proposed structures and parking areas:** included
- **Easements, road widening and rights-of-way:** included
- **Adjacent street names:** included

Development Servicing Report: Water

Confirm consistency with Master Servicing Study, if available: not applicable

Availability of public infrastructure to service proposed development: not applicable

Identification of system constraints: not applicable

Confirmation of adequate domestic supply and pressure: not applicable

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 locations throughout the development: not applicable

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: not applicable

Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design: not applicable

Address reliability requirements such as appropriate location of shut-off valves: not applicable

Check on the necessity of a pressure zone boundary modification:. not applicable

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: not applicable

Description of the proposed water distribution network, including locations of proposed connections to the existing systems, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions: not applicable

Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation: not applicable

Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines: not applicable

Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference: not applicable

Development Servicing Report: Wastewater

Summary of proposed design criteria: see page 2 of Servicing Brief

(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): not applicable

Confirm consistency with Master Servicing Study and /or justification for deviations: not applicable

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 conditions of sewers: not applicable

Descriptions of existing sanitary sewer available for discharge of wastewater from proposed development: see page 2 of Servicing Brief

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): not applicable

Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix C) format. not applicable

Description of proposed sewer network including sewers, pumping stations, and forcemains: see not applicable

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): not applicable

Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development: not applicable

Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity: not applicable

Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding: not applicable

Special considerations such as contamination, corrosive environment etc: not applicable

Development Servicing Report: Stormwater Checklist

Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property): see page 5 of Servicing Brief and Stormwater Management Report

Analysis of available capacity in existing public infrastructure. not applicable

A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern: see drawing C-1 to C-6

Water quality 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: see Stormwater Management Report Servicing Brief and Stormwater Management Report

Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements: Servicing Brief and Stormwater Management Report

Descriptions of the references and supporting information.
Set-back from private sewage disposal systems. not applicable

Watercourse and hazard lands setbacks: not applicable

Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed: the pre-application consultation record has not been issued

Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists: not applicable

Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period). see drawings C-1 to C-6 and Servicing Brief and Stormwater Management Report

Identification of watercourses within the proposed development and how watercourses will be protected, or , if necessary, altered by the proposed development with applicable approvals. see drawings C-1 to C-6 and Servicing Brief and Stormwater Management Report

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: see Servicing Brief and Stormwater Management Report

Any proposed diversion of drainage catchment areas from one outlet to another. : not applicable

Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities. : not applicable

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: not applicable

Identification of potential impacts to receiving watercourses: Servicing Brief and Stormwater Management Report

Identification of municipal drains and related approval requirements. : not applicable

Descriptions of how the conveyance and storage capacity will be achieved for the development: see page 3 of Servicing Brief and Stormwater Management Report

100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading:

Inclusion of hydraulic analysis including hydraulic grade line elevations. : not applicable

Description of approach to erosion and sediment control during construction for the protection of receiving watercourses of drainage corridors: see notes 2.1 to 2.6 on drawing C-5

Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplains elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current: not applicable

Identification of fill constraints related to floodplain and geotechnical investigation. : not applicable

Approval and Permit Requirements: Checklist

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 each 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 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: see page 19 of Servicing Brief and Stormwater Management Report

Application for Certificate of Approval (CofA) under the Ontario Water Resources Act:

Changes to Municipal Drains. : not applicable

Other permits (National Capital commission, Parks Canada, public Works and Government Services Canada, Ministry of transportation etc.) : not applicable

Conclusion Checklist

Clearly stated conclusions and recommendations: see page 6 of Servicing Brief

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: included