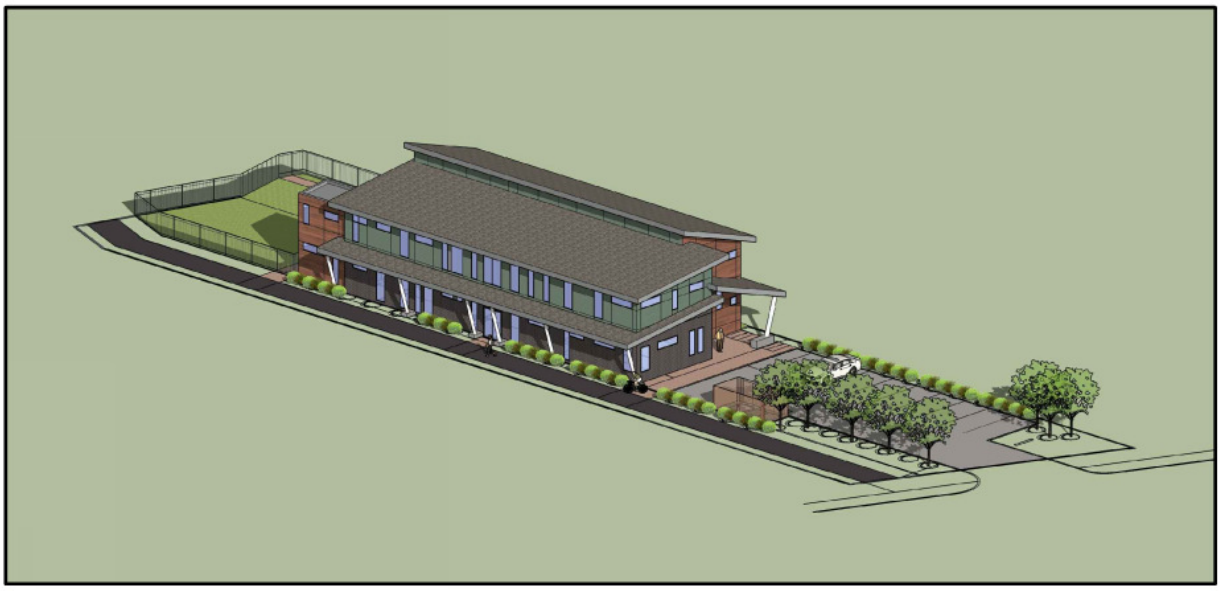
RIVERSIDE PARK EARLY LEARNING CENTRE
2826 SPRINGLAND DRIVE, OTTAWA, ON

SERVICING AND STORMWATER MANAGEMENT REPORT

MAY 10, 2019
REVISION 1 – JULY 31, 2019



RIVERSIDE PARK NURSERY SCHOOL 2826 SPRINGLAND DRIVE, OTTAWA, ON

SERVICING AND STORMWATER MANAGEMENT REPORT

DEVELOPER: CANOE BAY DEVELOPMENT INC.
OWNER: ANDREW FLECK CHILD SERVICES

PROJECT NO.: 191-03236-00
DATE: MAY 2019
REVISION 1 – JULY 31, 2019

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ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Issued for Site Plan Application	Response to Review Comments		
Date	May 10, 2019	July 31, 2019		
Prepared by	Ding Bang (Winston) Yang	Ding Bang (Winston) Yang		
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1 GENERAL

1.1 EXECUTIVE SUMMARY

WSP was retained by Canoe Bay Development Inc to provide servicing, grading and stormwater management design services for the proposed daycare facility, located at 2826 Springland Drive, north west of Walkley Road and Springland Drive. This report outlines findings and calculations pertaining to the servicing of the proposed building with gross floor area of 810 m².

The subject site is 0.178 ha in size. The site is bounded by existing residential development to the east, an elementary school to the north, a church to the south and future public park to the west. The property is described as Block 12, Part of Lots 24 & 25, Concession Junction Gore, Plan 4R-12424, Geographic Township of Gloucester, now City of Ottawa. (refer to Appendix A for the Topographical Survey Plan by Annis, O'Sullivan, Vollebekk Ltd, January 2019). Currently, the site is vacant and consists primarily of grassed area. Based on the topographic survey, the overall topography of the site is draining towards Springland Drive to the east and towards the existing Holy Cross Church to the south.

As established at the pre-consultation meeting, stormwater quantity control is required for the impacted areas of the site in order that post-construction runoff rates do not exceed existing rates for the 5 year and 100 year storm events. The proposed development will increase the runoff coefficient as a result of the increase in impervious areas, thus stormwater quantity control will be provided for this development. The controlled areas do not receive any drainage contribution from adjacent lands. Drainage from adjacent lands entering the site is conveyed through the site via a swale and pipe system outside of the controlled area.

Stormwater quality control has been requested by the Rideau Valley Conservation Authority, and will be accommodated with an oil and grit separator to be installed on the outlet storm sewer from the development site to provide 80% TSS removal.

This report was prepared utilizing servicing design criteria obtained from available sources and outlines the design for water, sanitary wastewater, and stormwater facilities, including stormwater management. The proposed design for the site is indicated on Drawing C1 – Grading Plan - Sediment and Erosion Control, and Drawing C2 – Civil Services Plan, both provided in Appendix D.

The format of this report matches that of the servicing study checklist found in section 4 of the City of Ottawa's Servicing Study Guidelines for Development Applications, November 2009.

The following municipal services are available within Springland Drive adjacent to the development as recorded from the following as-built drawings received from the City of Ottawa registry:

Springland Drive:

- 200 mm watermain, 250 mm sanitary sewer and 450 mm storm sewer.

City Registry drawings: 8" water main, 10" sanitary sewer and 18" storm sewer Plan No. 1554p&p1 and 1554p&p2

It is proposed that:

- On-site stormwater management systems, employing surface storage and underground stormwater detendtion chambers will be provided to attenuate flow rates leaving the new parking lot and new building roof.

1.2 DATE AND REVISION NUMBER

This version of the report is the first revision, dated July 23, 2019, prepared in response to City review comments dated July 11, 2019.

1.3 LOCATION MAP AND PLAN

The proposed development located at 2826 Springland Drive, in the City of Ottawa is shown in Figure 1-1 below.

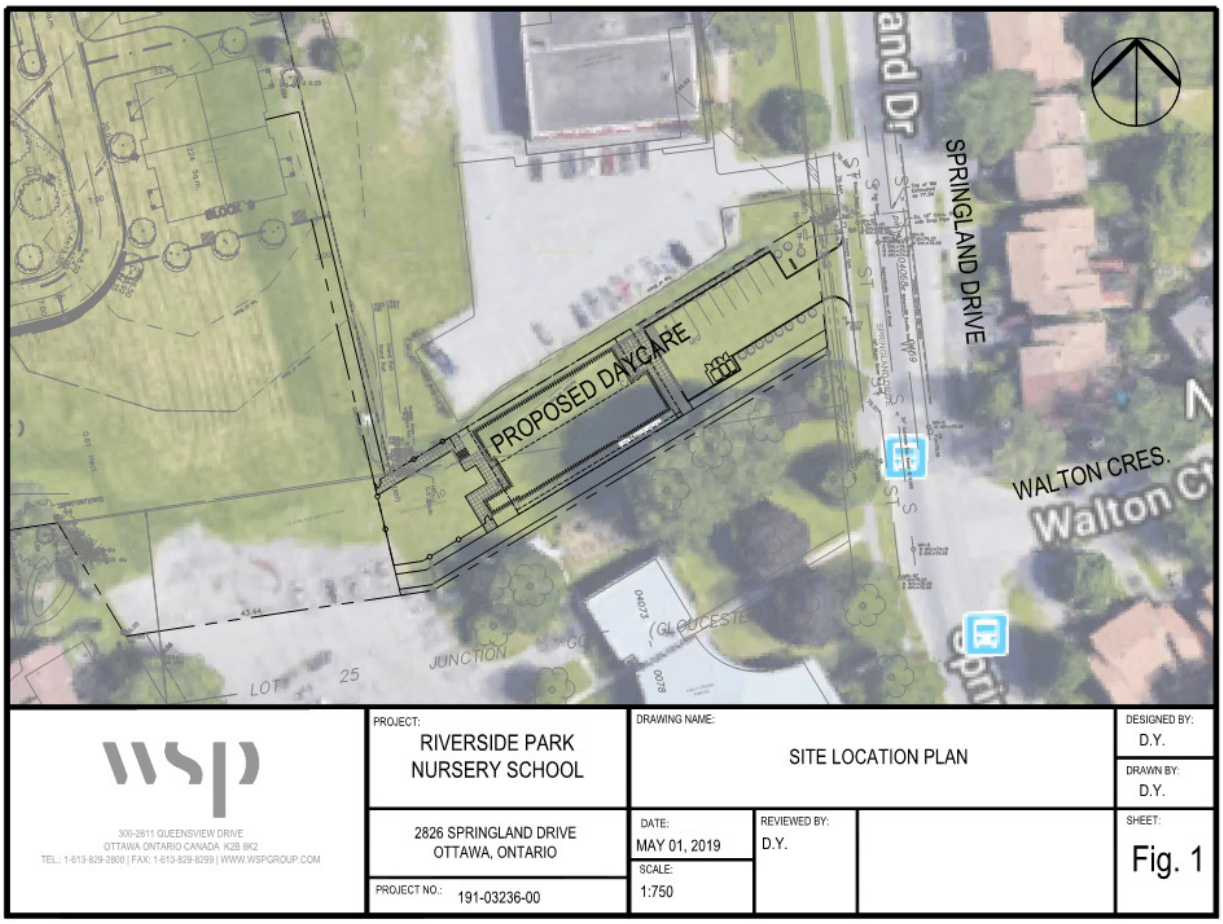


Figure 1-1 Site Location

1.4 ADHERENCE TO ZONING AND RELATED REQUIREMENTS

The proposed property use will be in conformance with zoning and related requirements prior to approval and construction. The Official Plan Designation is General Urban Area (Section 3.6.1). The site is within the Riverside Park Secondary Plan. The zoning is Minor Institutional Zone, which permits a daycare use.

1.5 PRE-CONSULTATION MEETINGS

A pre-consultation meeting was held with the City of Ottawa on February 27, 2019. Notes from this meeting are provided in Appendix A.

1.6 HIGHER LEVEL STUDIES

The review for servicing has been undertaken in conformance with, and utilizing information from, the following documents:

- Ottawa Sewer Design Guidelines, Second Edition, Document SDG002, October 2012, City of Ottawa including:
    - Technical Bulletin ISDTB-2012-4 (20 June 2012)
    - Technical Bulletin ISDTB-2014-01 (05 February 2014)
    - Technical Bulletin PIEDTB-2016-01 (September 6, 2018)
    - Technical Bulletin ISDTB-2018-01 (21 March 2018)
    - Technical Bulletin ISDTB-2018-04 (27 June 2018)
- Ottawa Design Guidelines – Water Distribution, July 2010 (WDG001), including:
    - Technical Bulletin ISDTB-2014-02 (May 27, 2014)
    - Technical Bulletin ISTB-2018-02 (21 March 2018)
- Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change, March 2003 (SMPDM).
- Design Guidelines for Drinking-Water Systems, Ontario Ministry of the Environment and Climate Change, 2008 (GDWS).
- Fire Underwriters Survey, Water Supply for Public Fire Protection (FUS), 1999.

1.7 STATEMENT OF OBJECTIVES AND SERVICING CRITERIA

The objective of the site servicing is to meet the requirements for the proposed modification of the site while adhering to the stipulations of the applicable higher-level studies and City of Ottawa servicing design guidelines.

1.8 AVAILABLE EXISTING AND PROPOSED INFRASTRUCTURE

A municipal watermain, sanitary and storm sewers are located within the Springland Drive right of way, east of the site. A new sanitary and storm service and a new water service will extend from Springland Drive to the proposed building. Quantity control is required to restrict the discharge for all events up to a 100 year event to the 5 year pre-development flow rate. Quantity control will be achieved using surface ponding and underground chamber storage. Site access for vehicles will be provided from Springland Drive.

1.9 ENVIRONMENTALLY SIGNIFICANT AREAS, WATERCOURSES AND MUNICIPAL DRAINS.

The proposed development site is bordered by residential to the east, by institutional land to the north and south, and by future recreational park land to the west. There are no environmentally significant areas, water courses or municipal drains identified at or in close proximity to the site. The existing municipal storm sewer along Springland Drive conveys drainage from this and the neighbouring properties to the downstream storm sewer network, but is not classified as a watercourse or municipal drain.

1.10 CONCEPT LEVEL MASTER GRADING PLAN

A detailed grading plan (Drawing C1) for the site has been developed, matching the existing grades at the property lines. A copy of Drawing C1 is provided in Appendix D.

Runoff on the site will flow overland, and be collected via a series of landscape and regular catch basins, and then conveyed via storm sewers to Springland Drive. Roof drainage will be collected via downspouts which will outlet to the site storm sewers. The site topographic survey, included in Appendix A, provides evidence of direction of overland flow.

Due to the existing grade difference north of the building, it will be necessary to construct a shallow retaining wall of 0.5m height, along the east section of the north boundary. Grading will employ terraced slopes of 3H:1V to provide transitions in selected areas. No changes will be made to grades at the property perimeter.

1.11 IMPACTS ON PRIVATE SERVICES

There are no existing domestic private services (septic system and well) located on the site. There are no neighbouring properties using private services.

1.12 DEVELOPMENT PHASING

No development phasing is expected for the current proposal.

1.13 GEOTECHNICAL SUTDY

A geotechnical investigation report has been prepared by the Paterson Group (Report PG4883-1, April 30, 2019), and its recommendations has been taken into account in developing the engineering specifications. A copy of the report can be found in Appendix A.

1.14 DRAWING REQUIREMENT

The engineering plans submitted for site plan approval will be in compliance with City requirements.

2 WATER DISTRIBUTION

2.1 CONSISTENCY WITH MASTER SERVICING STUDY AND AVAILABILITY OF PUBLIC INFRASTRUCTURE

There is an existing 200mm diameter water service on Springland Drive providing water to adjacent properties. The new two-storey day care building will be sprinklered, and will require a 100mm diameter water service. A private fire hydrant will be provided at the site within 45m to the Siamese connection. No changes are required to the existing City water distribution system to allow servicing for this property.

2.2 SYSTEM CONSTRAINTS AND BOUNDARY CONDITIONS

Boundary conditions have been provided by the City of Ottawa at the 203 mm diameter watermain on Springland Drive for the development, and are included in Appendix B. A fire flow of 100 l/s (6,000 l/min) was used for the development which was calculated in Section 2.4. The boundary conditions were based on fire flows and domestic demands estimated for the proposed two-storey building as supplied by the City of Ottawa and summarized as follows:

Table 2-1: Boundary Conditions

BOUNDARY CONDITIONS	
SCENARIO	HGL (m)
Maximum HGL	133.8
Minimum HGL (Peak Hour)	124.8
Max Day + Fire Flow	123.5

2.3 CONFIRMATION OF ADEQUATE DOMESTIC SUPPLY AND PRESSURE

Water demands are based on Table 4.2 of the Ottawa Design Guidelines – Water Distribution. As previously noted, the development is considered as a school development, consisting of a new daycare facility and parking. The daycare is assumed to have an average demand of at 70 l/student/d as found in Table 4.1 of the Design Guidelines. It was assumed that the maximum building population is 103, as noted in Section 3.2 of this report. A water demand calculation sheet is included in Appendix B, and the total water demands are summarized as follows:

	School Building
Average Day	0.08 l/s
Maximum Day	0.13 l/s
Peak Hour	0.23 l/s

The 2010 City of Ottawa Water Distribution Guidelines stated that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point the distribution system shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls may be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

A water model software, InfoWater was used to perform the water distribution analysis for the proposed building. The minimum water pressure inside the building at the connection is determined with the minimum HGL condition, resulting in a pressure of 439.38 kPa which exceeds the minimum requirement of 276 kPa per the guidelines, Refer to Appendix B for the water distribution analysis output.

2.4 CONFIRMATION OF ADEQUATE FIRE FLOW PROTECTION

The fire flow rate has been calculated using the Fire Underwriters Survey (FUS) method. The method takes into account the type of building construction, the building occupancy, the use of sprinklers and the exposures to adjacent structures. A calculation was performed for the proposed daycare. Assuming fire resistive construction and a sprinkler system, a fire flow demand of 6,000 l/min has been calculated. A copy of the calculation is included in Appendix B.

The demand of 6,000 l/min can be delivered through one existing municipal fire hydrant and one proposed fire hydrant. The proposed hydrant will be located east of the site as shown in drawing C2. The existing hydrant, located 170m north of the property is rated as 5,700 l/min and would provide 2,839 l/min at the building site based on the distance from the site. The proposed fire hydrant will be located east of the building and within 75m of the building footprint and is rated as 5,700 l/min. The two hydrants provide a combined total of 8,539 l/min.

The proposed building on site will be serviced by a single 100 mm service off the 200 mm municipal watermain. The service will run into the mechanical/pump room. The proposed building will be fully sprinklered and fire protection will be provided with the fire department Siamese connection within 45 m of the new private fire hydrant at the entrance from Springland Drive. The Siamese connection is located on the northeast corner of the building. The new private fire hydrant will also be rated at 5700 l/min based on the results of our hydraulic analysis.

The boundary condition for Maximum Day and Fire Flow results in a pressure of 342.96 kPa at the ground floor level and 411.96 kPa at the new private hydrant. In the guidelines, a minimum residual pressure of 140 kPa must be maintained in the distribution system for a fire flow and maximum day event. As a pressure of 342.96 kPa is achieved, the fire flow requirement is exceeded. Refer to Appendix B for the detailed water distribution analysis output.

2.5 CHECK OF HIGH PRESSURE

High pressure is not a concern. Maximum water pressure inside the building at the connection is determined with the maximum HGL condition, resulting in a pressure of 527.59 kPa which is less than the 552 kPa threshold in the guideline in which pressure control is required. Based on this result, pressure control is not required for this building. Refer to Appendix B for details of the water distribution analysis.

2.6 PHASING CONSTRAINTS

No phasing constraints exist.

2.7 RELIABILITY REQUIREMENTS

A shut off valve will be provided for the building water service at the property line along Springland Drive. Water can be supplied to the service stub from both the north and south along Springland Drive, and can be isolated from either direction.

2.8 NEED FOR PRESSURE ZONE BOUNDAY MODIFICATION

There is no need for a pressure zone boundary modification.

2.9 CAPABILITY OF MAJOR INFRASTRUCTURE TO SUPPLY SUFFICIENT WATER

The current infrastructure is capable of meeting the domestic demand based on City requirements and fire demand as determined by FUS requirements for the proposed building.

2.10 DESCRIPTION OF PROPOSED WATER DISTRUBTION NETWORK

A 100 mm water service is proposed to be provided into the proposed building. An new private hydrant is located within 45 metres of the fire department connection on the east side of the building as per OBC requirements.

2.11 OFF-SITE REQUIREMENTS

No off-site improvements to watermains, feedermains, pumping stations, or other water infrastructure are required to maintain existing conditions and service the adjacent buildings, other than the connection of the new private watermain to the City watermain in the south frontage of the site.

2.12 CALCULATION OF WATER DEMANDS

Water demands were calculated as described in Sections 2.3 and 2.4 above.

2.13 MODEL SCHEMATIC

The water works consist of a single building service and a new private fire hydrant, and a model schematic is provided with the InfoWater modelling output provided in Appendix B.

3 WASTEWATER DISPOSAL

3.1 DESIGN CRITERIA

In accordance with the City of Ottawa's Sewer Design Guidelines, the following design criteria have been utilized in order to predict wastewater flows generated by the subject site and complete the sewer design;

- Minimum Velocity 0.6 m/s
- Maximum Velocity 3.0 m/s
- Manning Roughness Coefficient 0.013
- Total est. hectares Institutional use 0.178
- Proposed Daycare Average Flow 70 l/student/d
- Number of students and staff 103
- Commercial/Institutional Average Flow 28,000 l/gross Ha/d
- Commercial/Institutional Peaking Factor 1.5
- Infiltration Allowance (Total) 0.33 L/s/Ha
- Minimum Service Slopes – 135 mm diameter 1.00%
- Minimum Sewer Slopes – 200 mm diameter 0.32%

3.2 CONSISTENCY WITH MASTER SERVICING STUDY

The outlet for the sanitary service is the 250 mm diameter local municipal sewer on Springland Drive.
The Ottawa Sewer Design Guidelines provide estimates of sewage flows based on institutional development. The anticipated average flow based on an ultimate development area of 0.178 Ha (at an average rate of 28,000 L/gross Ha/d) is 0.058 L/s. Applying the peaking factor of 1.5, and adding the extraneous flow, the estimated ultimate peak flow is 0.15 L/s. The maximum building population is 88 children and 15 staff, but it is not anticipated that this level of population will be achieved at any given time. The total population of 103 is therefore likely conservative.

The criteria to determine anticipated actual peak flow based on site used as described in Ottawa Sewer Design Guidelines Appendix 4-A are as follows;

- Day school with cafeteria (assumed there may be some meal preparation) 70 l/(student/d)

Given the above, and the 1.5 institutional peaking factor, the anticipated actual sanitary sewer flow is 0.18 l/s peak flow including the extraneous flow, which is greater than the value of 0.15 l/s calculated above. The sanitary service has been designed in accordance with 0.18 l/s.

3.3 REVIEW OF SOIL CONDTIONS

There are no specific local subsurface conditions that suggest the need for a higher extraneous flow allowance.

3.4 DESCRIPTION OF EXISTING SANITARY SEWER

The outlet sanitary sewer is the existing 254 mm diameter sewer on Springland Drive. This local sewer discharges to a 600mm diameter trunk sanitary sewer on Springland Drive, also contained along the frontage of the site.

3.5 VERIFICATION OF AVAILABLE CAPACITY IN DOWNSTREAM SEWER

The capacity of the downstream 254 mm diameter sewer at 0.30% slope is 32.57 l/s, which is adequate for the flow assumptions from the proposed site as noted above. As noted above, the expected flow based on the proposed building will be lower than the flow allowance assumed for the site based on the Sewer Design Guidelines. An offsite sanitary sewer capacity check has been performed. Refer to Appendix C for the sanitary sewer design sheet and plan of offsite sanitary sewers and drainage areas (Figure 2).

3.6 CALCULATIONS FOR SANITARY SEWER

The 135 mm diameter sanitary service from the sanitary monitoring manhole at the property line to the street will have a slope of 1.0%, and a capacity of 11.50 l/s, with a velocity of 0.80 m/s. The 135 mm sanitary service between the building and the private monitoring manhole will have a slope of 1.0%, and a capacity of 11.50 l/s, with a velocity of 0.80 m/s. the capacity of each pipe exceeds the estimated peak sanitary flow rate of 0.18 l/s for the entire proposed site.

3.7 DESCRIPTION OF PROPOSED SEWER NETWORK

The proposed sanitary sewer network on site will consist of a 135 mm diameter building service, a 1200 mm diameter monitoring manhole near the property boundary, and a 135 mm diameter outlet sewer discharging to the existing high level 250mm diameter City sanitary sewer on Springland Drive.

3.8 ENVIRONMENTAL CONSTRAINTS

There are no previously identified environmental constraints that impact the sanitary servicing design in order to preserve the physical condition of watercourses, vegetation, or soil cover, or to manage water quantity or quality.

3.9 PUMPING REQUIREMENTS

The proposed development will have no impact on existing pumping stations and will not require new pumping facilities.

3.10 FORCE-MAINS

No force-mains are required specifically for this development.

3.11 EMERGENCY OVERFLOWS FROM SANITARY PUMPING STATIONS

No pumping stations are required for this site.

3.12 SPECIAL CONSIDERATIONS

Site investigations have not yielded the need for special considerations for sanitary sewer design related to contamination, corrosive environments, or any other issue.

4 SITE STORMWATER MANAGEMENT

4.1 EXISTING CONDITION

Drainage from the site currently flows overland to the Springland Drive right of way on the east side of the property and to the existing church property to the south. The available drainage outlet from the site is the existing 450 mm diameter storm sewer along Springland Drive.

As noted in the pre-consultation meeting and associated notes from the City of Ottawa, the stormwater design for the site modifications is required to result in peak flow rates under 5 year and 100 year conditions that do not exceed the 5 year rate generated under existing conditions.

The Rideau Valley Conservation Authority has asked that 80% TSS removal be provided for stormwater discharges.

4.2 ANALYSIS OF AVAILABLE CAPACITY IN PUBLIC INFRASTRUCTURE

The allowable release rate for the 0.178 ha site was calculated as follows:

Q (total allowable)	= 2.78 x C x I_{100yr} x A	where:
C	= 0.25 (Weighted average pre-development C)	
I_{5yr}	= Intensity of 5-year storm event (mm/hr)	
	= 998.071 x (T_c + 6.053)^0.814 = 104.19 mm/hr; where T_c = 10 mins	
A	= Area = 0.178 Ha	

Therefore, the total allowable release rate can be determined as:

= 12.89 L/s

Detailed calculations are provided in Appendix D.

The receiving downstream sewers already accept uncontrolled flow from the site equal to or greater than the proposed maximum 12.89 l/s that will be generated from the proposed development under 5 year and higher return period storm events. No capacity issues with existing infrastructure have been noted.

4.3 DRAINAGE DRAWING

Drawing C2 shows the receiving storm sewer and site storm sewer network. Drawing C1 provides proposed grading and drainage, and includes existing grading information. Figure 3 provides a drainage sub-area plan, including both site and roof information. Site sub-area information is also provided on the storm sewer design sheet attached in Appendix D.

4.4 WATER QUANTITY CONTROL OBJECTIVE

The water quantity objective for the site is to limit the flow release to 12.89 L/s. Excess flows above this limit up to those generated by the 100 year storm event are temporarily stored on site.

No provision is required on the site to accommodate any flow from the adjacent lands. All flows exceeding the defined minor system capacity and on-site storage capability will enter the major system, with overflow to the City right of way on the east of the site. Detailed stormwater management calculations are provided in Appendix D.

4.5 WATER QUALITY CONTROL OBJECTIVE

As noted previously, the designated water quality control objective is to achieve 80% TSS removal. This objective will be achieved through the use of an oil and grit separator for the runoff generated from the site, achieving the approximate TSS removal required as well as oil capture. A Hydro First HC oil and grit separator is proposed for quality treatment. A design sheet for this unit is provided in Appendix D.

4.6 DESIGN CRITERIA

The stormwater system was designed following the principles of dual drainage, making accommodation for both major and minor flow.
Some of the key criteria include the following:

• Design Storm	1:2 year return (Ottawa)
• Rational Method Sewer Sizing	
• Initial Time of Concentration	10 minutes
• Runoff Coefficients	
Landscaped Areas	C = 0.25
Asphalt/Concrete	C = 0.90
Traditional Roof	C = 0.90
• Pipe Velocities	0.80 m/s to 6.0 m/s
• Minimum Pipe Size	250 mm diameter (200 mm CB Leads and service pipes)

4.7 PROPOSED MINOR SYSTEM

The detailed design for this site provides a storm sewer outlet to the existing storm sewer network along Springland Drive. Uncontrolled surface drainage from the adjacent developed parcel of lands to the north of the site will be captured by the proposed northside ditch and conveyed to the existing storm sewer network along Springland Drive.

Using the above noted criteria, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated storm sewer drainage area plan is included in Appendix D.

4.8 STORMWATER MANAGEMENT

The subject site will be limited to a release rate established using the criteria described in section 4.6. this will be achieved through installation of an inlet control device (ICD) and detention storage on the surface of the parking lot, and in chambers below the parking lot.

Flows generated that are in excess of the site's allowable release rate will be detained on site and gradually released into the minor system so as not to exceed the site's flow allocation.

The maximum surface retention depth of the developed areas will be limited to 300mm during a 1:100 year event.

No surface ponding will occur during a 2 year event, and only minimal ponding will occur during a 5 year event.

Overland flow routes will be provided in the grading to permit emergency overland flow from the site. The overflow routes will eliminate any increase in ponding depth for events exceeding 100 years, including under a stress test of 20% above 100 year flow rates.

The opportunity to collect and store runoff is limited due to grading constraints and building geometry in certain site locations. These locations are located at the perimeter of the site where it is necessary to tie into public boulevards and adjacent properties, and it is not always feasible to capture or store stormwater runoff. These "uncontrolled areas - 0.013 hectares (S3a) for the connection pathway to the future Canoe Bay Development to the north of the site, and 0.005 hectares (S3b) along the corridor between the existing school property and the proposed day care building, have a weighted average C value of 0.70 and 0.25 respectively. Based on 1:100 year storm uncontrolled flows, the uncontrolled areas generate 5.80 l/s runoff (refer to Section 4.9 for calculation).

The site grading and ponding has been designed to control water generated during the 1:100-year event, with no overflow leaving the site. Please refer to the SWM Calculations in Appendix C.

4.9 INLET CONTROLS

The allowable release rate for the 0.178 ha site has been calculated in Section 4.2, the total allowable release rate can be determined as:

= 12.89 l/s

As noted in Section 4.8, two small areas of the site (S3a and S3b), will discharge uncontrolled to Springland Drive.

(Area S3a and S3b):

$Q_{(uncontrolled)}$ = 2.78 x C x I_{100yr} x A where:

C = 0.65 (Weighted average post-development C)

I_{100yr} = Intensity of 100-year storm event (mm/hr)

= 1735.688 x (T_c + 6.014)^0.814 = 178.56 mm/hr; where T_c = 10 minutes

A = Area = 0.0182 Ha

The uncontrolled release = 5.80 L/s.

The maximum allowable release rate from the remainder of the site can then be determined as:

$Q_{(max\ allowable)} = Q_{(total\ allowable)} - Q_{(uncontrolled} = 12.89$ l/s – 5.80 l/s = **7.09 l/s**

Based on the flow allowance at the inlet location, an inlet control device (ICD) was chosen in the design. The proposed model is a Hydrovex 75 VHV-1, which will be placed on the outlet of CBMH2 at the east end of the parking lot. The flow curve for this device are provided in Appendix D. The entire site will be captured by this manhole, with the exception of the narrow landscape strip located along the north property boundary, north of the building and parking lot. The design of the inlet control device is unique to all the drainage areas and is determined based on a number of factors, including hydraulic head and allowable release rate. The inlet control device was sized according to the manufacturer's design charts. The restrictions will cause the on-site catchbasins and manholes to surcharge, generating surface ponding and underground detention storage in the parking areas. The design for the Stormtech underground detention chambers is provided in Appendix D.

4.10 ON-SITE DETENTION

Any excess storm water up to the 100-year event is to be stored on-site in order to not surcharge the downstream municipal storm sewer system. Detention will be provided in parking and underground detention chambers, where feasible. As previously noted, the volume of underground storage chambers is dependent on the characteristics of the ICD. It should be noted that 0.59 m of vertical separation has been provided from the maximum ponding elevations to lowest building openings.

The following Table summarizes the on site storage requirements during the 1:5-year and 1:100-year events.

Table 4-1: On-Site Storage Requirements

ICD AREA	TRIBUTARY AREA	AVAILABLE STORAGE (m^3)	100-YEAR STORM		5-YEAR STORM	
			RESTRICTED FLOW (L/s)	REQUIRED STORAGE (m^3)	RESTRICTED FLOW (L/s)	REQUIRED STORAGE (m^3)
S1, S2, S4 and RD1	0.160	60.00	7.01	49.08	6.94	19.04
TOTAL	**0.160**	**60.00**	**7.01**	**49.08**	**6.94**	**19.04**

In all instances the required storage is met with surface ponding and Stormtech underground detention chambers which detain the stormwater and discharge at the restricted flow rate to the sewer system. Refer to the Stormtech chamber design, and hydraulic analysis of underground storage in Appendix D for design information.

The following Table summarizes the inlet control devices to be utilized on the site. ICD pre-set flow curves can be found in Appendix D.

Table 4-2: ICD Type

STRUCTURE ID	AREA ID	PROPOSED ICD			
		100 YR HEAD	FLOW (L/s)	TYPE	OUTLET DIA.
STM MH2	S1, S2, S4 and RD1	2.75	7.01	HYDROVEX 75VHV-1	200

As demonstrated above, the site uses a new inlet control device to restrict the 100 year storm event to the criteria approved by the City of Ottawa. Restricted stormwater will be contained onsite by utilizing surface ponding and underground detention chambers. In the 100 year event, there will be no overflow off-site from restricted areas.

The sum of released flows from the site including building roof, parking areas and landscape areas, and uncontrolled flows is (7.01 l/s + 5.80 l/s) =12.81 l/s, which is less than the maximum allowable release of 12.89 l/s noted in Section 4.9.

4.11 WATERCOURSES

There are no watercourses on or adjacent to the site.

4.12 PRE AND POST DEVELOPMENT PEAK FLOW RATES

Pre and post development peak flow rates for the impacted areas of the site have been noted in the sections above.

4.13 DIVERSION OF DRAINAGE CATCHMENT AREAS

Three external drainage catchment areas, EXT S1, EXT S2 and EXT S3, arising from the Canoe Bay development and the landscape areas from the existing school north of the site, will be directed via the proposed north side ditch on the site and discharge to the existing storm sewer network along Springland Drive. Please note that an allocation for flows from these adjacent lands to the north of the site will be directed to existing Springland Drive storm sewer network, and are separated completely from the day care site controlled drainage system.

4.14 DOWNSTREAM CAPACITY WHERE QUANITY CONTROL IS NOT PROPOSED

This checklist item is not applicable to this development as quantity control is provided.

4.15 IMPACTS TO RECEIVING WATERCOURSES

No significant negative impact is anticipated to downstream receiving watercourses due the separation of the site from the eventual receiving watercourse as a result of discharge through City owned sewers and swales. The installation of an oil and grit separator with 80% TSS removal, as requested by the RVCA, will address water quality concerns.

4.16 MUNICIPAL DRAINS AND RELATED APPROVALS

There are no municipal drains on the site or associated with the drainage from the site.

4.17 MEANS OF CONVEYANCE AND STORAGE CAPACITY

The means of flow conveyance and storage capacity are described in Sections 4.7, 4.8, 4.9 and 4.10 above.

4.18 HYDRAULIC ANALYSIS

Hydraulic calculations for the site storm sewers are provided in the storm sewer design sheet.

4.19 IDENTIFICATION OF FLOODPLAINS

There are no designated floodplains on the site of this development.

4.20 FILL CONSTRAINTS

There are no known fill constraints applicable to this site related to any floodplain. The site is generally being raised higher relative to existing conditions. No fill constraints related to soil conditions are anticipated, as confirmed in the geotechnical report.

5 SEDIMENT AND EROSION CONTROL

5.1 GENERAL

During construction, existing storm water conveyance system can be exposed to sediment loadings. A number of construction techniques designed to reduce unnecessary construction sediment loadings will be used including;

- Filter cloths will remain on open surface structures such as manholes and catchbasins until these structures are commissioned and put into use;
- Installation of silt fence, where applicable, at the downstream perimeter of the proposed work area.

During construction of the services, any trench dewatering using pumps will be fitted with a "filter sock." Thus, any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filter sock as needed including sediment removal and disposal.

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. Consequently, until the surrounding surface has been completed, these structures will be covered to prevent sediment from entering the minor storm sewer system. These measures will stay in place and be maintained during construction and build-out until it is appropriate to remove them.

During construction of any development both imported and native soils are placed in stockpiles. Mitigative measures and proper management to prevent these materials entering the sewer system are needed.

During construction of the deeper watermains and sewers, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally placed before any catchbasins are installed.

Sediment and erosion control measures are listed on Drawing C1.

6 APPROVAL AND PERMIT REQUIREMENTS

6.1 GENERAL

The proposed development is subject to site plan approval and building permit approval.

No approvals related to municipal drains are required.

No permits or approvals are anticipated to be required from the Ontario Ministry of Transportation, National Capital Commission, Parks Canada, Public Works and Government Services Canada, or any other provincial or federal regulatory agency.

7 CONCLUSION CHECKLIST

7.1 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the proposed development can meet all provided servicing constraints and associated requirements. It is recommended that this report be submitted to the City of Ottawa in support of the application for site plan approval.

7.2 COMMENTS RECEIVED FROM REVIEW AGENCIES

Comments received from the City of Ottawa, Rideau Valley Conservation Authority and other regulatory agencies are provided in Appendix A.

APPENDIX

A

- PRE-CONSULTATION MEETING NOTES
- TOPOGRAPHIC SURVEY PLAN
- GEOTECHNICAL REPORT BY PATERSON GROUP
- CORRESPONDENCE
  -CITY OF OTTAWA
  -RIDEAU VALLEY CONSERVATION
  -MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS

Yang, Winston

From: Ghada Zaki <zaki@fotenn.com>
Sent: March-12-19 2:51 PM
To: Stephanie Morris; James Gerwin; Johnston, Jim; jl@jbla.ca; Christopher Gordon; Mark D'Arcy; David Gilbert; mark.crockford@cghtransportation.com
Cc: Jim Fullarton
Subject: FW: 2826 Springland Drive
Attachments: 2018-11-12_898_spa_ggg_path-grading-Path Grading.pdf; F8.pdf; Plans and Study list.pdf

Good Afternoon Team,

As a follow-up to our pre-consult meeting regarding the daycare facility on 2826 Springland Drive, the File Planner has provided a summary below. As you'll note, Staff had comments on Transportation, Urban Design, Parks and Facilities, Infrastructure and Planning.

To kick-off the project, discuss the comments below, timeline for submission of the application and any other concerns that may arise, I suggest we meet next Monday (March 18th) at our office. I will be sending out a meeting invite shortly.

Thanks,
Ghada Zaki
Planner
T 613.730.5709 ext. 226

From: Walker, Max <max.walker@ottawa.ca>

Hi

As a follow-up to our meeting, please find below information regarding the potential development of a day care facility at 2826 Springland Drive. I have attached the required plans and studies list for an application for Site Plan Control (Manager Approval, Public Consultation). Should the proposed development/use change, another pre-consultation should be scheduled to discuss.

Policies/designations of the site:

- Official Plan – designated 'General Urban Area' (Section 3.6.1)
- Riverside Park Secondary Plan
- Zoning – Minor Institutional Zone
    - The purpose of the Minor Institutional Zone is to:
        - permit a range of community uses, institutional accommodation and emergency service uses to locate in areas designated as General Urban Area or Central Area in the Official Plan; and
        - minimize the impact of these minor institutional uses located in close proximity to residential uses by ensuring that the such uses are of a scale and intensity that is compatible with neighborhood character.
        - Day care is a permitted use subject to the provisions of subsection 169(3).
- Section 93 is only applicable to a group of occupancies located in an AM, GM, LC, MC, MD, IG, IH, IL, or IP zone.

Infrastructure Comments:

- Servicing - There is available public Water, Storm, and Sanitary infrastructure within Springland Dr.
    - Sanitary – A connection to the Rideau River Trunk Collector is typically not permitted. The consultant should review options to connect to the high level sanitary sewer within Springland Drive. In the meeting the consultant identified a potential conflict with the watermain within Springland Drive. This conflict will need further discussion and review.
    - Storm – Control the 100-year post development to a 5-year design event. The 5-year design event is to be calculated using a runoff coefficient of either C=0.5 or pre-development, whichever is less. A calculated time of concentration is required (tc > 10mins).
    - Water – Water boundary condition request to be submitted to the City project manager.
- The applicant should consider the potential impacts noise from Walkley Road & Riverside Drive could have on the outdoor play area for the daycare. The site location is just outside of the threshold to require a Noise Study, therefore it at the discretion of the applicant if they require a Noise Study to protect the noise sensitive use. Good planning practice should be considered to reduce direct exposure to traffic noise.

Transportation Comments:

- The TIA Screening form is to be submitted, also parking is an issue for this development and is to be addressed.
- Note that No Stopping is allowed on Springland Drive.
- The proposed MUP connection between the daycare and Riverside Drive is to be reviewed.
- Springland Drive is designated as a Collector road. Since Springland Drive is identified as a Collector the minimum clear throat length required is 8.0 metres TAC Manual, Part 2, Table 3.2.9.3 and method of measurement as per Figure 3.2.5.2.
- The concrete sidewalk should be 2.0 metres in width and be continuous and depressed through the proposed access.
- Signs related to the development site are to be placed in accordance with the applicable sign by-law. An Encroachment Agreement will be required for any signage on the road allowance.

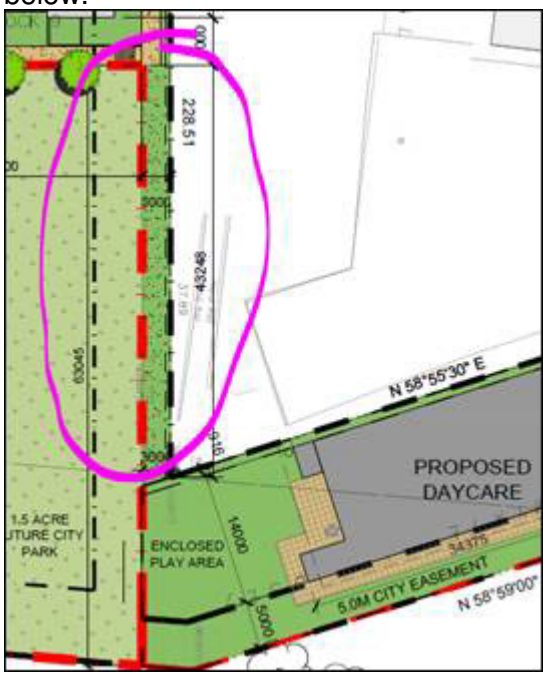
Planning Comments:

- For the purposes of the Secondary Plan, Institutional uses refer to schools, places of worship, and **community facilities**
    - The Zoning By-law specifies that community centre means a multi-purpose facility that offers a variety of programs of a recreational, cultural, **day care**, social, community service, informational or instructional nature, and may include, as a portion of it, a medical facility.
- The policies governing neighbourhood serving uses, Section 3.6.1 of the Official Plan apply to institutional uses in Riverside Park.
- The minimum interior side yard setback is 3 metres.
- Consider covered bicycle parking.
- New developments must be sensitive to what exists and fit within the existing character. The development is not to cause undue adverse impacts on surrounding properties and to fit well within its physical context.
    - Please ensure that consideration is given to the public-private interface. The outdoor play area and the access located to the south of the building should allow for an efficient transition between the public and private spaces and provide for reciprocal visibility.
    - Table 101- Minimum parking space rates

I	**IV**
Land Use	**Area C on Schedule 1A**
Daycare	2 per 100 m^2 of gross floor area

    - Please clarify the width of the handicap parking space - 3.4m is required and a 1.5 metres access aisle, clearly indicated by high contrast diagonal pavement markings that extend the full length of the space.
    - There is a bus stop located south of the property and no parking is permitted within 34 metres of the approach side of a bus stop and within 18 metres of the leaving side of a bus stop.

- A consent application will be required to established a surface easement along a portion of the site, below.



Urban Design Comments:

- Please consider design features than can mitigate creating a compound look and feel, e.g., fence material wood with vision panels
- It would be a missed opportunity if the design of the MUP is not an integral part of the building design.
- The design, i.e., the roof, can be design to support and protect community members - give back and make this building important to people in the neighbourhood even if they don't have kids.
- Concerns about what the nature of t he design approach. The plan should not be created independently of elevations and massing.
- Here are some creative ideas and areas to look at:
    - Stair placement is problematic;
    - Mirror front end so entrance faces public realm and path;
    - Visibility within rooms; and
    - Separation of staff from classrooms.

Parks and Facilities Planning Comments:

- Parkland dedication was previously addressed for the site through the subdivision application at 3071 Riverside Drive.
- Condition C.30 to Schedule "H" of the subdivision agreement requires a 5m wide public access easement along the south side of 2826 Springland Drive with a 2.5m wide asphalt pathway and fencing on both sides of the pathway. The fence style is described as either a 1.5m high chain link fence or a two-rail post and rail fence, and the condition indicates that the fence style will be confirmed during the design process for the proposed park at 3071 Riverside Drive. The current concept plan for the park is based on the provision of two-rail post-and-rail fencing along the south edge of the park adjacent to the Holy Cross Parish. A photo and detail of the proposed post-and-rail fence style are attached. The intent is to continue the same fence style along the south side of the public access easement. The location and style of fencing along the north side of the public access easement can be addressed through the site plan application for the proposed day care facility. Fencing may only be needed in the location between the daycare's outdoor play area and the public access easement.
- Fencing will be required along the west side of the daycare's outdoor play area adjacent to the public park. A fence style that maintains clear sight lines between the park and the public access easement would be preferred.

- Please note that requests have been received as part of the current public consultation for the park to construct the pathway as a 3m wide multi-use pathway. Pathway lighting was also requested by some residents. Decisions on the pathway width and lighting have not yet been made.
- Note that the attached Path Grading plan was prepared by DSEL for the pathway including the segment through the public access easement.
- A landscape buffer should be provided to separate the parking spaces and parked vehicles from the pathway.
- There are wooden steps located immediately to the north of the outdoor play area within the Holy Cross Elementary School property. Will the Ottawa Catholic School Board be contacted to remove the steps?
- Will a sidewalk or pathway be constructed between the daycare and the Canoe Bay development within the 3m wide north-south corridor between the park and the Holy Cross Elementary School? This connection was contemplated in earlier site plans for the Canoe Bay development.
- The design of the south façade of the building should reflect the use of the easement as a public space.

For information and guidance on preparing required studies and plans refer to http://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans

Prior to making a complete submission, I also encourage you to discuss the proposal with the area Councilor and local community associations. Please note that these pre-consultation comments are valid for one year. If you submit a development application after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change.

If you have any questions regarding the above, please feel free to contact me.

Regards,

-Max

Max Walker, **RPP**
Planner I | Urbaniste I
Development Review (South Services) | Examen des projets d'aménagement (services sud)
Planning, Infrastructure and Economic Development | Services de planification, d'infrastructure et de développement économique
City of Ottawa | Ville d'Ottawa
☎ 613.580.2424 ext./poste 23947
ottawa.ca/planning / ottawa.ca/urbanisme

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SURVEYOR'S REAL PROPERTY REPORT

PART 1 Plan of

PART OF LOTS 24 and 25
CONCESSION JUNCTION GORE
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 400

16 12 8 4 0 8 16 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 21st day of December, 2016.

Date

E. H. Herweyer
Ontario Land Surveyor

PART 2
THIS PLAN MUST BE READ IN CONJUNCTION WITH SURVEY REPORT DATED: DECEMBER 23, 2016

ANNIS, O'SULLIVAN, VOLLEBEKK LTD. grants to Canoe Bay Development Inc. ("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.

Notes & Legend

	Denotes	
—○—	-	Survey Monument Planted
—■—	-	Survey Monument Found
SIB	-	Standard Iron Bar
SSIB	-	Short Standard Iron Bar
IB	-	Iron Bar
CC	-	Cut Cross
IB⊕	-	Round Iron Bar
(WIT)	-	Witness
Meas.	-	Measured
(AOG)	-	Annis, O'Sullivan, Vollebekk Ltd.
(P1)	-	Plan 4R-2442
(P2)	-	(1474) Plan November 16, 1999
(P3)	-	(1692) Plan March 4, 2015
(P4)	-	Plan 4R-12424
(P5)	-	Plan 5R-2359
(P6)	-	Plan 4R-29405
	-	Deciduous Tree
	-	Coniferous Tree
FH	-	Fire Hydrant
WV	-	Water Valve
MH-ST	-	Maintenance Hole (Storm Sewer)
MH-S	-	Maintenance Hole (Sanitary)
MH	-	Maintenance Hole (Unidentified)
OHW	-	Overhead Wires
CB	-	Catch Basin
TB-B	-	Bell Terminal Box
TB-C	-	Cable Terminal Box
CLF	-	Chain Link Fence
BF	-	Board Fence
MF	-	Metal Fence
PF	-	Picket Fence
HR	-	Hand Rail
RW	-	Retaining Wall
T/G	-	Top of Grate
WRW	-	Wooden Retaining Wall
PO-W	-	Wooden Pole
UP	-	Utility Pole
AN	-	Anchor
LS	-	Light Standard
Ø	-	Diameter
145.00	-	Location of Elevations
145.00	-	Top of Concrete Curb / Wall Elevation
C/L	-	Centreline
	-	Property Line
S	-	Sign
VC	-	Valve Chamber (Watermain)

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2000028

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

Topographic data was collected under Winter Conditions. Snow cover and ice preclude determining location and elevation of some topographical data that is otherwise visible.

SITE AREA = 4.316 Ha

Bearings are grid bearings, derived from the southerly limit of Mooney's Bay Place shown to be N81°28'10"E on Plan 4R-2359 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@aovll.com

Ontario Land Surveyors

Job No.16810–16 CanoeBay Lts 24, 25 JG Gl, T F | 1g

patersongroup

Consulting Engineers
154 Colonnade Road South
Ottawa, Ontario
K2E 7J5
Tel: (613) 226-7381
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Geotechnical Engineering
Environmental Engineering
Hydrogeology
Geological Engineering
Materials Testing
Building Science
Archaeological Services

www.patersongroup.ca

April 30, 2019
Report: PG4883-1

Canoe Bay
3071 Riverside Drive
Ottawa, Ontario
K2J 328

Attention: **Mr. Jim Fullarton**

Subject: **Geotechnical Investigation**
Proposed Daycare Center
2826 Springland Drive - Ottawa

Dear Sir,

Please find enclosed three (3) copies of Report PG4883-1 regarding the geotechnical investigation conducted by this firm at the aforementioned location.

We trust that this information is satisfactory.

Sincerely,

Paterson Group Inc.

David J. Gilbert, P. Eng.

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

patersongroup

Geotechnical Investigation

Proposed Daycare Center
2826 Springland Drive
Ottawa, Ontario

Prepared For

Canoe Bay

April 30, 2019

Report: PG4883-1

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
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Canada K2E 7J5

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Fax: (613) 226-6344
www.patersongroup.ca

Table of Contents

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Canoe Bay to conduct a geotechnical investigation for the proposed building to be located at 2826 Springland Drive in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objectives of the geotechnical investigation were to:

- determine the subsoil and groundwater conditions at this site by means of boreholes.
- provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect its design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

Based on the available drawings, it is our understanding that the proposed development will consist of a slab-on-grade, 2-storey daycare center. An asphalt-paved parking area will be located to the east of the proposed building and an asphalt-paved multi-use pathway will be located along the south of the building. A enclosed play area will occupy the western side of the property. It is assumed this area will be landscaped. It is also understood that the proposed development will be municipally serviced.

3.0 Method of Investigation

3.1 Field Investigation

The field program for the geotechnical investigation was carried out on April 1, 2019 and consisted of 3 boreholes advanced to a maximum depth of 6.7 m below the existing ground surface. The boreholes were distributed in a manner to provide general coverage taking into considerations existing site features. The locations of the test holes are shown on Drawing PG4883-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were advanced using a track-mounted drill rig operated by a two person crew. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer. The test hole procedures consisted of advancing the boreholes to the required depths at the selected locations and sampling the overburden.

Sampling and In Situ Testing

Soil samples were recovered using a 50 mm diameter split-spoon sampler or from the auger flights. The split-spoon and auger samples were classified on site and placed in sealed plastic bags. All samples were transported to our laboratory. The depths at which the split-spoon and auger samples were recovered from the boreholes are shown as SS and AU, respectively, on the Soil Profile and Test Data sheets in Appendix 1.

The Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split-spoon samples. The SPT results are recorded as “N” values on the Soil Profile and Test Data sheets. The “N” value is the number of blows required to drive the split-spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

The subsurface conditions observed in the test holes were recorded in detail in the field. The soil profiles are logged on the Soil Profile and Test Data sheets in Appendix 1 of this report.

Groundwater

Flexible piezometers were installed in the boreholes to permit monitoring of the groundwater levels subsequent to the completion of the sampling program.

Sample Storage

All samples will be stored in the laboratory for a period of one month after issuance of this report. They will then be discarded unless we are otherwise directed.

3.2 Field Survey

The test hole locations and ground surface elevation at each test hole location were surveyed by Paterson. The ground surface elevation at the borehole locations were surveyed with respect to a temporary benchmark (TBM), consisting of the top of grate of a catch basin located on the west side of Springland Drive with a geodetic elevation of 79.37 m. The borehole locations and ground surface elevation at each borehole location are presented on Drawing PG4885-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were recovered from the boreholes and visually examined in our laboratory to review the field logs.

4.0 Observations

4.1 Surface Conditions

Currently, the site is undeveloped and grass covered with trees along the southern side of the property and a fence along the northern side. The existing ground surface across the site is relatively level, however slopes steeply upward near the existing fence to the north. The site is bordered to the north by the asphalt-paved parking area of a two-storey elementary school, Springland Drive to the east, the Holy Cross Parish to the south and an asphalt-paved parking lot to the west.

4.2 Subsurface Profile

Overburden

Generally, the soil profile encountered at the borehole locations consists of a 200 mm thick topsoil layer.

Sandy silt to silty sand was found in all boreholes underlying the topsoil extending to approximate depths of 0.2 to 6.7 m below the existing ground surface. Auger refusal was encountered in BH 1 through BH 3 at approximate depths of 6.1 to 6.7 m below the existing ground surface.

Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for specific details of the soil profiles encountered at each test hole location.

Bedrock

Based on available geological mapping, bedrock in the area of the subject site consists of limestone of the Bobcaygeon Formation with drift thicknesses ranging from 5 to 10 m.

4.3 Groundwater

Groundwater levels were measured in the piezometers at the borehole locations on April 25, 2019. The measured groundwater level (GWL) readings are presented in Table 1 below.

Table 1 - Measured Groundwater Levels

Test Hole Location	Ground Surface Elevation (m)	Groundwater Level		Date
		Depth (m)	Elevation (m)	
BH 1	79.98	2.27	77.71	April 25, 2019
BH 2	79.77	3.18	76.59	April 25, 2019
BH 6	79.78	3.43	76.35	April 25, 2019

Note: - The ground surface elevations are referenced to a temporary benchmark (TBM), consisting of the top of grate of a catch basin located along Springland Drive with a geodetic elevation of 79.37 m.

It should be noted that groundwater measurements can be influenced by surface water infiltrating the backfilled boreholes. The long-term groundwater table can also be estimated based on consistency, moisture levels and colour of the recovered soil samples. Based on these observations, the long-term groundwater level is expected at an approximate depth ranging from 2.0 to 3.0 m depth. It should be noted that the groundwater is subject to seasonal fluctuations and therefore, groundwater could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed slab-on-grade two-storey building. It is expected that the proposed building will be constructed with conventional shallow footings bearing on an undisturbed, compact silty sand bearing surface.

The above and other considerations are further discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil, asphalt and fill, containing deleterious or organic materials, should be stripped from under any building, paved areas, pipe bedding and other settlement sensitive structures.

Fill Placement

Fill used for grading beneath the proposed building footprint, unless otherwise specified, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The fill should be tested and approved prior to delivery to the site. It should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building area should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Site excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD.

5.3 Foundation Design

Bearing Resistance Values

Footings placed on an undisturbed, compact silty sand bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**. A geotechnical resistance factor of 0.5 was applied to the reported bearing resistance value at ULS.

An undisturbed soil bearing surface consists of a surface from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

Settlement

Footings placed on a soil bearing surface and designed using the bearing resistance values at SLS given above will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to silty sand, or glacial till above the groundwater table when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V passes only through in situ soil of the same or higher capacity as the bearing medium soil.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class C**.

Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the Ontario Building Code 2012 for a full discussion of the earthquake design requirements.

5.5 Slab on Grade Construction

With the removal of all topsoil, the undisturbed soil subgrade approved by the geotechnical consultant at the time of excavation will be considered an acceptable subgrade surface on which to commence backfilling for slab-on-grade construction.

It is recommended that the upper 200 mm of sub-floor fill consist of OPSS Granular A crushed stone. All backfill materials required to raise grade within the footprint of the proposed building should be placed in maximum 300 mm thick loose layers and compacted to at least 98% of its SPMDD.

5.6 Pavement Design

Car only parking areas, access lanes and heavy truck parking areas are anticipated at this site. The proposed pavement structures are shown in Tables 2 and 3.

Table 2 - Recommended Pavement Structure - Car Only Parking Areas

Thickness (mm)	Material Description
50	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill	

Table 3 - Recommended Pavement Structure
Access Lanes and Heavy Truck Parking Areas

Thickness (mm)	Material Description
40	**Wear Course** - Superpave 12.5 Asphaltic Concrete
50	**Binder Course** - Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
	SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material's SPMDD using suitable vibratory equipment.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for the proposed structure. The system should consist of a 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to a catch basin.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for placement as backfill against the foundation walls unless used in conjunction with a composite drainage system, such as Delta Drain 6000 or Miradrain G100N. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should be placed for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover (or equivalent) should be provided in this regard.

Exterior unheated footings, such as those for isolated exterior piers and loading docks, are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or a combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is expected that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. Excavations below the groundwater level should be cut back at a maximum slope of 1.5H:1V. The subsoil at this site is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and

Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

The pipe bedding for sewer and water pipes should consist of at least 150 mm of OPSS Granular A material. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of the SPMDD. The bedding material should extend at least to the spring line of the pipe. The cover material, which should consist of OPSS Granular A, should extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of the SPMDD.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

6.5 Groundwater Control

It is anticipated that groundwater infiltration into the excavations should be low to moderate and controllable using open sumps. Pumping from open sumps should be sufficient to control the groundwater influx through the sides of shallow excavations.

The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium. A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project.

The subsoil conditions at this site consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters and tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

The results of analytical testing indicate that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The chloride content and the pH of the sample indicate that they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a low to moderate corrosive environment.

7.0 Recommendations

It is a requirement for the foundation design data provided herein to be applicable that the following material testing and observation program be performed by the geotechnical consultant.

- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials used.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review the grading plan once available and to review our recommendations when the drawings and specifications are complete.

A geotechnical investigation of this nature is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. The extent of the limited area depends on the soil, bedrock and groundwater conditions, as well the history of the site reflecting natural, construction, and other activities. Should any conditions at the site be encountered which differ from those at the test locations, we request notification immediately in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Canoe Bay or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Kevin A. Pickard, EIT

David J. Gilbert, P.Eng.

Report Distribution:

- ❑ Canoe Bay (3 copies)
- ❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE & TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TESTING RESULTS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
2826 Springland Drive
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin located in front of subject site, along Springland Drive. Geodetic elevation = 79.37m.

FILE NO. PG4883

REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** April 1, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.98
TOPSOIL 0.23		AU	1				
		SS	2	38	19	1	78.98
		SS	3	79	21	2	77.98
GLACIAL TILL: Compact to dense, brown silty sand with gravel, cobbles and boulders, trace clay		SS	4	58	8	3	76.98
		SS	5	67	16		
- grey by 3.8m depth		SS	6	42	46	4	75.98
		SS	7	46	35	5	74.98
		SS	8	100	37		
		SS	9	0	39	6	73.98
6.70 End of Borehole							

(GWL @ 2.27m - April 25, 2019)

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
2826 Springland Drive
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin located in front of subject site, along Springland Drive. Geodetic elevation = 79.37m.

FILE NO. PG4883

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** April 1, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.77
TOPSOIL 0.20		AU	1				
		SS	2	38	7	1	78.77
		SS	3	62	24	2	77.77
GLACIAL TILL: Compact to very dense, brown silty sand with gravel, cobbles and boulders, trace clay		SS	4	25	13	3	76.77
		SS	5	0	24		
- grey by 3.8m depth		SS	6	54	18	4	75.77
		SS	7	50	26	5	74.77
		SS	8		60		
6.15 End of Borehole		SS	9	0	50+	6	73.77
(GWL @ 3.18m - April 25, 2019)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
2826 Springland Drive
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin located in front of subject site, along Springland Drive. Geodetic elevation = 79.37m.

FILE NO. PG4883

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** April 1, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.20		AU	1			0	79.78		
		SS	2	38	9	1	78.78		
		SS	3	79	5	2	77.78		
Loose to compact, brown **SANDY SILT/SILTY SAND,** trace clay		SS	4	71	19	3	76.78		
		SS	5	46	23				
		SS	6	54	9	4	75.78		
		SS	7	62	24	5	74.78		
5.33									
Very dense, brown **SAND,** trace silt		SS	8	100	50+				
6.10						6	73.78		
End of Borehole									
(GWL @ 3.43m - April 25, 2019)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

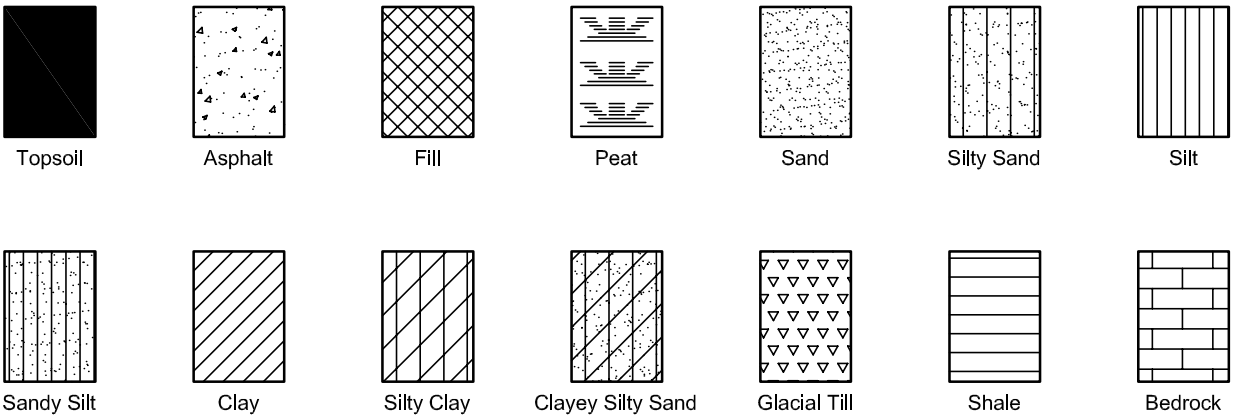
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

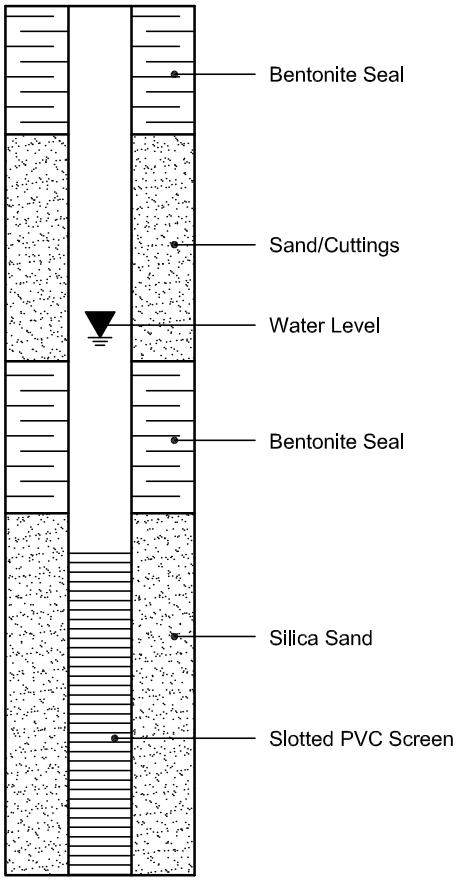
SYMBOLS AND TERMS (continued)

STRATA PLOT

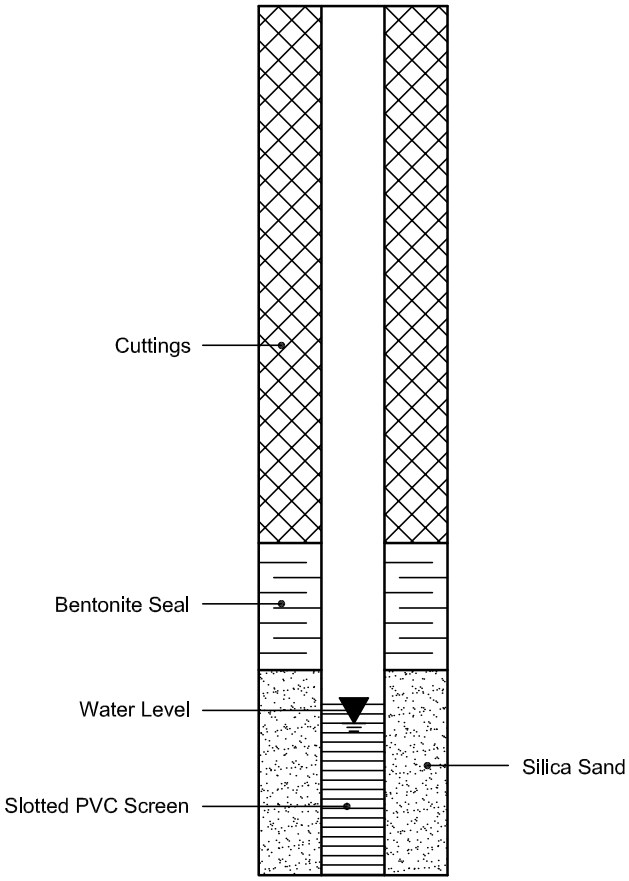


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 24621

Report Date: 30-Apr-2019

Order Date: 25-Apr-2019

Project Description: PG4883

	Client ID:	BH2-SS3	-	-	-
	Sample Date:	04/01/2019 10:45	-	-	-
	Sample ID:	1917547-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	88.9	-	-	-
General Inorganics					
pH	0.05 pH Units	7.95	-	-	-
Resistivity	0.10 Ohm.m	58.0	-	-	-
Anions					
Chloride	5 ug/g dry	50	-	-	-
Sulphate	5 ug/g dry	9	-	-	-

APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG4883-1 - TEST HOLE LOCATION PLAN

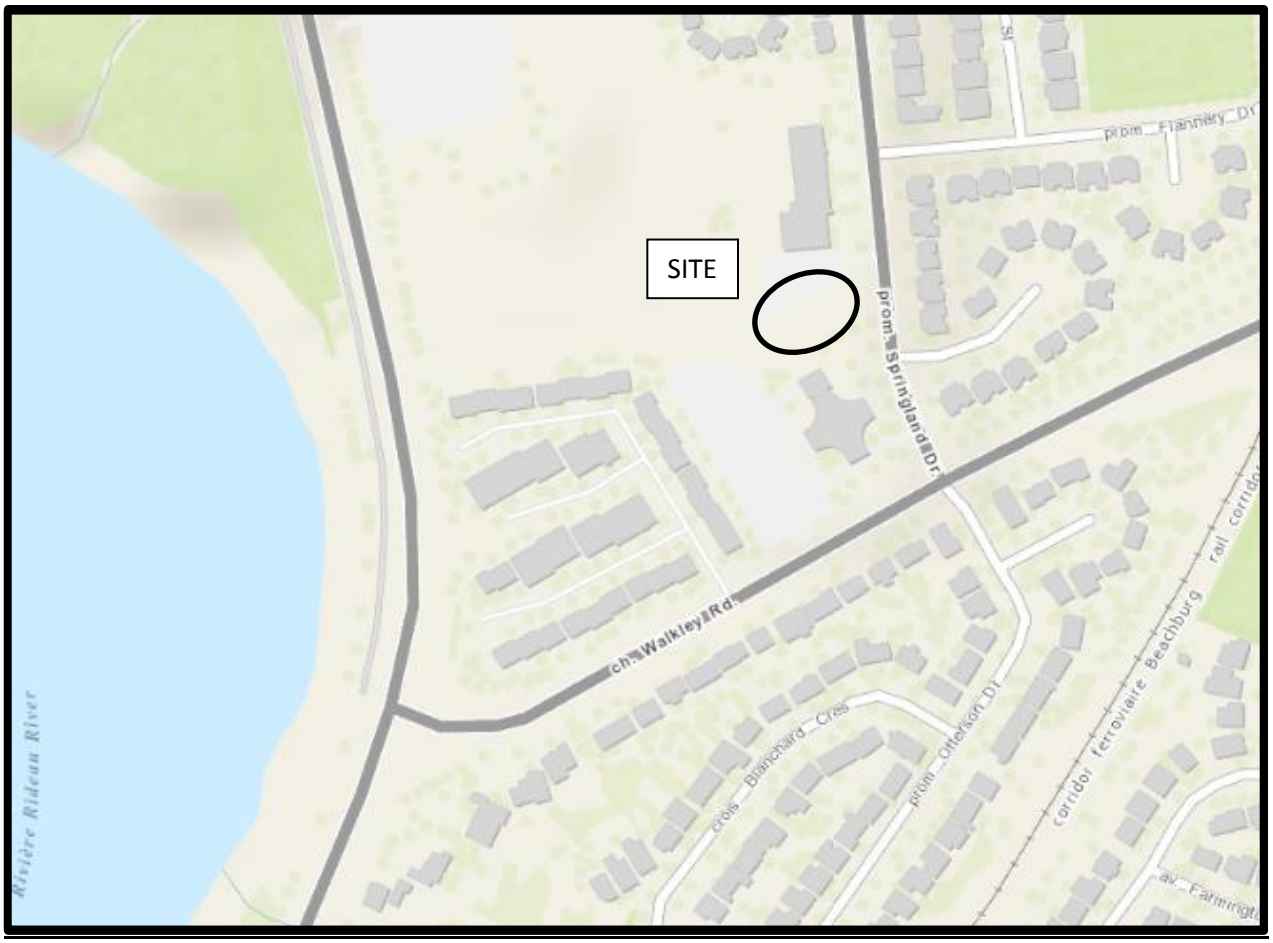
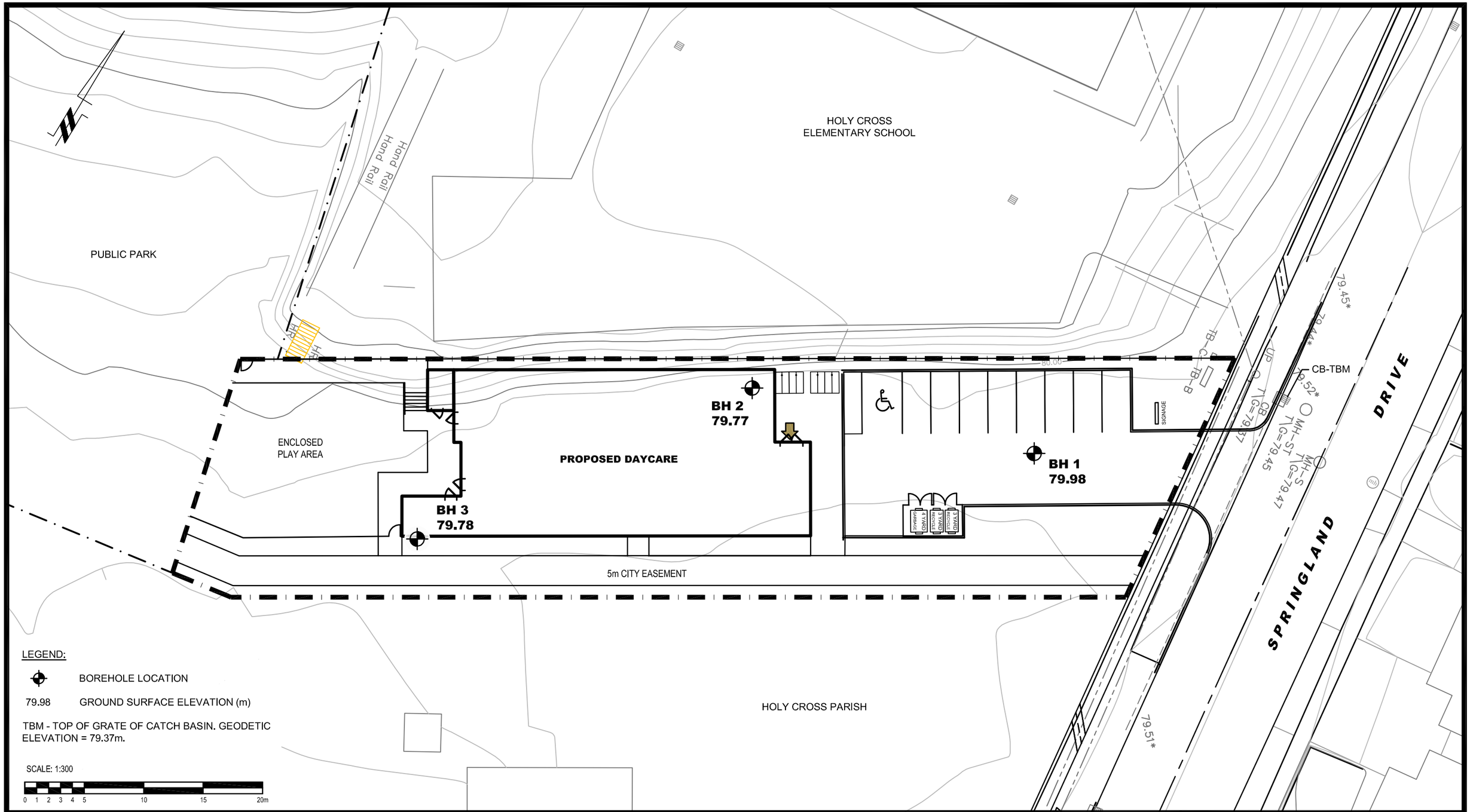


FIGURE 1

KEY PLAN



LEGEND:

BOREHOLE LOCATION

79.98 GROUND SURFACE ELEVATION (m)

TBM - TOP OF GRATE OF CATCH BASIN. GEODETIC ELEVATION = 79.37m.

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

CANOE BAY

GEOTECHNICAL INVESTIGATION
PROPOSED DAYCARE - 2826 SPRINGLAND DRIVE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:300	Date: 04/2019
Drawn by: MPG	Report No.: PG4883-1
Checked by: KP	PG4883-1
Approved by: DJG	Revision No.:

p:\autocad drawings\geotechnical\pg48xx\pg4883-1 thlp.dwg

Yang, Winston

From: Oram, Cody <Cody.Oram@ottawa.ca>
Sent: April-17-19 3:55 PM
To: Johnston, Jim
Subject: RE: Riverside Park Nursery School - Grading and Servicing Preliminary Design - 2826 Springland Drive

Hi Jim,

I've added my comment below in blue. If you have any questions, please don't hesitate to call.

Cody

Cody Oram, P.Eng. Senior Engineer
Development Review, South Services
Planning, Infrastructure and Economic Development Department | Services de planification, d'infrastructure et de 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 **13422**, fax/téléc:613-580-2576, cody.oram@ottawa.ca

---

From: Johnston, Jim <James.Johnston@wsp.com>
Sent: April 16, 2019 5:03 PM
To: Oram, Cody <Cody.Oram@ottawa.ca>
Subject: FW: Riverside Park Nursery School - Grading and Servicing Preliminary Design - 2826 Springland Drive

Hello Cody,
Sorry for not being able to contact your earlier. I have enclosed some preliminary concept drawings for grading and servicing at 2826 Springland Drive. Some correction to elevations and inverts remains to be undertaken, and any crossing conflicts resolved.. We have two primary servicing issues:

1. The site presently accepts drainage from the north, with a small area from the Canoe Bay Development at 3071 Riverside Drive, and also from the rear and side yards of Holy Cross Catholic School. We propose to collect this drainage at the property boundary, and convey it along the north side of the site, discharging to the proposed site storm sewer at a point downstream of the detention storage and flow control. As we are simply conveying this drainage around the site, and not controlling it, we are hoping to avoid the need for an ECA. The drainage system collecting this flow will be sized for the 100 year flow as a minimum. There will also be some minor uncontrolled flow (approximately 6 L/s under 100 year conditions) from the actual site, but this will be accounted and compensated for in the controlled release rate. I agree with the approach to manage the external drainage. I do not foresee an ECA being required.
2. As mentioned at the pre-consultation meeting, there is some difficulty associated in connecting the site sanitary service to the existing local sanitary main on the east side of Riverside Drive. We have found two potential options:
   - Construct the sanitary service with insulation. The depth of cover will be on the order of 1.5 to 1.6m. The sanitary service will cross above the municipal storm, sanitary trunk, and watermain, with clearance over the watermain of 0.5m.

- Construct the sanitary service over top of the municipal storm and sanitary trunk sewers, and then under the watermain. Anticipated vertical clearance between the sanitary and water would be 0.3m. Depth of cover for the sanitary service would be greater than 2.0m.

There is also the option of directly connecting the sanitary service to an existing manhole on the trunk sewer, but this would require an external drop structure. I am assuming that this option will not be entertained by the City as there appear to be viable options for connecting to the local sewer. Our preference for the local sanitary sewer connection would be shallow option described above, with insulation. The two options presented above are acceptable. The City would not accept a new connection to the trunk sewer when options to connect to available high level infrastructure is present.

We welcome your opinion on these concepts.

James (Jim) Johnston, P.Eng., MBA, M.Sc., LEED AP BD+C
Infrastructure

T+ 1 613-690-3786 M+ 1 613-298-5960
2611 Queensview Drive, Suite 300, Ottawa, Ontario. K2B 8K2 Canada
wsp.com

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'

'

File No. D07-12-19-0081

July 11, 2019

Fotenn Consultants Inc.
223 McLeod Street
Ottawa, ON K2P 0Z8

Attention: Ghada Zaki & Stephanie Morris
Senior Planner's

Dear: Ghada Zaki & Stephanie Morris

Subject: Manager Approval, Public Consultation, Site Plan Control Application 2826 Springland Drive

The following comments are provided in response to the submission received by the City on May 13th, 2019:

Planning Comments:

General

1. Please include the file number **D07-12-19-0081** the **Plan Number:** ___ on the bottom right of all plans.
2. Can you confirm that you have received permission to encroach on the five metre easement with the concrete upstands and associated roof line?
3. Include the identified snow storage area on the site plan or landscape plan – if snow is to be removed, please note this on the appropriate plan.
4. Provide design details for bicycle parking on the site plan or landscape plan
5. Please include the design details for the waste management and recycling enclosure on the site or landscape plan.
6. Please confirm that there will be building-mounted lighting to provide more coverage throughout the site, especially near the bicycle parking, along the MUP, and along the pathway to the adjacent residential community. From the plans it appears only one light standard is proposed on site. The provision of more lighting on site will allow the development to be in more conformity with the Riverside Park Secondary Plan Section 8.4.5.d. A site lighting certificate will be required demonstrating that light spillage is within acceptable limits.
7. Clarify the GFA for the structure on the site plan, calculated in accordance with the Zoning By-law 2008-250 definition for "gross floor area". The floor plan states

City of Ottawa
Planning, Infrastructure, and Economic Dev.
110 Laurier Avenue West
Ottawa ON K1P 1J1
Tel : 613-580-2400
Fax : 613-580-2576
www.ottawa.ca

Ville d'Ottawa
Services de l'urbanisme et de la gestion de la croissance
110, avenue Laurier Ouest
Ottawa ON K1P 1J1
Tél : 613-580-2400
Fac : 613-580-2576
www.ottawa.ca

that the GFA is 408m^2, however this appears to be the floor plate rather than the GFA. As a result it is unclear what GFA was used to calculate parking and bicycle parking rates. The site plan zoning table may need to be updated with the following as a result of possible changes:
    - Minimum Parking Space Rates (Section 101: N30 “Daycare”)
    - Landscaping Provisions for Parking Lots (Section 110)
    - Bicycle Parking Space Rates and Provisions (Section 111 “e”)
8. Please note that a Minor Variance will be required for the following possible zoning deficiencies
    - Drive aisle Width
    - Minimum Parking Space Rates
    - Interior Side Yard Setback
    - Landscaping Provisions for Parking lots
9. Best efforts should be committed to make the MUP 3.0m wide – see further information regarding this below. If there are constraints preventing this please provide a rationale. Note that the perforated pipe and catch basins which run along the southern property line should remain outside of the MUP.
10. Note that the ground-mounted sign will need to comply with our signage by-law and will require a separate permit.

Site Plan

11. Remove “driving surface” from legend, or update plan to include driving surface areas as nothing appears to be identified by this symbol in this plan
12. Include the proposed fire route and signage locations on the plan.
13. Remove the proposed trees and vegetation from the site plan, as they are included in the landscape plan – and also don’t reflect one another.
14. Please identify the widths of the non-accessible parking spaces.

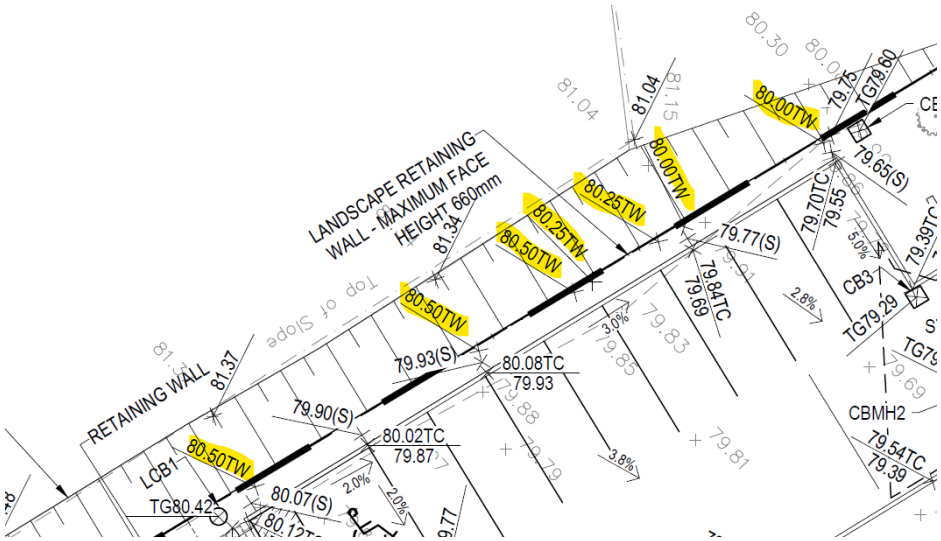
Landscape Plan

15. Include in the legend graphic symbols used on the plan which are not currently included in the legend: zig-zagged lines south of the MUP, drainage/manhole covers.

Engineering Comments

A. List of Drawing(s):
Grading Plan – Sediment and Erosion Control, C1, prepared by WSP, 191-03236-00, dated 2019-03-22, revision 1, dated 2019-05-10.

16. Identify or reference survey monument location.
17. Identify the emergency overland flow route.
18. Show surface ponding outline and elevations for 5-year and 100-year events.
19. Show the outline of the retaining wall that is identified by proposed grades on the north side of the property.



Civil Services Plan, C2, prepared by WSP, 191-03236-00, dated 2019-03-22, revision 1, dated 2019-05-10.

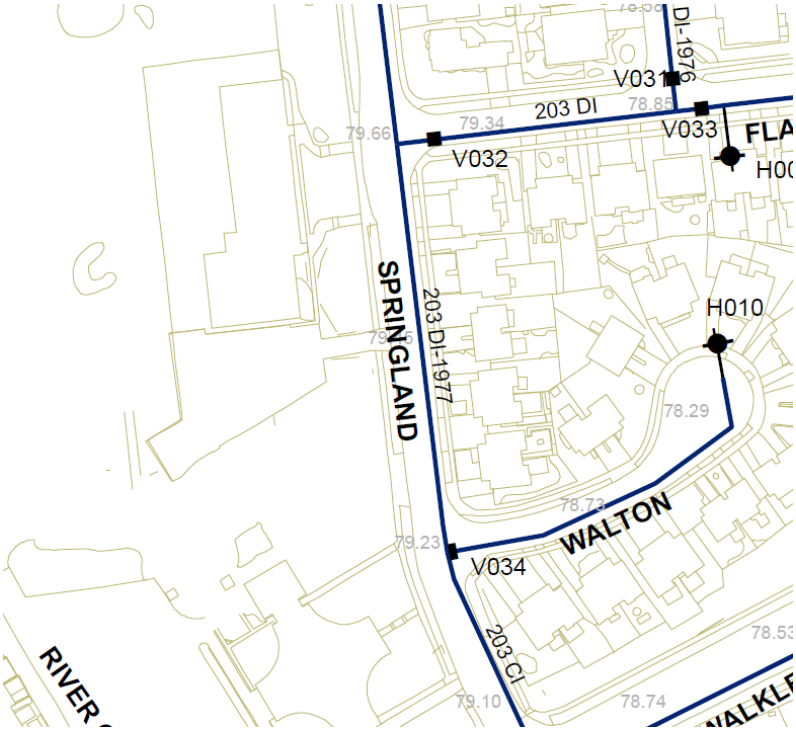
20. Identify or reference survey monument location.

21. Provide standard that will be used for the landscaping CBs.

22. Show location of water and remote meters.

23. Identify that S24 and S25 will be used for SAN MH2.

24. Identify each water valve that will be used to turn off the water main during installation of the 150mmx200mm tee connection. Identify how many properties will be affected by the water main being shutoff during the installation of the tee.



B. <u>List of Report(s):</u>

Geotechnical Investigation – Proposed Daycare Center – 2826 Springland Drive, Paterson Group, PG4883-1, dated April 30, 2019.

25. Identify if there are any grade raise restrictions.

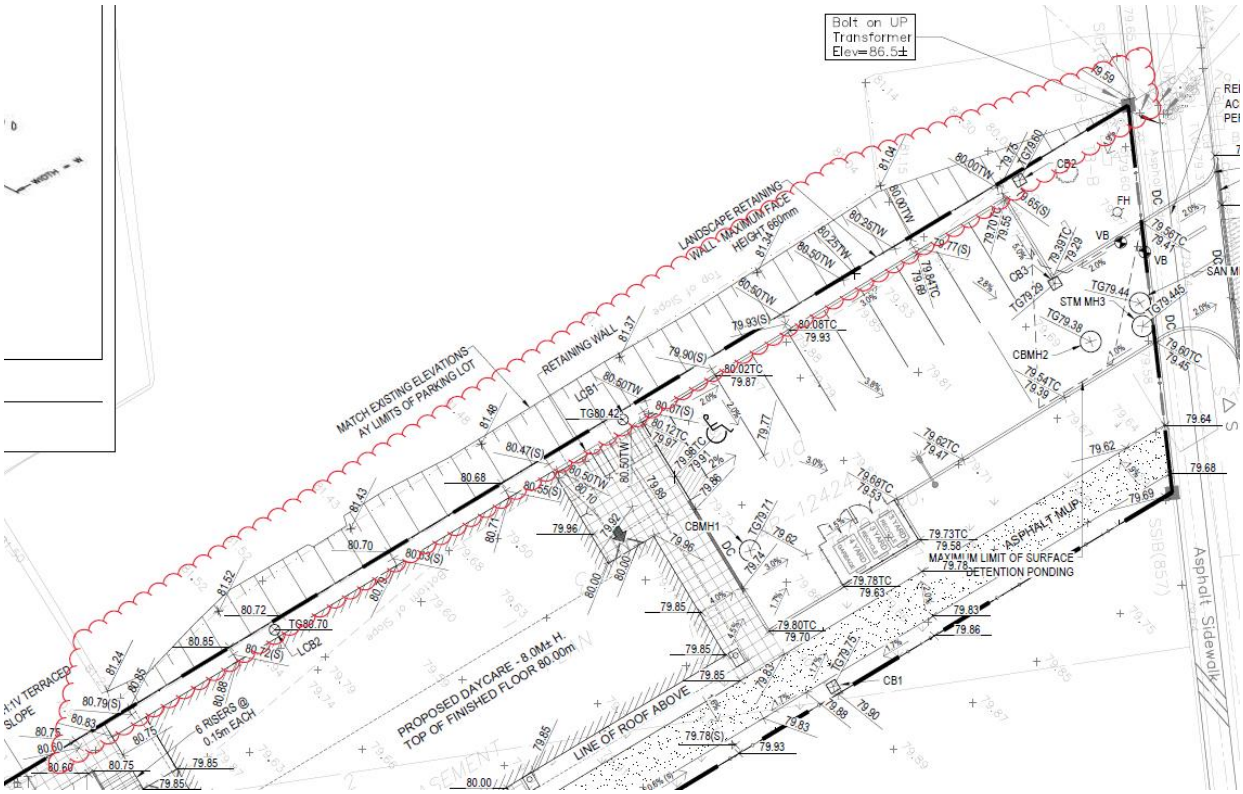
26. Provide letter of confirmation that associated grading plan has been reviewed and is acceptable with regards to geotechnical requirements.

Servicing and Stormwater Management Report, prepared by WSP, 191-03236-00, dated May 2019.

27. Appendix B – The water demand calculation sheet indicates that the proposed building is a 2-storey car wash and service bay. Please confirm that the calculations were done for the proposed nursery school.

C. Additional Comments

28. The grading plan indicates that proposed work will be undertaken on the terracing to the north, outside the property bounds of the site. Please provide a letter from the neighbouring property to the north that the proposed work is acceptable.



Please consider these comments in combination with comments you receive from other technical groups, agencies and the public. Contact me if it is necessary to resolve any conflicting comments and/or include the above comments with your summary to the applicant. Also, please add the following statement in the letter to the applicant.

Transportation Comments

List of Drawing reviewed:

- Site Plan Sp-1, Revision #1, Dated May 08, 2019

Comments:

29. Springland Drive is designated as a Collector road. Since Springland Drive is identified as a Collector the minimum clear throat length required is 8.0 metres TAC Manual, Part 2, Table 3.2.9.3 and method of measurement as per Figure 3.2.5.2.

30. The concrete sidewalks should be 2.0 metres in width and be continuous and depressed through the proposed access (please refer to the City's sidewalk and curb standard drawing SC7.1 for unsignalized entrance).

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

List of Report(s) reviewed:

- TIA Screening Form, CGH – Project No. 2019-12, Dated March 27, 2019
- Technical Memorandum, CGH – Project No. 2019-12, Dated March 27, 2019

Comments:

32. No further TIA reports are required.

Parks and Facilities Planning Branch

General

33. Parkland dedication associated with the property has previously been satisfied through the subdivision application at 3071 Riverside Drive.

Site Plan, Drawing No. SP-1

34. The multi-use pathway segment through the adjacent park to the west is proposed to have a minimum width of 3m as determined earlier this year. Maintaining the same pathway width through 2826 Springland Drive would be preferred rather than narrowing to 2.5m as shown on the Site Plan. A 3m width provides a more comfortable size for the sharing of the pathway by pedestrians, cyclists and other pathway users, and is consistent with the City's standard dimensions for multi-use pathways. Please review the potential to widen the pathway by up to 0.5m on the south side of the pathway. This would result in a +/- 0.5m wide clearance strip along the south side of the pathway. While this is less than a typical 1.0 to 1.5m wide clearance strip, it would be acceptable for a relatively short pathway segment. Expanding the pathway on the south side would not interfere with the building

canopy as proposed on the north side of the pathway. Consideration could also be given to reducing the pathway to less than 3m wide at CB1 to accommodate the infrastructure requirements. Alternatively, the pathway could be widened on both sides.

35. As per Condition C.30 of Schedule "H" to the subdivision agreement for 3071 Riverside Drive, the multi-use pathway should be extended to the edge of curb of Springland Drive and a depressed curb should be provided. Please review if this can be implemented. This depressed curb was previously recommended by Transportation Services (Robin Bennett). If appropriate at this location, tactile warning surface indicators may also be needed to comply with the City's Accessibility Design Standards.

36. Add a solid yellow painted centreline for the multi-use pathway and a bicycle stop sign for cyclists approaching the Springland Drive right-of-way.

Landscape Plan, Drawing No. L.1

37. The spirea shrubs encroach into the pathway clearance zone that is typically required within 1.0m to 1.5m of a multi-use pathway. The spread for this shrub is approximately 1.0m to 1.5m, which may also result in foliage coming close to or over the pathway edge unless the shrubs are pruned regularly. Please consider deleting the shrubs, relocating the shrubs within the enclosed play area, or replacing the shrubs with other shrubs or perennials with a smaller spread or possibly with one or two trees instead.

38. Maintain a clearance space between the edge of the multi-use pathway and any plantings within the childrens' garden area.

39. Locate the fence between the park and the enclosed play area 0.15m on the private side of the lot line.

40. Please specify the fence type along the south side of the pathway corridor as a two-rail wood post and rail fence, and use the City of Ottawa's standard detail drawing No. F8 as a detail on the landscape plan. This will continue the same fence type that is proposed to the west between the park and church properties.

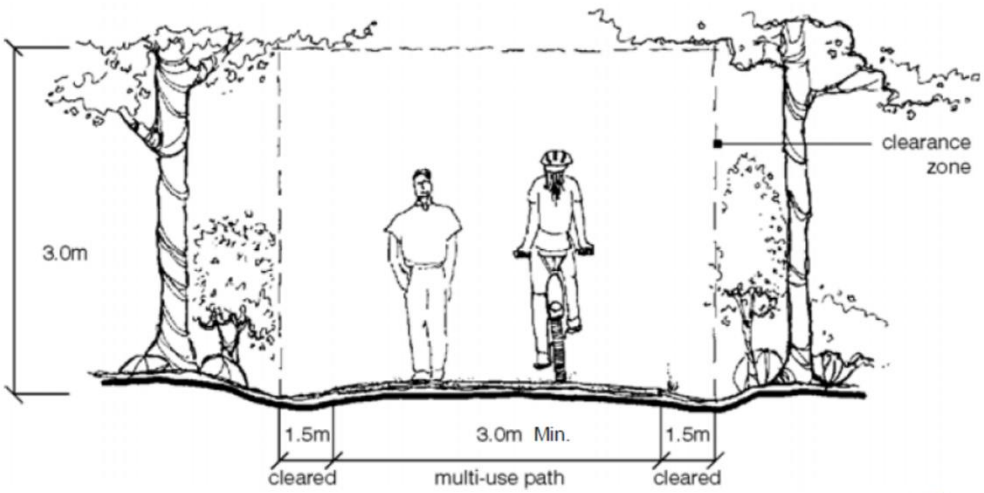


Figure 3-11: Off-Road Multi-Use Pathway

Grading Plan, Drawing No. C1

41. Extend the multi-use pathway to the Springland Drive curb, provide a depressed curb and/or a tactile warning surface indicator, if appropriate.

42. Provide proposed grades for the north-south pathway located adjacent to the park that connects the daycare with the Canoe Bay development.

Natural Systems and Rural Affairs

43. A tree permit is not needed as the existing trees are adequately protected.

Hydro Ottawa Comments

44. Below is Hydro Ottawa's response to the above noted proposal:

1. The Owner is advised that there is medium voltage overhead infrastructure along the west side of Springland Drive.
    a. The Owner shall ensure that no personnel or equipment encroaches within three meters (3.0m) of the Hydro Ottawa overhead medium voltage distribution lines, unless approved by Hydro Ottawa. The Owner shall contact Hydro Ottawa prior to commencing work when proposing to work within 3.0m of Hydro Ottawa distribution lines. No such work shall commence without approval of Hydro Ottawa.
    b. The Owner is advised that permanent structures located within the "restricted zone" surrounding overhead lines are prohibited. This zone is defined by Hydro Ottawa's standard OLS0002 "Overhead High Voltage

Clearances to Adjacent Building", which can be found at http://www.hydroottawa.com/residential/renovating/guide/clearances/. This standard complies with the requirements of the Ministry of Labour's Occupational Health & Safety Act, the Ontario Building Code, and the Ontario Electrical Safety Code. Permanent structures include buildings, signs (even lit signs when open for maintenance), antennas, pools, and fences.

c. Hydro Ottawa prohibits any change of grade that results in reduced life expectancy of its asset. Any change in grade of more than 0.3m in the vicinity of proposed or existing electric utility equipment shall be reviewed with Hydro Ottawa.

d. The Owner shall ensure that the distance between the proposed curb and pole is a minimum of half a meter (0.5m).

e. The Owner shall ensure that any landscaping or surface finishing does not encroach into existing or proposed Hydro Ottawa overhead or underground assets or easement. When proposing to plant trees in proximity of existing power lines, the Owner shall refer to Hydro Ottawa's free publication "Tree Planting Advice" which can be found at https://hydroottawa.com/outages/safety/safety-outside/planting-trees. The shrub or tree location and expected growth must be considered. If any Hydro Ottawa related activity requires the trimming, cutting or removal of vegetation, or removal of other landscaping or surface finishing, the activity and the re-instatement shall be at the owner's expense.

45. The Owner shall convey, at their cost, all required easements as determined by Hydro Ottawa.

46. The Owner is advised that there is limited capacity to service the proposed development at this time. The Owner may be responsible for a Capital Contribution payment(s) towards a distribution system expansion if the proposed development requires electrical servicing greater than can be provided by the existing distribution system in the vicinity, either in capacity or in extension limit. This amount shall be in accordance with Hydro Ottawa's Contributed Capital Policy and Conditions of Service.

47. The Owner shall enter an Installation and Service agreement with Hydro Ottawa.

48. The Owner shall comply with Hydro Ottawa's Conditions of Service and thus should be consulted for the servicing terms. The document, including referenced standards, guidelines and drawings, may be found at http://www.hydroottawa.com/residential/rates-and-conditions/conditions-of-service/. The Owner should consult Hydro Ottawa prior to commencing engineering designs to ensure compliance with these documents.

49. Hydro Ottawa reserves the right to raise conditions throughout the development of this proposal should the revisions contain non-conformances with, for example, Hydro Ottawa's Conditions of Service or Standards. To ensure the best outcome, Hydro Ottawa welcomes an early discussion on the proposal.

For details on electrical servicing, please contact https://hydroottawa.com/accounts-and-billing/contractors-and-developers/guide/distribution-system-design.

CPTED Comments:

50. There are good sightlines to the building and parking lot area from Antares Drive. Lighting and possibly video surveillance will be important for the parking lot area to help prevent theft. No major issues were identified from a Police/CPTED viewpoint with this plan. Good luck with the project.

Ottawa Accessibility Advisory Committee Comments

51. There are no accessible washrooms proposed.
52. The daycare is accessible by stairs only.
53. There are no entrance/exits for strollers or wheelchairs.

Enbridge Gas Distribution Comments

54. Enbridge Gas Inc. does not object to the proposed application(s).

This response does not constitute a pipe locate or clearance for construction.

The applicant shall contact Enbridge Gas Inc.'s Customer Connections department by emailing SalesArea60@Enbridge.com for service and meter installation details and to ensure all gas piping is installed prior to the commencement of site landscaping (including, but not limited to: tree planting, silva cells, and/or soil trenches) and/or asphalt paving.

If the gas main needs to be relocated as a result of changes in the alignment or grade of the future road allowances or for temporary gas pipe installations pertaining to phase construction, all costs are the responsibility of the applicant.

In the event that easement(s) are required to service this development, the applicant will provide the easement(s) to Enbridge Gas Inc. at no cost. The inhibiting order will not be lifted until the application has met all of Enbridge Gas Inc.'s requirements.

Enbridge Gas Inc. reserves the right to amend or remove development conditions.

Canada Post Comments

55.
Service type and location

56. Canada Post will provide mail delivery service to the subdivision through centralized Community Mail Boxes (CMBs) which is already installed at 2786 Springland drive

57. If the development includes plans for multi-unit building(s) with a common indoor entrance, the developer must supply, install and maintain the mail delivery equipment within these buildings to Canada Post's specifications. Marked on Plan as Apartment A,B,C

Municipal requirements

58. Please update our office if the project description changes so that we may determine the impact (if any).
59. Should this subdivision application be approved, please provide notification of the new civic addresses as soon as possible.

Developer timeline and installation

60. Please provide Canada Post with the excavation date for the first foundation/first phase as well as the date development work is scheduled to begin.

Community Comments

61. How will the site contribute to traffic and possible traffic bottlenecks turning into Holy Cross?
62. Will pickups/ drop-offs for the daycare and school significantly impact traffic and congestion on the local roads?
63. How will drop-offs be facilitated given the right turn restrictions from Walkley Road onto Springland Drive?
64. Will the development lead to increased traffic on Riverside Drive and other local streets as a result of right hand turn restrictions?

Please provide a resubmission that addresses each of the comments in the form of a cover letter stating how each were addressed on the resubmission. Co-ordinate the numbering of each resubmission comment or issue with the above noted comment number. As part of your resubmission, provide three (3) full-size folded copies of each plan and three (3) copies of each report. Ensure that all plans are revised where necessary to ensure consistency. All addenda or revisions to any studies, or drawings, shall be accompanied by a *.pdf copy (either by CD or e-mail).

Please contact me at John.Bernier@Ottawa.ca or at 613-580-2424 Ext 21576 if you have any questions regarding design, site plan or landscaping comments. The Project Manager, Cody Oram, may be contacted directly for questions regarding engineering comments at Cody.Oram@Ottawa.ca or at 613-580-2424 Ext 13422.

Regards,

John Bernier
Planner
Development Review, Suburban Services South
Planning, Infrastructure, and Economic Development

Yang, Winston

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: April-04-19 9:11 AM
To: Proag, Ved; Eric Lalande
Cc: Johnston, Jim
Subject: RE: Request for pre-consultation - Daycare at 2826 Springland Drive, Ottawa

Good Morning Ved,

Stormwater from this site outlets to the Rideau River approximately 516 metres downstream. No municipal facility provides water quality treatment for stormwater entering the Rideau River. The RVCA advises that on-site water quality treatment of 80 % TSS Removal (enhanced) must be provided in the stormwater management plan for the site to mitigate the impacts on surface water quality and aquatic habitat of the Rideau River.

Jamie Batchelor, MCIP,RPP
Planner, ext. 1191
jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | www.rvca.ca

From: Proag, Ved <Ved.Proag@wsp.com>
Sent: Wednesday, April 03, 2019 4:22 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>; Eric Lalande <eric.lalande@rvca.ca>
Cc: Proag, Ved <Ved.Proag@wsp.com>; Johnston, Jim <James.Johnston@wsp.com>
Subject: FW: Request for pre-consultation - Daycare at 2826 Springland Drive, Ottawa

Jamie,

I wanted to follow up on the request below.

Thank you,
Ved

From: Eric Lalande [mailto:eric.lalande@rvca.ca]
Sent: February-27-19 4:28 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>; Proag, Ved <Ved.Proag@wsp.com>
Subject: FW: Request for pre-consultation - Daycare at 2826 Springland Drive, Ottawa

Hi Ved,

I am forwarding this to Jamie Batchelor as it is in his area for review and comments.

Thanks,

Eric Lalande, MCIP, RPP
Planner, Rideau Valley Conservation Authority
613-692-3571 x1137

From: Proag, Ved <Ved.Proag@wsp.com>
Sent: Wednesday, February 27, 2019 3:15 PM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Proag, Ved <Ved.Proag@wsp.com>
Subject: Request for pre-consultation - Daycare at 2826 Springland Drive, Ottawa

Hello Eric,

We are requesting initial RVCA comments on a proposed daycare at 2826 Springland Drive in Ottawa (see attached site plan).

The proposed building will be serviced by a proposed parking lot located on the west side of the building. The building will be serviced by the 200mm watermain, 600mm sanitary and 450mm storm sewers located on Springland Drive (see geoOttawa map attached). The municipal storm sewer network eventually outlets to the Rideau River. Stormwater quantity control will be possibly provided through swales at the south of the building and ICDs in the proposed parking lot.

Please call me if you have any questions, or if my inquiry should be directed to an alternative representative.

Yours truly,
Ved Proag, P.Eng
Municipal Engineer/ *Ingénieur Municipal*
Municipal Infrastructure / *Infrastructure Municipal*

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F+ 1 613-829-8299

2611 Queenview Drive, Suite 300
Ottawa, Ontario
K2B 8K2, Canada
wsp.com

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Yang, Winston

From: MECPOttawaSewage (MECP) <MOECCOttawaSewage@ontario.ca>
Sent: March-28-19 3:11 PM
To: Proag, Ved
Cc: Johnston, Jim; Leavoy, Jena (MECP); Primeau, Charlie (MECP)
Subject: RE: Springland Daycare - MECP pre-consultation request
Attachments: ODO - Pre-Submission Consultation Request Fill-in Form- 2019-03-06.docx; 2019-03-25_191-03236-00_C1.pdf

Good Afternoon:

The MECP Ottawa District Office has received your pre-submission consultation request. Jena Leavoy, Senior Environmental Officer, assigned to your file will contact you.

Thank you,

Jéhanne Hurlbut
District Administrative Assistant (Bilingual)
Ministry of the Environment, Conservation and Parks | Ottawa District Office
2430 Don Reid Drive, Unit 103
Ottawa, ON K1H 1E1
Tel: (613) 521-3450 X 221 | Fax: 613-521-5437 | jehanne.hurlbut@ontario.ca

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From: Proag, Ved <Ved.Proag@wsp.com>
Sent: Wednesday, March 27, 2019 11:34 AM
To: MECPOttawaSewage (MECP) <MOECCOttawaSewage@ontario.ca>
Cc: Proag, Ved <Ved.Proag@wsp.com>; Johnston, Jim <James.Johnston@wsp.com>
Subject: Springland Daycare - MECP pre-consultation request

Good morning,

Please find attached a request for a pre-submission consultation associated with the proposed construction of a daycare. Attached is a copy of the preliminary proposed site plan.

Thank you,

Ved Proag, P.Eng
Municipal Engineer/ *Ingénieur Municipal*
Municipal Infrastructure / *Infrastructure Municipal*

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F+ 1 613-829-8299

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Connect with me on LinkedIN

-LAEmHhHzdJzBITWfa4Hgs7pbKI

APPENDIX

B

- WATERMAIN BOUNDARY CONDITIONS FROM CITY OF OTTAWA
- FIRE UNDERWRITERS SURVEY – FIRE FLOW CALCULATION
- WATER DEMAND CALCULATION
- INFOWATER RESULTS OUTPUT

Proag, Ved

From: Oram, Cody <Cody.Oram@ottawa.ca>
Sent: March-13-19 9:14 AM
To: Proag, Ved
Subject: RE: Fire Flow Request - 2826 Springland Drive

Hi Ved,
The sanitary sewer capacity is designed for current zoning permissions (institutional). Through detail design of the site plan, actual site demands are calculated based on the proposal. The actual demands are compared with the design calculations to confirm adequate capacity is available.
The storm sewer capacity is calculated on a 5-year design event using a runoff coefficient of C=0.5 or pre-development, whichever is less.

I hope this helps, if you have any questions please let me know.
Cody

From: Proag, Ved <Ved.Proag@wsp.com>
Sent: March 12, 2019 2:48 PM
To: Oram, Cody <Cody.Oram@ottawa.ca>
Cc: Proag, Ved <Ved.Proag@wsp.com>
Subject: RE: Fire Flow Request - 2826 Springland Drive

Thank you Cody. Would you have the sanitary and storm sewers existing capacity on Springland Drive?

From: Oram, Cody [mailto:Cody.Oram@ottawa.ca]
Sent: March-06-19 3:06 PM
To: Proag, Ved <Ved.Proag@wsp.com>
Cc: 'Ved Proag' <vedbhashinee@gmail.com>
Subject: RE: Fire Flow Request - 2826 Springland Drive

Hi Ved,

The following are boundary conditions, HGL, for hydraulic analysis at 2826 Springland (zone 2C) assumed to be connected to the 203mm on Springland (see attached PDF for location).

Minimum HGL = 124.8m

Maximum HGL =133.8m

MaxDay + FireFlow (100 L/s) = 123.5m

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.

Regards,

Cody Oram, P.Eng. Senior Engineer
Development Review, South Services
Planning, Infrastructure and Economic Development Department | Services de planification, d'infrastructure et de 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 **13422**, fax/téléc:613-580-2576, cody.oram@ottawa.ca

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From: Proag, Ved <Ved.Proag@wsp.com>
Sent: Friday, March 01, 2019 1:44 PM
To: Oram, Cody <Cody.Oram@ottawa.ca>
Cc: 'Ved Proag' <vedbhashinee@gmail.com>
Subject: Fire Flow Request - 2826 Springland Drive

Hello Cody,

We are working on the Site Servicing Study for the proposed daycare at 2826 Springland Drive. The proposed development is a two-storey daycare building with a proposed parking. The building is proposed to be serviced from the 203 mm diameter watermain along Springland Drive. The total square footage of the proposed building is 816 m².

The domestic water demands were calculated using the City of Ottawa's Water Design Guidelines where the commercial consumption rate of 70 L/student/d was used to estimate average day demand. Maximum daily demand was calculated by multiplying average day by a factor of 1.5. Maximum hour demand was calculated by multiplying maximum daily demand by a factor of 1.8.

The fire flow required was determined following the Fire Underwriter Survey (FUS) method. The resulting FUS fire flow is 6,000 L/min or 100 L/s.

In summary:
Average Daily Demand = 0.09 L/s
Maximum Daily Demand = 0.13 L/s
Maximum Hour Demand = 0.23 L/s
Required Fire Flow = 100 L/s

Site plan, FUS calculation and Domestic flow calculation are attached.

Please provide fire flow information for the fire hydrant on 2826 Springland Drive in the vicinity of the property.

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

Thank you,
Ved Proag, P.Eng
Municipal Engineer/ *Ingénieur Municipal*
Municipal Infrastructure / *Infrastructure Municipal*

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F+ 1 613-829-8299

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wsp.com

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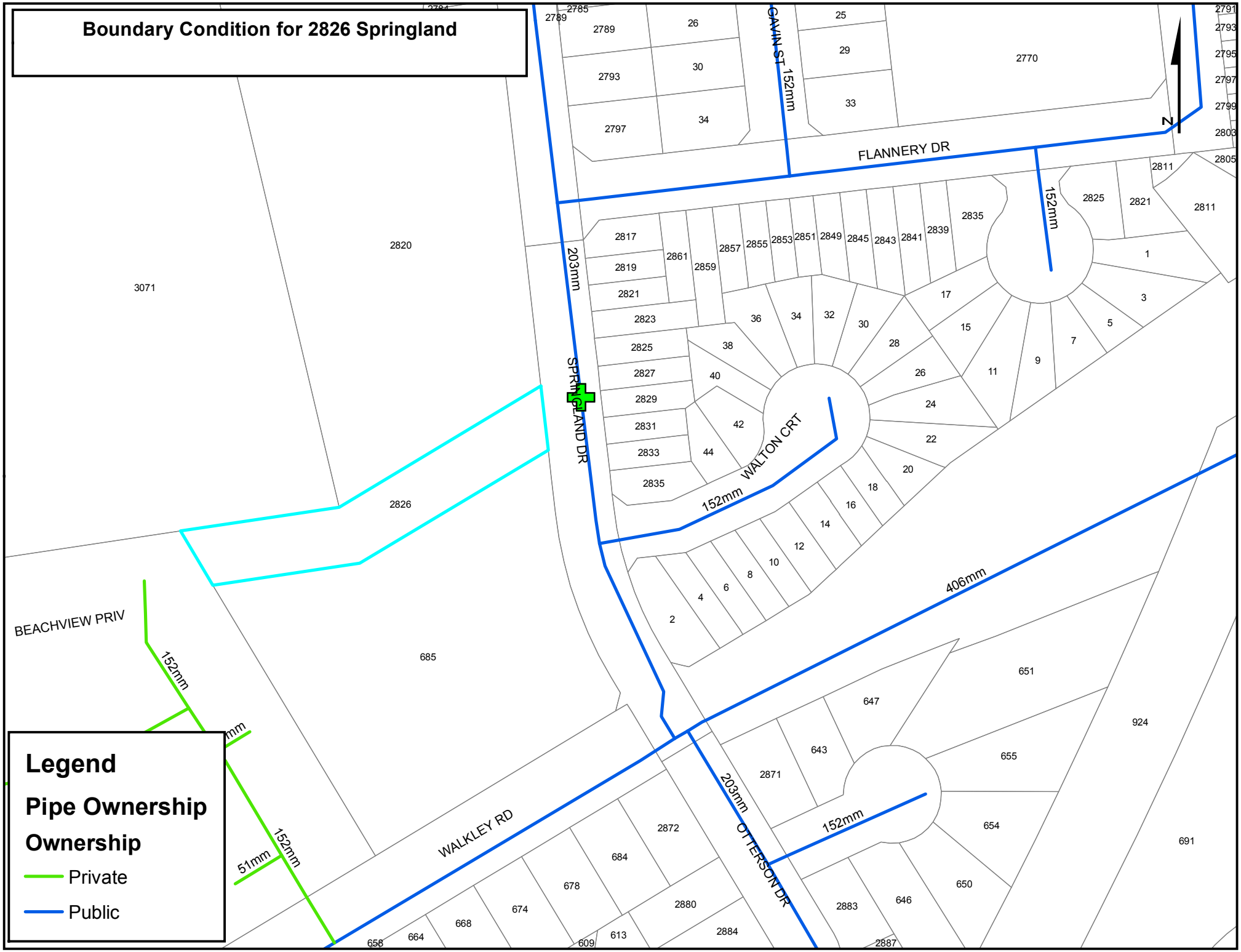

Boundary Condition for 2826 Springland
CAVIN ST
152mm
FLANNERY DR
203mm
SPRINGLAND DR
WALTON CRT
406mm
WALKLEY RD
OTTERSON DR
BEACHVIEW PRIV
51mm
2826
2820
3071
685
2770
924
N
Legend
Pipe Ownership
Ownership
Private
Public

Fire Flow Design Sheet (FUS)
RIVERSIDE PARK NURSERY SCHOOL
2826 SPRINGLAND DRIVE, OTTAWA, ON
WSP Project No. 191-03236-00
Date: 03-May-19

Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 1999

1. An estimate of the Fire Flow required for a given fire area may be estimated by: $F = 220\ C\ \sqrt{A}$

F = required fire flow in litres per minute
C = coefficient related to the type of construction
- 1.5 for wood construction (structure essentially combustible)
- 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
- 0.8 for noncombustible construction (unprotected metal structural components, masonry or metal walls)
- 0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = total floor area in square metres (including all storeys, but excluding basements at least 50% below grade)

A = 816 m^2
C = 1.5
F = 9426.7 L/min

rounded off to 9,000 L/min (min value of 2000 L/min)

2. The value obtained in 1. may be reduced by as much as 25% for occupancies having a low contents fire hazard.

Non-combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Reduction due to low occupancy hazard -15% x 9,000 = 7,650 L/min

3. The value obtained in 2. may be reduced by as much as 50% for buildings equipped with automatic sprinkler protection.

Adequate Sprinkler confirms to NFPA13	-30%
Water supply common for sprinklers & fire hoses	-10%
Fully supervised system	-10%
No Automatic Sprinkler System	0%

Reduction due to Sprinkler System -40% x 7,650 = -3,060 L/min

4. The value obtained in 2. is increased for structures exposed within 45 metres by the fire area under consideration.

Separation	Charge
0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
30.1 to 45 m	5%

Side 1	60	0%	north side
Side 2	34	5%	east side
Side 3	75	0%	south side
Side 4	18	15%	west side
		20%	(Total shall not exceed 75%)

Increase due to separation 20% x 7,650 = 1,530 L/min

5. The flow requirement is the value obtained in 2., minus the reduction in 3., plus the addition in 4.

The fire flow requirement is 6,000 L/min (Rounded to nearest 1000 L/min)
or **100 L/sec**
or 1,585 gpm (us)
or 1,320 gpm (uk)

Based on method described in:
"Water Supply for Public Fire Protection - A Guide to Recommended Practice", 1991
by Fire Underwriters Survey

Water Demand Calculation Sheet

Project:	**RIVERSIDE PARK NURSERY SCHOOL**	**Date:**	**7/22/2019**
Location:	**2826 SPRINGLAND DRIVE, OTTAWA, ON**	**Design:**	**WY**
WSP Project No.	**191-03236-00**	**Page:**	**1 of 1**

Proposed Buildings	Residential				Non-Residentail			Average Daily			Maximum Daily			Maximum Hourly			Fire
	Units			Beds	Industrial	Institutional	Commercial	Demand (l/s)			Demand (l/s)			Demand (l/s)			Demand
	SF	APT	ST		(ha)	(ha)	(ha)	Res.	Non-Res.	Total	Res.	Non-Res.	Total	Res.	Non-Res.	Total	(l/min)
2 Storey Building for Early Learning Centre						0.08			0.08	0.08		0.13	0.13		0.23	0.23	6,000

Population Densities

Single Family	3.4	person/unit
Semi-Detached	2.7	person/unit
Duplex	2.3	person/unit
Townhome (Row)	2.7	person/unit
Bachelor Apartment	1.4	person/unit
1 Bedroom Apartment	1.4	person/unit
2 Bedroom Apartment	2.1	person/unit
3 Bedroom Apartment	3.1	person/unit
4 Bedroom Apartment	4.1	person/unit
Avg. Apartment	1.8	person/unit

Average Daily Demand

Residentail	280	l/cap/day
Industrial	35000	l/ha/day
Institutional	28000	l/ha/day
Commercial	28000	l/ha/day

School

Average Day Demand	70	l/(Students/d)
Number of Student	103	Students

Maximum Daily Demand

Residential	2.5	x avg. day
Industrial	1.5	x avg. day
Institutional	1.5	x avg. day
Commercial	1.5	x avg. day

Maximum Hourly Demand

Residential	2.2	x max. day
Industrial	1.8	x max. day
Institutional	1.8	x max. day
Commercial	1.8	x max. day

Peaking Factors From MOECC Table 3-3 (Peaking Factors for Water Systems Servicing Fewer than 500 persons

Dwelling Units Serviced		Equivalent Population		Night Min. Hour Factor	Max. Day Factor	Peak Hour Factor
10		30		0.1	9.50	14.3
50		150		0.1	4.90	7.4
100		300		0.2	3.60	5.4
150		450		0.3	3.00	4.5
167		500		0.4	2.9	4.3

3.00

Top of Slope

Bottom of Slope

Hand Rail

Hand Rail

Bottom of Slope

Wooden Steps with Hand Rail

SIB(WTT)Bent

HR

HR

HR

0.5 South

CC(857)

1.5 ACRE FUTURE CITY PARK

ENCLOSED PLAY AREA

SIB(857)

ASPHALT MUP

PROPOSED DAYCARE - 8.0M± H.
TOP OF FINISHED FLOOR 80.00m

LINE OF ROOF ABOVE

J12

P11

J10

TB-C

TB-B

SIB(857)

UP

79.45*

79.44*

79.52*

Bell

Bell

CB
G=79.37

Asphalt Sidewalk

Concrete Curb

24" San Sewer

Top of WM
Estimated
as 77.2M

Ex. 10" Conc. San.
with Drop Pipe

MH-S
G=79.37
W INV.=76.50

MH-S
G=79.37
E INV.=74.46
N INV.=74.51
S INV.=74.41

RES9000

P13

pin 04068 - 0459

Approximate Crown of Road

250mm Concrete San Sewer

SPRINGLAND DRIVE

SIB(857)

79.51*

24" Concrete San Sewer @ 0.16%

MH-S
N INV.=76.59

CB
G=79.28

CB
G=79.29

UP

MH-S
N INV.=74.19
S INV.=74.19

pin 04073 - 00

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
	J10	0.00	79.56	133.80	531.53
	J12	0.08	79.96	133.80	527.59

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)
P11	J12	J10	34.37	101.60	100.00	-0.08	0.01	0.00	0.00
P13	RES9000	J10	14.19	152.40	150.00	0.08	0.00	0.00	0.00

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
	J10	0.00	79.56	124.80	443.33
	J12	0.23	79.96	124.80	439.38

	ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)
	P11	J12	J10	34.37	101.60	100.00	-0.23	0.03	0.00	0.03
	P13	RES9000	J10	14.19	152.40	150.00	0.23	0.01	0.00	0.00

	ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Available Flow at Hydrant (L/s)	Available Flow Pressure (kPa)
	J10	0.00	430.58	123.50	100.00	411.96	443.14	137.86
	J12	0.13	426.63	123.50	31.50	342.96	61.74	137.86

ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
J10	100.00	443.14	J12	133.92	93.63	439.90	137.86	141.81
J12	31.63	61.74	J12	137.86	94.03	61.74	137.86	137.86

APPENDIX

C

- SANITARY SEWER DESIGN SHEET
- OFFSITE SANITARY SEWERS AND DRAINAGE AREA PLAN FIGURE 2

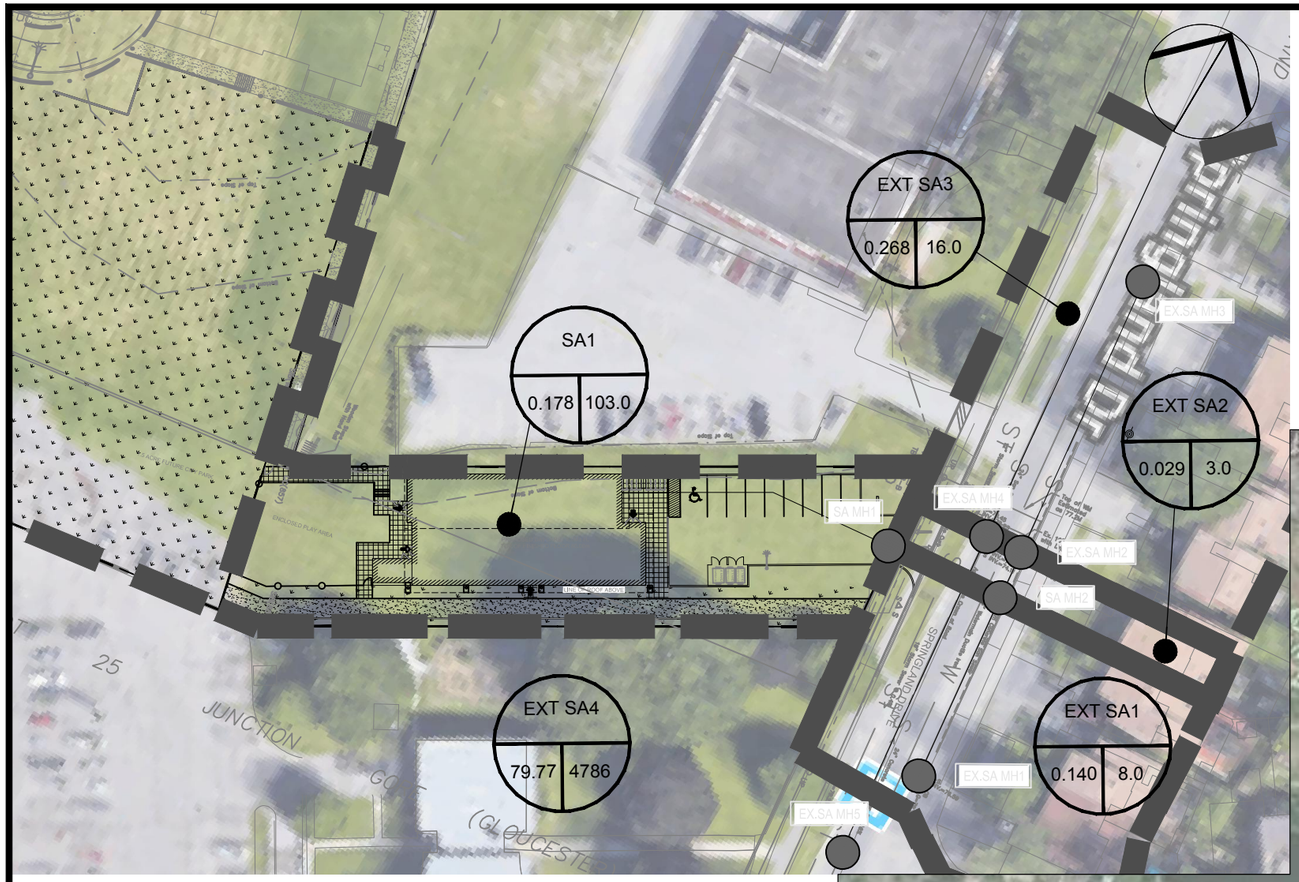
RIVERSIDE PARK NURSERY SCHOOL
2826 SPRINGLAND DRIVE, OTTAWA, ON
SANITARY SEWER DESIGN SHEET
Project No.: 191-03236-00

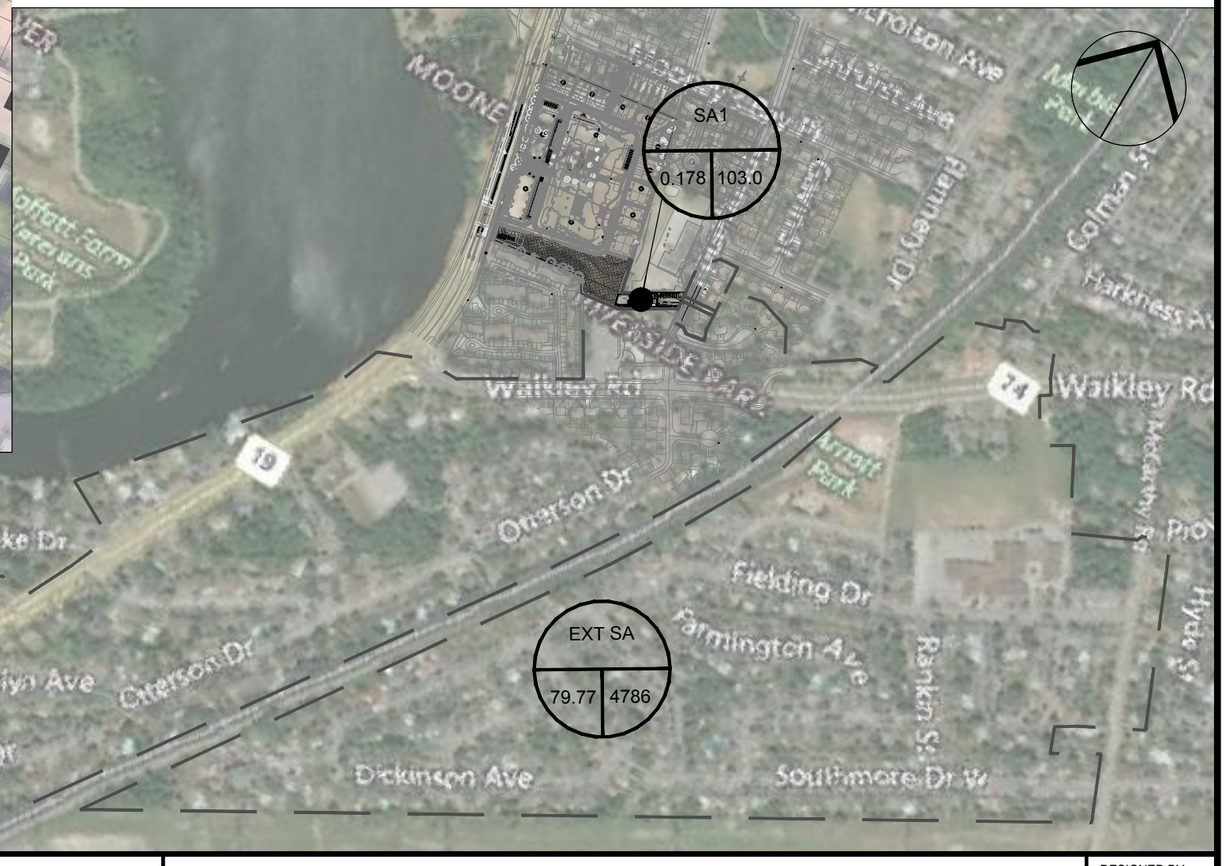
LOCATION				RESIDENTIAL AREA AND POPULATION												INDUSTRIAL				COMMERCIAL		INSTITUTIONAL		I+C+I	INFILTRATION			TOTAL	PIPE					
LOCATION	FROM M.H.	TO M.H.	SANITARY DRAINAGE AREA ID	INDV AREA (ha)	ACCU AREA (ha)	NUMBER OF UNITS						POPULATION		PEAK FACT.	PEAK FLOW (l/s)	GROSS AREA (ha)	DEVEL. AREA (ha)	ACCU. AREA (ha)	PEAK FACTOR	INDIV AREA (ha)	ACCU. AREA (ha)	INDIV AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	INDIV AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	LENGTH (m)	DIA. (mm)	SLOPE (%)	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)	AVAIL. CAP. (%)
						SINGLES	SEMIS	TOWNS	1-BED APT.	2-BED APT.	3-BED APT.	INDIV POP.	ACCU POP.																					
THE AVERAGE SEWER FLOW GENERATED FROM THE SCHOOL WILL BE EQUVALENT TO THE WATER DEMANDS FOR THE PROPOSED SCHOOL = 0.08 l/s																																	
SPRINGLAND DRIVE	BLDG	SA MH1	SA1									0	0	3.80	0.00						0.00	0.178	0.18	0.12	0.178	0.178	0.06	**0.18**	35.00	135	1.00	11.50	0.80	**98.45%**
SPRINGLAND DRIVE	SA MH1	SA MH2										0	0	3.80	0.00						0.00		0.18	0.12	0.000	0.178	0.06	**0.18**	15.50	135	1.00	11.50	0.80	**98.45%**
EXISTING SANITARY CAPACITY ANALYSIS																																	
SPRINGLAND DRIVE	*EX. SA MH1*	SA MH2	*EXT SA1*	*0.140*	*0.140*		*3*					8	8	3.74	0.10						0.00				0.140	0.140	0.05	**0.14**	*24.63*	*250*	*0.30*	*32.57*	*0.66*	***99.56%***
SPRINGLAND DRIVE	SA MH2	*EX. SA MH2*	*EXT SA2*	*0.029*	*0.169*		*1*					3	11	3.73	0.13						0.00		0.18	0.12	0.029	0.347	0.11	**0.37**	*6.28*	*250*	*0.30*	*32.57*	*0.66*	***98.88%***
SPRINGLAND DRIVE	*EX. SA MH3*	*EX. SA MH2*	*EXT SA3*	*0.268*	*0.268*		*6*					16	16	3.71	0.19						0.00				0.268	0.268	0.09	**0.28**	*55.75*	*250*	*0.30*	*32.57*	*0.66*	***99.13%***
SPRINGLAND DRIVE	*EX. SA MH2*	*EX. SA MH4*			*0.437*							0	27	3.69	0.32						0.00		0.18	0.12	0.000	0.615	0.20	**0.65**	*4.78*	*250*	*0.30*	*32.57*	*0.66*	***98.02%***
SPRINGLAND DRIVE	*EX. SA MH5*	*EX. SA MH4*	*EXT SA4*	*79.770*	*79.770*	*ASSUME 60 PERSONS PER GROSS HECTARE DENISTY*						4786	4786	2.81	43.59						0.00				79.770	79.770	26.32	**69.91**	*50.55*	*600*	*0.16*	*245.60*	*0.87*	***71.54%***
SPRINGLAND DRIVE	*EX. SA MH4*	*EX. SA MH6*			*80.207*							0	4813	2.81	43.80						0.00		0.18	0.12	0.000	80.385	26.53	**70.45**	*85.00*	*600*	*0.16*	*245.60*	*0.87*	***71.32%***

DESIGN PARAMETERS

RESIDENTIAL AVG. DAILY FLOW =	280	l/cap/day	COMMERCIAL PEAK FACTOR =	1.5	(WHEN AREA > 20%)	PEAK POPULATION FLOW, (l/s) =	P*q*M/86400	UNIT TYPE	PERSONS/UNIT		
COMMERCIAL AVG. DAILY FLOW =	28,000	l/ha/day		1.0	(WHEN AREA < 20%)	PEAK EXTRANEOUS FLOW, (l/s) =	I*Ac	SINGLES	3.4		
	0.324	l/ha/s				RESIDENTIAL PEAKING FACTOR, M =	1+(14/(4+P^0.5))*K	SEMI-DETACHED	2.7		
INSTITUTIONAL AVG. DAILY FLOW =	28,000	l/ha/day	INSTITUTIONAL PEAK FACTOR =	1.5	(WHEN AREA > 20%)	Ac = CUMULATIVE AREA (ha)		TOWNHOMES	2.7		
	0.324	l/ha/s		1.0	(WHEN AREA < 20%)	P = POPULATION (THOUSANDS)		SINGLE APT. UNIT	1.4		
LIGHT INDUSTRIAL FLOW =	35,000	l/ha/day						2-BED APT. UNIT	2.1		
	0.405	l/ha/s	RESIDENTIAL CORRECTION FACTOR, K =	0.80		SEWER CAPACITY, Qcap (l/s) =	1/N S^(1/2) R^(2/3) Ac	3-BED APT. UNIT	3.1		
HEAVY INDUSTRIAL FLOW =	55,000	l/ha/day	MANNING N =	0.013		(MANNING'S EQUATION)					
	0.637	l/ha/s	PEAK EXTRANEOUS FLOW, I (l/s/ha) =	0.33							

DESIGNED:	NO.	REVISION	DATE
Ding Bang Yang, P.Eng.	1.	City Submission No.1	10/05/2019
CHECKED:	2.	City Submission No.2	23/07/2019
Jim Johnston, P.Eng.			
PROJECT:			
RIVERSIDE PARK NURSERY SCHOOL			
2826 SPRINGLAND DRIVE			
LOCATION:			
Ottawa, Ontario			
PAGE NO:	**FILE & DWG. REFERENCE:**		
1 of 1	Figure 2		





wsp

300-2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 1-613-829-2800 | FAX: 1-613-829-8299 | WWW.WSPGROUP.COM

PROJECT:
RIVERSIDE PARK
NURSERY SCHOOL

ADDRESS:
2826 SPRINGLAND DRIVE
OTTAWA, ONTARIO

PROJECT NO.:
191-03236-00

DRAWING NAME:
OFFSITE SANITARY SEWERS
AND DRAINAGE AREA PLAN

DATE:
MAY 01, 2019

REVIEWED BY:
J.J

SCALE:
AS SHOWN

LEGEND

I.D.
AREA POP

I.D. DENOTES SANITARY DRAINAGE AREA ID
AREA DENOTES DRAINAGE AREA IN HECTARES
POP DENOTES TOTAL POPULATION

SANITARY DRAINAGE BOUNDARY

DESIGNED BY:
D.Y.

DRAWN BY:
D.Y.

SHEET:
Fig. 2

APPENDIX

D

- STORM SEWER DESIGN SHEET
- POST DEVELOPMENT STORMWATER AREA PLAN FIGURE 3
- GRADING AND SEDIMENT AND EROSION CONTROL PLAN C1
- SERVICING PLAN C2
- STORMWATER MANAGEMENT CALCULATIONS
- STORMTECH DETENTION CHAMBERS MC-3500 DESIGN SHEET
- HYDRO FIRST DEFENSE HC OGS DESIGN SHEET
- HYDROVEX ICD FLOW CURVES
- HYDRAULIC ANALYSIS OF UNDERGROUND STORAGE

STORM SEWER DESIGN SHEET

Riverside Park Nursery School
2826 Springland Drive, Ottawa, ON
Project: 191-03236-00
Date: July, 2019

LOCATION				AREA (Ha)						RATIONAL DESIGN FLOW												PROPSOED SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.25	C= 0.35	C= 0.50	C= 0.60	C= 0.75	C= 0.90	IND 2.78AC	CUM 2.78 AC	INLET (min)	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	BLDG FLOW (L/s)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	MATERIAL PIPE	SIZE (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME IN PIPE	AVAIL CAP (L/s)	AVAIL CAP (%)
												30.00																			
Springland Drive	EXT S1, EXT S2, EXT S3, S3a, S3b	CB3	STM MH2 - STM MH3	0.104					0.021	0.125	0.125	30.00	30.16	40.04	53.93	91.87		5.00				5.00	PVC DR-35	200.0	1.10	10.30	34.43	1.09	0.16	29.44	85.48%
												20.00																			
Springland Drive	S1, S2	CB1	CBMH1	0.032					0.030	0.097	0.222	30.16	30.30	39.90	53.74	91.54		8.86				8.86	PVC DR-35	200.0	1.00	9.10	32.83	1.04	0.15	23.97	73.00%
Flow from the Building Roof																														
Springland Drive	RD1	BLDG	CBMH1						0.041	0.103	0.103	10.00	10.07	76.81	104.19	178.56		7.88				7.88	PVC DR-35	200.0	1.00	4.30	32.83	1.04	0.07	24.95	76.00%
Springland Drive		CBMH1	STORMWATER CHAMBERS							0.000	0.325	30.30	30.42	39.77	53.56	91.24		12.92				12.92	PVC DR-35	200.0	0.60	5.50	25.43	0.81	0.11	12.52	49.22%
Springland Drive		STORMWATER CHAMBERS	CBMH2							0.000	0.325	30.42	30.51	39.67	53.43	91.01		12.88				12.88	PVC DR-35	200.0	0.60	4.60	25.43	0.81	0.09	12.55	49.34%
Springland Drive	S4	CB2	CBMH2	0.009					0.048	0.126	0.126	10.00	10.06	76.81	104.19	178.56		9.70				9.70	PVC DR-35	200.0	1.00	3.60	32.83	1.04	0.06	23.13	70.44%
Springland Drive		CBMH2	STM MH3							0.000	0.576	30.51	30.54	39.59	53.31	90.81		22.80				22.80	PVC DR-35	200.0	2.10	3.00	47.58	1.51	0.03	24.78	52.08%
Springland Drive		STM MH3	*EXISTING STORM SEWER*							0.000	0.576	30.54	30.63	39.56	53.28	90.75		22.78				22.78	PVC DR-35	200.0	2.10	8.00	47.58	1.51	0.09	24.79	52.11%

Definition:
Q=2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall Intensity in millimeters per hour (mm/hr)
i = 732.951/(TC+6.199)^0.810 — 2 Year
i = 1174.184/(TC+6.014)^0.816 — 5 Year
i = 1735.688/(TC+6.014)^0.820 — 100 Year

Notes:
1. Mannings coefficient (n) = 0.013

2 .Building flow for the office building is calculated at 42 l/s/ha

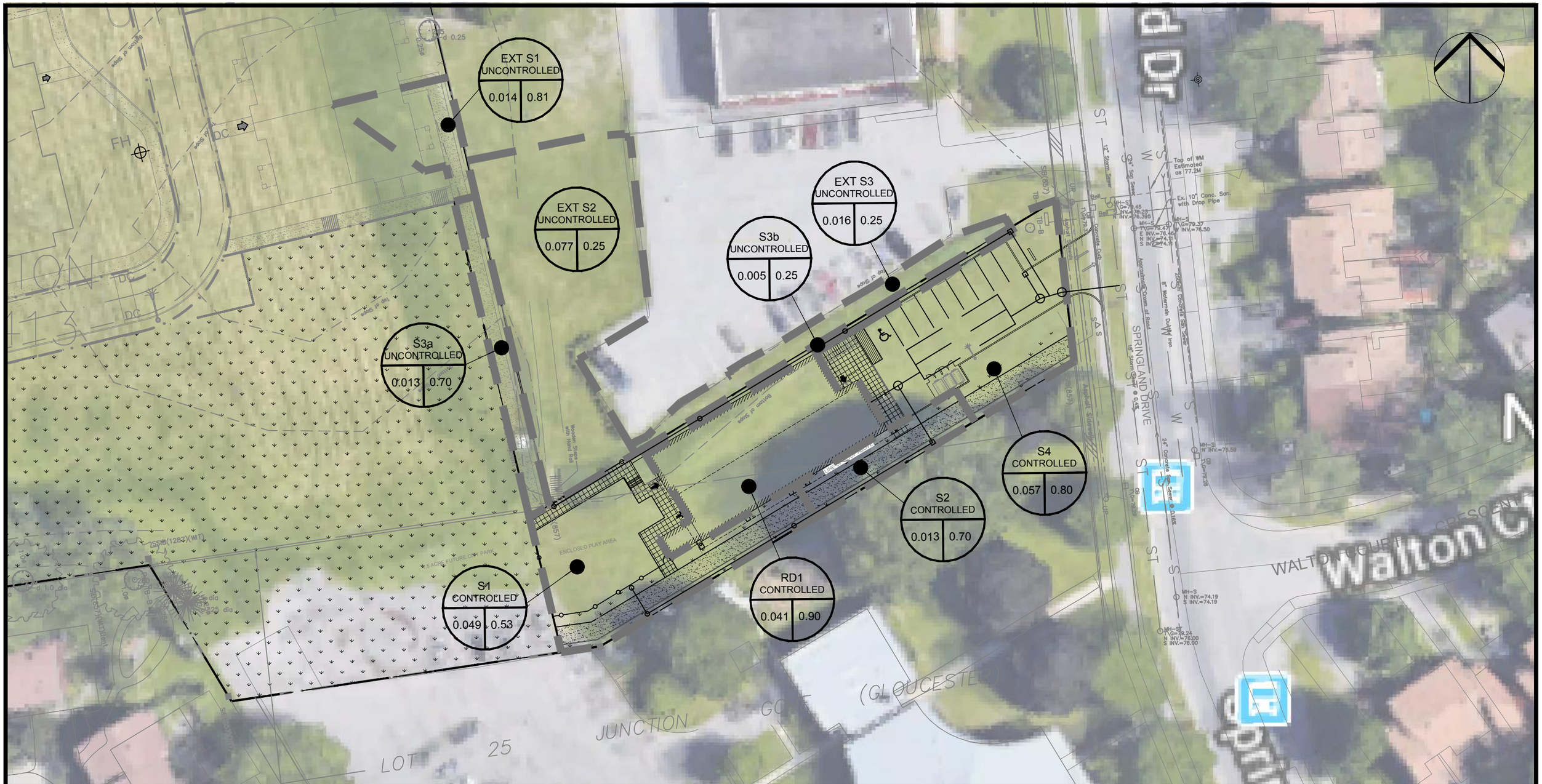
Time-of-Concentration in the Swale
FAA Equation: t (min) = 3.258 [(1.1 - C) L^0.5 / S^.33]
Where: Longest Watercourse Length, L (m). S (%)
Runoff Coef.C = 0.25 Impervious

No.	L (m)	S %
1	60.42	0.50
2	45.35	0.50

Designed: W.Y.
Checked: W.Y./J.J.
Dwg. Reference: Figure 3

No.	Revision	Date
1.	City Submission No. 1	10/05/2019
2.	City Submission No. 2	31/07/2019

File Reference:	Date:	Sheet No:
191-03236-00	31/07/2019	1 of 1



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PROJECT:
RIVERSIDE PARK
NURSERY SCHOOL

ADDRESS:
2826 SPRINGLAND DRIVE
OTTAWA, ONTARIO

PROJECT NO.: 191-03236-00

DRAWING NAME:
POST DEVELOPMENT STORM
DRAINAGE AREA PLAN

DATE: APRIL 22, 2019

REVIEWED BY: J.J

SCALE: 1 : 500

LEGEND

I.D. CONTROLLED | Ha | C

I.D. DENOTES SANITARY DRAINAGE AREA ID
Ha DENOTES DRAINAGE AREA IN HECTARES
C DENOTES RUNOFF COEFFICIENT

STORM DRAINAGE BOUNDARY

DESIGNED BY: D.Y.

DRAWN BY: D.Y.

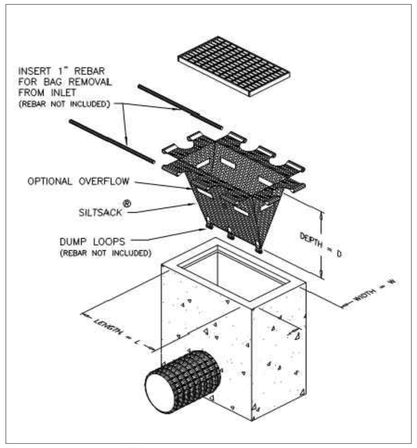
SHEET: Fig. 3

1 / C1 GRADING PLAN
SCALE= 1:200

0 5m 10m 15m 20m
SCALE: 1:200

LEGEND

- EXISTING GRADE ELEVATION
- EXISTING STORM CATCHBASIN
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED GRADE ELEVATION
- PROPOSED TOP & BOTTOM OF CURB
- PROPOSED TOP OF GRATE
- PROPOSED TOP OF WALL
- PROPOSED SWALE ELEVATION
- PROPOSED GRADE SLOPE
- PROPOSED 3H:1V TERRACE SLOPE
- PROPOSED WATER SERVICE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED STORM SUBDRAIN
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN
- PROPOSED LANDSCAPE CATCHBASIN
- PROPOSED SANITARY MANHOLE
- PROPOSED VALVE AND BOX
- PROPOSED REDUCER
- PROPOSED FIRE HYDRANT
- PROPOSED FIRE DEPARTMENT CONNECTION
- REMOTE WATER METER READER
- WATER METER LOCATION



2 / C1 SILTSACK DETAIL
SCALE= N/A

PAVEMENT DESIGN

(REFER TO GEOTECHNICAL REPORT:PG-4883-1
PROVIDED BY PATERSON GROUP
DATED APRIL 30, 2019 FOR SITE PAVEMENT DESIGN RECOMMENDATIONS.)

Table No. III: Recommended Pavement Structure Thicknesses for Running Tracks, Playground, Light & Heavy Duty Pavement

Pavement Layer	Compaction Requirements	Asphalt Paths (Including MUP)	Car Only Parking Areas	Access Lane and Heavy Truck Parking Areas
Asphaltic Concrete (PG 58-34)	92-96% MRD	50mm HL3 FINE	50mm SC	40mm SC 50mm BC
Stone Dust	100% SPMDD	-	-	-
OPSS 1010 Granular 'A' Base (crushed limestone)	100% SPMDD*	150mm	150mm	150mm
OPSS 1010 Granular 'B' II Sub-Base	100% SPMDD**	300mm	300mm	450mm
Subgrade	Engineered Fill/approved Fill as per specifications or Native Subgrade Material			

Notes:
*SPMDD denotes standard Proctor maximum dry density, ASTM, D-698.
MRD denotes Maximum Relative Density, ASTM D2041.
The upper 300mm of the subgrade fill must be compacted to 98% SPMDD.
SC Denotes Surface course asphalt and may comprise of Marshall HL3 Mix or SP 12.5mm (Cat C) Superpave Mix.
BC Denotes Base course asphalt and may comprise of Marshall HL8 Mix or SP 19mm (Cat C) Superpave Mix.

BEST MANAGEMENT PRACTICES

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATER COURSE DURING CONSTRUCTION ACTIVITIES.

THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

EROSION AND SEDIMENTATION SHOULD BE CONTROLLED BY THE FOLLOWING TECHNIQUES:

INSTALL SILTSACK FILTER SOCKS FROM TERRAFIX, OR APPROVED ALTERNATIVE, BETWEEN FRAME AND COVER ON ALL PROPOSED CATCH BASINS AND CATCH BASIN MANHOLES AND ON ALL EXISTING CATCH BASINS THAT WILL RECEIVE RUN-OFF FROM THE WORK SITE. PROVIDE SILT FENCE AS PER OPSD 219.110 ALONG SOUTH PROPERTY LINE AND ALONG SOUTH HALF OF EAST PROPERTY LINE. MINIMIZE DURATION OF EXPOSED SOILS.

MAINTAIN ALL SEC MEASURES THROUGHOUT THE CONSTRUCTION PERIOD AND REMOVE UPON ESTABLISHMENT OF GRASS AND COMPLETION OF CONSTRUCTION.

FOR TRENCH DEWATERING, DIRECT PUMP DISCHARGE TO A FILTER TRAP CONSTRUCTED OF GEOTEXTILES AND STRAW BALES SIMILAR TO OPSD 219.240 - DEWATERING TRAP. FILTER GROUNDWATER COLLECTED PRIOR TO DISCHARGE FROM SITE.

MINIMIZE AREA OF DISTURBED SOIL BY STAGING CLEARING AND GRUBBING WORK. PREVENT RUNOFF FROM FLOWING ACROSS DISTURBED AREAS. PLACE REQUIRED FILL MATERIALS AND PERMANENT SURFACE FINISH AS SOON AS POSSIBLE FOLLOWING SITE CLEARING. ENSURE ALL DISTURBED AREAS ARE STABILIZED. PROVIDE TEMPORARY SEEDING, MULCHING OR COVER OF DISTURBED AREAS AND TOPSOIL STOCK PILES IF SUCH LOCATIONS ARE TO REMAIN UNSTABILIZED FOR PERIODS EXCEEDING TWO MONTHS.

GENERAL NOTES:

1. ALL WORK TO BE COORDINATED WITH OTHER PLANS FOR THIS SITE. REFER TO M AND E DRAWINGS FOR GAS, ELECTRICAL, PLUMBING AND COMMUNICATION SERVICES. ARCHITECTURAL SITE PLAN TO BE USED FOR SITE LAYOUT AND PHASING. ARCHITECTURAL DRAWINGS AND SPECIFICATIONS PROVIDE THE LOCATIONS FOR THE SURFACE FINISHES. REFER TO LANDSCAPE DRAWINGS FOR PLANTING PLANS AND CONCRETE PAVERS REQUIREMENTS.
2. VERIFY THAT JOB BENCHMARKS HAVE NOT BEEN ALTERED OR DISTURBED AND THAT THEIR RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THE DRAWINGS. REFER TO SURVEY PLAN FOR EXISTING CONDITIONS.
3. LOCATION OF SERVICES, CHAMBERS, UTILITIES AND ALL UNDERGROUND WORKS ARE APPROXIMATE. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF ALL SERVICES, UTILITIES, AND UNDERGROUND STRUCTURES PRIOR TO ANY CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND REINSTATEMENT.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVALS NECESSARY TO SATISFY ENGINEERING WORKS.
5. CONFORM TO RECOMMENDATIONS OF GEOTECHNICAL REPORT, INCLUDING REQUIREMENTS FOR DEWATERING SYSTEMS. PROVIDE ENGINEERING SHOP DRAWINGS FOR REVIEW AND APPROVAL BY THE OWNER'S GEOTECHNICAL ENGINEER FOR DEWATERING SYSTEMS. OBTAIN A PERMIT TO TAKE WATER FROM THE ONTARIO MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS IF THE QUANTITY OF GROUND AND SURFACE WATER TO BE PUMPED WILL EXCEED 400,000 LITRES PER DAY.
6. CONTRACTOR RESPONSIBLE FOR OBTAINING ROAD CUT PERMIT, AND PROVIDING ALL ASSOCIATED TRAFFIC CONTROL. CONTRACTOR TO RECORD VERTICAL AND HORIZONTAL LOCATION OF ALL UNDERGROUND WORKS FOR RECORD DRAWINGS.
7. CONTRACTOR TO PROVIDE POST CONSTRUCTION TOPOGRAPHIC SURVEY COMPLETED BY OLS OR PROFESSIONAL ENGINEER CONFIRMING COMPLIANCE WITH GRADING AND SERVICING DESIGN

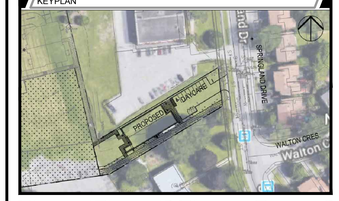
wsp
300-2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 1-613-829-2800 | FAX: 1-613-829-8299 | WWW.WSPGROUP.COM
PROJECT No.: 191-03236-00

CLIENT

DEVELOPER:
CANOE BAY DEVELOPMENT INC.
51 CORTLEIGH DRIVE, OTTAWA,
ONTARIO K2J 3Z8
613-447-0208

OWNER:
ANDREW FLECK CHILD SERVICES

KEYPLAN



NORTH / NORD

SEAL / SCEAU
REGISTERED PROFESSIONAL ENGINEER
J. C. JOHNSTON
2019-07-31
PROVINCE OF ONTARIO

No.		
8		
7		
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4	REVISED PER SITE PLAN CHANGES	2019-07-31
3	REVISED PER SITE PLAN CHANGES	2019-07-26
2	REVISED PER CITY COMMENTS	2019-07-23
1	ISSUED FOR SITE PLAN APPLICATION	2019-05-10
No.	↑ ISSUE NOTES ↑	DATE
No.	↓ REVISION NOTES ↓	DATE
1	??	??
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PROJECT NAME / NOM DU PROJET

RIVERSIDE PARK
EARLY LEARNING CENTRE
2826 SPRINGLAND DRIVE
OTTAWA, ONTARIO

DRAWING TITLE / TITRE DU DESSIN

GRADING PLAN
SEDIMENT AND EROSION CONTROL

INFORMATION	
Designed by:	JJ
Drawn by:	BN
Reviewed by:	JJ
Approved by:	JJ
Scale:	AS SHOWN
Date:	2019-03-22
Project No.:	191-03236-00
Client Plan#:	N/A

SHEET No. / No. PAGE
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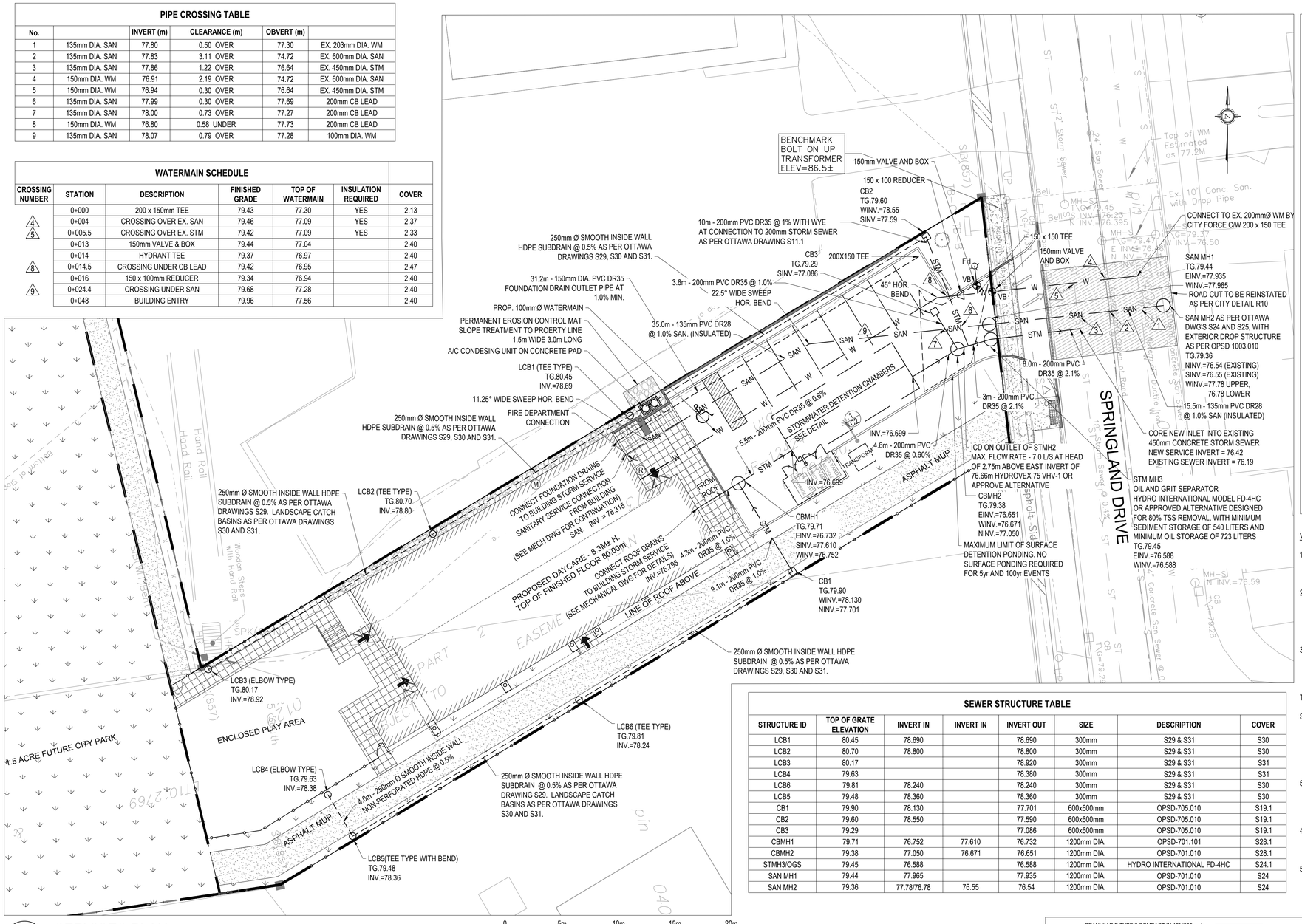
PLOTDATE: Jul 31, 2019 - 1:29pm - COOPERJ

PIPE CROSSING TABLE

No.		INVERT (m)	CLEARANCE (m)	OBVERT (m)	
1	135mm DIA. SAN	77.80	0.50 OVER	77.30	EX. 203mm DIA. WM
2	135mm DIA. SAN	77.83	3.11 OVER	74.72	EX. 600mm DIA. SAN
3	135mm DIA. SAN	77.86	1.22 OVER	76.64	EX. 450mm DIA. STM
4	150mm DIA. WM	76.91	2.19 OVER	74.72	EX. 600mm DIA. SAN
5	150mm DIA. WM	76.94	0.30 OVER	76.64	EX. 450mm DIA. STM
6	135mm DIA. SAN	77.99	0.30 OVER	77.69	200mm CB LEAD
7	135mm DIA. SAN	78.00	0.73 OVER	77.27	200mm CB LEAD
8	150mm DIA. WM	76.80	0.58 UNDER	77.73	200mm CB LEAD
9	135mm DIA. SAN	78.07	0.79 OVER	77.28	100mm DIA. WM

WATERMAIN SCHEDULE

CROSSING NUMBER	STATION	DESCRIPTION	FINISHED GRADE	TOP OF WATERMAIN	INSULATION REQUIRED	COVER
4, 5	0+000	200 x 150mm TEE	79.43	77.30	YES	2.13
	0+004	CROSSING OVER EX. SAN	79.46	77.09	YES	2.37
	0+005.5	CROSSING OVER EX. STM	79.42	77.09	YES	2.33
	0+013	150mm VALVE & BOX	79.44	77.04		2.40
	0+014	HYDRANT TEE	79.37	76.97		2.40
8	0+014.5	CROSSING UNDER CB LEAD	79.42	76.95		2.47
	0+016	150 x 100mm REDUCER	79.34	76.94		2.40
9	0+024.4	CROSSING UNDER SAN	79.68	77.28		2.40
	0+048	BUILDING ENTRY	79.96	77.56		2.40



SERVICES PLAN

1 / C2

SCALE= 1:200

0 5m 10m 15m 20m

SCALE: 1:200

SEWER STRUCTURE TABLE

STRUCTURE ID	TOP OF GRATE ELEVATION	INVERT IN	INVERT IN	INVERT OUT	SIZE	DESCRIPTION	COVER
LCB1	80.45	78.690		78.690	300mm	S29 & S31	S30
LCB2	80.70	78.800		78.800	300mm	S29 & S31	S30
LCB3	80.17			78.920	300mm	S29 & S31	S31
LCB4	79.63			78.380	300mm	S29 & S31	S31
LCB6	79.81	78.240		78.240	300mm	S29 & S31	S30
LCB5	79.48	78.360		78.360	300mm	S29 & S31	S30
CB1	79.90	78.130		77.701	600x600mm	OPSD-705.010	S19.1
CB2	79.60	78.550		77.590	600x600mm	OPSD-705.010	S19.1
CB3	79.29			77.086	600x600mm	OPSD-705.010	S19.1
CBMH1	79.71	76.752	77.610	76.732	1200mm DIA.	OPSD-701.101	S28.1
CBMH2	79.38	77.050	76.671	76.651	1200mm DIA.	OPSD-701.010	S28.1
STMH3/OGS	79.45	76.588		76.588	1200mm DIA.	HYDRO INTERNATIONAL FD-4HC	S24.1
SAN MH1	79.44	77.965		77.935	1200mm DIA.	OPSD-701.010	S24
SAN MH2	79.36	77.78/76.78	76.55	76.54	1200mm DIA.	OPSD-701.010	S24

LEGEND

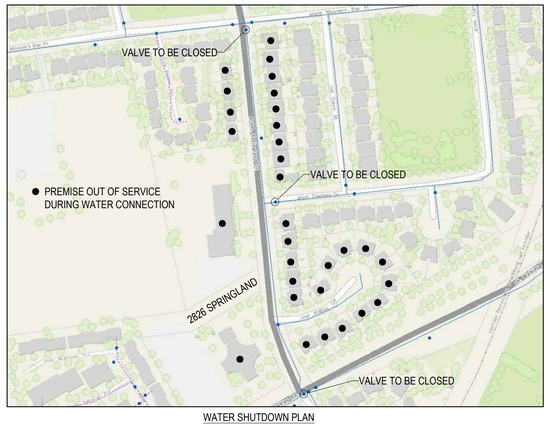
- EXISTING GRADE ELEVATION (+ 79.81)
- EXISTING STORM CATCHBASIN (CB)
- EXISTING STORM MANHOLE (MH–ST)
- EXISTING SANITARY MANHOLE (MH–S)
- EXISTING STORM SEWER (ST)
- EXISTING SANITARY SEWER (S)
- EXISTING WATERMAIN (W)
- PROPOSED GRADE ELEVATION (81.43)
- PROPOSED TOP & BOTTOM OF CURB (79.98TC / 79.91)
- PROPOSED TOP OF GRATE (TG80.42)
- PROPOSED TOP OF WALL (80.50TW)
- PROPOSED SWALE ELEVATION (80.55(S))
- PROPOSED GRADE SLOPE (3%)
- PROPOSED 3H:1V TERRACE SLOPE
- PROPOSED WATER SERVICE (W)
- PROPOSED SANITARY SEWER (SAN)
- PROPOSED STORM SEWER (STM)
- PROPOSED STORM SUBDRAIN
- PROPOSED STORM MANHOLE (STM MH1)
- PROPOSED STORM CATCHBASIN (CB1)
- PROPOSED LANDSCAPE CATCHBASIN (LCB1)
- PROPOSED SANITARY MANHOLE (SAN MH1)
- PROPOSED VALVE AND BOX (VB)
- PROPOSED REDUCER
- PROPOSED FIRE HYDRANT (FH)
- PROPOSED FIRE DEPARTMENT CONNECTION
- REMOTE WATER METER READER (R)
- WATER METER LOCATION (M)

WATER NOTES

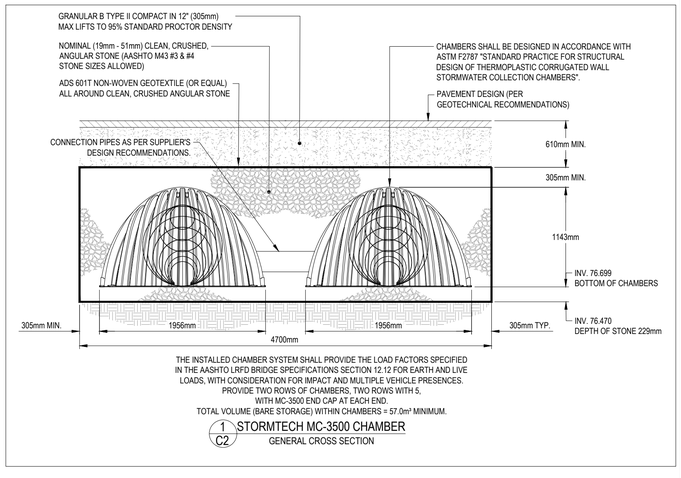
1. ALL WATER SERVICE AND VALVE MATERIALS TO CONFORM WITH CITY OF OTTAWA STANDARDS. SITE WATER SERVICE AND MAIN TO BE PVC DR18.
2. OBTAIN AND PAY FOR WATER PERMIT FROM CITY OF OTTAWA. HYDROSTATIC AND BACTERIOLOGICAL TESTING REQUIRED AS PER OTTAWA STANDARDS. ALL MATERIALS, EXCAVATION, BACKFILL, LABOUR AND REINSTATEMENT BY CONTRACTOR. CITY PROVIDED SERVICES WILL BE PAID UNDER THE WATER PERMIT.
3. COMPLY WITH THE FOLLOWING OTTAWA STANDARD DRAWINGS:
   W17 STANDARD TRENCH DETAIL
   W18 HYDRANT LOCATION
   W19 HYDRANT INSTALLATION
   W22 THERMAL INSULATION FOR WATERMAINS IN SHALLOW TRENCHES.
   W23 THERMAL INSULATION OF WATERMAINS AT OPEN STRUCTURES - APPLICABLE AT CB3.
   W24 VALVE BOX ASSEMBLY
   W25-3 CONCRETE THRUST BLOCKS
   W25-4 THRUST BLOCK DIMENSION TABLES
   W25-5 RESTRAINING AND RETAINING RINGS
   W25-6 TABLES OF RESTRAINED LENGTHS
   W25 WATERMAIN CROSSING BELOW SEWER - MIN. CLEARANCE 500mm
   W36 TRACER WIRE INSTALLATION
   W40 CATHODIC PROTECTION
   W42 TYPICAL ANODE INSTALLATION
4. PROVIDE MINIMUM 2.4m COVER. IF NOT ACHIEVABLE, PROVIDE THERMAL INSULATION TO THE SATISFACTION OF THE CITY, AND IN ACCORDANCE WITH OTTAWA DRAWINGS W22 AND W23.
5. PROVIDE FLOW TESTING FOR NEW FIRE HYDRANT AND PAINT HYDRANT BASED ON FLOW RATING IN ACCORDANCE WITH CITY OF OTTAWA REQUIREMENTS FOR PRIVATE HYDRANTS.

SEWER NOTES

1. CONSTRUCT SEWERS AND APPURTENANCES AS PER OTTAWA AND MINISTRY OF THE ENVIRONMENT STANDARDS. CONFIRM EXISTING TIE IN ELEVATIONS PRIOR TO CONSTRUCTION. SEWER TRENCH SHALL INCLUDE CLASS 'B' BEDDING AS PER OTTAWA S6 AND S7. COMPACTION TO BE A MINIMUM OF 95% SPMDD FOR PIPE AND DRAINAGE STRUCTURE BEDDING AND BACKFILL.
2. PVC STORM SEWERS AND CATCH BASIN LEADS TO BE PVC DR 35 CERTIFIED TO CAN/CSA-B182.2. PVC SANITARY SERVICE TO BE DR28 TO CAN/CSA B182.2.
3. PROVIDE FLEXIBLE BOOT CONNECTION FOR ALL PVC SEWER CONNECTIONS AT MANHOLES. PROVIDE RUBBER CONNECTORS IN ACCORDANCE WITH CSA A257.3-09 FOR CONCRETE PIPE CONNECTORS TO MANHOLES.
4. CATCHBASIN SUMP TO BE 600mm.
5. SEWERS AND SERVICES SHALL BE CONSTRUCTED WITH A MINIMUM CLEARANCE OF 2.0m FROM TREES.
6. STORM MANHOLES TO HAVE 300mm MINIMUM SUMP BELOW LOW INVERT. SANITARY MANHOLES TO BE BENCHED AS PER OPSD 701.021.
7. PROVIDE CAMERA INSPECTION OF ALL SEWERS FOLLOWING COMPLETION OF CONSTRUCTION AND PROVIDE TO ENGINEER. MAINTAIN SEWERS IN CLEAN CONDITION UNTIL OWNER ACCEPTANCE.
8. TEMPORARY FLOW CONTROLS TO BE PLACED ON SEWER OUTLETS AS PER OTTAWA TECHNICAL BULLETIN ISD 2010-1. INLET CONTROL DEVICE PLACEMENT TO BE CERTIFIED BY QUALITY VERIFICATION ENGINEER RETAINED BY CONTRACTOR.
9. PROVIDE 50mm THICK HIGH DENSITY GRADE A POLYSTYRENE INSULATION ACROSS WIDTH OF TRENCH (MINIMUM 1220mm) AT 150mm ABOVE SANITARY SEWER.
10. PERFORM LEAKAGE TESTING OF SANITARY SEWERS IN ACCORDANCE WITH OPSS 410.07.01.15 AND 407.07.25. TESTING SHALL BE OBSERVED BY AN ONTARIO REGISTERED PROFESSIONAL ENGINEER, RETAINED BY THE CONTRACTOR, WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.



WATER SHUTDOWN PLAN
NTS



THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
PROVIDE TWO ROWS OF CHAMBERS, TWO ROWS WITH 5, WITH MC-3500 END CAP AT EACH END.
TOTAL VOLUME (BARE STORAGE) WITHIN CHAMBERS = 57.0m³ MINIMUM.

1 / C2 STORMTECH MC-3500 CHAMBER
GENERAL CROSS SECTION

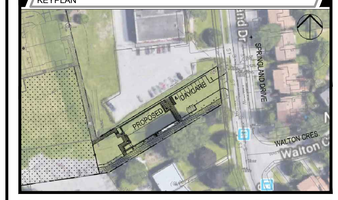
wsp
300-2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 1-613-829-2800 | FAX: 1-613-829-8299 | WWW.WSPGROUP.COM

CLIENT

DEVELOPER:
CANOE BAY DEVELOPMENT INC.
51 CORTLEIGH DRIVE, OTTAWA,
ONTARIO K2J 3Z8
613-447-0208

OWNER:
ANDREW FLECK CHILD SERVICES

KEYPLAN



NORTH / NORD

SEAL / SCEAU

REGISTERED PROFESSIONAL ENGINEER
J. C. JOHNSTON
2019-07-31
PROVINCE OF ONTARIO

No.	ISSUE NOTES	DATE
8		
7		
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5		
4	REVISED PER SITE PLAN CHANGES	2019-07-31
3	REVISED PER SITE PLAN CHANGES	2019-07-26
2	REVISED PER CITY COMMENTS	2019-07-23
1	ISSUED FOR SITE PLAN APPLICATION	2019-05-10

No.	REVISION NOTES	DATE
1		
2		
3		
4		
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PROJECT NAME / NOM DU PROJET

RIVERSIDE PARK
EARLY LEARNING CENTRE
2826 SPRINGLAND DRIVE
OTTAWA, ONTARIO

DRAWING TITLE / TITRE DU DESSIN

CIVIL SERVICES PLAN

INFORMATION	
Designed by:	JJ
Drawn by:	BN
Reviewed by:	JJ
Approved by:	JJ
Scale:	AS SHOWN
Date:	2019-03-22
Project No.:	191-03236-00
Client Plan#:	N/A

SHEET No. / No. PAGE

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FILENAME: P:\2019 Projects\191-03236-00_Riverside Park NS, Ottawa - New Daycare Center\Civil\3. Drawings\Working drawings\Sheets\191-03236-00_C.dwg
PLOTDATE: Jul 31, 2019 - 11:28am, cawy069741

Riverside Park Nursery School
2826 Springland Drive, Ottawa, ON
Project: 191-03236-00
Date: July, 2019

Stormwater Management Summary

Drainage Area I.D.	Location	Sub Area (ha)	Avg. Composite 'C' 5 yr	Avg. Composite 'C' 100 yr	Outlet Location	5 Year Uncontrolled/ Controlled Release (L/s)	5 year Storage Required (m^3)	100 Year Uncontrolled/ Controlled Release (L/s)	100 year Storage Required (m^3)	100 Year Storage Provided (m^3)
Total Allowable Release Rate								**12.89**		
UNCONTROLLED										
S3a and S3b	CB2	0.018	0.58	0.65	Springland Drive	3.00		5.80		
			Maximum Allowable Release Rate					**7.09**		
CONTROLLED										
S1, S2, S4 and RD1	CBMH2	0.160	0.73	0.82	Springland Drive	6.94	19.04	7.01	49.08	58.40
Total		0.178				9.94	19.04	12.81	49.08	58.40

Riverside Park Nursery School
2826 Springland Drive, Ottawa, ON
Project: 191-03236-00
Date: July, 2019

Table 1a - Allowable Release Rate (Pre-Development)

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.25)/A_{tot}$

5 Year Event

	C	Intensity	Area
5 Year	0.25	104.19	0.178
2.78CIA=	12.89		
	12.89	L/s	

*Use a 10.00 minute time of concentration for 5 year

Equations:

Flow Equation

Q = 2.78 x C x I x A

Where:

C is the runoff coefficient

I is the intensity of rainfall, City of Ottawa IDF

Rainfall Intensity = $998.071/(T+6.053)^{\wedge -0.814}$ T= time in minutes

A is the total drainage area

Riverside Park Nursery School
2826 Springland Drive, Ottawa, ON
Project: 191-03236-00
Date: July, 2019

TABLE 2a - Uncontrolled from S3a and S3b

Maximum Allowable Release Rate:
12.89 l/s

Post Dev run-off Coefficient "C"

			2 & 5 Year Event		100 Year Event	
Area	**Surface**	**Ha**	**"C"**	**C_{avg}**	**"C"+25%**	***C_{avg}**
Total	Asphalt	0.009	0.90	**0.58**	0.99	**0.65**
0.018	Roof		0.90		0.99	
	Grass	0.009	0.25		0.31	

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$
$*C = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{tot}$

*Runoff coefficients increased by 25% up to a maximum value of 0.99 for the 100-Year event

Post Dev Free Flow
5 Year Event

Pre Dev.	**C**	**Intensity**	**Area**
5 Year	0.58	104.19	0.02
2.78CIA=	3.02		
3.00	L/S		

**Use a 10 minute time of concentration for 5 year

100 Year Event

Pre Dev.	**C**	**Intensity**	**Area**
100 Year	0.65	178.56	0.02
2.78CIA=	5.81		
5.80	L/S		

**Use a 10 minute time of concentration for 100 year

Equations:

Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the intensity of rainfall, City of Ottawa IDF
A is the total drainage area

Riverside Park Nursery School
2826 Springland Drive, Ottawa, ON
Project: 191-03236-00
Date: July, 2019

TABLE 2b - Storage Required for S1, S2, S4 and RD1

Maximum Allowable Release Rate:
12.89 l/s

Post Dev run-off Coefficient "C"

			2 & 5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" x 1.25	$C_{100\ avg}$
Total	Asphalt	0.119	0.90	**0.73**	0.99	**0.82**
0.160	Roof		0.90		0.99	
	Grass	0.041	0.25		0.31	

*Areas are approximate based on Architectural site plan and Storm Draiange Area Plan

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$
$*C = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{tot}$

*Runoff coefficients increased by 25% up to a maximum value of 0.99 for the 100-Year event

QUANTITY STORAGE REQUIREMENTS - 5 Year

0.160 = Area(ha)
0.73 = C
12.9 l/s = max allowable release rate

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Runoff (L/s)	Net Runoff To Be Stored (L/s)	Storage Req'd m^3	Storage Avail m^3
	10	104.19	33.83	6.94	26.89	16.13	58.40
	20	**70.25**	**22.81**	**6.94**	**15.87**	**19.04**	**58.40**
	30	53.93	17.51	6.94	10.57	19.02	58.40
5 YEAR	40	44.18	14.35	6.94	7.40	17.77	58.40
	50	37.65	12.23	6.94	5.28	15.85	58.40
	60	32.94	10.70	6.94	3.75	13.52	58.40

Orifice #1 Sizing
Ex.CBMH101

Event	Flow (L/s)	Head (m)	ORIFICE AREA(m^2)	SQUARE (1-side mm)	CIRC (mmØ)
5 Year	6.94	2.70	0.002	40	45
100 Year	7.01	2.75	0.002	40	45

ICD TYPE WILL BE HYDROVEX 75VHV-1

Orifice Control Sizing
$Q = 0.6 \times A \times (2gh)1/2$
Where:
Q is the release rate in m^3/s
A is the orifice area in m^2
g is the acceleration due to gravity, $9.81 m/s^2$
h is the head of water above the orifice centre in m
d is the diameter of the orifice in m

QUANTITY STORAGE REQUIREMENTS - 100 Year

0.160 = Area(ha)
0.82 = *C
12.9 l/s = max allowable release rate

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Runoff (L/s)	Net Runoff To Be Stored (L/s)	Storage Req'd m^3	Storage Avail m^3
	10	178.56	65.13	7.01	58.12	34.87	58.40
	20	119.95	43.75	7.01	36.74	44.09	58.40
100 YEAR	30	91.87	33.51	7.01	26.50	47.70	58.40
	40	75.15	27.41	7.01	20.40	48.96	58.40
	45	**69.05**	**25.19**	**7.01**	**18.18**	**49.08**	**58.40**
	50	63.95	23.33	7.01	16.32	48.96	58.40
	55	59.62	21.75	7.01	14.74	48.64	58.40

Orifice Invert =	76.660	m
Ponding Elevation =	79.430	m
Top of CB Elevation =	79.380	m

Note: Orifice #1 is located on the downstream invert of CBMH2

Equations:

Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the intensity of rainfall, City of Ottawa IDF
A is the total drainage area

StormTech®
Detention • Retention • Recharge
Subsurface Stormwater Management℠

MC-3500 Site Calculator

Project Information:

Project Name: Riverside Park Nursery School
Location: 2826 Springland Drive, Ottawa, ON
Date: May 8, 2019
Engineer: Winston Yang
StormTech RPM:

System Requirements

Units		Metric	
Required Storage Volume		57	cubic meters
Stone Porosity (Industry Standard = 40%)		40	%
Stone Above Chambers	(305 mm min.)	305	mm
Stone Foundation Depth	(229 mm min.)	229	mm
Average Cover over Chambers	(610 mm min.)	610	mm
Bed size controlled by WIDTH or LENGTH?		LENGTH	
Limiting WIDTH or LENGTH dimension		12.5	meters
Storage Volume per Chamber		5.0	cubic meters
Storage Volume per End Cap		1.2	cubic meters

System Sizing

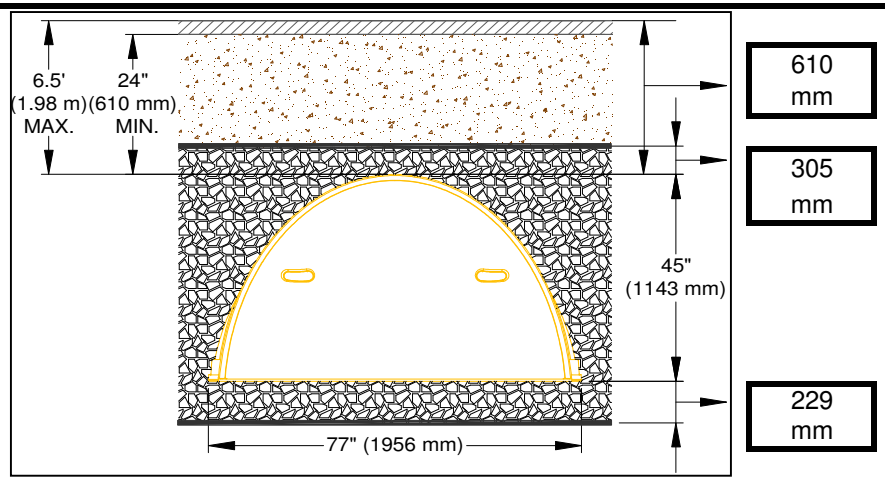
Number of Chambers Required	10	each
Number of End Caps Required	4	each
Bed Size (including perimeter stone)	58	square meters
Stone Required (including perimeter stone)	105	metric tonnes
Volume of Excavation	114	cubic meters
Non-woven Filter Fabric Required (20% Safety Factor)	206	square meters
Length of Isolator Row	12.3	meters
Non-woven Isolator Row Fabric (20% Safety Factor)	59	square meters
Woven Isolator Row Fabric (20% Safety Factor)	74	square meters
Installed Storage Volume	55	cubic meters

Controlled by Length

Maximum Length =	12.5	meters

2 rows of 5 chambers
0 row of 0 chambers

Maximum Length =	12.3	meters
Maximum Width =	4.7	meters



Hydro First Defense® - HC

Net Annual Water Quality Worksheet

Hydro International

Project Name:	**2826 Springfield Dr**	*Report Date:*	Paste
Street:		*City:*	**Ottawa**
Province:		*Country:*	
Designer:	**WSP**	*email:*	

Teatment Parameters:

Structure ID:	OGS	
TSS Goal:	80	% Removal
TSS Particle Size:	Fine	
Area:	0.247	ha
Percent Impervious:	52%	
Rational C value:	0.61	Calc. Cn
Rainfall Station:	Ottawa	
Peak Storm Flow:		L/s

RESULTS SUMMARY

Model	TSS	Volume
FD-3HC	92.1%	100.0%
FD-4HC	**92.7%**	**100.0%**
FD-6HC	93.1%	100.0%
FD-8HC	93.3%	100.0%

Model Specification:

Model:	**FD-4HC**	
Diameter:	1200	mm
No Bypass Flow:	20.00	L/s
Peak Flow Capacity:	510.00	L/s
Sediment Storage:	0.54	m^3
Oil Storage:	723.00	L/s

Installation Configuration:

Placement:	Online		
Outlet Pipe Size:	600	mm	*OK*
Inlet Pipe 1 Size:	600	mm	*OK*
Inlet Pipe 2 Size:	600	mm	*OK*
Inlet Pipe 3 Size:		mm	*OK*
Rim Level:	100.000	m	Calc Invs.
Outlet Pipe Invert:	97.400	m	*OK*
Invert Pipe 1:	97.400	m	*OK*
Invert Pipe 2:	97.400	m	*OK*
Invert Pipe 3:		m	

Designer Notes:

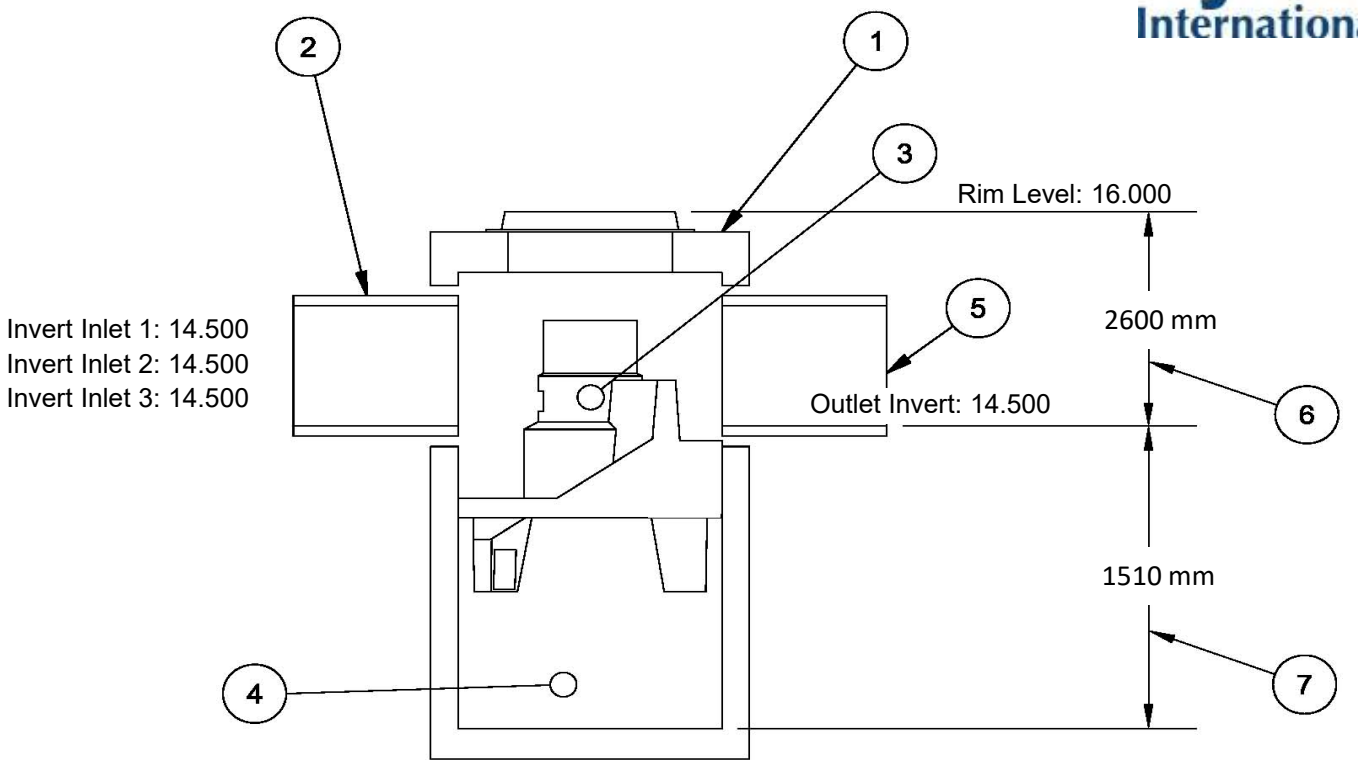
Net Annual Removal Model: FD-4HC

Intensity[1]	Fraction of Rainfall[1]	FD-4HC Removal Efficiency[2]	Weighted Net Annual Efficiency
(mm/hr)	(%)	(%)	(%)
0.50	9.3%	99.9%	9.3%
1.00	10.7%	99.8%	10.7%
1.50	10.3%	99.8%	10.3%
2.00	7.8%	99.7%	7.8%
3.00	16.4%	99.5%	16.3%
4.00	9.1%	99.4%	9.0%
5.00	7.8%	99.2%	7.8%
6.00	5.1%	99.0%	5.1%
7.00	3.0%	98.9%	3.0%
8.00	3.5%	98.7%	3.4%
9.00	2.3%	98.6%	2.3%
10.00	1.2%	98.4%	1.2%
11.00	1.5%	98.3%	1.4%
12.00	2.3%	98.1%	2.2%
15.00	3.5%	97.6%	3.4%
20.00	6.1%	96.8%	5.9%
25.00	0.0%	96.1%	0.0%
30.00	0.0%	95.3%	0.0%
100.00	0.0%	0.0%	0.0%

Net Annual Treatment:	99.2%
60 Minute Rainfall Adjustment Factor[3]:	-6.5%
Total Net Annual Removal Efficiency:	92.7%
Total Runoff Volume Treated:	**100.0%**

1. Based on 10 years of rainfall data from Canadian Station 6105976, Ottawa
2. Based on third party verified data and appoximating the removal of a PSD similar to the STC Fine distribution
3. Adjustment for use of 60 minute time step data with Tc < 30 min.

Hydro First Defense® - HC



All drawing elevations are metres.

FD-4HC Specification

1	Vortex Chamber Diameter	1200	mm
2	Inlet Pipe Diameter	600	mm
3	Oil Storage Capacity	723.00	L
4	Min. Provided Sediment Storage Capacity	0.54	m^3
5	Outlet Pipe Diameter	600	mm
6	Height(Final Grade to Outlet Invert)	2600	mm

Notes:

7	Sump Depth(Outlet Invert to Sump)	1800	mm
	Total Depth	**4400**	**mm**

HYDROVEX®

VHV Vertical Vortex Flow Regulator

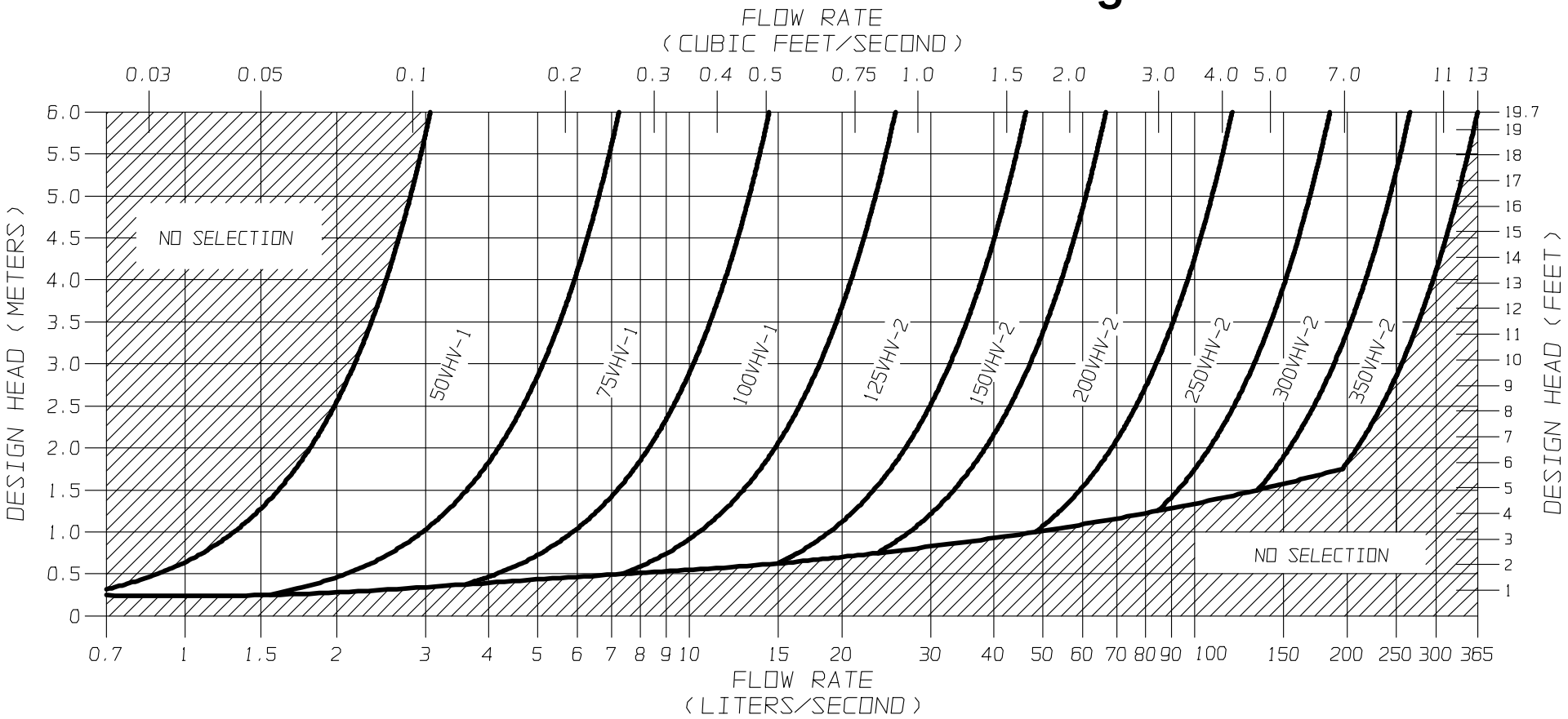


FIGURE 2 - VHV

JOHN MEUNIER

HYDROVEX®

SVHV Vertical Vortex Flow Regulator

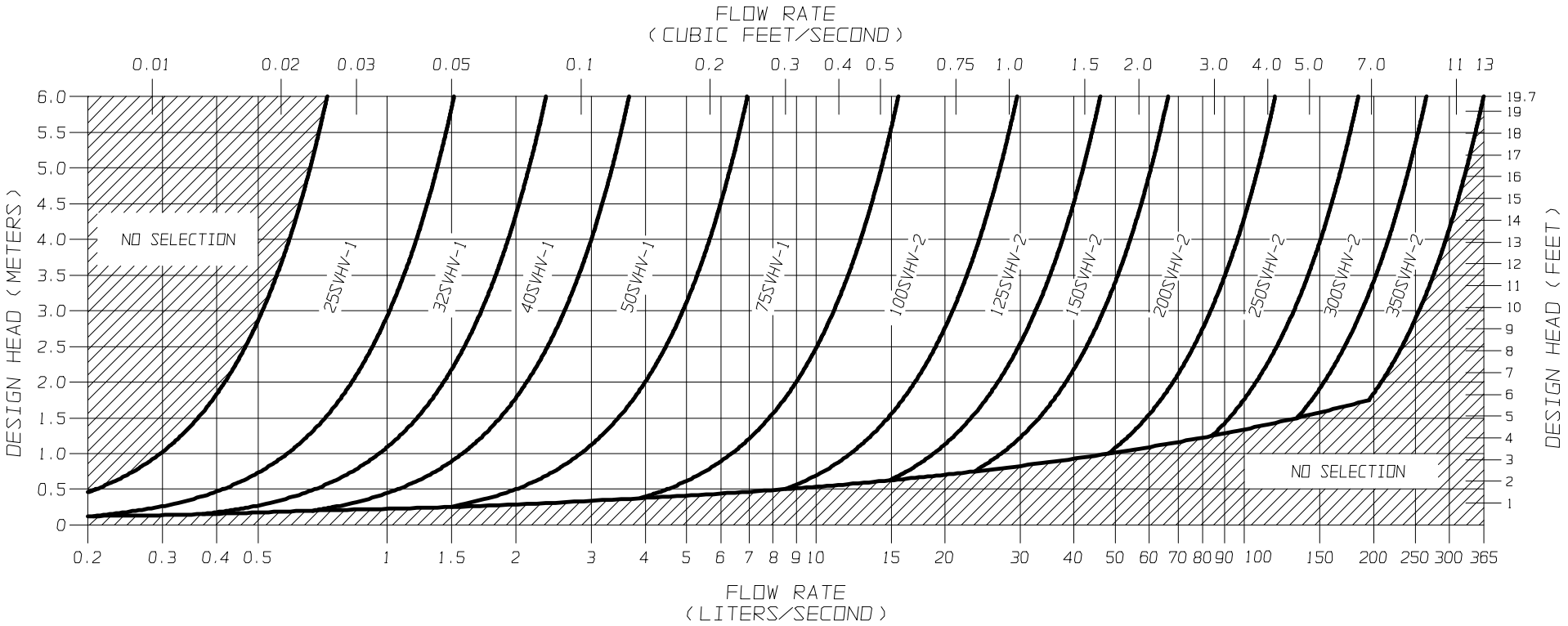


FIGURE 2 - SVHV

JOHN MEUNIER

MEMO

TO: Jim Johnston, Winston Yang

FROM: Ben Worth

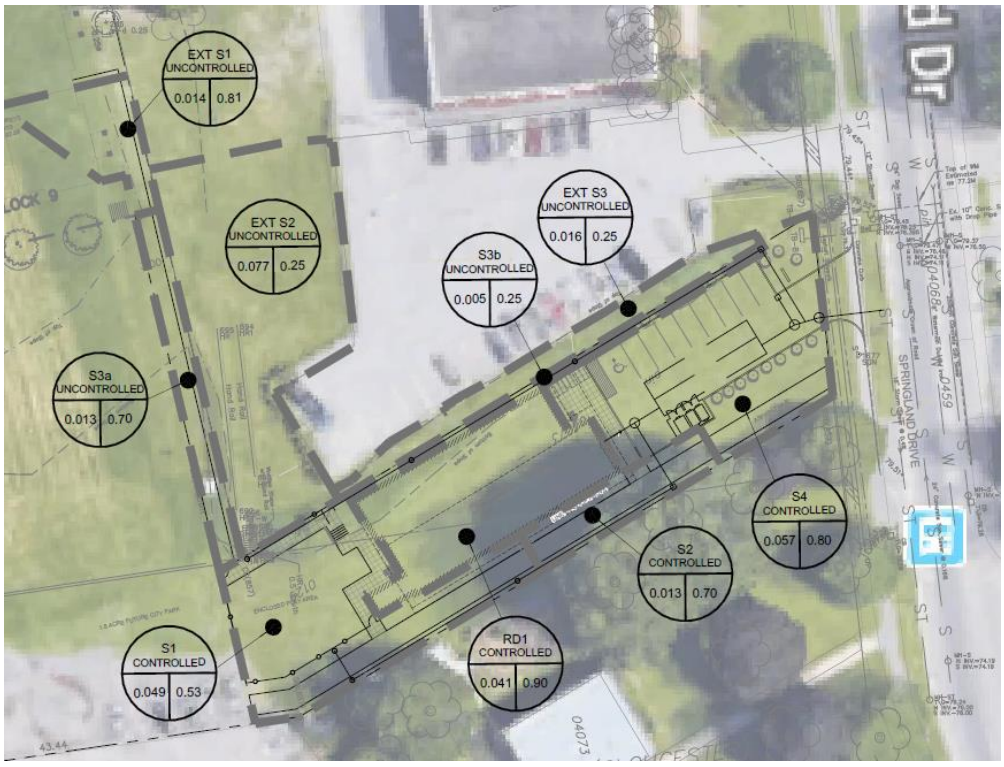
SUBJECT: **Riverside Park Nursery School – Stormwater Management**

DATE: **May 8, 2019**

This memo details modelling and analysis undertaken to support the design of proposed stormwater management (SWM) facilities for the planned redevelopment of the Riverside Park Nursery School site, at 2826 Springland Drive, Ottawa, Ontario. It should be read in conjunction with Servicing Report for the project.

OVERVIEW

The proposed works include a new building, enclosed play area, parking facilities, and associated hard/soft landscaping. An excerpt from the Servicing Report Figure 3 is provided below to illustrate post-development conditions.



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F: +1 613 829-8299
wsp.com

The total site area covered by this application is 0.178 hectares, with the following area breakdown.

CATCHMENT REF.		AREA MEASUREMENT (HA)		
CONTROLLED	**S1**	0.049		
	S2	0.013		
	S4	0.057		
	RD1	0.041		
	Sub-Total		**0.160**	
UNCONTROLLED	**S3a**	0.013		
	S3b	0.005		
	Sub-Total		**0.018**	
TOTAL				**0.178**

There are also three external catchments contributing runoff to the site (catchments EXT S1, EXT S2, and EXT S3). It is noted that the project has no obligation to provide flow control for these areas, however a suitably sized swale will be provided to capture external runoff and direct flow through the site. It will then connect back into the drainage system downstream of the proposed flow control via a CB inlet.

Based on the affected site area (0.178 hectares) a 100-year allowable release rate of 12.89 l/sec has been established (please refer to the Servicing Report for further details). It is noted however that due to site grading constraints, catchments S3a and S3b will drain offsite uncontrolled. These catchments contribute a peak rate of 5.80 l/sec during a100-year event, therefore the net target release rate for the controlled portions of the site is 7.09 l/sec.

A StormTech subsurface storage chamber is proposed to provide the flow attenuation necessary to comply with the target offsite release rate. All ‘controlled’ portions of the site (catchments S1, S2, S4, RD1) will drain to the chamber, and CB inlets will be sized to collect the 100-year flows without uncontrolled spill offsite.

ANALYSIS

A HydroCAD model of the project was developed to simulate the performance of the proposed system in a range of design return period events, and to inform the necessary storage volume and specification of the flow control at the downstream end of the system.

The Modified Rational Method (an inherent subroutine of the HydroCAD software) was used, based on IDF data for the City of Ottawa (from Section 5.4.2 of the City’s Sewer Design Guidelines, OSDG). The HydroCAD analysis allows the performance of the system to be verified in all possible storm durations, and helps identify the critical storm duration for the system.

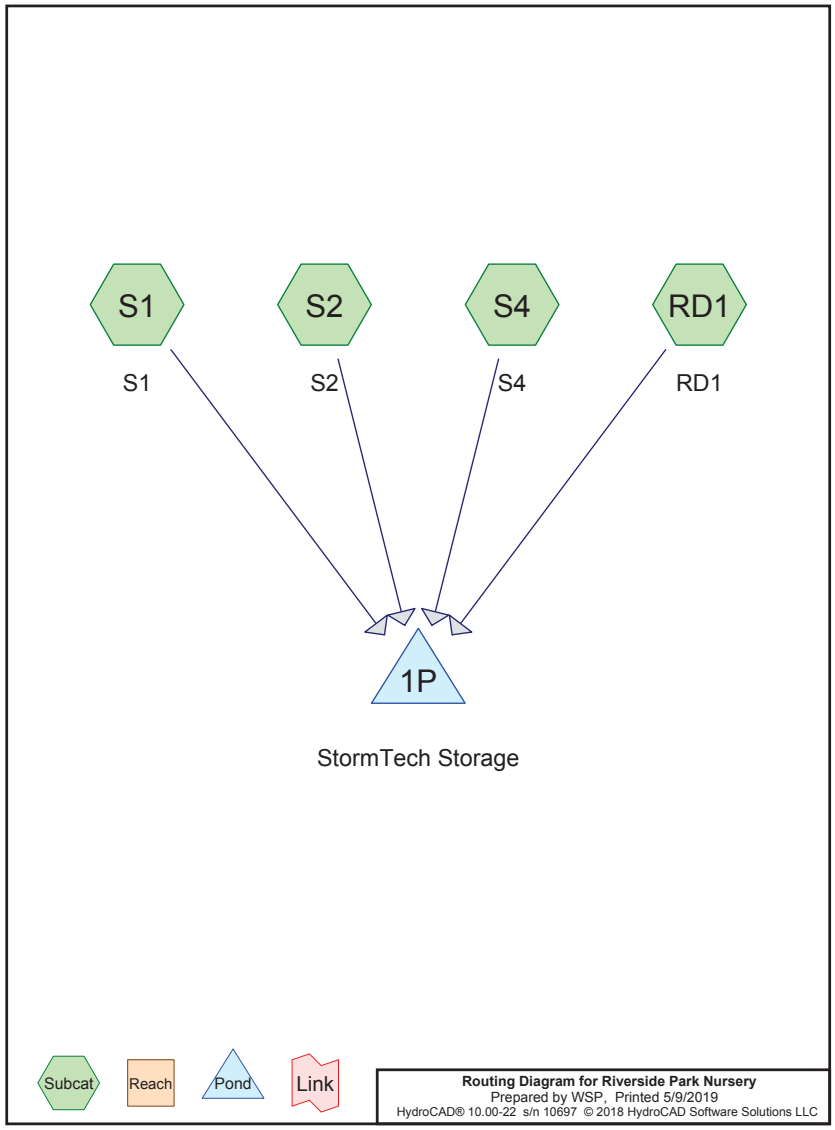
Following an iterative analysis process, it was concluded that a StormTech MC-3500 system with 2 rows of 5 chambers each, and a HYDROVEX 75 VHV-1 vortex flow regulator as the outlet

control, would be sufficient to satisfy the design criteria. A summary of the model results is provided in the table below, and HydroCAD model output (100-year) is appended to the memo.

RETURN PERIOD (YEARS)	PEAK DISCHARGE RATE (L/SEC)	CRITICAL DURATION (MINS)	TARGET RELEASE RATE (L/SEC)	PEAK WATER DEPTH (M)	MAX. STORAGE UTILIZED (M3)
2	3.65	57	**7.09**	0.44	20.6
5	4.38	60		0.61	28.2
10	4.90	63		0.73	33.3
25	5.58	63		0.90	39.8
50	6.12	66		1.05	44.7
100	**6.67**	66		**1.25**	**49.8**

In this configuration the rainfall intensity and storm duration combination resulting in the largest peak flow discharged from the system (coinciding with maximum storage utilized) occurs at the critical storm duration, t_d = 66 minutes for the 100-year event (determined iteratively using HydroCAD). It can be seen the modelled post-development peak flow rate is 6.67 l/sec for the 100-year event, which satisfies the maximum allowable release rate (7.09 l/s). The model results show that the maximum utilized storage volume is 49.8 m^3 to control the 100-year post-development runoff. This volume results in a maximum water depth in the chamber of 1.25 m.

Ben Worth, P.Eng.
Manager, Water Resources



Area Listing (all nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
410.0	0.90	(RD1)
490.0	0.53	(S1)
130.0	0.70	(S2)
570.0	0.80	(S4)
1,600.0	**0.73**	**TOTAL AREA**

Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment RD1: RD1 Runoff Area=0.0410 ha 0.00% Impervious Runoff Depth=52 mm
Tc=10.0 min C=0.90 Runoff=0.00533 m³/s 21.1 m³

Subcatchment S1: S1 Runoff Area=0.0490 ha 0.00% Impervious Runoff Depth=30 mm
Tc=10.0 min C=0.53 Runoff=0.00375 m³/s 14.9 m³

Subcatchment S2: S2 Runoff Area=0.0130 ha 0.00% Impervious Runoff Depth=40 mm
Tc=10.0 min C=0.70 Runoff=0.00132 m³/s 5.2 m³

Subcatchment S4: S4 Runoff Area=0.0570 ha 0.00% Impervious Runoff Depth=46 mm
Tc=10.0 min C=0.80 Runoff=0.00659 m³/s 26.1 m³

Pond 1P: StormTech Storage Peak Elev=1.250 m Storage=49.8 m³ Inflow=0.01700 m³/s 67.3 m³
Outflow=0.00667 m³/s 48.5 m³

Total Runoff Area = 1,600.0 m² Runoff Volume = 67.3 m³ Average Runoff Depth = 42 mm
100.00% Pervious = 1,600.0 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment RD1: RD1

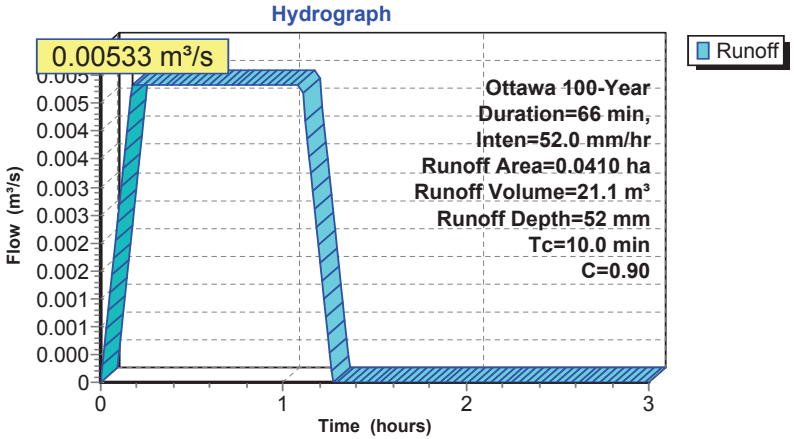
Runoff = 0.00533 m³/s @ 0.17 hrs, Volume= 21.1 m³, Depth= 52 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

Area (ha)	C	Description
0.0410	0.90	
0.0410		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment RD1: RD1



Summary for Subcatchment S1: S1

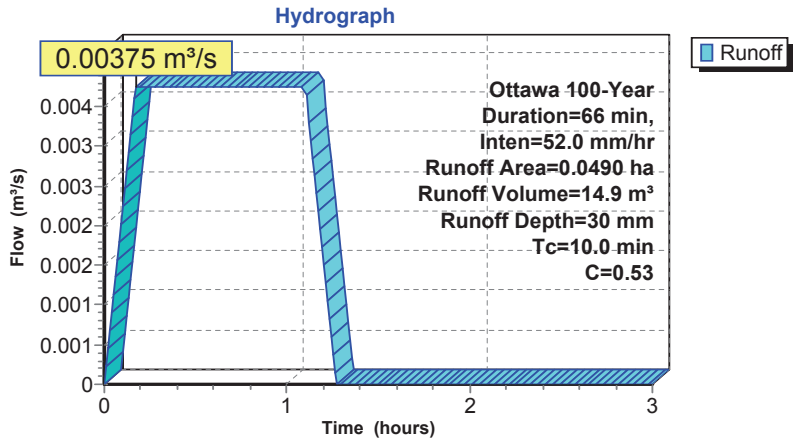
Runoff = 0.00375 m³/s @ 0.17 hrs, Volume= 14.9 m³, Depth= 30 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

Area (ha)	C	Description
0.0490	0.53	
0.0490		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S1: S1



Summary for Subcatchment S2: S2

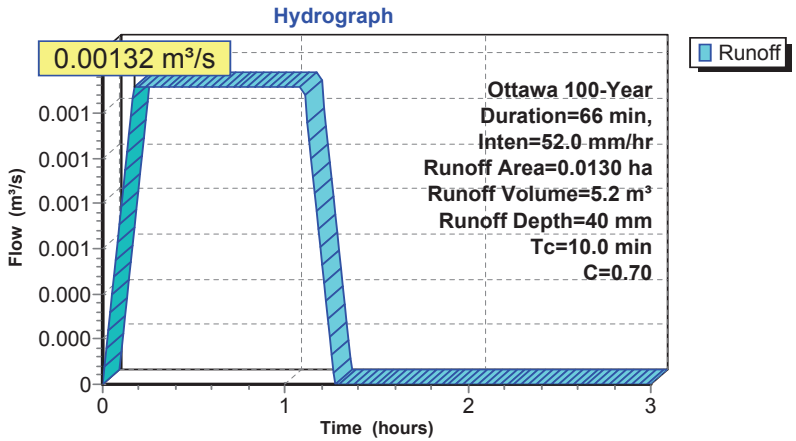
Runoff = 0.00132 m³/s @ 0.17 hrs, Volume= 5.2 m³, Depth= 40 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

Area (ha)	C	Description
0.0130	0.70	
0.0130		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S2: S2



Summary for Subcatchment S4: S4

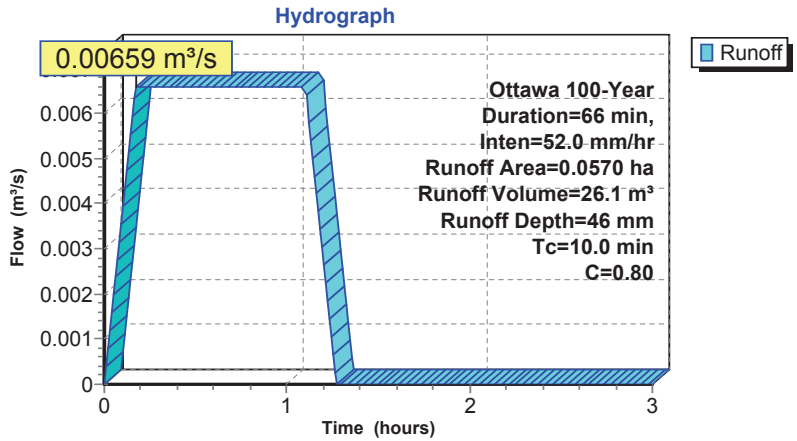
Runoff = 0.00659 m³/s @ 0.17 hrs, Volume= 26.1 m³, Depth= 46 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

Area (ha)	C	Description
0.0570	0.80	
0.0570		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment S4: S4



Summary for Pond 1P: StormTech Storage

Inflow Area = 1,600.0 m², 0.00% Impervious, Inflow Depth = 42 mm for 100-Year event
Inflow = 0.01700 m³/s @ 0.17 hrs, Volume= 67.3 m³
Outflow = 0.00667 m³/s @ 1.20 hrs, Volume= 48.5 m³, Atten= 61%, Lag= 61.9 min
Primary = 0.00667 m³/s @ 1.20 hrs, Volume= 48.5 m³

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 1.250 m @ 1.20 hrs Surf.Area= 60.2 m² Storage= 49.8 m³

Plug-Flow detention time= 66.2 min calculated for 48.5 m³ (72% of inflow)
Center-of-Mass det. time= 56.9 min (94.9 - 38.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.000 m	21.7 m³	**4.75 mW x 12.66 mL x 1.45 mH Field A** 87.1 m³ Overall - 32.8 m³ Embedded = 54.3 m³ x 40.0% Voids
#2A	0.000 m	32.8 m³	**ADS_StormTech MC-3500 d +Cap**x 10 Inside #1 Effective Size= 1,789 mmW x 1,143 mmH => 1.425 m² x 2.19 mL = 3.11 m³ Overall Size= 1,956 mmW x 1,143 mmH x 2.29 mL with 0.10 m Overlap 2 Rows of 5 Chambers Cap Storage= +0.42 m³ x 2 x 2 rows = 1.69 m³
		54.5 m³	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**Hydrovex 75-VHV-1** Elev. (meters) 0.000 0.400 0.750 1.000 1.750 2.750 6.000 Disch. (m³/s) 0.000000 0.003500 0.005000 0.006000 0.008000 0.010000 0.015000

Primary OutFlow Max=0.00667 m³/s @ 1.20 hrs HW=1.250 m (Free Discharge)
↑—**1=Hydrovex 75-VHV-1** (Custom Controls 0.00667 m³/s)

Pond 1P: StormTech Storage - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech®MC-3500 d rev 03/14 with Cap volume)
Effective Size= 1,789 mmW x 1,143 mmH => 1.425 m² x 2.19 mL = 3.11 m³
Overall Size= 1,956 mmW x 1,143 mmH x 2.29 mL with 0.10 m Overlap
Cap Storage= +0.42 m³ x 2 x 2 rows = 1.69 m³

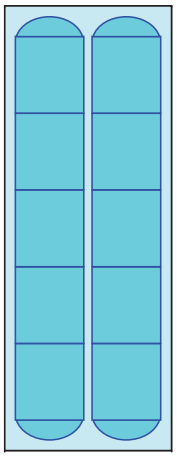
1,956 mm Wide + 229 mm Spacing = 2,185 mm C-C Row Spacing

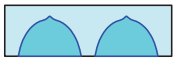
5 Chambers/Row x 2.19 m Long +0.56 m Cap Length x 2 = 12.05 m Row Length +305 mm End Stone x 2 = 12.66 m Base Length
2 Rows x 1,956 mm Wide + 229 mm Spacing x 1 + 305 mm Side Stone x 2 = 4.75 m Base Width
1,143 mm Chamber Height + 305 mm Cover = 1.45 m Field Height

10 Chambers x 3.11 m³ + 0.42 m³ Cap Volume x 2 x 2 Rows = 32.82 m³ Chamber Storage

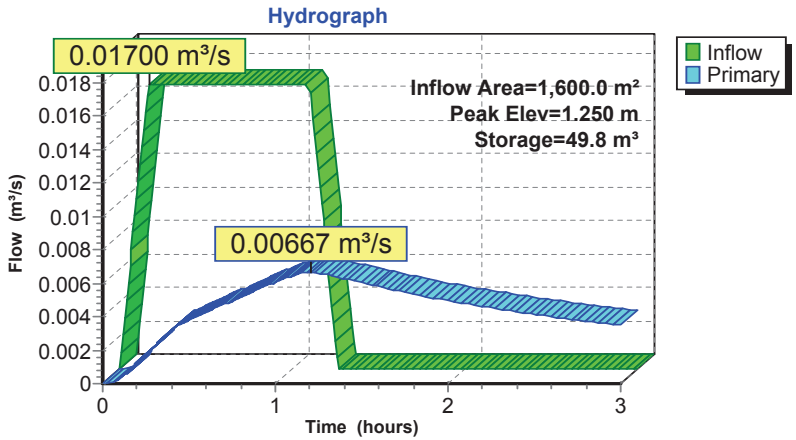
87.12 m³ Field - 32.82 m³ Chambers = 54.30 m³ Stone x 40.0% Voids = 21.72 m³ Stone Storage

Chamber Storage + Stone Storage = 54.54 m³ = 0.055 MI
Overall Storage Efficiency = 62.6%
Overall System Size = 12.66 m x 4.75 m x 1.45 m

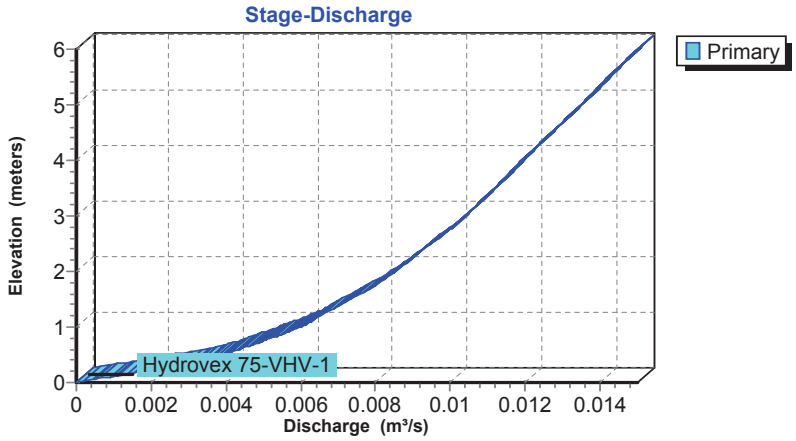




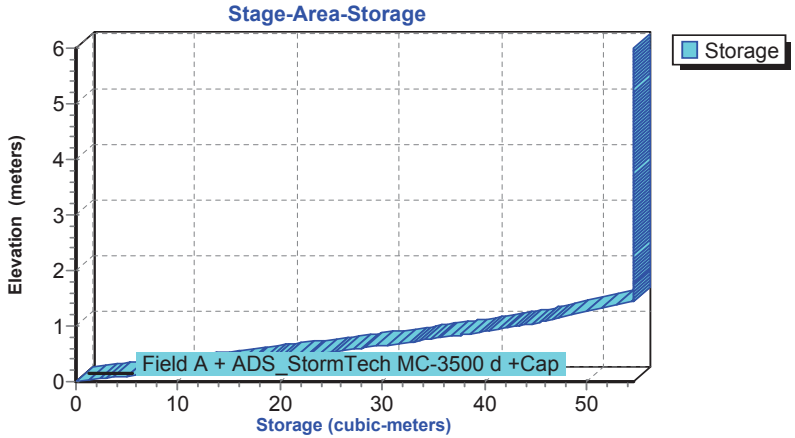
Pond 1P: StormTech Storage



Pond 1P: StormTech Storage



Pond 1P: StormTech Storage



Stage-Discharge for Pond 1P: StormTech Storage

Elevation (meters)	Primary (m^3/s)	Elevation (meters)	Primary (m^3/s)
0.000	0.00000	3.120	0.01057
0.060	0.00052	3.180	0.01066
0.120	0.00105	3.240	0.01075
0.180	0.00157	3.300	0.01085
0.240	0.00210	3.360	0.01094
0.300	0.00262	3.420	0.01103
0.360	0.00315	3.480	0.01112
0.420	0.00359	3.540	0.01122
0.480	0.00384	3.600	0.01131
0.540	0.00410	3.660	0.01140
0.600	0.00436	3.720	0.01149
0.660	0.00461	3.780	0.01158
0.720	0.00487	3.840	0.01168
0.780	0.00512	3.900	0.01177
0.840	0.00536	3.960	0.01186
0.900	0.00560	4.020	0.01195
0.960	0.00584	4.080	0.01205
1.020	0.00605	4.140	0.01214
1.080	0.00621	4.200	0.01223
1.140	0.00637	4.260	0.01232
1.200	0.00653	4.320	0.01242
1.260	0.00669	4.380	0.01251
1.320	0.00685	4.440	0.01260
1.380	0.00701	4.500	0.01269
1.440	0.00717	4.560	0.01278
1.500	0.00733	4.620	0.01288
1.560	0.00749	4.680	0.01297
1.620	0.00765	4.740	0.01306
1.680	0.00781	4.800	0.01315
1.740	0.00797	4.860	0.01325
1.800	0.00810	4.920	0.01334
1.860	0.00822	4.980	0.01343
1.920	0.00834	5.040	0.01352
1.980	0.00846	5.100	0.01362
2.040	0.00858	5.160	0.01371
2.100	0.00870	5.220	0.01380
2.160	0.00882	5.280	0.01389
2.220	0.00894	5.340	0.01398
2.280	0.00906	5.400	0.01408
2.340	0.00918	5.460	0.01417
2.400	0.00930	5.520	0.01426
2.460	0.00942	5.580	0.01435
2.520	0.00954	5.640	0.01445
2.580	0.00966	5.700	0.01454
2.640	0.00978	5.760	0.01463
2.700	0.00990	5.820	0.01472
2.760	0.01002	5.880	0.01482
2.820	0.01011	5.940	0.01491
2.880	0.01020	6.000	**0.01500**
2.940	0.01029		
3.000	0.01038		
3.060	0.01048		

Stage-Area-Storage for Pond 1P: StormTech Storage

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
0.000	0.0	3.120	54.5
0.060	2.9	3.180	54.5
0.120	5.8	3.240	54.5
0.180	8.7	3.300	54.5
0.240	11.5	3.360	54.5
0.300	14.4	3.420	54.5
0.360	17.2	3.480	54.5
0.420	19.9	3.540	54.5
0.480	22.6	3.600	54.5
0.540	25.3	3.660	54.5
0.600	27.9	3.720	54.5
0.660	30.5	3.780	54.5
0.720	33.0	3.840	54.5
0.780	35.4	3.900	54.5
0.840	37.7	3.960	54.5
0.900	39.9	4.020	54.5
0.960	42.0	4.080	54.5
1.020	44.0	4.140	54.5
1.080	45.6	4.200	54.5
1.140	47.1	4.260	54.5
1.200	48.6	4.320	54.5
1.260	50.0	4.380	54.5
1.320	51.5	4.440	54.5
1.380	52.9	4.500	54.5
1.440	**54.3**	4.560	54.5
1.500	**54.5**	4.620	54.5
1.560	54.5	4.680	54.5
1.620	54.5	4.740	54.5
1.680	54.5	4.800	54.5
1.740	54.5	4.860	54.5
1.800	54.5	4.920	54.5
1.860	54.5	4.980	54.5
1.920	54.5	5.040	54.5
1.980	54.5	5.100	54.5
2.040	54.5	5.160	54.5
2.100	54.5	5.220	54.5
2.160	54.5	5.280	54.5
2.220	54.5	5.340	54.5
2.280	54.5	5.400	54.5
2.340	54.5	5.460	54.5
2.400	54.5	5.520	54.5
2.460	54.5	5.580	54.5
2.520	54.5	5.640	54.5
2.580	54.5	5.700	54.5
2.640	54.5	5.760	54.5
2.700	54.5	5.820	54.5
2.760	54.5	5.880	54.5
2.820	54.5	5.940	54.5
2.880	54.5	6.000	54.5
2.940	54.5		
3.000	54.5		
3.060	54.5		

HYDROVEX®

VHV/SVHV Vortex Flow Regulator

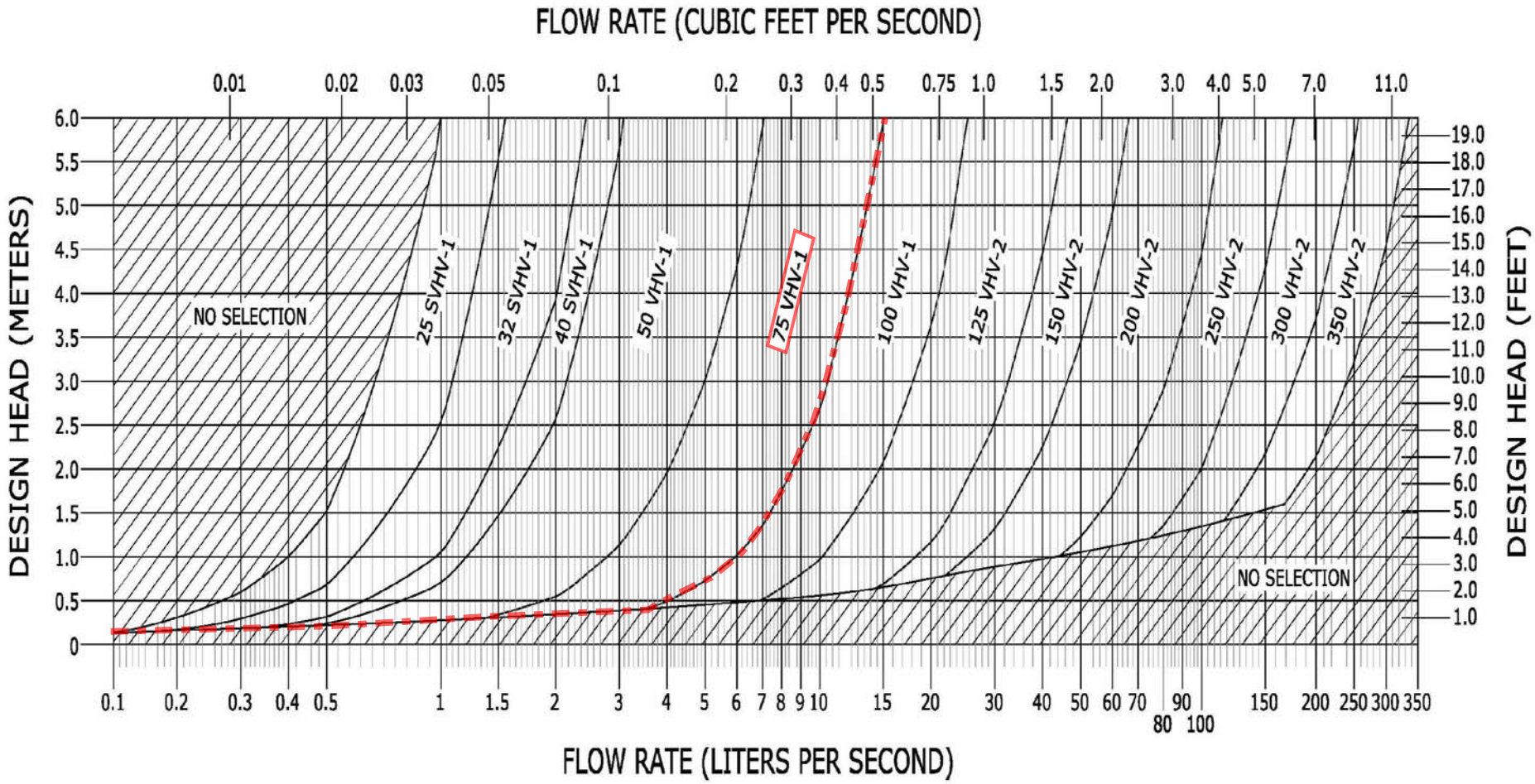


FIGURE 3

JOHN MEUNIER

APPENDIX

E

- SUBMISSION CHECK LIST

4.1 General Content

☒ Executive Summary (for larger reports only).

Comments: Refer to Servicing Report Section 1.1

☒ Date and revision number of the report.

Comments: *Refer to front page of the Report*

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

Comments: *Refer to Figure 1.1 Site Location for Location Map and Plan*

☒ Plan showing the site and location of all existing services.

Comments: *Refer to drawing C-2*

☒ 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.

Comments: *Refer to Architectural Site Plan*

☒ Summary of Pre-consultation Meetings with City and other approval agencies.

Comments: Refer to Appendix A for Pre-Consultation Meeting Notes

☒ 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.

Comments: *N/A*

☒ Statement of objectives and servicing criteria.

Comments: Refer to Servicing Report Section 1.7

☒ Identification of existing and proposed infrastructure available in the immediate area.

Comments: *Refer to drawing C-2*

☒ 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).

Comments: *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.

Comments: *Refer to drawing C-1*

☒ 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.

Comments: *N/A*

☒ Proposed phasing of the development, if applicable.

Comments: *N/A*

☒ Reference to geotechnical studies and recommendations concerning servicing.

Comments: *N/A*

☒ 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

Comments: *Refer to drawing C-1 and C-2*

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available

Comments: *Refer to Servicing Report Section 2.1*

☒ Availability of public infrastructure to service proposed development

Comments: Refer to Servicing Report Section 2.1

☒ Identification of system constraints

Comments: N/A

☒ Identify boundary conditions

Comments: *Refer to Servicing Report Section 2.2*

☒ Confirmation of adequate domestic supply and pressure

Comments: *Refer to Servicing Report Section 2.3*

☒ 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.

Comments: *Refer to Servicing Report Section 2.4*

☒ 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.

Comments: *Refer to Servicing Report Section 2.5*

☒ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

Comments: *Refer to Servicing Report Section 2.6*

☒ Address reliability requirements such as appropriate location of shut-off valves

Comments: *Refer to Servicing Report Section 2.7*

☒ Check on the necessity of a pressure zone boundary modification.

Comments: *Refer to Servicing Report Section 2.8*

☒ 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

Comments: *Refer to Servicing Report Section 2.9*

☒ 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.

Comments: *Refer to Servicing Report Section 2.10*

☒ 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.

Comments: *Refer to Servicing Report Section 2.11*

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

Comments: *Refer to Servicing Report Section 2.12*

☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

Comments: *Refer to Servicing Report Section 2.13*

4.3 Development Servicing Report: Wastewater

☒ 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).

Comments: *Refer to Servicing Report Section 3.1*

☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.

Comments: *Refer to Servicing Report Section 3.2*

☒ 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.

Comments: *Refer to Servicing Report Section 3.3*

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

Comments: *Refer to Servicing Report Section 3.4*

☒ 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)

Comments: *Refer to Servicing Report Section 3.5*

☒ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

Comments: Refer to Servicing Report Section 3.9 and 3.11

☒ Special considerations such as contamination, corrosive environment etc.

Comments: *Refer to Servicing Report Section 3.8*

4.4 Development Servicing Report: Stormwater

☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

Comments: *Refer to Servicing Report Section 4.1*

☒ Analysis of available capacity in existing public infrastructure.

Comments: *Refer to Servicing Report Section 4.2*

☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

Comments: *Refer to drawing C-1*

☒ 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.

Comments: *Refer to Servicing Report Section 4.4*

☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

Comments: *Refer to Servicing Report Section 4.5*

☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

Comments: *Refer to Servicing Report Section 4.6-4.10*

☒ Set-back from private sewage disposal systems.

Comments: *N/A*

☒ Watercourse and hazard lands setbacks.

Comments: N/A

☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

Comments: Refer to Appendix A for corresponding emails

☒ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

Comments: *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).

Comments: *Refer to Servicing Report Section 4.6-4.10 and Appendix D*

☒ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.

Comments: *Refer to Servicing Report Section 4.11*

☒ 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.

Comments: *Refer to Servicing Report Section 4.12*

☒ Any proposed diversion of drainage catchment areas from one outlet to another.

Comments: *Refer to Servicing Report Section 4.13*

☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.

Comments: Refer to Servicing Report Section 4.6-4.10, Appendix D and drawing C-2

☒ 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.

Comments: Refer to Servicing Report Section 4.6-4.10 and Appendix D

☒ Identification of potential impacts to receiving watercourses

Comments: *Refer to Servicing Report Section 4.15*

☒ Identification of municipal drains and related approval requirements.

Comments: *Refer to Servicing Report Section 4.16*

☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.

Comments: *Refer to Servicing Report Section 4.17*

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

Comments: Refer to drawings C-1 and C-2

☒ Inclusion of hydraulic analysis including hydraulic grade line elevations.

Comments: *Refer to Servicing Report Section 4.18*

☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.

Comments: *Refer to Servicing Report Section 5.0*

☒ 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.

Comments: *N/A*

☒ Identification of fill constraints related to floodplain and geotechnical investigation.

Comments: *N/A*

4.5 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 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.

Comments: *No approval anticipated. RVCA will be circulated.*

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

Comments: Not applicable.

☐ Changes to Municipal Drains.

Comments: *Not applicable.*

☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

Comments: *Not applicable.*

4.6 Conclusion Checklist

☒ Clearly stated conclusions and recommendations

Comments:

☐ 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.

Comments: *Further comments to be added following site plan application review.*

☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

Comments: