Assessment of Adequacy of Public Services Report

Official Plan Amendment and Zoning By-law Amendment

30 Cleary Avenue,
Ottawa, ON

Prepared for:

Theia Partners

Attention:
Scott Bentley

LRL File No.: 230437.00

May 31, 2024

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1 Introduction and Site Description

LRL Associates LTD. was retained by **Theia Partners** to prepare a functional serviceability report to support Zoning Bylaw Amendment and an Official Plan Amendment of the property located at **30 Cleary Avenue** within the City of Ottawa.

The subject site is within the Bay Ward 7, located backing onto the Kichi Zibi Mikan Parkway, accessed via Cleary Avenue and has an approximate area of 2.07 ha. Under the City of Ottawa Zoning by-law, the property is currently zoned as I1A [314] H(13.8). The land consists of three (3) existing buildings, paved areas as well as some landscaping. The subject site can be seen below in Figure 1.

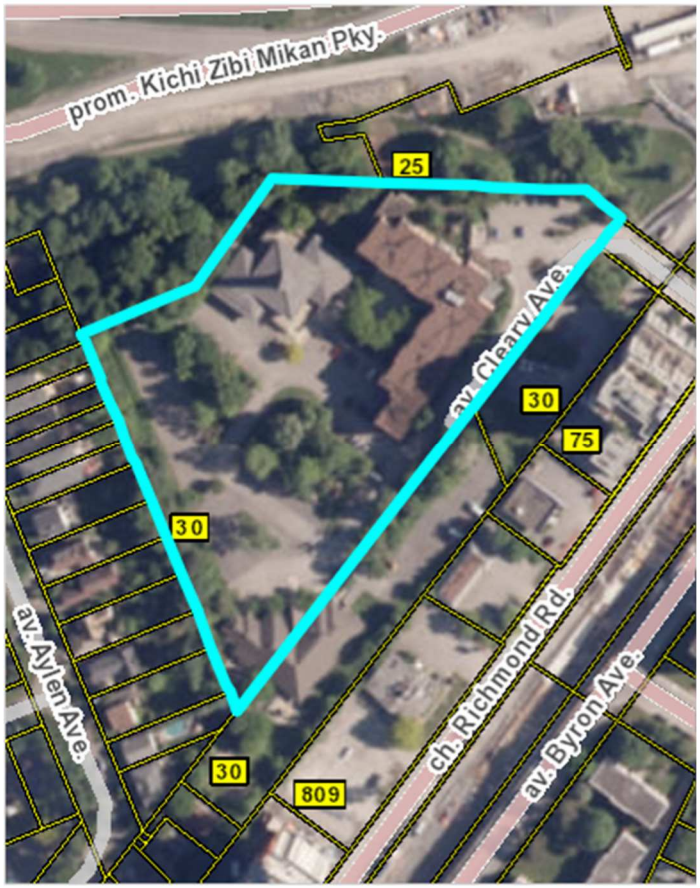


Figure 1: Arial View of Subject Site

The Official Plan amendment and Zoning by-law amendment will seek to formally establish zoning framework and amend the Sherbourne and New Orchard secondary plan to facilitate future development on the southwest portion of the site currently occupied by surface parking.

2 EXISTING SITE AND AVAILABLE SERVICES

The subject property is currently occupied by three (3) separate building; the Unitarian House of Ottawa (residential building) and The First Unitarian Congregation of Ottawa (church) in the North East portion of the site, as well as the River Parkway Children's Centre in the south corner of the site. The balance of the property not occupied by buildings is landscape greenspace, and asphalt for vehicular circulation and surface parking.

Given that the property houses development in its current state, there is localized sanitary sewers, water distribution and storm networks utilized to service the existing buildings and surrounding parking lot.

Based on the topography and site survey information, the property generally slopes in the north direction towards the NCC owned forested land, ultimately towards the Kichi Zibi Mikan parkway and Ottawa river. The existing site topographical survey can be found in ***Appendix A.***

The site is accessed via Cleary Avenue. Sewer and watermain mapping, along with as-built information collected from the City of Ottawa (included in ***Appendix D***) indicate the following existing infrastructure located within road entering the property.

Cleary Avenue:

- 250 mmØ PVC Sanitary sewer
- 450 mmØ CONC Storm sewer
- 250 mmØ PVC Watermain.

Additionally, running along the southeast boundary of the subject property is a 1200 mmØ water feeder main located under an easement in this location.

Recognizing that a secondary connection will be made connecting to Richmond Road, it is important to note that there is an existing 200 mmØ watermain within the right-of-way.

3 CONCEPT DEVELOPMENT

Based on the site plan from Figurr, the intended area that will be developed is approximately 0.57ha. The contemplated development will be located along the west border of the site, where there is currently asphalt surface parking. It would be comprised of two (2) multistorey buildings, with a shared underground parking garage. Building one (1) will be 6 storeys high and will house 66 units. Building two (2) will be 16 storeys in height and will house 148 units. The development will have a total of 214 residential units. Additionally, each building will have designated amenity spaces on levels one and the highest storeys.

There are two levels of underground parking, parking level one (1) is shared by both buildings and has a total of 59 parking spaces and 113 bike parking spaces. Parking level 2 is located below building 2 and has a total of 39 parking spaces and 47 bike parking spaces. For additional detail of the proposed development, refer to the Concept Site Plan prepared by Figurr Architects Collective included in ***Appendix B.***

4 WATER SUPPLY SERVICING

The subject property lies within the City of Ottawa 1W water distribution network pressure zone. There is an existing 250 mm watermain within Cleary Avenue. There are currently two (2) existing fire hydrants within close proximity of the subject property. Refer to ***Appendix E*** for the water pressure zone and location of fire hydrants.

According to the City of Ottawa Water Distribution Guidelines (Technical Bulletin ISDTB-2014-02), since the subject site is anticipated to house more than 50 residential units, it is required to be serviced by two water service laterals, separated by an isolation valve, for redundancy and to avoid creation of a vulnerable service area. Hence, the contemplated development is anticipated to be serviced via two (2) 150 mm diameter services. One of the connections will be via the 250 mm watermain within Cleary Avenue. The second connection will be provided through a direct connection into the water main along Richmond Road via a mutually agreed upon servicing easement through 851 Richmond Road.

During the detailed design stage of the building, the two service laterals will be connected to the building and appropriately metered in coordination with the mechanical engineer.

Table 1, included below, summarizes the City of Ottawa Design Guidelines design parameters in the preparation of the water demand estimate.

Table 1: City of Ottawa Design Guidelines- Water Design Parameters

Design Parameter	Value
Residential Bachelor / 1 Bedroom Apartment	1.4 P/unit
Residential 2 Bedroom Apartment	2.1 P/unit
Residential 3 Bedroom Apartment	3.1 P/unit
Commercial Average Daily Demand	2.8 L/m^2/d
Average Daily Demand	280 L/d/per
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
Desired operating pressure range during normal operating conditions	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure shall not exceed	552 kPa
During fire flow operating conditions pressure must not drop below	140 kPa
**Table updated to reflect technical Bulletin ISDTB-2018-02*	

4.1 Feedermain Crossing

To proceed with the second watermain connection from Richmond Road, crossing an existing 1200 mmØ Concrete water feedermain will be required. Mitigation measures during construction will be taken to avoid any damage to the feedermain recognizing the close proximity to this critical infrastructure. These mitigations measured may include:

- Hydrovac to the feedermain to determine the depth and alignment at the crossing location
- Appropriate selection of bedding material to ensure integrity of pipe is not impacted.

- Reduction of use of vibratory or impact equipment in close proximity to the pipe.

Given the conditions of the provided historic as-builts from the City of Ottawa, existing elevation of the 1200 Ømm Concrete feedermain is unknown at this time. Further investigation will need to take place prior to construction to verify alignment and depth to allow the construction to be planned accordingly. Vertical clearance between the feedermain and the proposed service lateral must be respected. Shall the service lateral have to be installed shallower than 2.4 m from obvert of pipe to ground surface, to provide the required clearances, insulation will be provided.

4.2 Residential Water Demands

Anticipated population demands have been interpreted from the Concept Plans by Figurr. The contemplated development is anticipated to include **214** residential units, which translates to a population of **355.6** persons as per the City of Ottawa Water Distribution Design Guidelines. Table 1 below summarizes the proposed population count as interpreted using Table 4.1 of the *City of Ottawa Water Distribution Design Guidelines*.

Table 2: Development Residential Population Estimate

Unit Type	Persons Per Unit	Number of Units	Population
1 Bedroom Apartment	1.4	134	187.6
2 Bedroom Apartment	2.1	80	168
	Total	**214**	**355.6**

The required water supply requirements for the residential units in the proposed subdivision have been calculated using the following formula:

Where:

$$Q = (q \times P \times M)$$

q = average water consumption (L/capita/day)
P = design population (capita)
M = Peak factor

With reference to *Table 4.2 of the City of Ottawa Water Distribution Design Guidelines and Table (3-3) MOE Peaking Factors*, using an average water consumption rate of 280 L/c/d, a calculated Maximum Daily Demand Factor and Maximum Hour Demand Factor of 3.3 and 5.0, respectively, anticipated demands were calculated as follows:

- Average daily domestic water demand is **1.15** L/s,
- Maximum daily demand is **3.86** L/s, and
- Maximum hourly demand is **5.77** L/s.

For greater detail on Water Demand Calculations, please refer to ***Appendix E.***

4.3 Fire Demands

During the Site Plan Control design stage and as the detailed building design progresses, fire demands will have to be reviewed and updated to ensure that further advanced architectural plans are reviewed on considered to determine fire flow requirements. At this stage, building footprint and contemplated site layout have been considered to estimate the fire flow demands based on the Fire Underwriters Survey (FUS) methodology further expanded on below.

The estimated fire flow for the proposed buildings were calculated in accordance with *ISTB 2018-02*. The following parameters were provided by the contemplated architectural plans:

- Type of construction – Non-combustible construction;
- Occupancy type – Limited Combustibility;
- Sprinkler Protection – Fully Supervised and automatic Sprinkler System.

The estimated fire flow demand was estimated to be **11,000 L/min**, see ***Appendix E*** for details.

There are two (2) private hydrants located within 75 m of the proposed development. They can provide the development with a total available fire flow of 11,356 L/min. Refer to ***Appendix E*** for fire hydrant locations. It will be confirmed at the detailed design stage if the private hydrants will meet the required development fire demands or to identify on site alterations to ensure that all fire demand's can be met. A joint use agreement will be required to utilize the private hydrants.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated domestic water demand and fire flow demand. Correspondence on this request has been included in ***Appendix E***. Table 3 below summarizes the boundary conditions of the proposed development based on a computer model simulation expressed as the hydraulic grade line (HGL).

Table 3: Boundary Conditions

Water Pressure at Connection 1 (Cleary Road)			
HGL (m)		Pressure*	
		kPa	psi
Minimum	108.7	458.34	66.47
Maximum	115.6	525.99	76.29
Max Day + Fire Flow	86.5	240.69	34.91
*Ground elevation at connection point =61.95			
Water Pressure at Connection 2 (Richmond Road)			
HGL (m)		Pressure*	
		kPa	psi
Minimum	108.7	424.52	61.57
Maximum	115.8	494.13	71.67
*Assumed ground elevation at the connection point = 65.4 m			

Operating pressures for normal demands for the contemplated development fall within the allowable range of pressure with the exception of the fire flow at connection 2 intended to tie directly into the Richmond Road. The City of Ottawa provided feedback that the municipal watermain on Richmond Rd can only support a required fire flow of **9270 L/min** while maintaining a minimum pressure of 20 psi based on the input data to the model. Recognizing these restrictions, during the detailed design of the building, and the site plan design stage, further analysis will be required to determine the actual operating available fire flow while ensuring that there is a minimum operating pressure of 20PSI at the connection point. Following the rezoning and official plan amendment process, it is recommended that details of the building will be further defined, and existing infrastructure on the site will be further assessed to ensure that any development on this parcel of land will have ample fire protection and operating pressures will be available as per the City of Ottawa design guidelines. The available fire flow could be met using a combination of the following:

1) Multi hydrant analysis surrounding the site to determine actual operating pressures.
2) Refinement of the floor plan and building details to reduce the required fire flow.
3) Potential introduction of a fire wall that meets or exceeds the requirements of the current edition of the National Building Code of Canada (provided this necessitates a fire resistance rating of 2 or more hours) to subdivide the building into more than one area.

At the detailed site plan approval process, a hydraulic model will be completed to assess the build out conditions on site and evaluate operating pressures.

5 SANITARY SERVICE

There is an existing 250 mmØ PVC municipal sanitary sewer within Cleary Avenue. As per pre-consultation with City staff, it is anticipated that the contemplated development will connect to the existing 250 mmØ sanitary sewer within Cleary Avenue via a single 200 mm diameter sanitary service lateral, to be connected to all proposed buildings through the underground parking garage.

The total anticipated post development total flow was calculated to be is **4.62 L/s** as a result of proposed residential population, commercial use and a small portion of infiltration. Refer to ***Appendix F*** for further information on the calculated sanitary flows.

Based on information available from the as-built profile data along Cleary Avenue provided by the City of Ottawa, the existing 250 mmØ PVC sanitary sewer has a slope of approximately 0.35% which translates to existing maximum capacity of approximately **35.18 L/s**. The anticipated wet wastewater flows from the contemplated development represent approximately 14% of the maximum existing sewer capacity.

Additionally, recognizing that there are existing buildings on site contributing to the sanitary sewer on Cleary Avenue, actual usage data has been collected and reviewed. Refer to ***Appendix E*** for water usage data of existing buildings on site.

The capacity of the Sanitary pipes would need to be reviewed with the City of Ottawa during detailed design stage to ensure the existing sanitary sewer has adequate capacity for the proposed sanitary flows. There is an existing 1500mmØ concrete sanitary collector pipe on Richmond Road, which the effluent from the Cleary development outlets to. The discharge from the contemplated development will represent a marginal percentage of the existing pipe capacity within Richmond Rd. Confirmation from asset management will be required at site plan application.

5.1 Existing Stormwater Infrastructure

The subject property lies within the Ottawa River West sub-watershed. There is an existing private 450 mmØ CONC Storm sewer located within 30 Cleary Avenue. The private storm sewer is received by a 1500 mmØ municipal storm sewer.

In pre-development conditions, the stormwater runoff from the subject site would generally flow uncontrolled overland in the north direction offsite towards NCC lands. Refer to ***Appendix A*** for topographical survey showing existing contours and grades. However, it is understood that this redevelopment will instead require the capture and control to eliminate any additional runoff quantity being directed in this direction.

There is currently a stormwater system in place for the building in the south corner of the property as well as a 525 mmØ diameter storm sewer used to convey flows from offsite from the development located at 851 Richmond Road. During the detailed design stage, this will be a critical consideration to ensure that the drainage from both developments are managed.

Additionally, runoff from the rear yards of properties fronting Aylen will be considered as an off-site watershed and accounted for in the detailed storm water design. Runoff from 851 Richmond Rd will be considered and rerouted if required as an off-site watershed and accounted for in the detailed storm water design. Runoff from the Daycare will also be considered as an on-site watershed and accounted for as part of the detailed storm water design. Stormwater details for Daycare and 851 Richmon Rd. is included in the Stantec Report in ***Appendix I*** and will be referenced during the detailed design.

5.2 Design Criteria

The stormwater management criteria for this development is based on pre-consultation with City of Ottawa officials, the City of Ottawa Sewer Design Guidelines including City of Ottawa Stormwater Management Design Guidelines, 2012 (City standards), as well as the Ministry of the Environment's Stormwater Planning and Design Manual, 2003 (SWMPD Manual).

The stormwater management will need to meet the following stormwater design criteria :

- Meet an allowable release rate based on the pre-development Rational Method Coefficient or a maximum of 0.50.
- Control the post-development flows to the 2-year pre-development flows for all events up to and including the 100-year storm.
- The time of concentration is to be calculated, min Tc = 10 mins
- Based on coordination with the City of Ottawa, enhanced quality treatment (80% TSS removal) prior to release from site will be required.
- Implement stormwater management plan to demonstrate that post development flows directed to NCC owned lands north of the site do not exceed predevelopment conditions.

5.3 Proposed Stormwater Management System

The contemplated development is anticipated to outlet to the existing 450 mmØ CONC private storm sewer located within Cleary Avenue. It is anticipated that catch basin manholes will collect surface water within the parking lot. Roof drains on building rooftops will be utilized to collect and direct runoff to the building's mechanical system to a cistern. A storm service lateral outlet will be used to discharge flows from the cistern to the proposed storm system onsite.

Based on stormwater objectives for the subject site, the allowable release rate (controlled to 2-year pre-development) for the portion of the site that's directed towards Cleary Avenue of the contemplated development is **142.10 L/s** for all storms up to and including the 100-year storms.

The remaining area of the site is directed towards NCC lands in pre-development conditions. This land with the additional off-site flows coming from rear yards along Alyne Ave. and controlled flow from 851 Richmond will be contemplated during the design phase to ensure that the NCC lands will not receive any additional flow in post development conditions.

As detailed site design progresses and during the Site Plan Control stage, detailed stormwater design will commence. The total amount of required storage will be determined based on the final grading design. The storage required will consider the allowable release rate for both outlet directions, as well as the implemented strategy to accommodate storm water management for the existing daycare on site and 851 Richmond Rd. Refer to drawing C401, conceptual servicing drawing, included in ***Appendix C*** for a conceptual servicing layout to support the contemplated development.

It is anticipated that the contemplated development would utilize an Oil/Grit Separator (OGS) to achieve the required **80% TSS** removal treatment as specified by RVCA. The OGS would be required to treat all contaminated runoff collected in the surface parking lot before runoff is discharged into ditch.

6 EROSION AND SEDIMENT CONTROL

If this development proceeds, sediment and erosion control measures will be implemented before, during and after the construction of this project. Typical control measures such as silt fences and

silt sacks are mandatory. Mud mats will also be required at the main access during construction. This works is to be inline with the most recent OPSD standards.

7 GEOTECHNICAL SITE CONSIDERATIONS

A geotechnical investigation has been done onsite by WSP. The final report was produced on November 7, 2023. A total of ten (10) borehole were drilled, seven (7) of the boreholes are located under the proposed buildings.

The following conclusions highlight data that was determined during the geotechnical investigation:

- The bedrock is located between 0.86 m to 1.93 m from the surface;
- The majority of the soil found between the bedrock and the surface grade is glacial till;
- The groundwater elevation was located at approximately 3.4 meter below surface;
- The existing soils have a low potential for corrosion of buried ferrous elements.

Considering that the proposed underground parking will be built on the bedrock and close to the groundwater level, the investigation report recommends precautionary drainage under the slab. Additional details are summarized in the Geotechnical report submitted with this application.

8 CONCLUSION

This evaluation is limited to assessing the serviceability of the site described within this document to support an Official Plan Amendment and Zoning By-law Amendment.

Based on the *Site Plan* provided by Figurr, included in ***Appendix B***, the following conclusions, in relation to the serviceability of the site, can be made:

- **Water**:
  - The contemplated development is anticipated to be serviced via a 150 mmØ dual connection.
  - One of the tie-in connections will be via the 250 mmØ PVC Watermain located in Cleary Avenue. The second connection will be via the water main along Richmond Road via a mutually agreed upon servicing easement through neighbouring properties fronting Richmond.
  - Domestic demands from the proposed development based on projected populations are expected to be in the range of **1.15 L/s** for the Average daily demand, **3.86 L/s** for the maximum daily and **5.77 L/s** for maximum hourly.
  - Boundary conditions were received and based on the input data provided at this stage, it was determined that there are operating pressure constraints with the fire flow provided.
  - The allowed fire flow from the municipal watermain on Richmond Rd is **9270 L/min** based on the City of Ottawa's input data at this time. Considerations will be implemented on the proposed development to reach the allowed fire flow.

- **Sanitary**:
  - The anticipated sanitary sewer flows are **6.02 L/s** as a result of proposed residential population, commercial use and a small portion of infiltration.
  - It is anticipated to service the contemplated development via a 200 mmØ diameter sanitary service lateral to be connected to the existing 250 mmØ sanitary sewer within the Cleary Avenue ROW.
  - The proposed sanitary discharge represents approximately 14% of the maximum capacity of the existing receiving sewer leg. Existing water usage data has been received and reviewed to confirm that the existing sanitary sewer can accommodate conveying this discharge towards Richmond Roads 1500 mmØ Concrete pipe.

- **Stormwater**:
  - Site stormwater runoff is divided in two outlets: Cleary Ave and NCC lands. The calculated pre-development runoff release rate for the Cleary Ave outlet is **142.10L/s.**
  - Volume storage solutions will be determined at the detailed design stage.
  - Off-site runoff from neighbouring properties as well as the Daycare storm water management system will also be considered during the detailed design stage.
  - It is anticipated that an OGS will be installed to treat all contaminated runoff to an enhanced quality treatment level (80% TSS removal).
  - The subject site is anticipated to outlet at a controlled rate to the 450 mmØ CONC. Storm sewer located within Cleary Avenue, as well as to NCC Lands ensuring that post development flow rates do not exceed pre-development conditions.

Shall the concept plan change in relation to the number of units, building footprint, or impervious area of the site, the conclusions above would no longer be appropriate. During the detailed design stage of this development, the storm, sanitary and water servicing details will be further defined and confirmed.

Prepared by:

LRL Associates Ltd.

Virginia Johnson, P. Eng.
Civil Engineer

APPENDIX A

Site Topographical Survey

Stantec

Stantec Geomatics Ltd.
300-1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

TOPOGRAPHIC SURVEY OF

LOTS 8, 9 & 10 & PART OF LOTS 6 & 7 (WEST CLYBOURNE AVENUE) PART OF LOTS 6 & 7 (EAST CLYBOURNE LOTS), PART OF LOT 6 (WEST ARDMORE AVENUE), PART OF CLYBOURNE AVENUE (CLOSED BY BY-LAW CR573286), PART OF GORMAN STREET (CLOSED BY BY-LAW CR573286) REGISTERED PLAN NO.236 AND PART OF LOTS 26 & 27 CONCESSION 1 (OTTAWA FRONT)

CITY OF OTTAWA

Stantec Geomatics Ltd.
ONTARIO LAND SURVEYORS

Scale 1:250
5 0 5 10 15 METRES

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

BEARING NOTE
BEARINGS ARE GRID, DERIVED FROM THE CAN-NET VRS NETWORK OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76°30' WEST LONGITUDE MTM ZONE 9. NAD83 (CSRS) (2010.0).

19773035 N:5006060.00 E:324888.04
19680191 N:5033563.88 E:388064.92

ELEVATION NOTE
ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA ELEVATION=95.230.

LEGEND

	DENOTES	
■	"	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
M/MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
P1	"	PLAN 5R-6767
P2	"	PLAN BY 857, DATED NOV.14, 2007
P3	"	PLAN BY AOV, DATED DEC.17, 2014
P4	"	PLAN 4R-28689
P5	"	PLAN 4R-34953
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
AP	"	AIR PUMP
ANT	"	ANTENNA
BH	"	BOREHOLE
BIB	"	HOSE BIB
BKR	"	BIKE RACK
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
CBMH	"	CB MANHOLE
CSV	"	CURB STOP VALVE
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HIC	"	HICKENBOTTOM
HLS	"	HYDRO LIGHT STANDARD
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
LS	"	LIGHT STANDARD
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHB	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLS	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLBX	"	PULL BOX
PLR	"	PILLAR
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SIA	"	SIAMESE CONNECTION
SN	"	SIGN
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS (D.B.H. SHOWN)
	"	TREE DECIDUOUS (D.B.H. SHOWN)
	"	TREE DRIP LINE
T	"	UNDERGROUND TELEPHONE
P	"	UNDERGROUND HYDRO
WTM	"	WATERMAIN
G	"	GASMAIN
STM	"	STORM SEWER
FOTS	"	UNDERGROUND FIBRE OPTIC

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 9th DAY OF MAY, 2024.

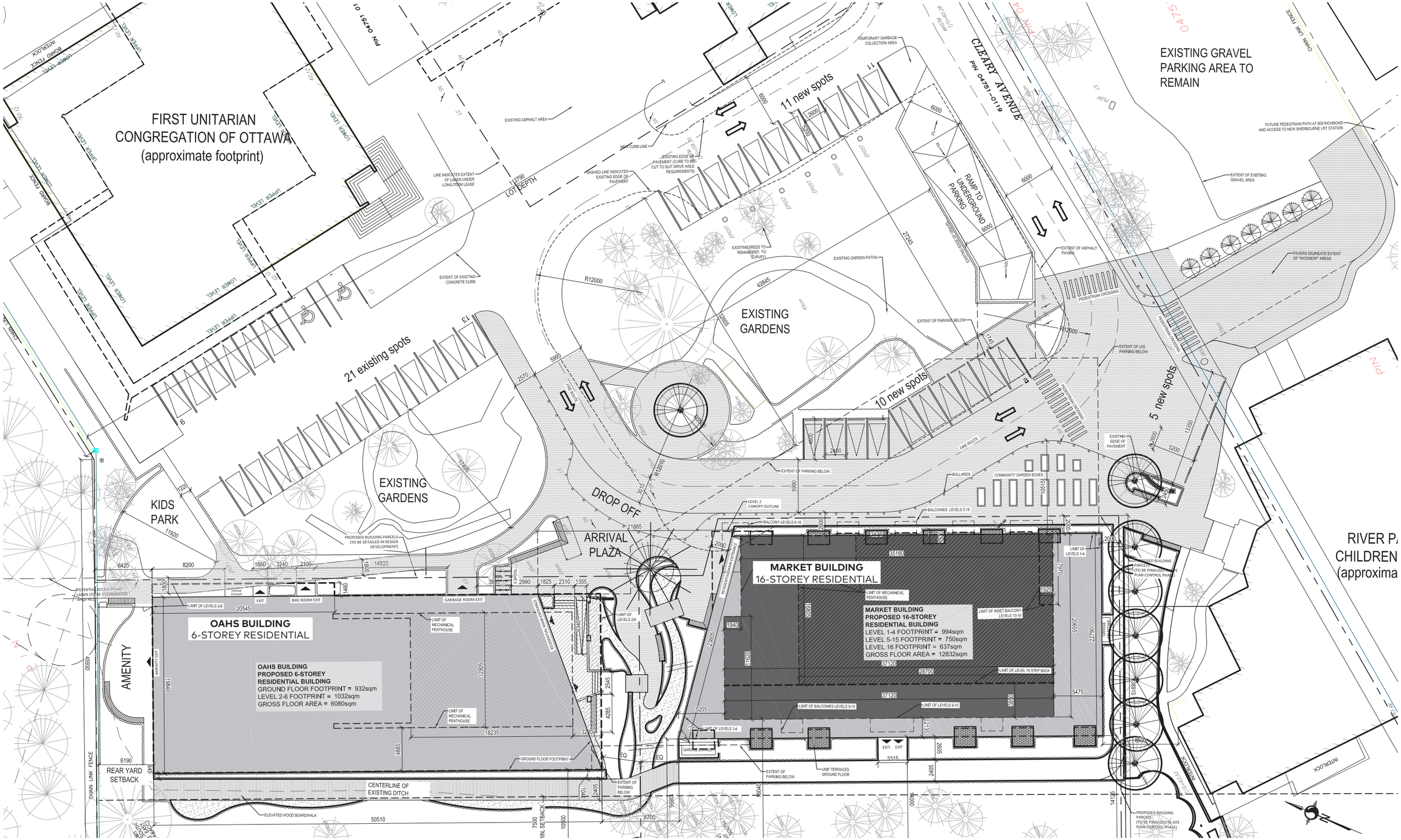
DATE

R. G. BENNETT
ONTARIO LAND SURVEYOR

DRAWN: CT CHECKED: CK PM: CT FIELD: CA/AW PROJECT No.: 161614713-111

APPENDIX B

Concept Architectural Site Plan



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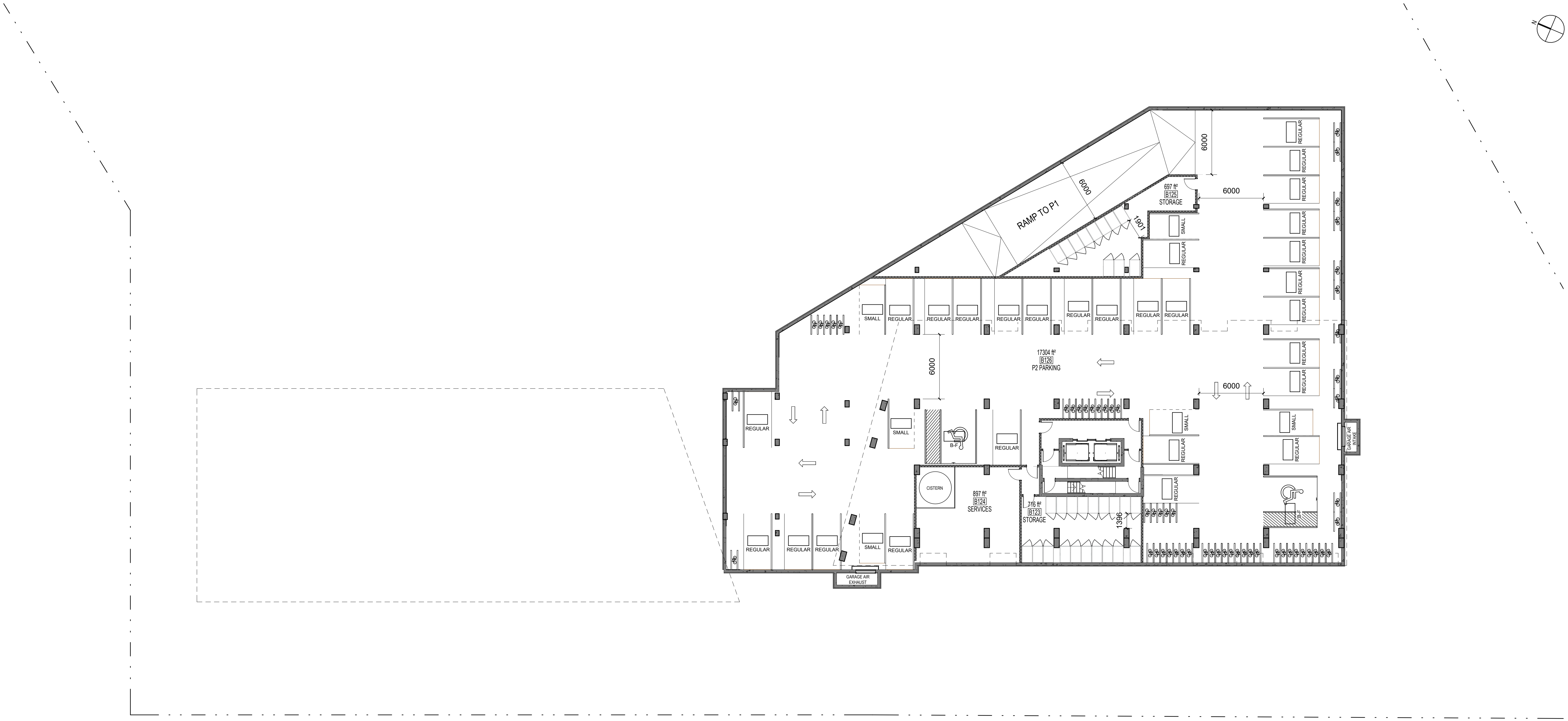
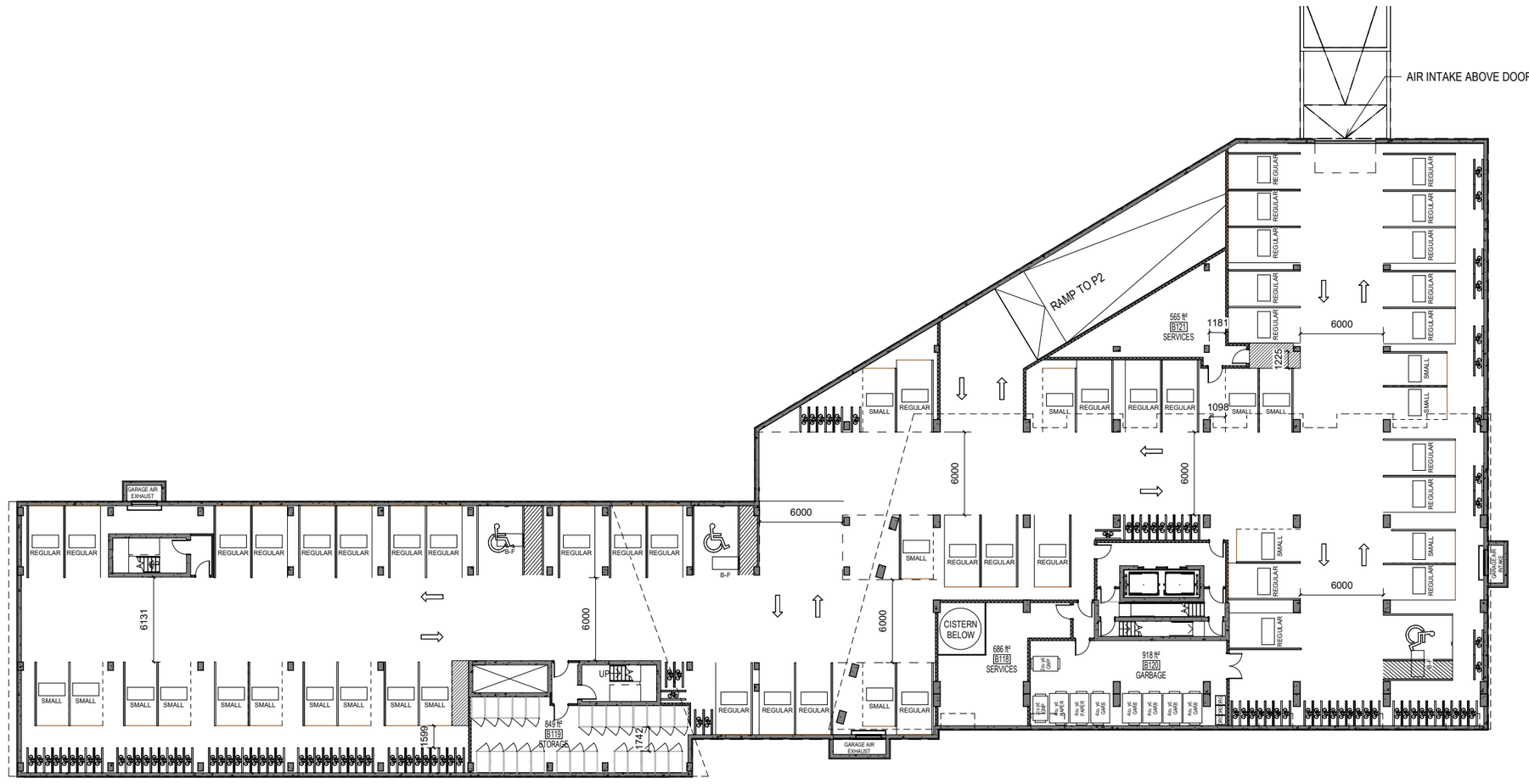
SITE PLAN

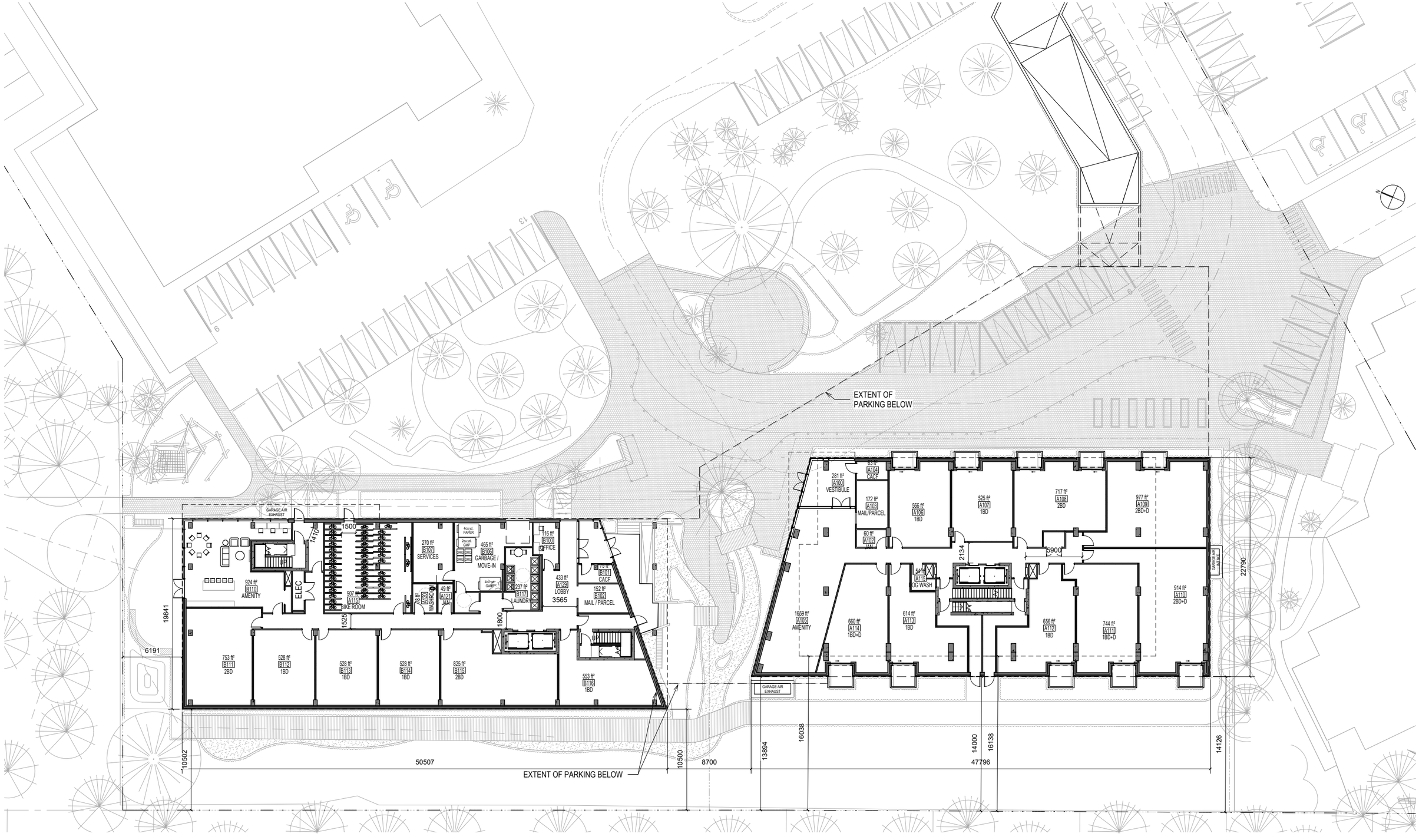
30 Cleary Ave.
2314
May 2024



PARKING P2 FLOOR PLAN



PARKING P1 FLOOR PLAN



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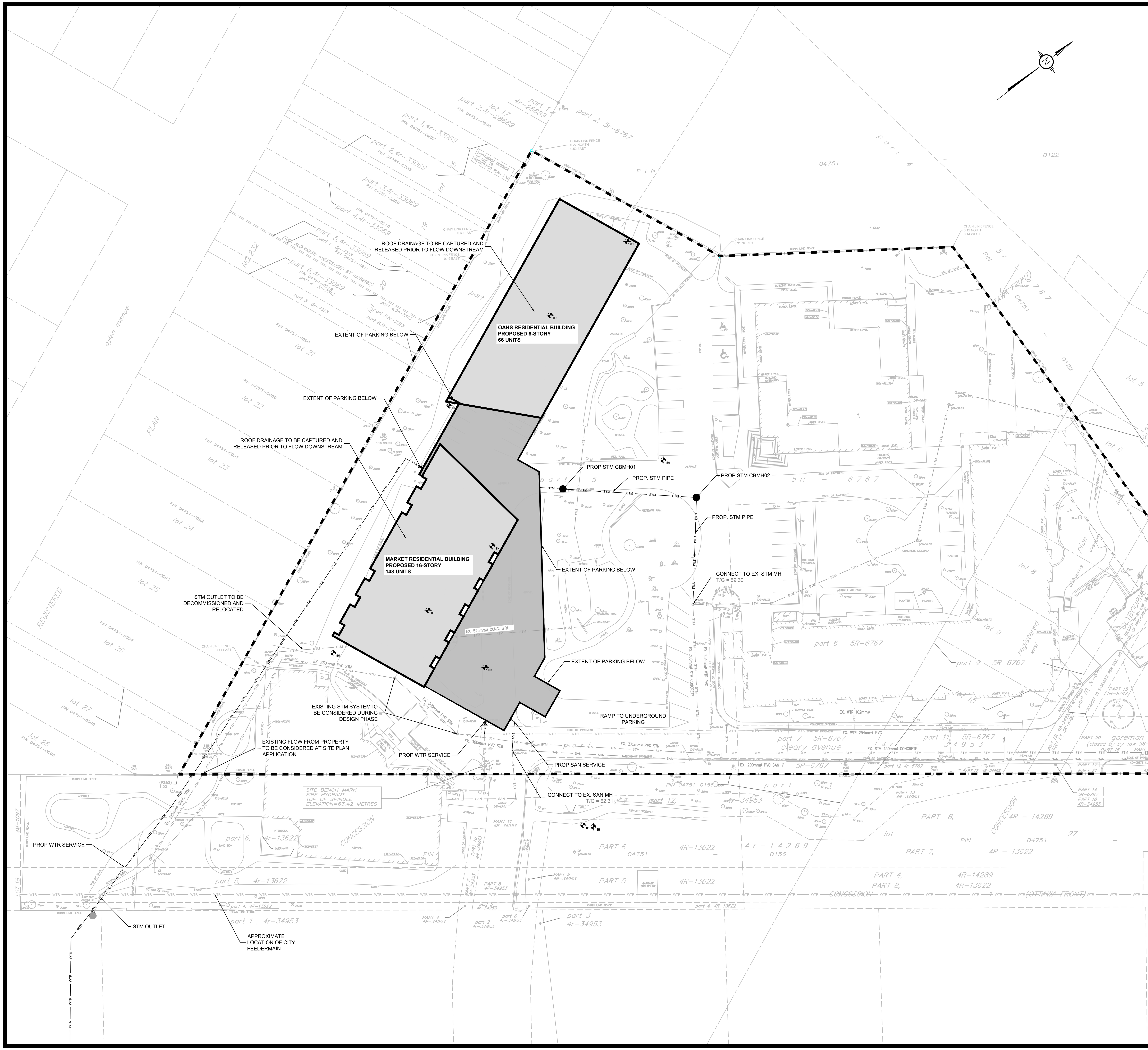
GROUND FLOOR PLAN

30 Cleary Ave.
2314
May 2024

APPENDIX C

Conceptual Servicing and Watershed Plan



LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED FENCE
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00S PROPOSED SWALE ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00BW PROPOSED EXPOSED BOTTOM OF RETAINING WALL
- ×50.00TW PROPOSED TOP OF RETAINING WALL
- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB — SUB PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM — STM PROPOSED STORM SEWER
- SAN — SAN PROPOSED SANITARY SEWER
- WTR — WTR PROPOSED WATERMAIN
- STM — STM EXISTING STORM SEWER
- SAN — SAN EXISTING SANITARY SEWER
- WTR — WTR EXISTING WATERMAIN
- GAS — GAS EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- BH APPROXIMATE BOREHOLE LOCATION
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED — WATERSHED NAME
- RUNOFF — RUNOFF COEFFICIENT
- AREA — AREA IN HECTARES

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

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CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

5m 0 10 20m

SCALE: 1:400

NOT FOR CONSTRUCTION TENDER OR PERMIT

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	M.S.	31 MAY. 2024

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
THEIA PARTNERS

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.S.	V.J.

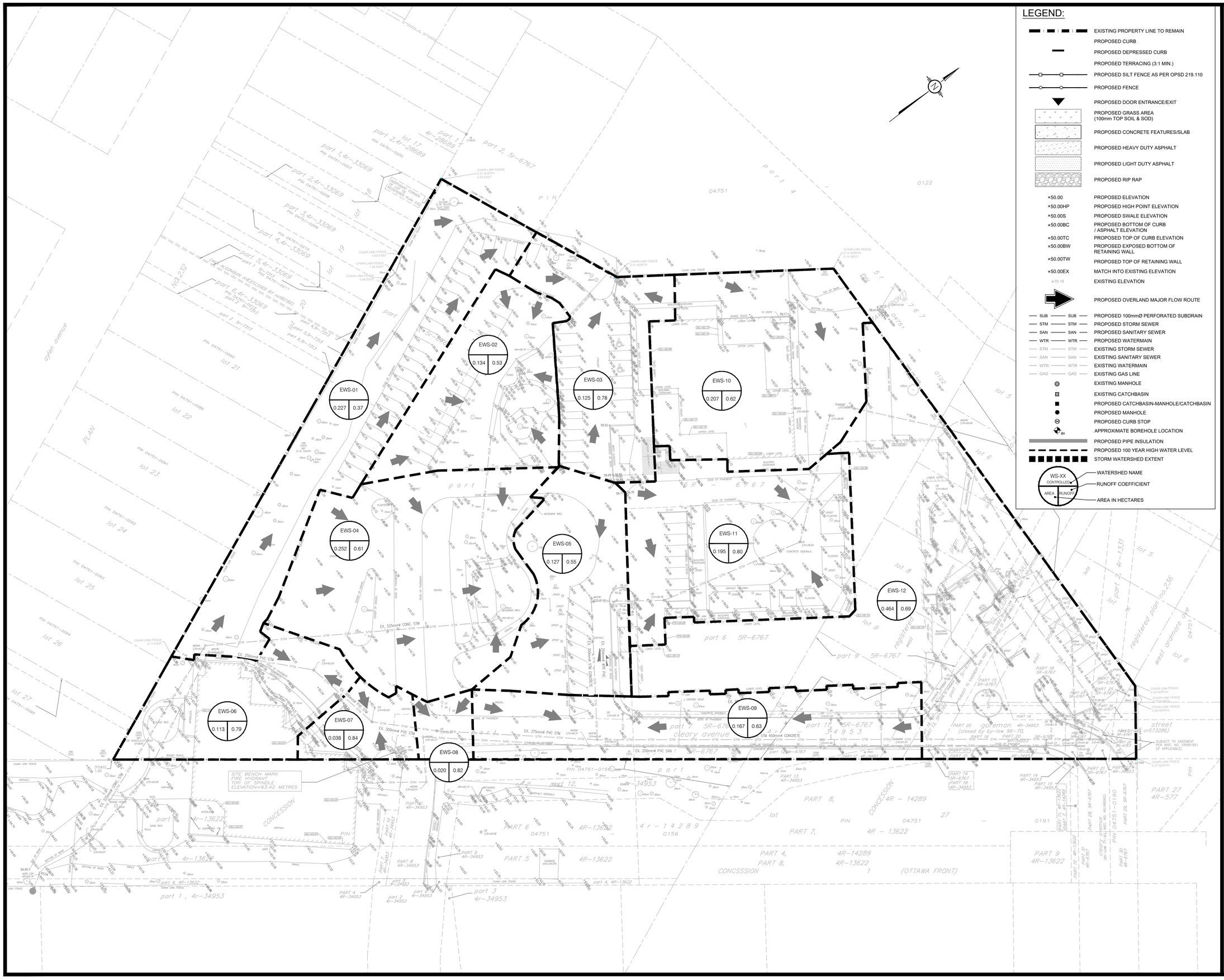
PROJECT
30 CLEARY AVENUE ODAYANHAWAY DEVELOPMENT
30 CLEARY AVENUE, OTTAWA, ON

DRAWING TITLE
CONCEPTUAL SERVICING PLAN

PROJECT NO.
230437

DATE
MAY 2024

C401



LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED FENCE
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
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- WTR WTR PROPOSED WATERMAIN
- STM STM EXISTING STORM SEWER
- SAN SAN EXISTING SANITARY SEWER
- WTR WTR EXISTING WATERMAIN
- GAS GAS EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- BH APPROXIMATE BOREHOLE LOCATION
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT

WS-XX
CONTROLLED
AREA | RUNOFF

- WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS IF REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAILED SIMILARLY AS WORK SHOWN MORE COMPLETELY ELSEWHERE IN THE CONTRACT DOCUMENTS.

BY USE OF THE DRAWINGS FOR CONSTRUCTION OF THE PROJECT, THE OWNER CONFIRMS THAT HE HAS REVIEWED AND APPROVED THE DRAWINGS. THE CONTRACTOR CONFIRMS THAT HE HAS VISITED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

UNLESS THE REVISION TITLE IS "ISSUED FOR CONSTRUCTION", THESE DRAWINGS SHALL BE CONSIDERED PRELIMINARY AND SHALL NOT BE USED AS A CONSTRUCTION DOCUMENT.

THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTAL OF A BID TO PERFORM THIS WORK IS ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHANGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

IN THE EVENT THE CLIENT, THE CLIENT'S CONTRACTORS OR SUBCONTRACTORS, OR ANYONE FOR WHOM THE CLIENT IS LEGALLY LIABLE MAKES OR PERMITS TO BE MADE ANY CHANGES TO ANY REPORTS, PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS PREPARED BY LRL ASSOCIATES LTD. (LRL) WITHOUT OBTAINING LRL'S PRIOR WRITTEN CONSENT, THE CLIENT SHALL ASSUME FULL RESPONSIBILITY FOR THE RESULTS OF SUCH CHANGES, THEREFORE THE CLIENT AGREES TO WAIVE ANY CLAIM AGAINST LRL AND TO RELEASE LRL FROM ANY LIABILITY ARISING DIRECTLY OR INDIRECTLY FROM SUCH UNAUTHORIZED CHANGES.

IN ADDITION, THE CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD HARMLESS LRL FROM ANY DAMAGES, LIABILITIES OR COST, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

IN ADDITION, THE CLIENT AGREES TO INCLUDE IN ANY CONTRACTS FOR CONSTRUCTION APPROPRIATE LANGUAGE THAT PROHIBITS THE CONTRACTOR OR ANY SUBCONTRACTORS OF ANY TIER FROM MAKING ANY CHANGES OR MODIFICATIONS TO LRL'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRL AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRL AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

GENERAL NOTES:

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5m 0 10 20m

SCALE: 1:400

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No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	M.S.	31 MAY. 2024

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www.lrl.ca | (613) 842-3434

CLIENT

THEIA PARTNERS

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.S.	V.J.

PROJECT

30 CLEARY AVENUE ODAYANHAWAY DEVELOPMENT
30 CLEARY AVENUE, OTTAWA, ON

DRAWING TITLE

PRE-DEVELOPMENT WATERSHED PLAN

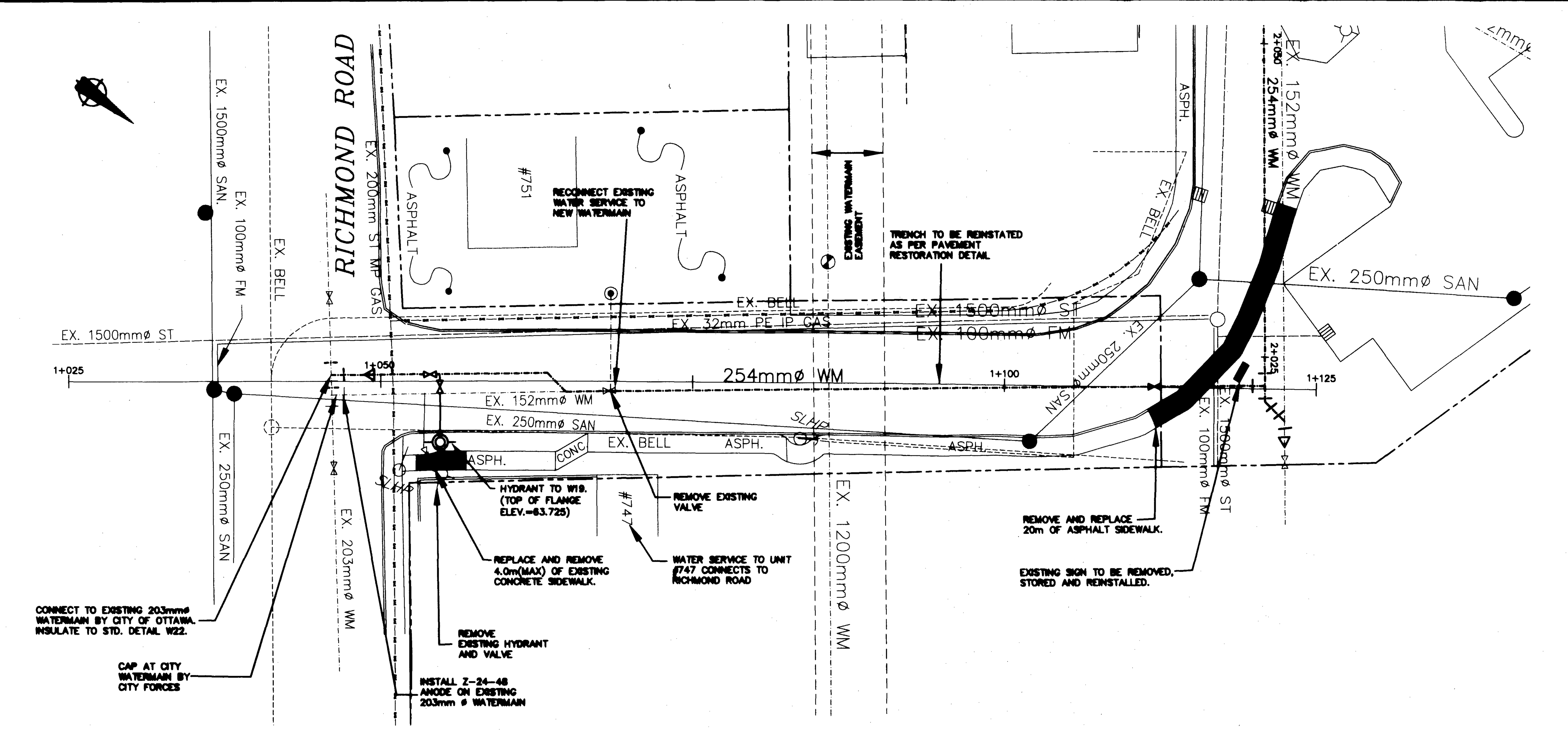
PROJECT NO.
230437

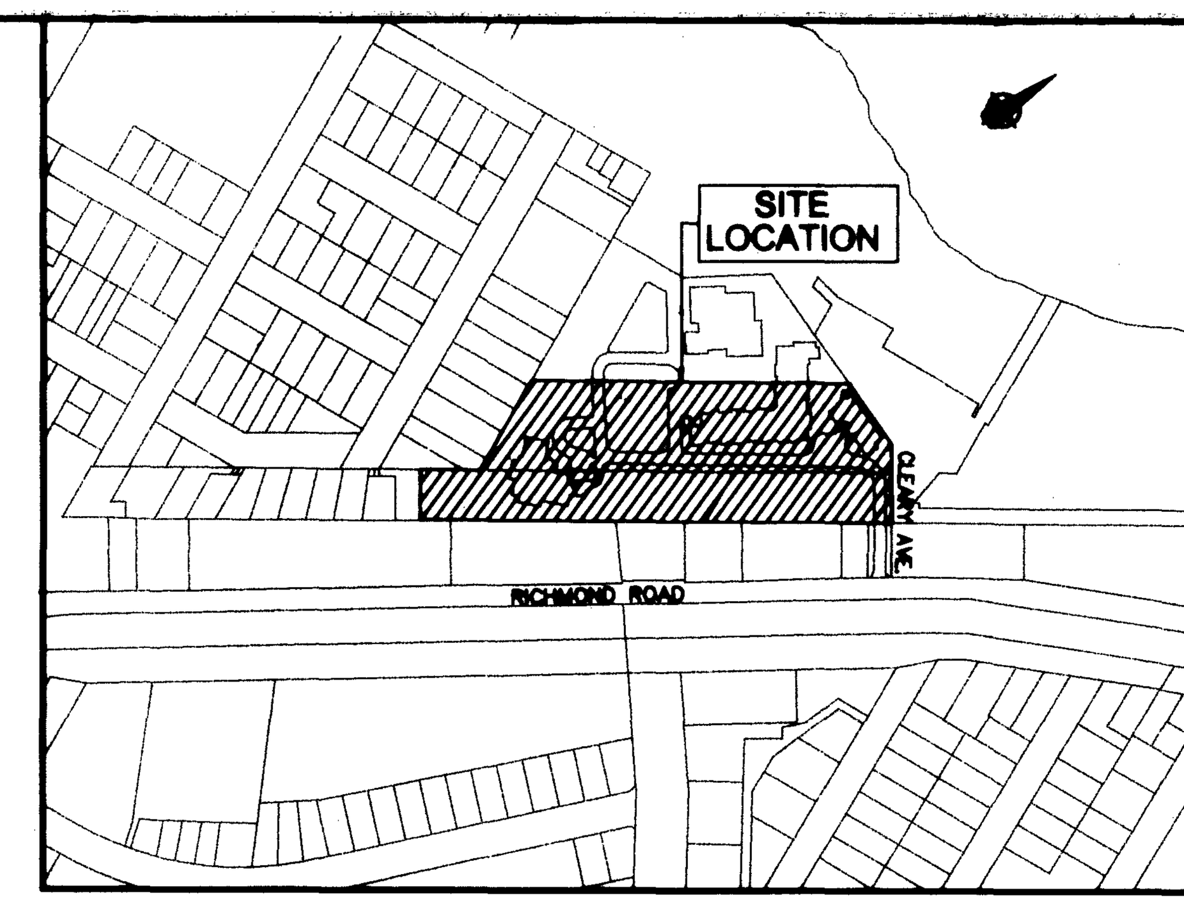
DATE
MAY 2024

C701

APPENDIX C

As-Built Road Profiles – Cleary Avenue





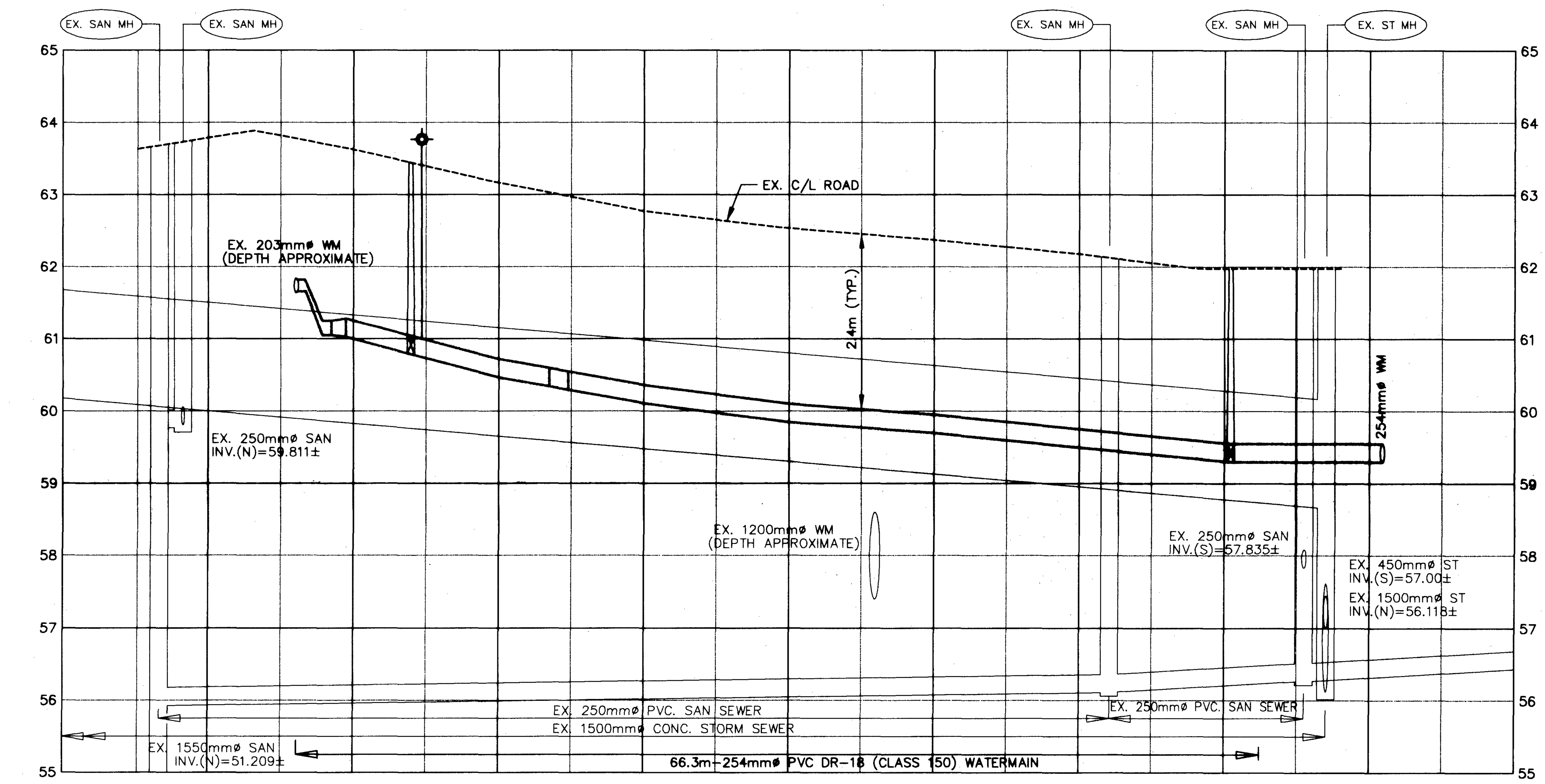
KEY PLAN

LEGEND

- EXISTING CATCH BASIN
- EXISTING WATERMAIN, VALVE & HYDRANT
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- PROPOSED WATERMAIN, VALVE & HYDRANT
- WATERMAIN VALVE AND VALVE BOX
- TP4 63.52 (60.51) — EX. GROUND ELEVATION / ROCK ELEVATION
- PROPERTY LINE

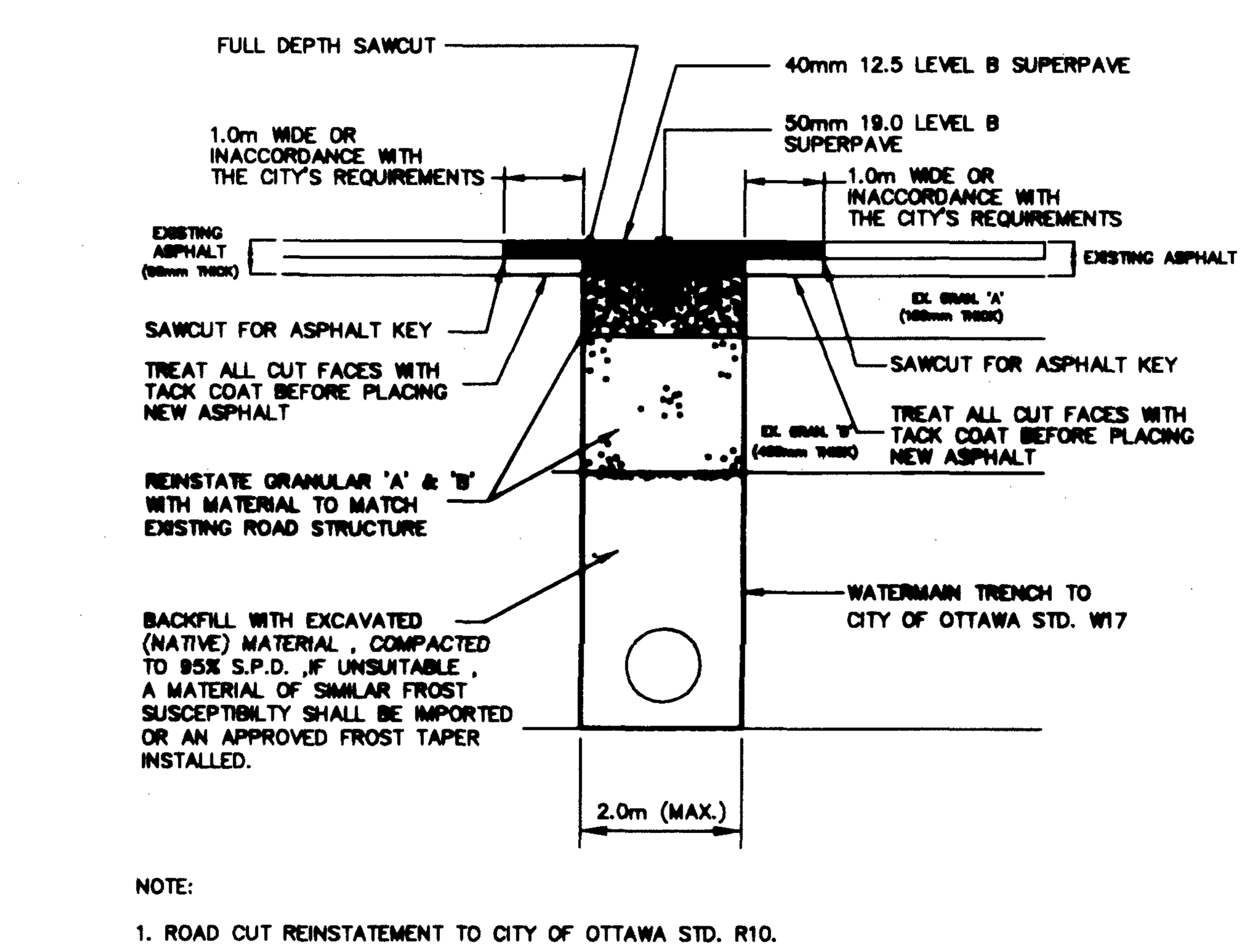
NOTE:
PROPERTY BOUNDARIES ARE APPROXIMATE ONLY AND ARE NOT TAKEN FROM A PLAN OF SURVEY.

CLEARY AVENUE



C.L. ROAD CHAINAGE	EX. C/L ROAD ELEVATION	PROP. TOP WATERMAIN ELEVATION	EX. STORM SEWER INV. ELEVATION	EX. SANITARY SEWER INV. ELEVATION	
1+030					
1+036.66				55.463±	
1+038.27				59.768±	
1+040	63.78				
1+046.06					203X203 TEE
1+046.72					22.5° VERTICAL BEND
1+047.95					22.5° VERTICAL BEND
1+048.98	63.63	61.23			203X254 REDUCER
1+050		61.23			
1+053.95		61.02			254mm ø VALVE & VB
1+054.72	63.40	61.00			HYDRANT VALVE & VB
1+060	63.17	60.77			
1+063.4					45° HORIZONTAL BEND
1+064.8					45° HORIZONTAL BEND
1+070	62.78	60.38			
1+080	62.53	60.13			
1+090	62.37	59.97			
1+100	62.18	59.78			
1+102.10				56.108± 56.118±	
1+110	61.98	59.58			
1+110.43		59.55			254mm ø VALVE & VB
1+112.4					APPROXIMATE LIMIT OF MUNICIPAL WATERMAIN
1+115.50			58.668±	56.260± 56.268±	
1+117.01					
1+120					
1+120.89		59.55			254X254 TEE
1+130					

NOTES:
THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL SERVICES AND UTILITIES PRIOR TO CONSTRUCTION, PROTECT AND ASSUME RESPONSIBILITY FOR ALL UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.



PAVEMENT RESTORATION FOR WATERMAIN TRENCH

NO.	ISSUE	DATE
9	AS CONSTRUCTED INFO ADDED	25/08/09
8	ISSUED FOR UTILITY CIRCULATION	10/05/07
7	ISSUED FOR POST-TENDER ADDENDUM #6	01/02/07
6	ISSUED FOR M.O.E. APPROVAL	26/01/07
5	REVISED PER CITY COMMENTS	23/01/07
4	ISSUED FOR TENDER	01/11/06
3	ISSUED FOR SITE CLIENT REVIEW	27/10/06
2	ISSUED FOR SITE PLAN APPROVAL	15/08/06
1	CLIENT REVIEW	07/04/06

SCALE: 1:250 H
1:50 V

AS CONSTRUCTED INFORMATION
This drawing comprises the original design drawing updated to reflect Contractor supplied information as to final "as constructed" conditions. The Contractor supplied information has not been verified and, as such, this drawing is not warranted by J.L. Richards & Associates Limited for completeness or accuracy.
Date of Issue: August 25, 2009

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

PROFESSIONAL STAMP

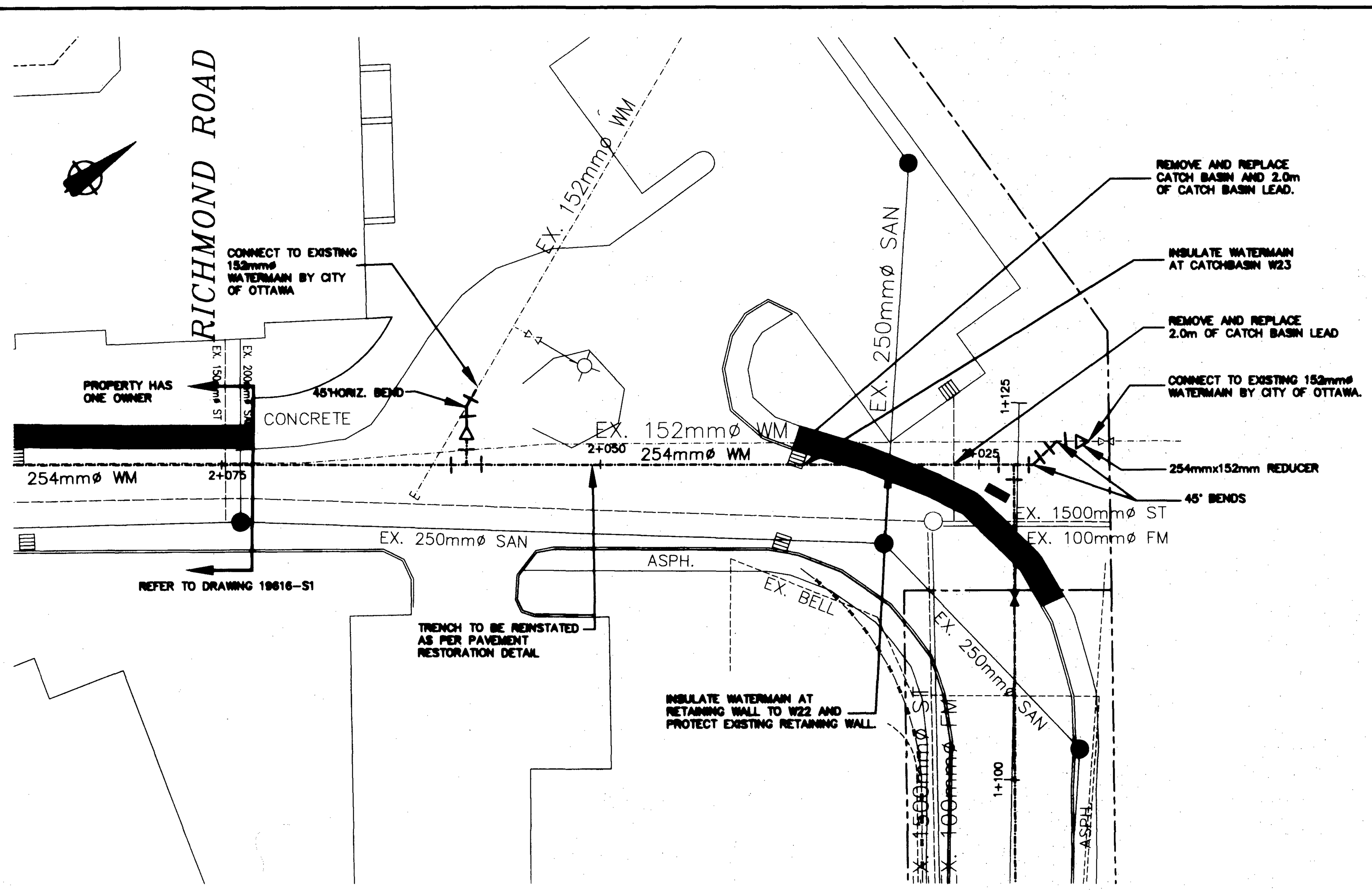
PROJECT NORTH

PROJECT:
RIVER PARKWAY PRESCHOOL CENTRE 40 CLEARY AVENUE
Ottawa, Ontario

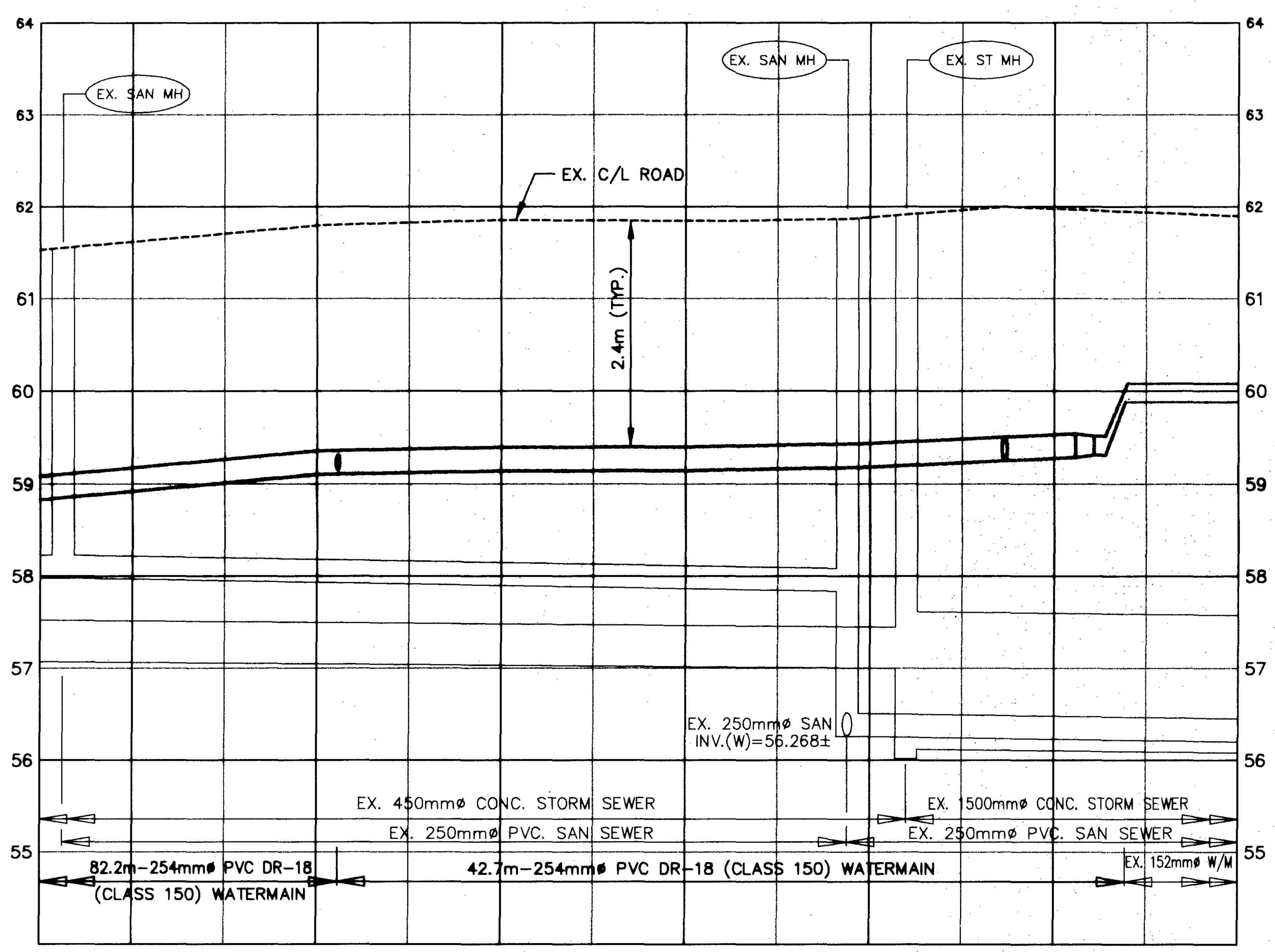
DRAWING:
PLAN AND PROFILE CLEARY AVENUE

DESIGN:	K.D.D.	DRAWING NO.:	01
DRAWN:	J.B.B.		
CHECKED:	P.D.R.		
CAD FILE:	19616-01	JLR JOB NO.:	19616
PLOTTED:	May 10, 2007		

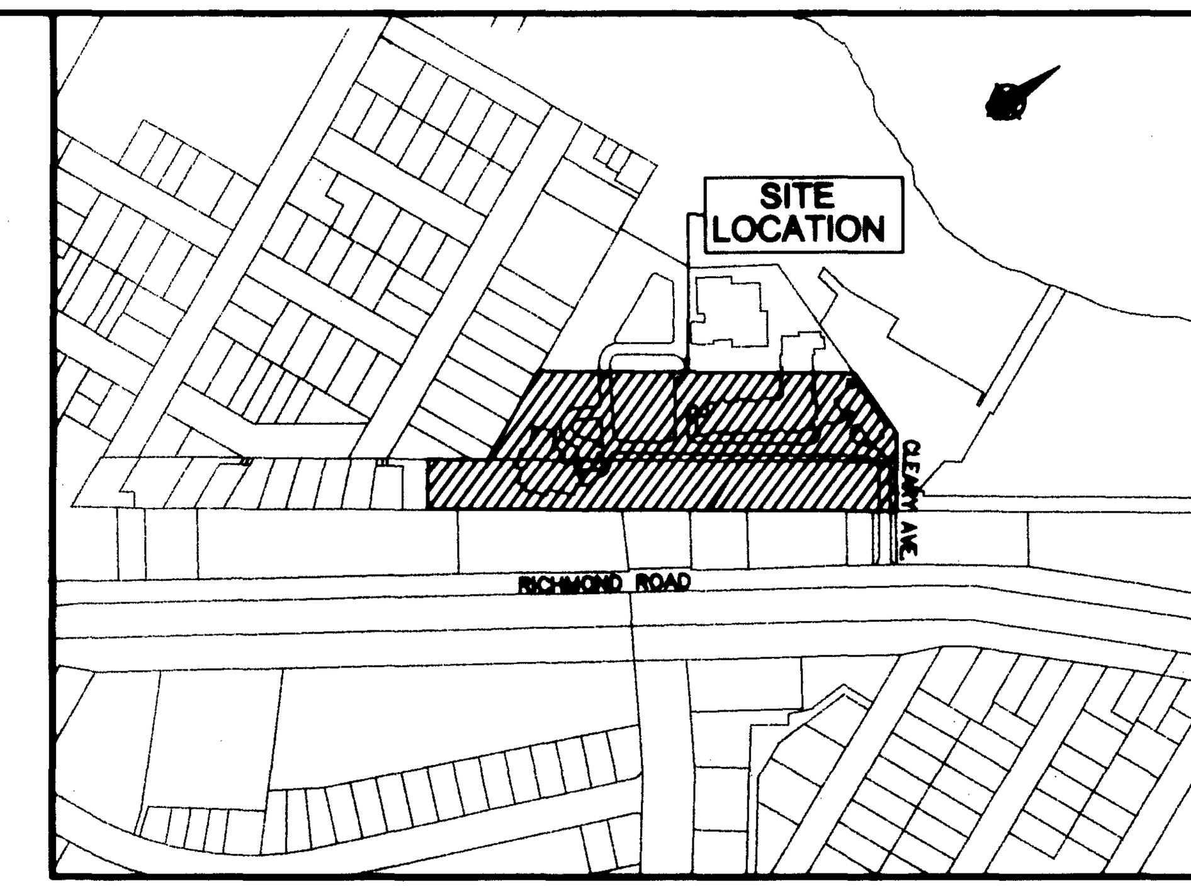
14306



CLEARY AVENUE



C.L. ROAD CHAINAGE	EX. C/L ROAD ELEVATION	PROP. TOP WATERMAIN ELEVATION	EX. STORM SEWER INV. ELEVATION	EX. SANITARY SEWER INV. ELEVATION
2+075 / 0+073.8	61.53	59.13		57.98± / 57.98±
2+070	61.62	59.22		
2+060 / 2+058.9	61.80	59.40	152X254 TEE	
2+050	61.85	59.45		
2+040	61.85	59.45		
2+031.2				57.835± / 56.260±
2+030	61.88	59.48	57.000± / 56.118±	
2+028.0				
2+022.7		254X254 TEE		
2+021.4		45° HORIZONTAL BEND		
2+020	61.98	59.58		
2+019.9		45° HORIZONTAL BEND		
2+018.3		254X152 REDUCER		
2+017.2		22.5° VERTICAL BEND		
2+016.0		22.5° VERTICAL BEND		
2+010	61.80			



KEY PLAN

LEGEND

- EXISTING CATCH BASIN
- EXISTING WATERMAIN, VALVE & HYDRANT
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- PROPOSED WATERMAIN, VALVE & HYDRANT
- WATERMAIN VALVE AND VALVE BOX
- TP4 63.52 (60.51) EX. GROUND ELEVATION / ROCK ELEVATION
- PROPERTY LINE

NOTE: PROPERTY BOUNDARIES ARE APPROXIMATE ONLY AND ARE NOT TAKEN FROM A PLAN OF SURVEY.

NO.	ISSUE	DATE
9	AS CONSTRUCTED INFO ADDED	25/08/09
8	ISSUED FOR UTILITY CIRCULATION	10/05/07
7	ISSUED FOR POST-TENDER ADDENDUM #6	01/02/07
6	ISSUED FOR M.O.E. APPROVAL	26/01/07
5	REVISED PER CITY COMMENTS	23/01/07
4	ISSUED FOR TENDER	01/11/06
3	ISSUED FOR SITE CLIENT REVIEW	27/10/06
2	ISSUED FOR SITE PLAN APPROVAL	15/08/06
1	CLIENT REVIEW	07/04/06

SCALE: 1:250 H, 1:50 V

J.L. Richards — ENGINEERS·ARCHITECTS·PLANNERS
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K1Z 5M2
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PROFESSIONAL STAMP

PROJECT NORTH

PROJECT: RIVER PARKWAY PRESCHOOL CENTRE
40 CLEARY AVENUE
Ottawa, Ontario

DRAWING: PLAN AND PROFILE CLEARY AVENUE

DESIGN:	K.D.D.
DRAWN:	J.B.B.
CHECKED:	P.D.R.
CAD FILE:	19616-01
PLOTTED:	May 10, 2007
DRAWING NO.:	02
JLR JOB NO.:	19616

AS CONSTRUCTED INFORMATION
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Date of Issue: August 25, 2009

14306

APPENDIX D

Water and Fire Demand Calculations and Boundary Conditions

Water Supply Calculations

LRL File No.	230437
Date	2024-02-21
Prepared by	Tamara Harb
Location	30 Cleary Avenue

Water Demand based on the City of Ottawa Design Guidelines-Water Distribution, 2010

Domestic Demand			
Unit Type	**Persons Per Unit**	**Number of Units**	**Population**
1 Bedroom Apartment	1.4	134	187.6
2 Bedroom Apartment	2.1	80	168.0
3 Bedroom Apartment	3.1	0	0.0
	Total	**214**	**355.6**

**Based on a daily demand of 280L/day per person as identified by Appendix 4-A of the Sewer design guidelines.*

Average Water Consumption Rate	280	L/c/d			
Average Day Demand	**99,568**	**L/d**		**1.15**	**L/s**
Maximum Day Factor	3.4		Table (3-3) MOE Peaking Factors		
Maximum Daily Demand	**333,741**	**L/d**		**3.86**	**L/s**
Peak Hour Factor	5.0		Table (3-3) MOE Peaking Factors		
Maximum Hour Demand	**498,238**	**L/d**		**5.77**	**L/s**

Institutional / Commercial / Industrial Demand					
Property Type	**Unit Rate**		**Units**		**Demand (L/d)**
	0	L/ha/d		ha	0.0

Average Day Demand	**-**	**L/d**	**0.000**	**L/s**
Maximum Day Factor	1.5	(Design Guidelines-Water Distribution Table 4.2)		
Maximum Daily Demand	**-**	**L/d**	**0.000**	**L/s**
Peak Hour Factor	1.8	(Design Guidelines-Water Distribution Table 4.2)		
Maximum Hour Demand	**-**	**L/d**	**0.000**	**L/s**

TOTAL DEMAND				
Average Day Demand	**99,568**	**L/d**	**1.15**	**L/s**
Maximum Daily Demand	**333,741**	**L/d**	**3.86**	**L/s**
Maximum Hour Demand	**498,238**	**L/d**	**5.77**	**L/s**

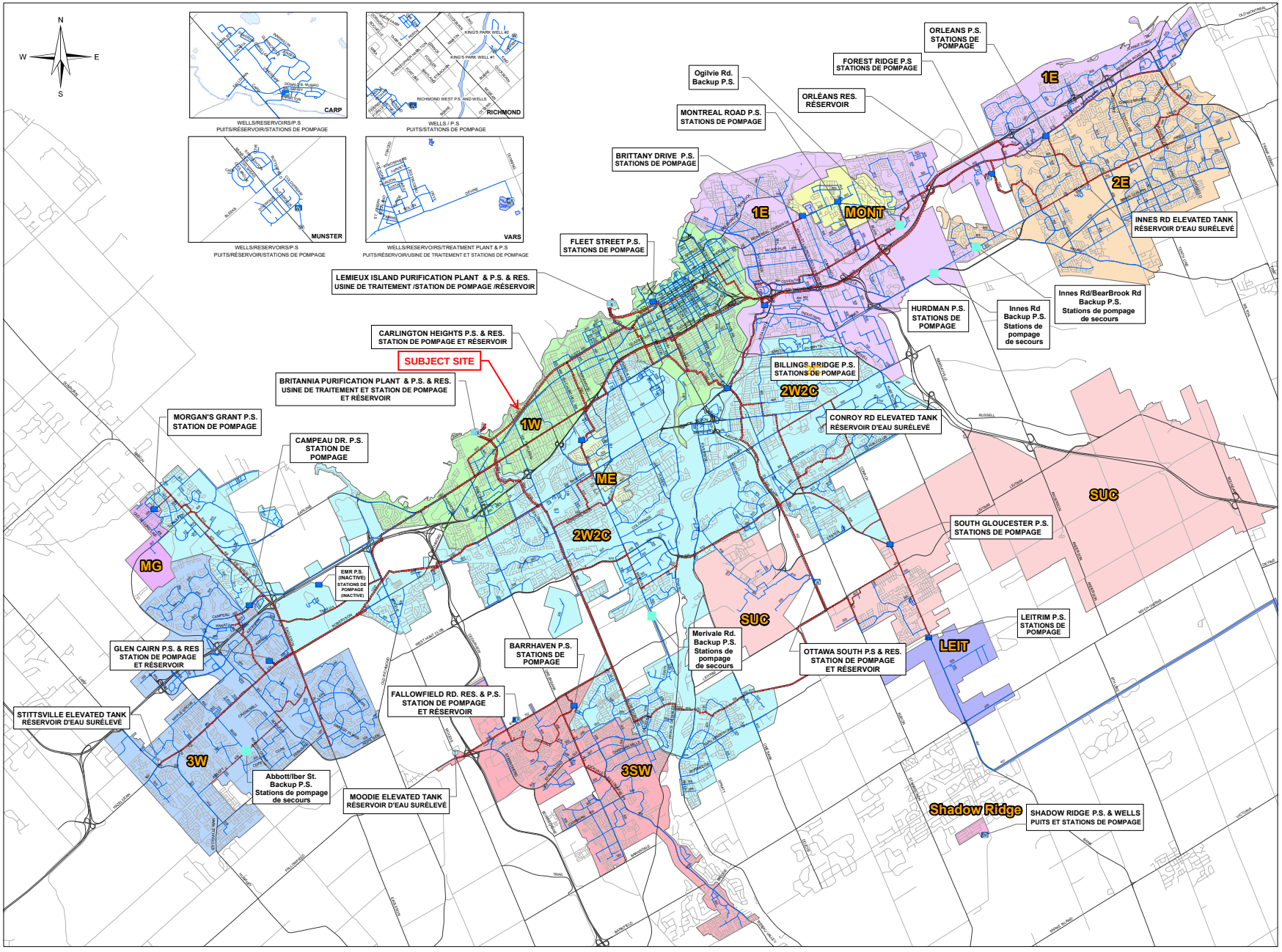
Water Service Pipe Sizing

Q = VA

Where: V = velocity
A = area of pipe
Q = flow rate

Assuming a maximum velocity of 1.8m/s, the diameter of pipe is calculated as:

Minimum pipe diameter (d) =	$(4Q/\pi V)^{1/2}$	
=	0.064	m
=	64	mm
Proposed pipe diameter (d) =	**150**	mm
=	**6**	Inches


N
W
E
S
CARP
WELLS/RESERVOIRS/P.S
PUITS/RÉSERVOIR/STATIONS DE POMPAGE
RICHMOND
WELLS / P.S
PUITS/STATIONS DE POMPAGE
MUNSTER
WELLS/RESERVOIRS/P.S
PUITS/RÉSERVOIR/STATIONS DE POMPAGE
VARS
WELLS/RESERVOIRS/TREATMENT PLANT & P.S
PUITS/RÉSERVOIR/USINE DE TRAITEMENT ET STATIONS DE POMPAGE
ORLEANS P.S. STATIONS DE POMPAGE
FOREST RIDGE P.S STATIONS DE POMPAGE
Ogilvie Rd. Backup P.S.
ORLÉANS RES. RÉSERVOIR
MONTREAL ROAD P.S. STATIONS DE POMPAGE
BRITTANY DRIVE P.S. STATIONS DE POMPAGE
FLEET STREET P.S. STATIONS DE POMPAGE
LEMIEUX ISLAND PURIFICATION PLANT & P.S. & RES.
USINE DE TRAITEMENT /STATION DE POMPAGE /RÉSERVOIR
CARLINGTON HEIGHTS P.S. & RES.
STATION DE POMPAGE ET RÉSERVOIR
SUBJECT SITE
BRITANNIA PURIFICATION PLANT & P.S. & RES.
USINE DE TRAITEMENT ET STATION DE POMPAGE ET RÉSERVOIR
MORGAN'S GRANT P.S.
STATION DE POMPAGE
CAMPEAU DR. P.S.
STATION DE POMPAGE
HURDMAN P.S. STATIONS DE POMPAGE
Innes Rd Backup P.S. Stations de pompage de secours
Innes Rd/BearBrook Rd Backup P.S. Stations de pompage de secours
INNES RD ELEVATED TANK
RÉSERVOIR D'EAU SURÉLÉVÉ
BILLINGS BRIDGE P.S.
STATIONS DE POMPAGE
CONROY RD ELEVATED TANK
RÉSERVOIR D'EAU SURÉLÉVÉ
SOUTH GLOUCESTER P.S.
STATIONS DE POMPAGE
EMR P.S. (INACTIVE)
STATIONS DE POMPAGE (INACTIVE)
BARRHAVEN P.S.
STATIONS DE POMPAGE
Merivale Rd. Backup P.S.
Stations de pompage de secours
OTTAWA SOUTH P.S & RES.
STATION DE POMPAGE ET RÉSERVOIR
LEITRIM P.S.
STATIONS DE POMPAGE
GLEN CAIRN P.S. & RES
STATION DE POMPAGE ET RÉSERVOIR
FALLOWFIELD RD. RES. & P.S.
STATION DE POMPAGE ET RÉSERVOIR
STITTSVILLE ELEVATED TANK
RÉSERVOIR D'EAU SURÉLÉVÉ
Abbott/Iber St. Backup P.S.
Stations de pompage de secours
MOODIE ELEVATED TANK
RÉSERVOIR D'EAU SURÉLÉVÉ
SHADOW RIDGE P.S. & WELLS
PUITS ET STATIONS DE POMPAGE
1E
2E
MONT
1W
ME
2W2C
MG
SUC
LEIT
3W
3SW
Shadow Ridge

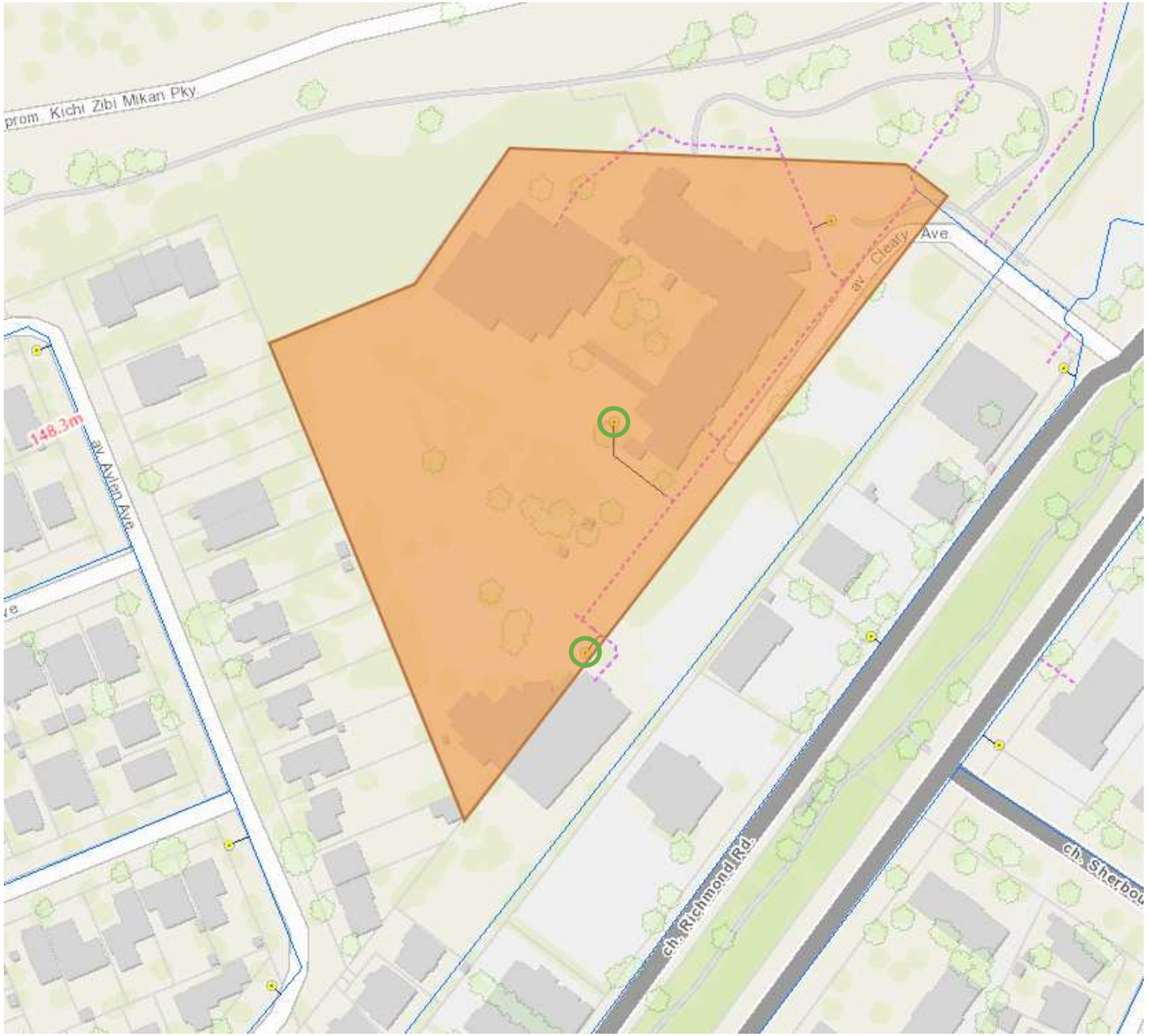
FIRE HYDRANT LOCATIONS
30 Cleary Avenue

LEGEND
Hydrants within 75m
Hydrants within 150m

Table 18.5.4.3 Maximum Fire Hydrant Fire Flow Capacity

Distance to Building[a]		Maximum Capacity[b]	
(ft)	(m)	(gpm)	(L/min)
≤ 250	≤ 76	1500	5678
> 250 and ≤ 500	> 76 and ≤ 152	1000	3785
> 500 and ≤ 1000	> 152 and ≤ 305	750	2839

[a]Measured in accordance with 18.5.1.4 and 18.5.1.5.
[b]Minimum 20 psi (139.9 kPa) residual pressure.



Fire Flow Calculations

LRL File No. 230437
Date May 10, 2024
Method Fire Underwriters Survey (FUS)
Prepared by Momen Siam
Location 30 Cleary Avenue, Ottawa, ON. **OAHS Building**

Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Structural Framing Material								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	**0.8**		
			Ordinary Construction	1.0				
			Non-combustible construction	0.8				
			Fire resistive construction <2 hrs	0.7				
			Fire resistive construction >2 hrs	0.6				
Floor Space Area (A)								
2	Total area					**6,080**	m^2	
3	Obtain fire flow before reductions	Required fire flow *(rounded to nearest 1,000 L/min)*	Fire Flow = 220 x C x $A^{0.5}$				L/min	**14,000**
Reductions or surcharge due to factors affecting burning								
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-25%	Limited combustible	**-15%**	L/min	**11,900**
			Limited combustible	-15%				
			Combustible	0%				
			Free burning	15%				
			Rapid burning	25%				
5	Choose reduction for sprinklers	Sprinkler reduction	Full automatic sprinklers	-30%	True	**-30%**	L/min	**5,950**
			Water supply is standard for both the system and fire department hose lines	-10%	True	**-10%**		
			Fully supervised system	-10%	True	**-10%**		
6	Choose separation	Exposure distance between units	North side	>30m	0%		L/min	**10,710**
			West side	20.1 to 30m	10%			
			East side	20.1 to 30m	10%			
			South side	3.1 to 10m	20%	**40%**		
Net required fire flow								
7	Obtain fire flow, duration, and volume				Minimum required fire flow rate (rounded to nearest 1000)		L/min	**11,000**
					Minimum required fire flow rate		L/s	**183.3**
					Required duration of fire flow		hr	**4.5**

Fire Flow Calculations

LRL File No. 230437
Date May 10, 2024
Method Fire Underwriters Survey (FUS)
Prepared by Momen Siam
Location 30 Cleary Avenue, Ottawa, ON. **Market Building**

Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Structural Framing Material								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	**0.8**		
			Ordinary Construction	1.0				
			Non-combustible construction	0.8				
			Fire resistive construction <2 hrs	0.7				
			Fire resistive construction >2 hrs	0.6				
Floor Space Area (A)								
2	Total area					**5,232**	m^2	
3	Obtain fire flow before reductions	Required fire flow *(rounded to nearest 1,000 L/min)*	Fire Flow = 220 x C x $A^{0.5}$				L/min	**13,000**
Reductions or surcharge due to factors affecting burning								
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-25%	Limited combustible	**-15%**	L/min	**11,050**
			Limited combustible	-15%				
			Combustible	0%				
			Free burning	15%				
			Rapid burning	25%				
5	Choose reduction for sprinklers	Sprinkler reduction	Full automatic sprinklers	-30%	True	**-30%**	L/min	**5,525**
			Water supply is standard for both the system and fire department hose lines	-10%	True	**-10%**		
			Fully supervised system	-10%	True	**-10%**		
6	Choose separation	Exposure distance between units	North side	3.1 to 10m	20%		L/min	**9,945**
			West side	>30m	0%			
			East side	>30m	0%			
			South side	3.1 to 10m	20%	**40%**		
Net required fire flow								
7	Obtain fire flow, duration, and volume	Minimum required fire flow rate (rounded to nearest 1000)					L/min	**10,000**
		Minimum required fire flow rate					L/s	**166.7**
		Required duration of fire flow					hr	**2**

Momen Siam

From: Dieme, Abi <Abibatou.Dieme@ottawa.ca>
Sent: May 27, 2024 11:01 AM
To: Virginia Johnson
Cc: Momen Siam; Shen, Stream; Gorni, Colette; Tyler Yakichuk; Scott Bentley; Rodney Wilts; Brian Casagrande; Roberto Campos
Subject: RE: 30 Cleary Follow-up - Engineering Comments
Attachments: 30 Cleary Avenue May 2024.pdf

Hi Virginia,

The following are boundary conditions, HGL, for hydraulic analysis at 30 Cleary Avenue (zone 1W) assumed to be connected via two connections to the 254mm watermain on Cleary Avenue and 203mm watermain on Richmond Road (see attached PDF for location).

Please note that the municipal watermain on Richmond Rd can only support a required fire flow of 9270 L/min. As such the proposed RFF must be reduced to meet the minimum 20 psi at both connections.

Connection 1 (Cleary):

Minimum HGL: 108.7 m

Maximum HGL: 115.6 m

Max Day+ Fire Flow (183.33 L/s): 86.5 m

Connection 2 (Richmond):

Minimum HGL: 108.7 m

Maximum HGL: 115.8m

Available Fire Flow at 20 (psi): 154.5 L/s, assuming ground elevation of 65.4 m

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,
Abi

From: Dieme, Abi
Sent: May 27, 2024 9:37 AM

To: Virginia Johnson <vjohnson@lrl.ca>
Cc: Momen Siam <msiam@lrl.ca>; Shen, Stream <Stream.Shen@ottawa.ca>; Gorni, Colette <colette.gorni@ottawa.ca>; Tyler Yakichuk <yakichuk@fotenn.com>; Scott Bentley <bentley@theiapartners.com>; Rodney Wilts <rodneyw@theiapartners.com>; Brian Casagrande <casagrande@fotenn.com>; Roberto Campos <rcampos@figurr.ca>
Subject: RE: 30 Cleary Follow-up - Engineering Comments

Hi Virginia,

I have reached out to IWSD for an update last week. I'll get back to you as soon as I obtain a response.

Regards,
Abi

From: Virginia Johnson <vjohnson@lrl.ca>
Sent: May 23, 2024 9:21 AM
To: Dieme, Abi <Abibatou.Dieme@ottawa.ca>
Cc: Momen Siam <msiam@lrl.ca>; Shen, Stream <Stream.Shen@ottawa.ca>; Gorni, Colette <colette.gorni@ottawa.ca>; Tyler Yakichuk <yakichuk@fotenn.com>; Scott Bentley <bentley@theiapartners.com>; Rodney Wilts <rodneyw@theiapartners.com>; Brian Casagrande <casagrande@fotenn.com>; Roberto Campos <rcampos@figurr.ca>
Subject: RE: 30 Cleary Follow-up - Engineering Comments

Hello Abi,
Are you able to give me an update on expected timeline for receiving these boundary conditions?
Thanks,

Virginia Johnson, P. Eng.
Civil Engineering Manager/Associate
LRL Engineering | lrl.ca
Cell: (613) 915-9503 | vjohnson@lrl.ca

Excited to announce we are now also operating out of our Pembroke Office, located at **1344 Pembroke Street West, Pembroke ON**

From: Dieme, Abi <Abibatou.Dieme@ottawa.ca>
Sent: Tuesday, May 14, 2024 9:06 AM
To: Virginia Johnson <vjohnson@lrl.ca>

Cc: Momen Siam <msiam@lrl.ca>; Shen, Stream <Stream.Shen@ottawa.ca>; Gorni, Colette <colette.gorni@ottawa.ca>; Tyler Yakichuk <yakichuk@fotenn.com>; Scott Bentley <bentley@theiapartners.com>; Rodney Wilts <rodneyw@theiapartners.com>; Brian Casagrande <casagrande@fotenn.com>; Roberto Campos <rcampos@figurr.ca>
Subject: RE: 30 Cleary Follow-up - Engineering Comments

Hi Virginia,

I will follow up with the Water Resources senior engineer. However, Development Review does not have control over their timeline.

Regards,
Abi

From: Virginia Johnson <vjohnson@lrl.ca>
Sent: May 13, 2024 6:03 PM
To: Dieme, Abi <Abibatou.Dieme@ottawa.ca>
Cc: Momen Siam <msiam@lrl.ca>; Shen, Stream <Stream.Shen@ottawa.ca>; Gorni, Colette <colette.gorni@ottawa.ca>; Tyler Yakichuk <yakichuk@fotenn.com>; Scott Bentley <bentley@theiapartners.com>; Rodney Wilts <rodneyw@theiapartners.com>; Brian Casagrande <casagrande@fotenn.com>; Roberto Campos <rcampos@figurr.ca>
Subject: RE: 30 Cleary Follow-up - Engineering Comments

Hello Abi,
I wanted to follow up on the status of the boundary conditions requested for the water data. As discussed, I know it's a tight turn around, however, hopeful that given the file is active, and the demands were a revision to the previous data that we would receive this very soon.

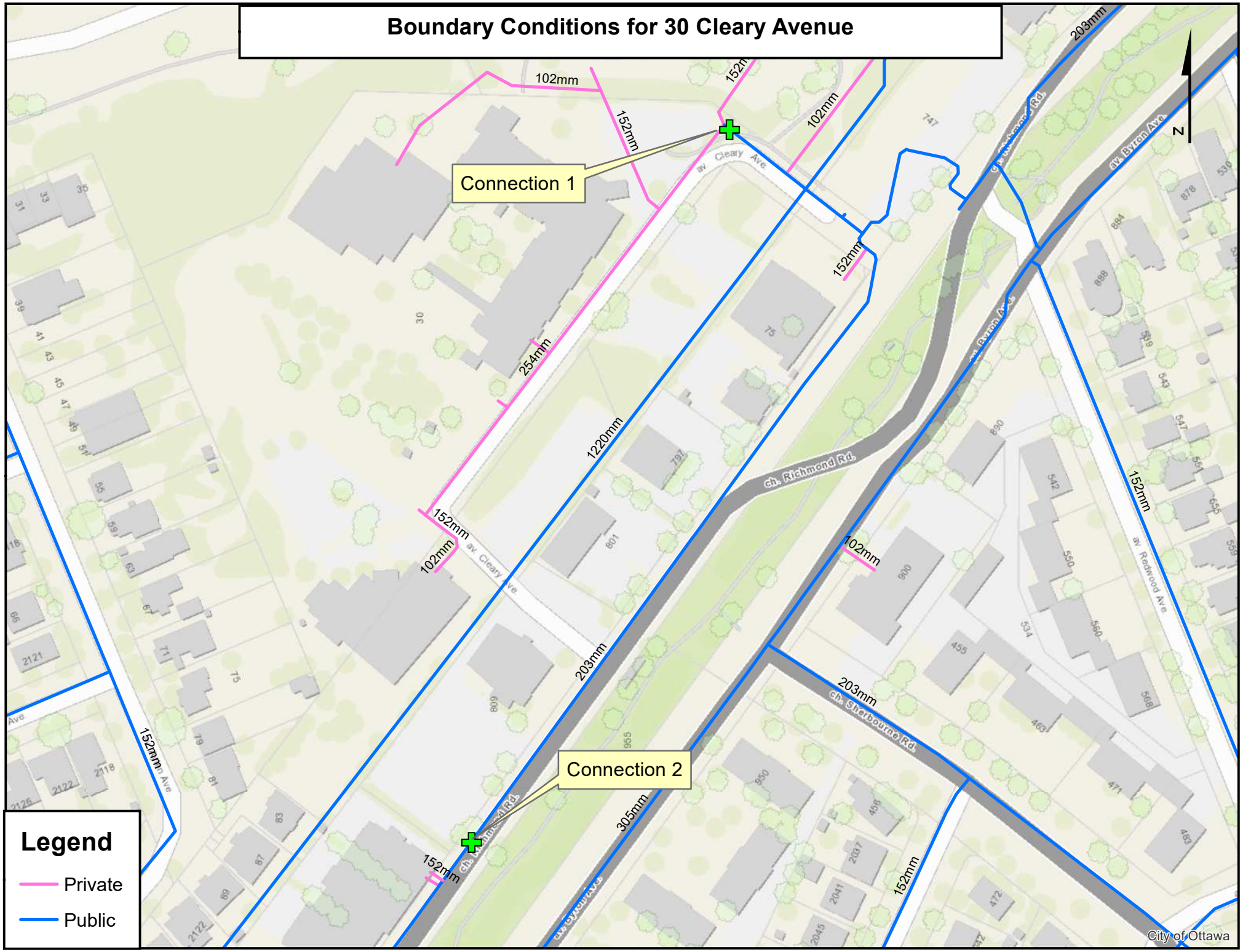
We are actively pushing to submit this week, so this input will be critical.
Thank you for your help on this.

Thanks,

Virginia Johnson, P. Eng.
Civil Engineering Manager/Associate
LRL Engineering | lrl.ca
Cell: (613) 915-9503 | vjohnson@lrl.ca

Excited to announce we are now also operating out of our Pembroke Office, located at **1344 Pembroke Street West, Pembroke ON**

Boundary Conditions for 30 Cleary Avenue



APPENDIX E

Sanitary Flow Calculations

LRL File No. 230437
Project: Mixed-Use Development/High Density Residential
Location: 30 Cleary Avenue
Date: May 31, 2024

Sanitary Design Parameters

Average Daily Flow = 280 L/p/day
Commercial & Institutional Flow = 28000 L/ha/day
Light Industrial Flow = 35000 L/ha/day
Heavy Industrial Flow = 55000 L/ha/day
Maximum Residential Peak Factor = 4.0
Commercial & Institutional Peak Factor = 1.00
Industrial Peak Factor = as per Appendix 4-B = 7
Extraneous Flow = 0.33L/s/gross ha

Pipe Design Parameters

Minimum Velocity = 0.60 m/s
Manning's n = 0.013

LOCATION			RESIDENTIAL AREA AND POPULATION						COMMERCIAL		INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			TOTAL FLOW (l/s)	PIPE					
STREET	FROM	TO	AREA (Ha)	POP.	CUMMULATIVE AREA (Ha)	CUMMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (Ha)	ACCU. AREA (Ha)	AREA (Ha)	ACCU. AREA (Ha)	PEAK FACT.	AREA (Ha)	ACCU. AREA (Ha)	PEAK FLOW (l/s)	TOTAL AREA (Ha)	ACCU. AREA (Ha)	INFILT. FLOW (l/s)		LENGTH (m)	DIA. (mm)	SLOPE (%)	MATERIAL	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)
Cleary Avenue	Proposed	*MH51048*	**0.570**	**355.6**	0.57	355.6	3.4	3.96	0.000	**0.000**	0.00	0.00	0.0	0.0	0.0	0.00	1.990	1.990	0.66	4.62	9.0	250	0.35%	PVC	35.18	0.72
Cleary Avenue	Daycare	*MH51049*	**0.130**	**67.0**	0.13	67.0	1.0	0.05	0.000	**0.000**	0.00	0.00	0.0	0.0	0.0	0.00		0.000	0.00	0.05				PVC	0.00	#DIV/0!
Cleary Avenue	*MH51048*	*MH51438*	**0.000**	**0.0**	0.00	0.0	3.8	0.00	0.000	**0.000**	0.00	0.00	0.0	0.0	0.0	0.00		0.000	0.00	4.66				PVC	0.00	#DIV/0!
Cleary Avenue	Unitarian House	*MH51046*	**0.260**	**130.0**	0.26	130.0	3.6	1.32	0.000	**0.000**	0.00	0.00	0.0	0.0	0.0	0.00		0.000	0.00	5.99				PVC	0.00	#DIV/0!
Cleary Avenue	*MH51046*	*MH26168*	**0.000**	**0.0**	0.00	0.0	3.8	0.00	0.000	**0.000**	0.00	0.00	0.0	0.0	0.0	0.00		0.000	0.00	5.99				PVC	0.00	#DIV/0!
Cleary Avenue	Church	*MH26168*	**0.140**	**100.0**	0.14	100.0	1.0	0.03	0.000	**0.000**	0.00	0.00	0.0	0.0	0.0	0.00		0.000	0.00	6.02				PVC	0.00	#DIV/0!
Cleary Avenue	*MH26168*	*MH26169 Richmond Rd.*	**0.000**	**0.0**	0.00	0.0	3.8	0.00	0.000	**0.000**	0.00	0.00	0.0	0.0	0.0	0.00		0.000	0.00	6.02				PVC	0.00	#DIV/0!

NOTES	Populations have been estimated based on concept plan

Designed: M.S.	PROJECT: Mixed-Use Development/High Density Residential		
Checked: V.J.	LOCATION: 30 Cleary Avenue		
Dwg. Reference: C.401	File Ref.: 230437	Date: 2024-05-31	Sheet No. 1 of 1

APPENDIX G

Stormwater Management Calculations

LRL Associates Ltd.
Storm Watershed Summary

LRL File No.	230437
Project:	Site Plan Control Design
Location:	30 Cleary Ave.
Date:	May 31, 2024
Designed:	Momen Siam
Drawing Reference:	C701/C702

Pre-Development Catchments

WATERSHED	C = 0.2	C=0.7	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C	Outlet Direction
EWS-01	1723.2	0.0	544.4	2267.5	0.227	0.37	NCC
EWS-02	668.9	158.3	511.0	1338.2	0.134	0.53	NCC
EWS-03	209.6	0.0	1044.1	1253.6	0.125	0.78	NCC
EWS-04	660.1	1312.0	551.0	2523.0	0.252	0.61	NCC
EWS-05	640.8	0.0	631.1	1271.9	0.127	0.55	Cleary
EWS-06	175.4	0.0	950.4	1125.7	0.113	0.79	Cleary
EWS-07	31.0	0.0	352.0	383.0	0.038	0.84	Cleary
EWS-08	9.6	46.8	140.5	196.8	0.020	0.82	Cleary
EWS-09	615.7	129.8	924.4	1669.8	0.167	0.63	Cleary
EWS-10	819.2	0.0	1255.0	2074.2	0.207	0.62	Cleary
EWS-11	280.1	0.0	1670.6	1950.8	0.195	0.80	Cleary
EWS-12	1397.9	0.0	3243.9	4641.8	0.464	0.69	Cleary
TOTAL	**7231.4**	**1646.8**	**11818.2**	**20696.4**	**2.070**	**0.64**	

LRL File No.	230437
Project:	Site Plan Control Design
Location:	30 Cleary Ave
Date:	May 31, 2024
Designed:	V Johnson
Drawing Ref.:	C701

Stormwater Management Design Sheet

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = $A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Stormwater Allowed Releasing towards Cleary Avenue- 2 Year Storm

*Portion of site directed towards Cleary Ave.

2 year storm

$I2 = 732.95 / (Td + 6.199)^{0.81}$

a = 732.951 **b = 0.810** **C = 6.199**

C =	0.50	max of 0.5 as per City of Ottawa
I =	76.8	mm/hr
Tc =	10	min
Total Area =	1.331	ha

Allowable Release Rate= 142.10 L/s

APPENDIX H

Pre- Consultation Notes

File No.: PC2023-0383

Tyler Yakichuk
Fotenn Planning and Design
Via email: yakichuk@fotenn.com

Subject: **Phase 3 Pre-Consultation: Review Feedback**
Proposed Zoning By-law Amendment and Official Plan Amendment – 30 Cleary Avenue

Please find below information regarding next steps as well as consolidated comments from the review of the studies and plans submitted in support of the above-noted pre-consultation.

Next Steps

1. A review of the materials submitted for the above-noted pre-consultation has been undertaken and staff have identified deficiencies needing to be resolved**.** Please proceed to complete a Pre-consultation Application Form for another Phase 3 review and submit together with the necessary revised studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent Phase 3 pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

Proposal

- The proposed development contemplates the development of two buildings on the existing parking lot area, abutting the western property line. A 6-storey building is proposed at the north-west side of the property, and a 16-storey building is proposed on the south end of the parking lot area. Associated parking is located below grade and is accessible from the north-west corner of the 6-storey building.

- The tower of the 16-storey building has been set back 16.1 metres from the interior side yard lot line. There is an existing mature bosque of trees that act as a landscape buffer between the subject property and the abutting low-rise neighbourhood that is intended to be preserved.

- The site is currently occupied by a two-storey place of worship (First Unitarian Church), four storey low-rise residential building (Unitarian House), and a one-storey day care facility (River Parkway Children's Centre).

- An Official Plan Amendment (OPA) is being sought to amend Policy 17(a) of the Sherbourne and New Orchard Secondary Plan to reduce the requirement of a 30-metre transition zone from adjacent residential zones to a specifically defined distance from the abutting residential zone.

- A Zoning By-law Amendment (ZBA) is being sought to rezone the site to "I1A[XXXX]" (Minor Institutional Zone, Subzone A, Urban Exception XXXX). Proposed urban exception XXXX includes the following:

    - Add "apartment dwelling, mid-rise" and "apartment dwelling, high-rise" as permitted uses;

    - Add "communal amenity area" to the list of structures noted in Section 64 – Permitted Projections Above the Height Limit, of the Zoning By-law; and

    - Increase maximum permitted building height from 13.8, 18, and 25 metres to 49.8 metres with a height schedule that would limit this to the footprint of one of the new buildings.

Planning

List of Studies and Plans Reviewed:

- **Response to Phase 1 Pre-Consultation Feedback,** prepared by Fotenn Planning + Design, dated November 16, 2023.

- **Urban Design Brief,** prepared by Fotenn Planning + Design, dated November 2023.

- **Site Plan,** A010, prepared by Fotenn Planning + Design, dated 2023-08-01, revision 1 dated 2023-11-07.

- **Landscape Concept Plan & Sections,** L1 of 1, prepared by Fotenn Planning + Design, dated 2023/07/14, revision 00 dated 2023/11/01.

- **Planning Rationale,** prepared by Fotenn Planning + Design, dated November 13, 2023.

- **Survey Plan,** prepared by Stantec, dated June 8, 2023.

Deficiencies:

1. Site Plan

    a. Dimensions of the subject land

    b. Clearly identify the extent of the Cleary Avenue right-of-way.

c. Show the footprint of the ground floor of the proposed six-storey building – based on the elevation drawings, it does not appear that whole building has an angled southern façade.

2. Landscape Concept Plan & Sections

    a. Add professional seal of the qualified Landscape Architect.

3. Planning Rationale

    a. Add section detailing the proposed development.

    b. Provide further discussion on the High-rise Design Guidelines.

    c. Demonstrate how the proposal meets the requirements under the Parkland Dedication By-law. Provide details regarding the provision of new parks, or 3 the extension of existing parks. Describe how the proposal meets the policies in Sub-section 4.4 - Parks and Recreation Facilities, of the Official Plan and responds to the needs assessments outlined in the Parks and Recreation Facilities Master Plan. If cash-in-lieu of parkland is proposed, provide a rationale.

    d. Add Section addressing Section 12.3 of the Official Plan.

Comments:

Policy

4. The following policies apply to the site:

    a. The subject site is designated Neighbourhood, subject to the Evolving Neighbourhoods Overlay, on Schedule B2 – Inner Urban Transect.

    b. The subject site is designated Institutional Mixed-Use on Schedule A – Designation Plan of the Sherbourne and New Orchard Secodnary Plan.

    c. The are no applicable Area-specific policies or Community Design Plan.

5. An Official Plan Amendment (OPA) is required to deviate from the requirement for a 30-metre transition zone, including a 7.5-metre setback measured from the residential lot line, with a low-rise built form, identified in Policy 17a of the Sherbourne and New Orchard Secondary Plan. Staff have concerns with the proposed OPA – further rationale is required to justify the deviation from policy direction in the Secondary Plan. Please provide the following in the next submission:

    a. Clarification on whether the proposed tower meets the 45-degree angular plane. There are contradicting statements in the Planning Rationale regarding the angular plane for the proposed high-rise building. On page 19 of the Planning Rationale, it is noted that “the high-rise building meets

the angular plane provision when measuring the angular plan from the average setback of the abutting residential dwellings". Whereas the next response on page 19 notes that a strict application of the angular plane demonstrates that it transects the upper elements of the tower." Please also provide drawing(s) as part of the next submission showing the following applications of the 45-degree angular plane: (1) from the property line abutting the residential zone to the west, (2) from the existing low-rise residential homes, and (3) the future context as envisioned per the Evolving Neighbourhoods Overlay policies.

b. Further discussion on the design techniques utilized to mitigate the impacts of a reduced transition zone. On page 19 of the Planning Rationale, it is noted that "the Official Plan explicitly states that angular plane is to be considered in conjunction with other design considerations, such as those mentioned above, when evaluating successful development transition." Staff recognize that transition can be achieved using a several different tools and design techniques; however, further information is required to understand what the other design techniques were utilized for the development beyond the 750m^2 tower floorplate.

c. Please elaborate further on the following statement on page 16 of the Planning Rationale – "To provide an appropriate transition to the existing low-rise neighbourhood to the west of the proposed development, the tower of the 16-storey building has been set back 16.1 metres from the interior side yard lot line (more than twice the required 7.5 metre zoning setback)." Provide discussion on the direction in the High-rise Design Guidelines related to transition from new development to abutting low-rise neighbourhoods.

d. Provide discussion as to why the definition of "transition zone" should include the provided rear yards of the abutting low-rise residential.

e. Add Section to the Planning Rationale addressing Section 12.3 of the Official Plan.

Zoning

6. Please note that staff would include a site-specific zoning schedule as part the rezoning to address the following:

    a. Permitted building heights, building/tower setbacks, step backs, etc.

    b. Limit the location of permitted residential uses / non-community servicing uses throughout the site.

    The zoning schedule will address the whole site in order to ensure that the direction in the Policy 20a of the Secondary Plan, requiring that future zoning by-law

amendment applications to add permitted uses and/or alter the as-of-right permitted heights consider the site in its entirety.

7. A holding symbol will be included in the zoning to address servicing concerns and the requirement to obtain a servicing easement.

8. Location of Buildings

    a. Staff have concerns that the location of the proposed buildings on the site do not align with the direction in Policy 17b and 17c of the Sherbourne and New Orchard Secondary Plan.

    b. Policy 17c directs that high-rise buildings up to 16 storeys are permitted and must be located:

        i. Must be located and designed to minimize the shadow impacts on the adjacent low-rise neighbourhood community. How does the proximity of the development to the existing low-rise residential impact shadows?

        ii. In a position with minimal view impacts on adjacent high-rise buildings. It appears that the proposed 16-storey building is directly behind an approved 24-storey tower along Richmond.

        iii. Be located close to the NCC corridor or in a location that will break up the cumulative massing along Richmond Road. Provide discussion on how this requirement is achieved.

    c. As part of the next submission, please provide drawings showing the following:

        i. A comparison of what the policy calls for on the site versus what is being proposed. The drawings should also show the context all along Richmond Road.

        ii. Perspectives showing the as-of-right versus proposed at Aylen (similar to massing studies shown on page 42 of the Design Brief), in the rear yard of the singles, on Kichi Zibi, on Richmond with the approved and future buildings massing showing, and birds eye view of the whole site (similar to the view shown on page 19 of the Design Brief).

9. Roof-top Amenity Area

    a. Staff have concerns with the proposed roof-top amenity area – remove this component as directed in the previous pre-con notes.

b. Please note that a maximum GFA for the roof-top amenity area would be identified in the site-specific exception. Please identify the GFA allocated for communal amenity area in the next submission.

Concept Plan

10. Transition to Low-rise Residential

    a. Staff have concerns that an appropriate transition from the development to the existing low-rise residential neighbourhood to the west has not been achieved, as requried by Policy 20c of the Sherbourne and New Orchard Secondary Plan.

    b. Consider increasing the tower setback for the 16-storey building – refer to the High Rise Design Guidelines.

    c. Consider re-orienting the proposed buildings so that the western façade is not parallel with shared proeprty line to the west/abutting the low-rise residential.

    d. Consider introducing more stepbacks into the proposed built form.

11. It is understood that the private garden on the site is a key design consideration for the site, and there is a desire to retain this feature as it is sacred to the congregation of the place of worship use on the site. However, as noted in the previous pre-comments, further consideration should be given to the surrounding context and the impacts of the proposed buildings location and massing on the abutting low-rise neighbourhood.

    a. Provide further infromation on the impact of construction on the trees in the private garden. It does not appear that they were considered in the provided TCR. Further, it appears in Figure 3 that the limits of construction encroach into this space.

12. Provide further information on the proposed woonerf / green street. It is noted in the response letter for Planning Comment #11 to refer to the Conceptual Landscape Plan and Site Plan for tree planting and cycling/pedestrian infrastructure along Cleary. It is also noted on page 18 of the Planning Rationale that a “woonerf” street is being integrated into the development. However, it’s unclear from the drawings how/where this street is being realized in the design.

13. Walkway Connection

    a. Staff have concerns with the approach to the walkway connection through the site from the LRT Station/809 Richmond Road. Please explore further opportunities to achieving a connection that is direct, intuitive, and not private.

b. Will the pathway continue through the NCC line to connect to the pedestrian facility at Kichi Zibi Mikan?

c. Which party is responsible for constructing the connection from the site to Richmond Road?

14. Provide further information on the unit breakdown in the next submission. Please note that the Official Plan directs that intensification should occur in a variety of dwelling unit floorspace sizes to provide housing choices, including the provision of large-household dwellings (i.e., three or more bedrooms). The minimum proportion of large-household dwellings within intensification identified for mid-rise or taller buildings within the Neighbourhood designation in the Inner Urban Transect is 5 percent (Table 3b).

Other

15. Please note that there is a restrictive covenant on the site, which requires that the National Capital Commission (NCC) provide approval for any works that take place.

NS177235.pdf

Feel free to contact Stream Shen, Senior Planner (File Lead), for follow-up questions.

Urban Design

List of Studies and Plans Reviewed:

- **Urban Design Brief,** prepared by Fotenn Planning + Design, dated November 2023.
- **Site Plan,** A010, prepared by Fotenn Planning + Design, dated 2023-11-07.
- **Landscape Concept Plan & Sections,** L1 of 1, prepared by Fotenn Planning + Design, dated 2023/11/01.
- **Response to Phase 1 Pre-Consultation Feedback,** prepared by Fotenn Planning + Design, dated November 16, 2023.

Deficiencies:

16. Please provide the full report of the wind study. A few images from the wind study are included in the Urban Design Brief, which is appreciated. However, the full report of the wind study is not included in the submission package.

17. The Urban Design Brief is generally well organized according to the Terms of Reference. The quality of images is appreciated. However, the document needs to be amended and updated.

    a. *Design Directive* section is missing.

        i. It is indicated on pages, 2, 13, 31, and 46 that *Design Directives* can be found in the Planning Rationale report prepared by Fotenn. The applicant's intent to avoid duplication is appreciated. However, the Urban Design Brief should include all necessary information as a standalone document. *Design Directives* is different from Planning Rationale although there may be overlaps. The *Design Directives* should not only summarize policies and guidelines, but also demonstrate how the proposed design responds to the policies and guidelines.

        ii. Information on pages 20-23 (regarding OP, Secondary Plan, and Zoning) are most suitable for *Design Directives*.

        iii. Please note the Design Directives should also include a response to urban design directions given at phase 1 preconsultation. It is noted that an itemized response to the urban design comments was provided in the general response letter prepared by Fotenn. It is recommended that a summary of these responses be incorporated into the Urban Design Brief with key issues of concerns highlighted.

    b. The *Design Research* section can be better organized and include additional images and information to explain how the applicants reach their conclusions.

        i. The *Design Research* section includes plan view images of the various options explored on pages 35-37. Page 38 appears to show massing images of two different site plan options where the high-rise tower is located at different places. But there is no explanation in terms of why these two options were chosen for 3-d massing analysis and why other options, such as those shown on pages 36 and 37 were not studied for their 3-d massing implications.

        ii. It is also noted that the 3-d massing analysis shown on page 38 includes only bird-eye view images. It is important to study the pedestrian level views of the various options explored.

        iii. Ramp location analysis, shown on page 39, requires some explanation.

iv. View studies shown on page 42 are insufficient. Directions regarding view studies were provided in the preconsultation comments dated October 10, 2023.

v. Bult form transition is crucially important. Yet, there is a lack of information in the *Design Research* section with respect to built form transition (also see comments below regarding design).

vi. The *Design Research* section should also include information and images about the public realm aspects of the development, including how the proposed development can improve pedestrian connections throughout. Further elaboration of the image on page 44 will be helpful.

vii. The landscape plan shown on pages 49 and 50 includes interesting elements. It will be helpful to offer some explanations in the Design Research section.

viii. Please follow phase 1 preconsultation comments to amend the *Design Research* section. Please organize images and diagrams in clear logical ways so that the design evolution and design decision-making process can be easily understood. Additional explanatory texts may be helpful.

c. Shadow Study -- please include recent approved buildings in the immediate vicinities as the shadow of these adjacent building will have implications for site design.

18. Site plan drawing

a. The scale on the drawing does not really show the scale. Please provide a scale similar to the one shown on the landscape plan.

b. Please use solid lines to show the footprint of the high-rise tower instead of dash lines.

c. Please use solid lines with greater weights for buildings to better differentiate buildings from other elements on the site.

19. Landscape Plan

a. Please include tree planting and other landscaping details to the extent possible.

Comments:

<u>Response Letter</u>

20. The Response Letter provided by Fotenn (item #4 under Comments on the Preliminary Design) indicates that the tower has shifted eastward by an additional meter. This is a welcoming change. It is noted that in the current proposal the tower is 16.04m away from the west property line whereas in the September 2023 proposal the tower setback was 13.675m. The shift appears to be more than a meter. Please clarify. Nevertheless, this shift is appreciated. However, it is not convincing if this shift has successfully addressed the concerns on built form transition given that the Secondary Plan requires a 30m tower setback.

21. Differences in opinion are expressed throughout the Response Letter. However, there appears to be a lack of evidence to support these opinions. For example:

22. Item #2 (under Comments on the Preliminary Design), with respect to contextual considerations and built form transition, the applicant states that “the location of the buildings, while prioritizing the existing vegetation on site, locates the high-rise tower 16.1 metres from the abutting low-rise neighbourhood. This creates an appropriate transition in built form between the proposed high-rise development to the existing low-rise area”. Rationale and evidence are required to support this opinion. Rationale may include angular plane analysis or other tools enabled by the City’s policies and guidelines. Visual evidence may include pedestrian level views. The proposed 16.1m setback, though greater than the previously proposed, is still significantly less than what is required by the Secondary Plan. Without rationale and evidence, the opinion appears arbitrary.

23. Item #5.c (under Comments on the Preliminary Design), with respect to alternative built form design approach, the applicant states that “ we have explored this, and we did not like how the building looked on the site. We are moving forward with proposal as presented”. Visual and other evidence is required to support this statement.

24. Item #7 (under Comments on the Preliminary Design), with respect to the lack of analysis along views from the Ottawa River, the applicant states that “the high-rise building is located approximately 225 metres from the Ottawa river. No consideration was given to the building’s location to the river”. This response appears to be arbitrary. Please note the Ottawa Parkway is a designated Capital Scenic Entry Route. The church building itself has been long established as a significant symbol along the Parkway. The relationship between the church and the proposed building should be studied from views along the Parkway. It is noted, however, on page 42 of the Urban Design Brief, view of the building from the Ottawa River Park is provided. Multiple view analysis that includes views in the winter season should be conducted.

25. Some opinions expressed in the Response Letter may be conflicting and confusing. For example, item #3 (under Comments on the Preliminary Design), the applicant states that “there is also different design aesthetics between the mid-rise and high-rise buildings” (that may be helpful to address the concerns of a wall) . At the same time, item #5. b, under Comments on the Preliminary Design, in response to the comment on the “angled walls” of the 6-storey building, the applicant states “this is a zoning application and under provincial mandates, specific “architectural” details are

not supposed to be discussed with this level of detail". It be noted that comment 5.b is related to massing and the space between the buildings. It is not entirely a matter of architectural details. Nevertheless, it is confusing to see conflicting messages from the applicants regarding whether architectural may be taken into consideration in consideration of rezoning.

26. Some opinions expressed in the Response Letter should be supported by additional information. For example, item#9 (under Comments on the Preliminary Design), in response to concerns on the feasibility to preserve the gardens due to the close proximity of the foundation walls, the applicant simply states that "it is our intention to work closely with a contractor early on (prior to construction) to establish such protection measures". The response is vague and unconvincing. Details of such measure should be explored as early as possible and offered as evidence to ensure the proposed design is appropriate for the purpose of preserving the gardens.

Site Design and Landscaping

27. Please note the area that is intended to be a gathering space is only appropriate for strolling in the spring, fall, and winter. Gathering space should be located at a wind-calm location.

28. Please also note the area between the two buildings, proposed for sitting, is only suitable for strolling in spring and winter. Landscape design, including the proposed functions should take into consideration microclimate conditions.

29. The community gardens are in shade in fall afternoons and after 2pm in the summer. Since the shadow study does not include recently approved buildings along Richmond Road, it is difficult to tell is the proposed location is a bright spot in the morning. This location is likely in shade of the recently approved towers in the morning.

30. The proposed pedestrian connection that links the LRT station and the NCC pathway should benefit both residents of the site and community at large. The proposed meandering connection is interesting. However, it may appear to be very private given the proposed use is residential only. While the woonerf concept can be appropriate, some delineation between the connection and the rest of the plaza, with respect to materials and color, to offer clear indication of the public function of the connection should be provided. Landscaping details around the entrance of the OAHS building and the community gardens should be further studied to ensure a clear passage that follows pedestrian desire line.

Building

31. Changes to the design of the top of the 6-storey as shown in the Urban Design Brief are noted.

32. It is noted that precedent images for the building, shown on page 33 of the Urban Design Brief, are all main street type of buildings (street wall buildings). This site is

not a main street site. As previously observed at phase 1 pre-con the proposed development is of the characteristics of buildings in the garden. How the buildings meet the ground (the garden and green spaces in this case) is one of the key issues that need to be further explored.

33. It is unconvincing if the proposed building will be complementary to the interesting form of the church building.

Conclusion

34. The proposed development departs significantly from the Secondary Plan policies with respect to site planning and built form design. Extensive design research with concrete evidence is needed to support the OPA. Materials provided in the submission, though generally of good visual quality, are insufficient and unconvincing. Concerns with respect to built form transition and impacts of the proposed development on the existing residential area to the west remain. Concerns on relationship with the existing church building, particularly with respect to views along Ottawa River Parkway (pathway) remain. Concerns on the "wall effects" of the buildings remain. Concerns on the close proximity of the foundation walls and their potential impacts on the gardens remain. Given the differences in opinion expressed by the applicant, urban design continues to believe that UDRP peer review, though not mandatory, can be a useful tool to use to facilitate decision-making moving forward.

Feel free to contact Randolph Wang, Senior Planner (Urban Design), for follow-up questions.

Engineering

- **Survey Plan,** prepared by Stantec, dated June 8, 2023.
- **Assessment of Adequacy of Public Services Report**, prepared by LRL Engineering, dated November 10, 2023.
- **Geotechnical Investigation** Report, prepared by WSP, dated November 07, 2023

Deficiencies:

35. The survey plan provided must be stamped and signed by an OLS and dated.

36. Update the survey to clearly show the full extent of all existing buildings on the property.

37. Please remove any lot that no longer exists from the survey plan and only reflect existing conditions.

38. The legend on the survey plan shows lines for watermain and sewers however they are not reflected on the plan. There are existing watermain and sewer lines within the subject property. Please show them.

39. Clarify where the site benchmark is located on the survey plan.

40. The Geotechnical report submitted refers to one level of underground parking proposed within the building footprint whereas two levels of underground parking extending beyond the building footprint are specified in the servicing report, site plan and servicing brief. Please update the recommendations in the geotechnical report accordingly

41. Provide Grading and Servicing Plans reflecting the design proposed in the report to support the Official Plan and Zoning By-Law Amendment applications.

42. Include the pre-consultation notes in the appendices.

43. Provide a section summarizing the geotechnical considerations and recommendations provided for the subject site.

44. City staff has already advised through a meeting and by email that a second watermain along Cleary Avenue will not be approved. Please remove the second option provided for the second watermain connection from the report. This leaves a second connection through an easement on one of the properties located along Richmond Road as the only option. Please provide details of such connection on the servicing plan. Staff will impose a holding provision on the Zoning-By-Law-Amendment which can only be lifted after an easement is obtained. Ensure the extent of the required easement is shown on the servicing plan or a separate plan

45. The second watermain connection will require crossing a critical watermain. Please discuss in the report proposed alternatives to mitigate impact on the backbone watermain.

46. A watermain hydraulic analysis is required to demonstrate that the proposed watermain system will meet the pressure requirements set in the Water Distribution Guidelines (section 4.2.2) at each node in the system. Please submit a boundary condition request to obtain the required information for the hydraulic analysis. Boundary condition request should include the following:

    a. The type of development;

    b. The latest revision of the site plan;

    c. The proposed connection locations to the existing watermain system;

    d. The proposed average daily domestic water demands;

    e. The maximum daily water demands;

f. The maximum hourly water demands, and;

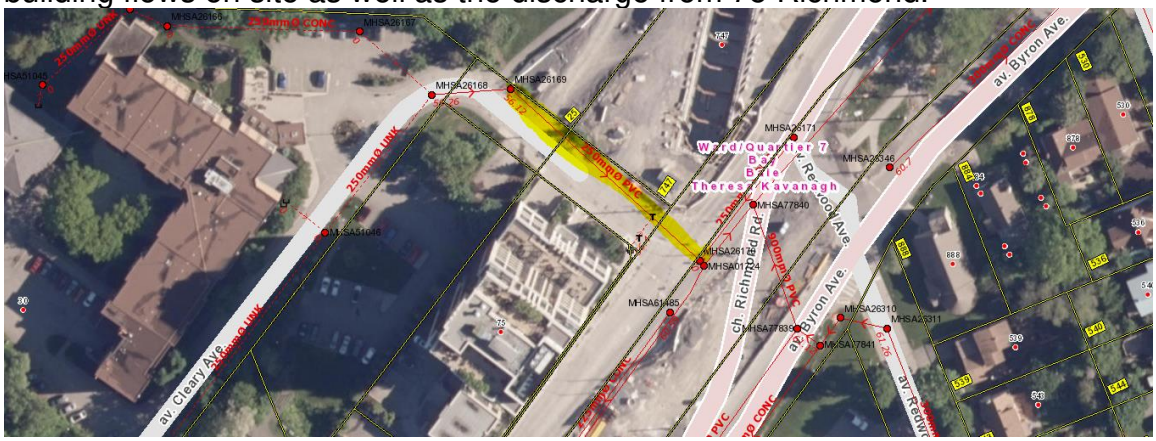
g. The fire flow calculations for each proposed building as per the FUS method.

**Demands and required fire flow must be provided with supporting calculations.

47. It is required to demonstrate adequate hydrant coverage for fire protection for this site as per Technical Bulletin ISTB-2018-02, Appendix I table 1 – maximum flow to be considered from a given hydrant.

48. An amenity area is different from a commercial space. Clarify which one is being proposed. The site plan is not referring to mixed used building or commercial space. If only an amenity area is being proposed, remove any calculated demand or discharge related to amenity areas.

    As per the pre-consultation notes, applicant is to demonstrate adequate capacity in the receiving sanitary system and downstream wastewater system up to the sanitary trunk on Richmond Road. The sanitary design sheet should include the existing building flows on site as well as the discharge from 75 Richmond.



49. The last paragraph in section 6.1 refers to external drainage areas to be considered in the design. Please also include external drainage from the rear yards of Aylen properties as indicated in the pre-consultation notes.

50. The storm design criteria provided by staff for this development included that post-development discharge to any existing ditch within NCC parcels must be controlled to the pre-development flows. Please include this under section 6.2.

51. As part of the application for Zoning By-Law and Official Plan Amendment, it is required to demonstrate adequacy of Services. Staff has provided the storm criteria and objectives to meet for this project. The applicant must demonstrate how each criterion and objective will be met with a proposed solution that can be implemented for the subject site. It is not sufficient to provide a list of potential stormwater management solutions. As such, the following are required:

- Pre-and post-development drainage plans showing the existing/proposed drainage outlets, catchment areas along with the runoff coefficients. Note that external drainage areas must be included on the plans.

- Allowable release rate for each proposed outlet in the report. Please specify in the report the method used to determine those release rates and provide the detailed calculations (detailed rationale method seen for the outlet to the storm sewer, one will be required for the ditch outlet).

- Required storage volumes along with detailed calculations (2-year and 100-year storm events).

- Proposed storage locations and volumes (underground tank, cistern, rooftop, ditch, parking surface, etc.) along with detailed calculation and description of emergency overflow systems as required.

- Proposed control system (ICD, roof drain, etc.). along with associated release rates and supporting calculations. Note, the engineer may have to select a certain product to provide a release rate in support of the application. The engineer will have the opportunity to change the proposed control system or selected product at the time of Site Plan as long as the design criteria and objectives are met. Please provide the manufacturer's sheets for any selected product (release rates, ICD curves, etc.)

- Demonstrate that all external flows are properly accounted for.

- For quality control, given that more than one storm outlet is anticipated, would more than one OGS be required? If so, how many and at which locations? Please also provide the release rate(s)

Note that additional information may be requested following subsequent phase 3 review. Refer to the City of Ottawa and Ontario stormwater design guidelines for the type of system selected to ensure all required information is provided.

52. Include a section discussing proposed erosion and sediment control.

Comments:

53. The existing private watermain on Cleary is 254mm, not 245mm. Please revise the adequacy of servicing report accordingly.

54. Section 4 of the adequacy of servicing report states that "the two service laterals are to be looped inside the building", which is not an acceptable approach. The looping of the water services is to occur before the water meter.

55. Table 1 of Section 4 – Revise the typo in the Value column for the Residential 3 Bedroom Apartment (3.1 P/unit~~6~~).

56. The number of units calculated in Table 2 of the adequacy of servicing report is inconsistent with the unit breakdown presented on the site plan. The site plan or the report should be revised so that the two documents are consistent.

57. Per the MOE Drinking Water guidelines Table 3-3, the maximum hourly residential water demand is obtained by multiplying the peak hour factor by the average demand, not the maximum daily demand. Please revise the calculations in the report accordingly.

58. Elaborate on how the water service pipe size of 150mm has been determined in Appendix D, i.e., the type of equation and maximum velocity parameter used. Watermain sizes are typically selected based on the pressures yielded through hydraulic analysis. Where equations are used to confirm watermain size, they typically incorporate a friction factor

59. The subject site indicated on the water pressure maps in appendix D is not correct. Please revise

60. Appendices D and E of the adequacy of servicing report are presenting water demand and sanitary design calculations for a commercial and amenity space on this site. If there is a proposed commercial space for this development, it should be discussed in Section 3.0 of the adequacy of servicing report. Demands and discharge calculations are only required for commercial space not an amenity space

61. The conclusion in the adequacy of servicing report states that this development is anticipated to be serviced by a 200mm sanitary service lateral. However, the sanitary section of the report is proposing a 150mm. Please revise for consistency.

62. Under section 6.1, specify that the 450mm concrete storm sewer is a private sewer. The receiving municipal sewer located in Cleary Avenue is 1500mm.

63. The quality control requirement provided in section 6.2 was not provided by the RVCA but City staff. Conservation Authorities no longer provide quality control criteria (since January 2023). Please remove reference to the RVCA.

Feel free to contact Abi Dieme (Abibatou.dieme@ottawa.ca) and Jean-Miguel Roy (Jean-Miguel.Roy@ottawa.ca), Infrastructure Project Managers, for follow-up questions.

Noise

List of Studies and Plans Reviewed:

- **Environmental Noise Assessment**, prepared by Gradient Wind, dated January 10, 2024.

Comments:

64. No comments.

Feel free to contact Mike Giampa, Transportation Project Manager, for follow-up questions.

Transportation

- **30 Cleary Avenue Transportation Impact Assessment**, prepared by CGH, dated November 2023.

Comments:

65. TOD mode shares (65% transit) would also be acceptable for the high-rise component of this development.

66. The 1-year Presto pass TDM measure is an excellent initiative but will eventually require a firm commitment from the applicant.

67. Ensure that the AODA parking requirements are met.

68. Asphalt pathways on Cleary Avenue (public right of way) should be replaced by 1.8m concrete sidewalks to meet current City standards. This could be addressed at site plan along with refinement of the internal pedestrian and cycling connections.

Feel free to contact Mike Giampa, Transportation Project Manager, for follow-up questions.

Environment and Trees

- **Tree Conservation Report,** prepared by CIMA+, dated November 17, 2023

- **Landscape Concept Plan & Sections,** L1 of 1, prepared by Fotenn Planning + Design, dated 2023/07/14, revision 00 dated 2023/11/01.

Deficiencies:

69. The TCR does not currently include the full scope of proposed development or provide sufficient detail to determine whether this design will allow for the retention of existing trees.

    a. Please include all trees on the subject site and adjacent sites with Critical Root Zones that could be impacted by the proposed design, including excavation for access and both surface and underground parking.

    b. Map 2 of the TCR needs to include an overlay of the tree locations on the actual site plan to allow for assessment of the full impact of the proposal.

    c. Include the extent of excavation for any underground parking, services, and other works on the plan and within the assessment of impacts.

d. Please list the ownership for each tree in the inventory. A permit cannot be issued for adjacent or boundary trees unless permission is provided by all owners. If permission cannot be obtained, plans must allow for the adequate protection of these trees.

70. Please address all comments from PC1, showing the requested detail on the plans:

    a. While a Tree Conservation Report (TCR) has now been provided, it does not yet address the concerns raised in PC1, and is not deemed to be complete. Please address the following: The primary concerns are impacts to trees in the 'existing garden' where there appears to be an entrance to underground parking proposed, the new parking lot on Cleary, and also to shared or adjacent trees along the western property line.

    b. The Landscape Plan & TCR must show the setback distances between proposed and existing trees to buildings and underground structures to ensure that both the above and below-ground space proposed is sufficient for tree planting in the Right of Way and other landscaped areas.

71. A Landscape Plan is required with this application and must address all requirements within the Landscape Plan Terms of Reference https://documents.ottawa.ca/sites/documents/files/landscape_tor_en.pdf , including the projection of canopy cover toward the target of 40%, and confirmation of adequate soil volumes to support any proposed trees. The conceptual Landscape Plan provided does not meet the requirements of the Landscape Plan TOR.

    a. Confirm sufficient soil volumes for all proposed trees.

    b. Confirm the canopy cover for site, based on the available greenspace in this design, including both retained and planted trees.

Comments:

72. Cleary is identified as a green street in the Secondary Plan, pedestrian and cycling upgrades along with tree plantings should be considered at this stage. Please show street trees with adequate soil volume on the landscape plan.

73. The High-Performance Development Standard identifies planting 1 new tree for every 5 parking spaces in a parking lot as a best practice to reduce the heat island effect. Please include sufficient space for tree planting within the expanded parking lot.

Feel free to contact Sami Rehman, Environmental Planner, or Nancy Young, Forester, for follow-up questions.

Parkland

74. Prior to site plan approval, please include the following details on the site plan. The requested information will be used to calculate parkland dedication:

    a. Gross Lot area to be developed, in square meters

    b. Number of proposed residential units

    c. Total Gross Floor Area of New Development

    d. Gross Floor Area of residential uses

    e. Gross Floor Area of commercial or other uses

    f. Documentation for the non-profit organisation (if applicable). For example, 'Article of Incorporation under the Canada Not-for-profit Corporations Act'

Feel free to contact Kimberley Baldwin, Parks Planner, for follow-up questions.

Conservation Authority

Comments:

75. No comments received from the Rideau Valley Conservation Authority (RVCA).

Feel free to contact Eric Lalande, RVCA, for follow-up questions.

National Capital Commission (NCC)

Comments:

Context

76. The proposed development is adjacent to the Ottawa River South Shore Riverfront Park.

77. (ORSSRPP), which is the 220-hectare federal park that stretches from Mud Lake to LeBreton Flats. The NCC's intentions for these lands are laid out in the Ottawa River South Shore Riverfront Park Plan (ORSSRPP).

78. The proposed development is also adjacent to the Sir John A Macdonald Parkway, which is one of the NCC's Parkways. The Ottawa River Pathway runs along the river, as is laid out in the NCC's Capital Pathways Strategic Plan.

79. The adjacent NCC-owned lands are designated as Capital Urban Greenspace in the Capital Urban Lands Plan.

Proposed Development

80. The proposed development seeks to redevelop the existing First Unitarian Congregation of Ottawa site (the 'subject lands') by adding two high-rise residential buildings. While the proposal is conceptual in nature, the existing buildings on site appear to be intended for retention. There is no vehicular access onto the Sir John A Macdonald Parkway.

Restrictive Covenant

81. A portion of the subject lands have been the subject of land transfers between the church and the NCC. The Congregation bought portions of property from the NCC in about 1965, as lands that were surplus to the creation of the parkway.

    A further transfer took place from the NCC to the Congregation in 1982. This transfer included a restrictive covenant as schedule B to the transfer. It is registered against PIN 04751-0119 as instrument NS177235. This covenant requires that the property owner obtain the design approval of the NCC before any modifications are made to the lands subject to the covenant.

    a. **Comment:** The lands subject to the covenant are described on Instrument NS177235 as 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 23, 24, 25, 26, and 27 on Plan 5R-6767. These are the most easterly of the Church's lands, adjacent to Cleary Avenue.

    b. **Comment:** It appears much of the proposed development takes place on lands not subject to the covenant, as the proposed development is on the westerly lands.

    c. **Comment:** If modifications or redevelopment is proposed on lands subject to the covenant, the NCC's approval will be required through the Federal Land Use, Design and Transaction Approval process. The Congregation should submit a 'Step 1 Form' to initiate the process.

Ottawa River South Shore Riverfront Park

82. As detailed in Section 4.4 – Connectivity, the connections to the NCC's pathway along the south side of the parkway are consolidated at a Secondary Gateway at the corner of Richmond and Cleary, a Community Gateway at the north property edge of the church. The existing pathway connection at the northeastern end of Cleary will be retained. A pedestrian and cyclist underpass will be constructed as part of the City's Stage 2 LRT works to allow connection to the Ottawa River Pathway.

    We understand that the City intends to secure an active mobility connection through this site, as detailed in the Cleary, Sherbourne and New Orchard Secondary Plan, which is to connect to the NCC pathways. Note that this is not currently reflected in the ORSSRPP. Any works on federal lands will require a FLUDTA.

a. **Comment:** We have had preliminary discussions with the proponent about a potential future pathway connection on NCC lands. We are open to the idea, subject to further design and review.

b. **Request:** That the City and the proponent include the NCC in any discussions on alignment of potential proposed pathway connections.

83. The design of the pedestrian pathway from the future Sherbourne Station to the riverfront park across this site as proposed appears circuitous and unintuitive – pedestrians must navigate crosswalks, sidewalks, a woonerf-style area with bollards, and the buildings' entry plaza.

    We are supportive of the pathway connection, but it is important that its design be inviting, consistent, and intuitive. Lacking this, it will create the impression of a private space where non-residents are not permitted instead of a publicly-accessible connection to the riverfront park.

    a. **Request:** That the City and proponent explore revisions that will minimize conflict points with vehicles, provide a universally accessible route, and clearly indicate to users that the pathway is a publicly-accessible route to the riverfront park.

84. If modifications are proposed to the design of the site along the edges abutting the ORSSRPP, care should be taken to avoid creating a user perception that the adjacent park land is part of the private development rather than publicly-owned space intended for natural heritage preservation.

    a. **Request:** That the City ensure that the design includes features to physically and visually delineate private and public space at the property edges.

85. The Ottawa River is a habitat for a wide diversity of animal species. Located within the Lac Deschênes–Ottawa River Important Bird Area and in a major migratory corridor, it serves as an important environment for bird conservation, and is recognized as one of the most popular urban sites for birdwatching in Canada. Design of buildings in the area should minimize the possibility of bird mortality from buildings.

    a. **Request:** That the City ensure the design adheres to the City's bird-friendly design standards, and avoids excessive illumination or light trespass.

<u>Construction</u>

86. At the OPA/ZBA stage there are not yet details of the construction approach to the buildings. Care should be taken that the buildings can be constructed from within the site without relying on NCC lands.

a. **Request:** That the proponent ensure their construction approach does not rely on excavation, shoring, tie-backs, or staging on NCC lands.

Servicing and Stormwater Management

87. **Comment:** The Serviceability Report (page 23) misidentifies the location of the site as being in Stittsville.

88. In current conditions much of the stormwater runoff from the subject site appears to flow northwards in an uncontrolled overland flow toward NCC lands.

    The NCC does not accept stormwater runoff from adjacent urban development. The development must instead capture and control its stormwater and direct it to a treatment train to outlet to the municipal storm sewer.

    a. **Request:** That the City ensure that through a future application for site plan approval, a detailed proposed stormwater management approach is prepared which captures all on-site stormwater and does not direct it onto NCC lands.

Trees

89. The Tree Conservation Report includes no analysis of the dense woodlot owned by the NCC to the north of the property. Despite this, impacts to these trees can be reasonably predicted.

    The TCR suggests the limits of construction for the northerly building is its footprint, despite the geotechnical report suggesting open-cut methods of excavation that will require a further slope to be excavated outside of the building footprint.

    The site plan and landscape plan illustrate modifications at grade along the northerly property line, including amenity space and a playground.

    Each of these has a likelihood to injure any trees whose crowns and roots extend onto the property. It is important that the existing adjacent NCC-owned trees are inventoried and assessed, and any potential impacts avoided and mitigated.

    a. **Requests:**

        i. That the City ensure that an updated TCR is provided as a condition of approval, whether through a holding provision or as part of a future application for site plan control.

        ii. That the TCR analyses both trees on the property and trees in proximity on adjacent NCC property that have the potential of impact due to construction.

iii. That the TCR identifies the location and ownership of trees by an Ontario Land Surveyor.

iv. That the TCR provides recommendations to prevent any injury to NCC-owned trees, including appropriate tree protection fencing during development.

Transportation

90. **Comment:** The geotechnical report (section 2.0) identifies one level of underground parking with about 70 parking spaces, while the TIA (section 2.1) indicates there will be two levels of underground parking with 113 spaces. The amount of excavation will influence the potential for construction impacts to NCC lands.

    a. **Request:** That the proponent clarify the intended excavation approach

Studies and Reports

91. If during the preparation of the studies in support of the application, the proponent or their consultants requires access to, or the use of, the abutting NCC lands, an Land Access Permit, is required from the NCC. It is the responsibility of the owner to initiate any formal requests to ensure adequate timing for any proposed access approvals from the NCC.

CREO

Comments:

92. Please be advised that this development proposal is adjacent to or in proximity to City land (non-right of way lands). Should this development require temporary or permanent interest in City land, CREO may require the developer to enter into an agreement to formalize such use at market value in accordance with CREO policy. This interest includes, but is not limited to, temporary or permanent access agreements across City lands, temporary staging areas, the installation of permanent infrastructure to the benefit of the development such as sewers, water, gas, pathways, Limiting Distance Agreements, the expansion of storm water management ponds to the benefit of the development. Note that several months may be required in order to formalize such agreements and conversations should be initiated early in the development process.

    For temporary interests, please contact Paul Kerluke, Program Manager, Leasing Unit, CREO: Paul.Kerluke@Ottawa.ca (Leases, Licenses and consent to enter agreements)

    For permanent interests, please contact Dhaneshwar Neermul, Program Manager, Disposal Unit, CREO: Dhaneshwar.Neermul@Ottawa.ca (purchase and sale agreements, disposal licenses (acknowledges the benefit to the

developer leveraging City lands, (i.e. expansion of existing storm water ponds and utilities).

Feel free to reach out Marcia Martin, Real Estate Advisor, for follow-up questions.

Disposals & Strategic Development Group (DSD)

93. Can all plans please include the boundaries of Cleary Avenue for staff to determine any encroachment of land use issues.

94. Comments from the Right-of-Way group should be considered with respect to and encroachment into the ROW.

95. On a design note, which I realize is not in part of our regular concerns, there seems to be an opportunity to provide a stronger pedestrian connection to Richmond Road through the existing parking lot. The connection would be difficult in winter conditions with snow piles etc.

Feel free to reach out to Simon Deiaco, Project Manager (DSD), for follow-up questions.

Community Benefit Charge

96. The proposed development meets the threshold for the Community Benefit Charge (CBC). Please note that the CBC charge will taken at the time of registration of the Site Plan Agreement. The CBC By-law (2022-307), can be found here.

Feel free to reach out to Ranbir Singh, Community Benefit Charge Coordinator, for follow-up questions.

O-Train

97. The subject site is in proximity to close proximity to rail infrastructure associated with Stage 2 O-Train. A Level 1 Proximity Study is required as part of the future Site Plan Control application.

98. Please have the Owner and their consultants sign and return the attached Non-Disclosure Agreement (NDA) to receive access to the Stage 2 O-Train drawings.

ST2 External NDA.pdf

Should there be any questions on the above, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Stream Shen

c.c. Colette Gorni, Planner, City of Ottawa
Randolph Wang, Senior Planner (Urban Design), City of Ottawa
Jean-Miguel Roy, Infrastructure Project Manager, City of Ottawa
Abi Dieme, Infrastructure Project Manager, City of Ottawa
Mike Giampa, Transportation Project Manager, City of Ottawa
Sami Rehman, Environmental Planner, City of Ottawa
Nancy Young, Planning Forester, City of Ottawa
Kimberley Baldwin, Parks Planner, City of Ottawa
Marcia Martin, Real Estate Advisor (CREO), City of Ottawa
Simon Deiaco, Project Manager (CREO,DSD), City of Ottawa
Ranbir Singh, CBC Coordinator, City of Ottawa
Gillian Dumencu, Rail Infrastructure, City of Ottawa
Jerico Gapas, Rail Infrastructure, City of Ottawa
Eric Lalande, RVCA
Ted Horton, NCC

APPENDIX I

Off-Site Stormwater Management Supporting Documents

Site Servicing and Stormwater Management Brief – 851 Richmond Road, Ottawa, ON

File: 160401329/83

Prepared for:
Homestead Land Holdings Ltd.

Prepared by:
Stantec Consulting Ltd.

August 27, 2018

Revision Record							
Revision	Description	Prepared By		Checked By		Approved By	
0	1st submission	A. Paerez	10/03/2017	S. Gillis	10/04/2017	A. Paerez	10/06/2017
1	2nd submission	N. Cody	27/03/2018	S. Gillis	27/03/2018	P. Moroz	27/03/2018
2	3rd Submission	W. Johnson	29/06/2018	S. Gillis	29/06/2018	N. Cody	29/06/2018
3	4th Submission	W.Johnson	27/08/2018	S.Gillis	27/08/2018	P.Moroz	27/08/2018

Sign-off Sheet

This document entitled Site Servicing and Stormwater Management Brief – 851 Richmond Road, Ottawa, ON was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Homestead Land Holdings Ltd. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Approved by 

(signature)

Sheridan Gillis

Approved by 

(signature)

Peter Moroz, P. Eng.

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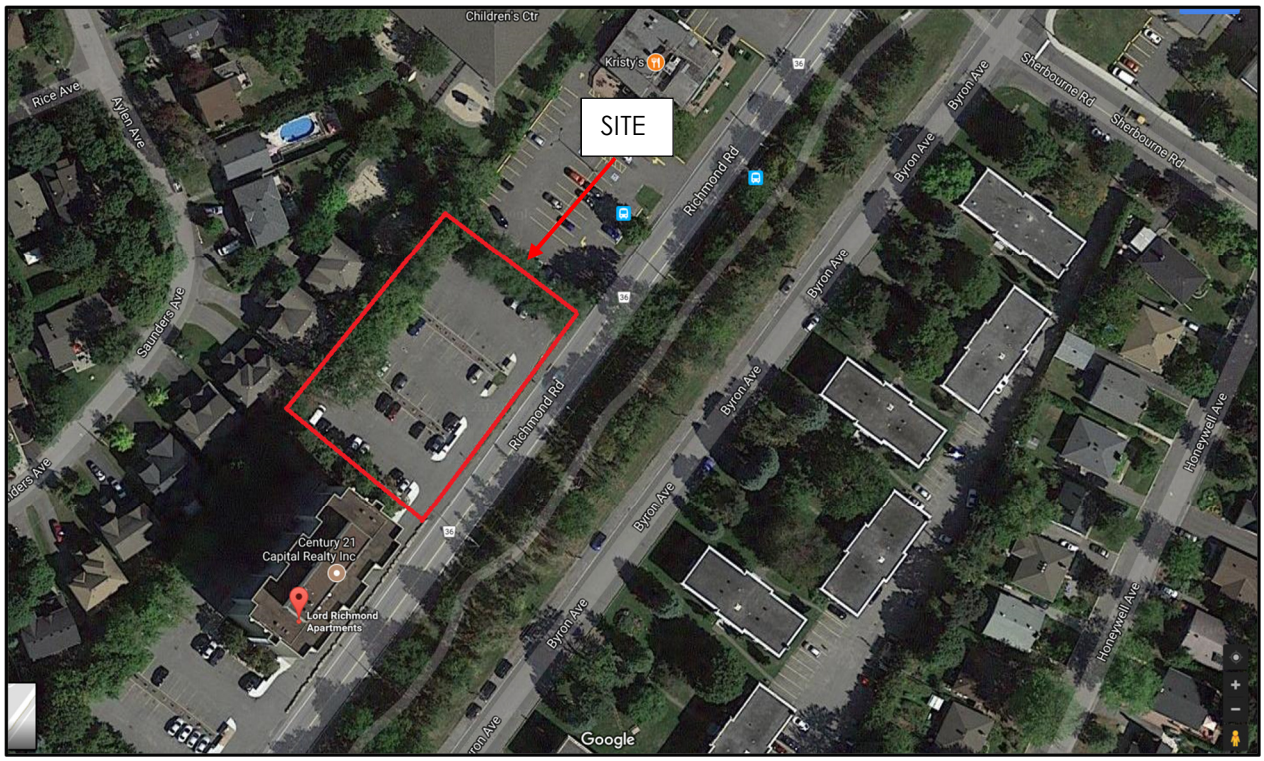
1.0 INTRODUCTION AND OBJECTIVE

Stantec Consulting Ltd. has been retained by Homestead Lands Holding Ltd. to prepare the following site servicing and stormwater management (SWM) brief to satisfy the City of Ottawa Site Plan Control Application process. The site is located at 851 Richmond Road, west of the intersection of Byron Avenue and Sherbourne Road and south-west of the intersection of Richmond Road and Cleary Avenue in the city of Ottawa (see **Figure 1** below).

The site proposed for re-development measures 0.31 ha, while the existing developed site area to the southwest measures 0.28 ha, for an overall area of 0.59 ha. The proposed re-development area is currently occupied by parking areas and a small vegetated strip. The proposed development consists of an eleven-storey residential building with 122 units, underground parking and associated access and servicing infrastructure.

Figure 1: Site Location



1.1 OBJECTIVE

This site servicing and SWM brief has been prepared to present a servicing scheme that is free of conflicts and which utilizes the existing infrastructure as obtained from available as-built drawings and in consultation with City of Ottawa staff. Infrastructure requirements for water supply, sanitary and storm sewer services are presented in this report.

Criteria and constraints provided by the City of Ottawa have been used as a basis for the conceptual servicing design of the proposed development. Specific elements and potential development constraints to be addressed are as follows:

- Prepare a preliminary grading plan in accordance with the proposed site plan and existing grades.
- Storm Sewer Servicing
    - Define major and minor conveyance systems in conjunction with the proposed grading plan
    - Determine the stormwater management storage requirements to meet the allowable release rate for the site
    - Coordinate with mechanical engineer to convey roof top drainage, trench drainage from the parking garage entrance, and area drainage from exterior drive aisle within the internal mechanical system and discharge to the proposed OGS unit.
    - install an oil/grit separator (OGS) to provide 'Enhanced' quality treatment (80% TSS removal) of runoff from the proposed development area.
    - Define and size the proposed storm sewers that will be connected to the existing 375 mm diameter CSP outlet located in the northeast corner of the site
- Wastewater Servicing
    - Define and size the sanitary service laterals which will be connected to the existing 225 mm diameter on Richmond Road
- Water Servicing
    - Estimate water demands to characterize the proposed feed for the proposed development which will be serviced from the existing 203 mm diameter watermain on Richmond Road.
    - Watermain servicing for the development is to be able to provide average day and maximum day (including peak hour) demands (i.e. non-emergency conditions) at pressures within the acceptable range of 50 to 70 psi (350 to 480 kPa)
    - Under fire flow (emergency) conditions, the water distribution system is to maintain a minimum pressure greater than 20 psi (140 kPa)

The accompanying drawings included in the back of this report illustrate the preliminary internal servicing scheme for the site.

1.2 PREVIOUS SUBMISSIONS

The 3rd submission of this report was completed on June 29th, 2018 and was sent for comments to the City of Ottawa. Comments from the City were received July 23rd, 2018. The comments letter and Stantec's response to the comments pertinent to this report are contained in Appendix G – Correspondence.

2.0 REFERENCES

The following background studies have been referenced during the preliminary servicing design of the proposed site:

- *Assessment of Adequacy of Public Services for OCEF Corp 809 Richmond Road*, David Schaeffer Engineering Ltd., December 2016
- *City of Ottawa Design Guidelines – Water Distribution*, City of Ottawa, July 2010
- *City of Ottawa Sewer Design Guidelines*, City of Ottawa, October 2012
- *Technical Bulletin ISDTB-2014-01,* City of Ottawa, February 2014
- *Technical Bulletin ISTB-2018-01*, City of Ottawa, March 21, 2018
- *Technical Bulletin ISTB-2018-02*, City of Ottawa, March 21, 2018
- *Technical Bulletin ISTB-2018-03*, City of Ottawa, March 21, 2018
- *Technical Bulletin PIEDTB -2016-01,* City of Ottawa, September 6, 2016
- *Geotechnical Investigation Proposed Multi-Storey Building 851 Richmond Road – Ottawa,* Paterson Group, October 3, 2017
- *Stormwater Management Report, River Parkway Preschool Centre, 40 Cleary Avenue, City of Ottawa*, J.L. Richards & Associates Limited, Revised January 2007

3.0 WATER DISTRIBUTION

The proposed building is located in Pressure Zone 1W of the City of Ottawa's Water Distribution System. The proposed development will be serviced through the existing 203 mm diameter watermain on Richmond Road as shown on the Site Servicing Plan (see **Drawing SSP-1**).

The proposed eleven-storey building is to be a high-rise residential building with a mix of one-bedroom and two-bedroom apartments for a total of 122 units, and underground parking. The building is to have a total floor space of approximately 12,479 m2 (1.25 ha) above grade.

Water demands were calculated using the City of Ottawa Water Distribution Guidelines (July, 2010) to determine the typical operating pressures to be expected at the building (see detailed calculations in **Appendix A**). A daily rate of 350 L/cap/day has been applied for the population of the proposed site. The average daily (AVDY) residential demand was estimated for an occupancy of 1.4 persons per unit for a one-bedroom apartment and 2.1 persons per unit for a two-bedroom apartment. Maximum day (MXDY) residential demand was determined by multiplying the AVDY demand by a factor of 2.5 and peak hourly (PKHR) residential demand was determined by multiplying the MXDY demand by a factor of 2.2. The estimated demands are summarized in **Table 1**.

Table 1: Estimated Water Demands

	Population	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
Residential	221	0.90	2.24	4.92

1. Residential population based on 72 two-bedroom apartments and 50 one-bedroom apartments.

The fire flow requirement was calculated in accordance with Fire Underwriters Survey (FUS) and determined to be approximately 5,000 L/min (83 L/s). This estimate is based on a non-combustible construction building with a two-hour fire separation considered between each floor per requirements for buildings over six-storeys per Ontario Building Code. Additionally, it is anticipated that all buildings will be sprinklered, with final sprinkler design to conform to NFPA 13 (see detailed calculations in **Appendix A**).

The boundary conditions listed below were provided by the City of Ottawa on June 28, 2017 for the estimated water demands shown in **Table 1**.

Minimum HGL = 108.6 m

Maximum HGL = 116.2 m

MXDY (2.3L/s) + Fire Flow (83 L/s) = 99.0 m

The desired normal operating objective pressure range as per the City of Ottawa 2010 Water Distribution Design Guidelines is 350 kPa (50 psi) to 480kPa (70 psi) and no *less than 275kPa (40 psi)* at ground elevation. Furthermore, the maximum pressure at any point in the water

distribution should not exceed 100 psi as per the Ontario Building/Plumbing Code; pressure reducing measures are required to service areas where pressures *greater than 552kPa (80 psi)* are anticipated.

The ground elevation along Richmond Road where the proposed building is to be connected is approximately 65.92 m. With respect to the peak hour flow conditions, the resulting boundary condition HGL of 108.6 m corresponds to a peak hour pressure of 418kPa (61 psi). Since the proposed building is an 11-storey building, an additional 34 kPa (5 psi) for every additional storey over two storeys is required to account for the change in elevation head and additional headloss. Given that the lowest pressure is expected to be 418 kPa (61 psi) at ground level, the resultant equivalent pressure at the 11th floor will be approximately 110 kPa (16 psi) and below the City's objective pressures. As a result, a pump will be required to maintain an acceptable level of service on the higher floors.

A maximum pressure check can be conducted using the building's finished floor elevation (66.36m) and the maximum boundary condition HGL of 116.2 m. This results in a pressure of 49.84m, or 489 kPa (70 psi). This value is below the limit of 80 psi which would require pressure reducing valves.

In regards to available fire flow, boundary conditions provided by the City confirm that a flow rate of 5,000 L/min (83 L/s) would have a residual pressure of 324kPa (47 psi). The fire flow rate should be achievable within the watermain at this proposed location while maintaining a residual pressure of 138kPa (20 psi).

In conclusion, based on the boundary conditions provided, the 203 mm diameter watermain on Richmond Road provides adequate fire flow capacity as per the Fire Underwriters Survey. In order to meet the City water supply objective that limits a single feed to 50 m^3/d during basic day demands, dual connection to the existing 203 mm diameter watermain on Richmond Road is required to service the proposed building. The service connection will be capable of providing anticipated demands to the lower storeys but will require a booster pump to maintain minimum pressures of 276 kPa (40 psi) for floors 7 to 11.

4.0 SANITARY SEWER

As illustrated on **Drawing SSP-1**, sanitary servicing for the proposed development will be provided through a proposed 200 mm diameter service lateral connecting to the existing 225 mm diameter sanitary sewer running east on Richmond Road. The 225mm Richmond Road public sewer ultimately discharges to a 1500mm diameter sanitary trunk sewer at the intersection of Richmond Road and Sherbourne Road.

The proposed 0.31 ha re-development area will consist of 50 one-bedroom apartments, 72 two-bedroom apartments, underground parking, and associated access infrastructure. The anticipated wastewater peak flow generated from the proposed development is summarized in **Table 2** below while a sanitary sewer design sheet is included in **Appendix C**.

Table 2: Estimated Wastewater Peak Flow

Residential Units				Infiltration Flow (L/s)	Total Peak Flow (L/s)
# of Units	Population	Peak Factor	Peak Flow (L/s)		
122	221	4.0	2.87	0.08	2.95

1. Average residential flow based on 280 L/p/day
2. Peak factor for residential units calculated using Harmon's formula
3. Apartment population estimated based on 1.4 persons/unit for one-bedroom apartments and 2.1 persons/unit for two-bedroom apartments
4. Infiltration flow based on 0.33 L/s/ha.
5. Figures may not exactly sum due to rounding

An analysis of the existing 225 mm diameter sanitary sewer on Richmond Road was completed in DSEL's Assessment of Adequacy of Public Services – 809 Richmond Road in December 2016 to estimate the available capacity within the sewer. The analysis concluded that the existing sanitary sewer had additional capacity for 42.6 L/s, and that the proposed development on 809 Richmond Road would generate 7.44 L/s of peak wet weather flow. As a result, the residual capacity of 35.2 L/s in the existing sewer will be sufficient to accommodate the proposed development's rate of 2.95 L/s.

Detailed sanitary sewage calculations are included in **Appendix C**. A backflow preventer will be required for the proposed building in accordance with the Ottawa sewer design guide and will be coordinated with building mechanical engineers.

All underground parking drains should be connected to the internal building plumbing. A sump pump will be required to drain the underground parking levels to the existing sanitary sewer on Richmond Road.

4.1 SANITARY SEWER DESIGN CRITERIA

As outlined in the City of Ottawa Sewer Design Guidelines and the MOECC's Design Guidelines for Sewage Works, the following criteria were used to calculate estimated wastewater flow rates and to size the sanitary sewer lateral:

- Minimum Velocity – 0.6 m/s (0.8 m/s for upstream sections)
- Maximum Velocity – 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes – 0.013
- 1.4 persons/one-bedroom apartment
- 2.1 persons/two-bedroom apartment
- Harmon's Formula for Peak Factor – Max = 4.0
- Extraneous Flow Allowance – 0.33 L/s/ha (conservative value)
- Manhole Spacing – 120 m
- Minimum Cover – 2.5 m

5.0 STORMWATER MANAGEMENT

5.1 OBJECTIVES

The objective of this stormwater management plan is to determine the measures necessary to control the quantity of stormwater released from the proposed development to the required levels and to provide sufficient detail for approval and construction.

5.2 EXISTING CONDITIONS

The site is currently paved consisting of parking areas for the existing 11-storey building immediately to the southwest. The existing parking areas sheet drain towards three existing catchbasins connected to a storm sewer system that conveys runoff from the site and discharges into an existing 375 mm diameter CSP at the northeast corner of the property. Based on visual observations during a recent site visit, there are no visible inlet controls installed in the existing catchbasins. The existing 375mm diameter CSP outlets to the north to sewers within the adjacent property at 40 Cleary Avenue (see **Drawing EX-1**).

The on-site sewer for 40 Cleary Avenue delivers flow through their property via a series of pipes, swales and ditches eventually outletting to the Ottawa River. As part of the site plan control application for 40 Clearly Avenue, a Stormwater Management Report was prepared by J.L. Richards and Associates in 2008. The report as it's been made available has been included in Appendix D. The report indicates that the 100-year peak flow from the 851 Richmond Road site was anticipated in their design and accommodated in the downstream sewer system capacity.

5.3 SWM CRITERIA AND CONSTRAINTS

The stormwater management criteria for the proposed site are based on City of Ottawa Sewer Design Guidelines (2012) and on consultation with City of Ottawa Staff. The following summarizes the criteria used in the preparation of this stormwater management plan:

- SWM Report for 40 Cleary Avenue identifies downstream discharge criteria, anticipating 851 Richmond Road site with C=0.90, Area=0.60, T/C of 10mins, accommodating 100-year peak flow in the existing 525mm downstream sewer. The allowable outlet rate is Q = 2.78 x C x I x A = 2.78 x 0.9 x 178.56 x 0.6 = **267.8 L/s**.
- Maximum 100-year water depth of 0.35 m in parking and access areas
- Provide adequate emergency overflow conveyance (overland flow route) to Richmond Road.
- Provide a storm outlet for the existing Lord Richmond Apartments.

- Size the storm lateral to convey the 100-year storm event, assuming only roof controls are imposed (i.e. provide capacity for system without inlet control devices (ICDs) installed)

- Size storm sewers using an inlet time of concentration (Tc) of 10 minutes

- Post-development runoff coefficient (C) value based on proposed impervious areas as per site plan drawing (see **Appendix B**)

5.4 STORMWATER MANAGEMENT DESIGN

The proposed 0.31 ha re-development area consists of an eleven-storey residential building, underground parking, access and landscaped areas, and associated servicing infrastructure. The imperviousness of the proposed site is 70% (C = 0.69). In combination with the existing area, the site measures 0.617 ha and has an overall imperviousness of 80% (C = 0.76).

The 851 Richmond Road development was identified as "Lord Richmond Apartments" in the 40 Cleary Avenue SWM report which designed the downstream infrastructure to convey the 100-year storm event for the site assuming a 0.60 ha area with a runoff coefficient of 0.90 and a time of concentration of 10 minutes.

While the downstream system has been designed to accommodate 100-year flows for 851 Richmond Road, the SWM strategy for the site will still provide roof top control on the proposed building to attenuate peak flows in the downstream system. A storm sewer system has been designed to convey flows from the existing 851 Richmond Road Apartment and parking lot, to the existing outlet along the north/west property line to an oil grit separator and ultimately discharging to the existing 375mm CSP outlet to 40 Cleary Avenue. The proposed expansion area will convey storm drainage through a combination of flow-control roof drains, trench drain for the underground parking ramp, and area drain for the building exterior and direct these flows to a sump pit and pump the flows to the oil grit separator at the north east corner of the building. Coordination with the mechanical consultant has been ongoing and current plans have been provided and flows identified to size the internal system. In addition to the storm conveyance, the internal mechanical system will also be designed to discharge to the building foundation drain.

The proposed oil and grit separator (an STC-750) will be installed just outside the underground parking structure to provide the required 80% TSS removal from runoff from the proposed development. The oil grit separator has been designed to provide quality control for the both the proposed expansion area and the existing 851 Richmond Road Apartment site.

As part of the proposed development, it is required that runoff from the existing development to the south be pumped on a temporary basis during construction across to the existing 375 mm diameter storm outlet.

The conceptual site plan and existing storm sewer infrastructure are shown on **Drawing SSP-1**.

5.4.1 Design Methodology

The intent of the stormwater management plan presented herein is to mitigate any negative impact that the proposed development could have on the existing drainage and storm sewer infrastructure, while providing adequate capacity to service the existing and proposed building, parking and access areas. The proposed stormwater management plan is designed to detain runoff on the rooftop to ensure that peak flows after construction from the proposed re-development area will not exceed the target release rate for the site.

A small portion of the site fronting Richmond Road could not be graded to enter the building's internal plumbing system and as such it will sheet drain uncontrolled. Runoff from this uncontrolled area is included in the overall site discharge calculations.

5.4.2 Water Quantity Control

The Modified Rational Method was used to assess the quantity and volume of runoff generated during post development conditions. The site was subdivided into subcatchments (subareas) tributary to storm sewer inlets, as defined by the location of catchbasins / inlet grates, and used in the storm sewer design (see **Appendix D**). A summary of subareas and runoff coefficients is provided in **Appendix D**, and **Drawing SD-1** indicates the stormwater management subcatchments.

5.4.3 Allowable Release Rate

Site discharge rates up to the 100-year storm event are to be restricted to the 100-year storm event with a runoff coefficient ('C' value of 0.90) as outlined below in Table 3. The overall site (existing and proposed sites) measure 0.59 ha, however the area discharging to Richmond Road is excluded (EXT-1 - 0.09 ha) therefore the remaining area measures 0.50 ha.

Table 3: Target Release Rate

Rational Method 'C'	Area (ha)	Time of Concentration (min)	Q_{Target} (L/s)
0.90	0.60	10	267.8

5.4.4 Storage Requirements

The site does not require quantity control measures to meet the stormwater release criteria, however to reduce the impact of the peak flow rates on the oil and grit separator sizing, it is proposed that restricted release rooftop drains be used. **Drawing SD-1** indicates the design release rate from the rooftop. Stormwater management calculations are provided in **Appendix D**.

5.4.4.1 Rooftop Storage

It is proposed to detain stormwater on the rooftop of the proposed building by installing restricted flow roof drains. The following calculations assume the roof will be equipped with standard Watts Model R1100 Accuflow Roof Drains fully open. The existing rooftop will not need to be retrofitted.

Watts "Accuflow" roof drain data has been used to calculate a practical roof release rate and detention storage volume for the rooftops. It should be noted that the "Accuflow" roof drain has been used as an example only and that other products may be specified for use, provided that the roof release rate is restricted to match the maximum rate of release indicated in the tables below and that sufficient roof storage is provided to meet (or exceed) the resulting volume of detained stormwater.

Table 4 and **Table 5** provide details regarding the detention of stormwater on the proposed rooftop during the 2 and 100-year storm events. Refer to **Appendix D** for details.

Table 4: Peak Controlled (Rooftop) 2-Year Release Rate

Area ID	Area (ha)	Head (m)	$Q_{release}$ (L/s)	V_{stored} (m^3)	$V_{available}$ (m^3)
BLDG1	0.019	0.097	0.93	1.8	6.5
BLDG2	0.013	0.088	0.87	1.0	4.5
BLDG3	0.013	0.088	0.87	0.9	4.4
BLDG4	0.015	0.092	0.89	1.3	5.2
BLDG5	0.017	0.094	0.91	1.5	5.8
BLDG6	0.02	0.099	0.94	2.1	7.2
BLDG7	0.009	0.081	0.82	0.5	3
BLDG8	0.009	0.081	0.82	0.5	3
BLDG9	0.004	0.054	0.65	0.1	1.4
TOTAL	0.12		7.70	9.7	41

Table 5: Peak Controlled (Rooftop) 100-Year Release Rate

Area ID	Area (ha)	Head (m)	$Q_{release}$ (L/s)	V_{stored} (m^3)	$V_{available}$ (m^3)
BLDG1	0.019	0.148	1.25	6.3	6.5
BLDG2	0.013	0.14	1.20	3.7	4.5
BLDG3	0.013	0.14	1.20	3.7	4.4
BLDG4	0.015	0.144	1.22	4.7	5.2
BLDG5	0.017	0.146	1.24	5.4	5.8
BLDG6	0.02	0.15	1.26	7.2	7.2
BLDG7	0.009	0.131	1.14	2	3
BLDG8	0.009	0.131	1.14	2	3
BLDG9	0.004	0.111	1.01	0.6	1.4
TOTAL	0.12		10.66	35.6	41

5.4.4.2 Surface Grading

The catchbasins in the existing Lord Richmond parking lot will be removed and replaced with two new catchbasins – CB203 and CBMH102. These structures will not need to be outfitted with inlet control devices. Although ponding is not needed to limit release rates, grading will still ensure that overland flow principles are implemented in case of a blockage of the minor system.

5.4.5 Uncontrolled Area

A small portion of the site fronting Richmond Road (see area fronting on Richmond Road on **Drawing SD-1**) could not be graded to enter the building's internal plumbing system and as such it will sheet drain uncontrolled. **Table 6** and **Table 7** summarize the 2 and 100-year uncontrolled release rates from the proposed development.

Table 6: Peak Uncontrolled (Non-tributary) 2-Year Release Rate

Area ID	Area (ha)	Runoff 'C'	Tc (min)	$Q_{release}$ (L/s)
UNC-1	0.11	0.60	10	14.1

Table 7: Peak Uncontrolled (Non-tributary) 100-Year Release Rate

Area ID	Area (ha)	Runoff 'C'	Tc (min)	$Q_{release}$ (L/s)
UNC-1	0.11	0.75	10	41.0

5.4.6 Results

Table 8 and **Table 9** demonstrate that the proposed stormwater management plan provides adequate attenuation storage to meet the target peak outflow for the site.

Table 8: Estimated Discharge from Site (2-Year)

Area Type	$Q_{release}$ (L/s)	Target (L/s)
Controlled Roof Area (BLDG)	7.7	**267.8**
Uncontrolled Surface Area Tributary to Outlet (L203A, L202A, L201A, RAMP, EX-BLDG)	63.5	
Uncontrolled, tributary to Richmond Road	14.1	
Total	**85.3**	

Table 9: Estimated Discharge From Site (100-Year)

Area Type	$Q_{release}$ (L/s)	Target (L/s)
Controlled Roof Area (BLDG)	10.7	**267.8**
Uncontrolled Surface Area Tributary to Outlet (L203A, L202A, L201A, RAMP, EX-BLDG)	179.8	
Uncontrolled, tributary to Richmond Road	41.0	
Total	**231.4**	

5.5 QUALITY CONTROL

As per correspondence with Rideau Valley Conservation Authority (RVCA) staff, runoff from the proposed and existing development requires 'Enhanced' quality treatment (80% TSS removal) prior to discharge into the site outlet which ultimately directs runoff to the Ottawa River.

As a result, it is proposed to install an oil/grit separator (OGS) unit just outside the underground parking structure to provide the required level of treatment of runoff from the existing and proposed site areas. The PCSWMM for Stormceptor software has been used to provide sizing. It should be noted that the Stormceptor unit has been used as an example only and that other products may be specified for use, provided that they meet the required level of treatment. See **Appendix D** for the Stormceptor sizing report and a detail drawing of the STC-750.

Based on sizing the entire tributary site area (approx. 0.5 ha @ 85.7% imperviousness) and using a fine particle size distribution, a Stormceptor model of STC750 will provide 81% TSS removal, exceeding the required target of 80% TSS removal.

Table 10: Treatment Capacity Figures for Stormceptor Model STC-750

Stormceptor Model	Treatment Rate (L/s)	Total Storage Volume (L)	Hydrocarbon Storage Capacity (L)	Maximum Sediment Capacity (L)
STC 750	22.4	4,070	915	3,000

6.0 GRADING AND DRAINAGE

The proposed re-development site measures approximately 0.31 ha in area. The site currently sheet drains towards three existing catchbasins. A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements and to provide sufficient cover over top of the underground parking garage. Site grading has been established to provide emergency overland flow routes for stormwater management in accordance with City of Ottawa requirements.

The subject site maintains emergency overland flow routes to the existing property to the north as depicted on **Drawings GP-1** and **SD-1**.

7.0 UTILITIES

All utilities (Hydro Ottawa, Bell Canada, Rogers Ottawa, and Enbridge Gas) have existing plants in the area. The site will be serviced through connection to these existing services. Detailed design of the required utility services will be further investigated as part of the composite utility planning process following design circulation.

8.0 EROSION CONTROL DURING CONSTRUCTION

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit extent of exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with plastic or synthetic mulches.
6. Provide sediment traps and basins during dewatering.
7. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
8. Plan construction at proper time to avoid flooding.
9. Installation of a mud matt to prevent mud and debris from being transported off site.
10. Installation of a silt fence to prevent sediment runoff.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

1. Verification that water is not flowing under silt barriers.
2. Clean and change silt traps at catch basins.

Refer to **Drawing EC/DS-1** for the proposed location of silt fences, and other erosion control structures.

9.0 GEOTECHNICAL INVESTIGATION

A geotechnical report was prepared by Paterson Group October 2007 (see **Appendix E**). As stated in the geotechnical report, the subsurface profile across the site consists of 60 to 100 mm thickness of asphalt overlying a granular layer. The pavement structure lies atop a fill layer, consisting of brown to grey sand and gravel with trace to some silt and clay that extends to a depth of approximately 1.5 to 2.5 m. A native glacial till deposit was encountered underlying the above-noted fill layers, followed by grey limestone bedrock.

Groundwater levels were measured on June 8, 2017 and were found to range between 2.2 m and 3.7 m.

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. Infiltration levels are anticipated to be low through the excavation face. The groundwater infiltration will be controllable with open sumps and pumps. A temporary MOECC permit to take water (PTTW) will be required for this project if more than 50,000 L/day are to be pumped during the construction phase. A minimum of four to five months should be allocated for completion of the application and issuance of the permit by the MOECC.

Bedrock removal will be required to complete the two (2) levels of underground parking. The geotechnical report recommended line drilling and controlled blasting to remove the bedrock. The report also recommended that prior to considering blasting operations, the effects on the existing services, buildings and other structures should be addressed.

An alignment of a large diameter watermain runs within an easement along the north property boundary of the subject site. It is expected that the adjacent watermain could be subjected to potential vibrations associated with the bedrock blasting program. To ensure that no detrimental vibrations cause damage to the adjacent watermain, a vibration attenuation trench is recommended for the bedrock along the north excavation face, as well as a vibration monitoring and control program during the blasting and excavation work required for the proposed building excavation (please refer to the Geotechnical report included in **Appendix E** for details).

The geotechnical report also recommended that a perimeter foundation drainage system be provided for the proposed structures. Given that it is expected that insufficient room will be available for exterior backfill, the report suggested that the foundation drainage system could be as follows:

- Bedrock vertical surface (Hoe ram any irregularities and prepare bedrock surface. Shotcrete areas to fill in cavities and smooth out angular features at the bedrock surface);
- Composite drainage layer.

Geotechnical Investigation
August 27, 2018

It was recommended that the composite drainage system (such as Miradrain G100N, Delta Drain 6000 or equivalent) extend down to the footing level. It was also recommended that 150 mm diameter sleeves at 3 m centres be cast in the footing or at the foundation wall/footing interface to allow the infiltration of water to flow to the interior perimeter drainage pipe. The perimeter drainage pipe and underfloor drainage system should direct water to sump pit(s) within the lower basement area for mechanical evacuation.

10.0 CONCLUSIONS

10.1 WATER SERVICING

The 203 mm diameter watermain on Richmond Road provides adequate fire flow capacity as per the Fire Underwriters Survey. In order to meet the City water supply objective that limits a single feed to 50 m^3/d during basic day demands, dual connection to the existing 203 mm diameter watermain on Richmond Road is required to service the proposed building. The service connection will be capable of providing anticipated demands to the lower storeys but will require a booster pump to maintain pressures of 276 kPa (40 psi) for floors 7 to 11.

10.2 SANITARY SERVICING

The proposed sanitary sewer lateral is sufficiently sized to provide gravity drainage for the site. The proposed site will be serviced by a 200 mm diameter service lateral directing wastewater flows to the existing 225 mm dia. Richmond Road sanitary sewer. A backflow preventer will be required for the proposed building in accordance with the Ottawa sewer design guide and will be coordinated with building mechanical engineers. The proposed sanitary drainage pattern is in accordance with direction from pre-consultation with City of Ottawa staff.

10.3 STORMWATER SERVICING

The proposed stormwater management plan is in compliance with the goals specified through consultation with the City of Ottawa, as well as local standards. Rooftop storage is provided on the proposed building and the sum of all flows from the site area into the minor system are under the required target release rate. An underground pump will be required to direct flows from the internal building drainage system to the proposed gravity service connected to the existing 375 mm dia. CSP running north and ultimately discharging into the Cleary Street storm sewer. An oil grit separator will be installed just outside the underground parking structure to provide 80% TSS removal for runoff generated from the proposed development areas.

10.4 GRADING

Grading for the site has been designed to provide an emergency overland flow route as per City requirements. Erosion and sediment control measures will be implemented during construction to reduce the impact on existing infrastructure. An alignment of a large diameter watermain runs within an easement along the north property boundary of the subject site. It is expected that the adjacent watermain could be subjected to potential vibrations associated with the bedrock blasting program. To ensure that no detrimental vibrations cause damage to the adjacent watermain, a vibration attenuation trench is recommended for the bedrock along the north

excavation face, as well as a vibration monitoring and control program during the blasting and excavation work required for the proposed building excavation.

10.5 UTILITIES

All utilities (Hydro Ottawa, Bell Canada, Rogers Ottawa, and Enbridge Gas) have existing plants in the subject area. Exact size, location and routing of utilities will be finalized after design circulation.

10.6 APPROVAL / PERMITS

Ministry of the Environment and Climate Change (MOECC) Environmental Compliance Approvals (ECA) are not expected to be required for the subject site as the site is private and will remain under singular ownership. A Permit to Take Water may be required for pumping requirements for construction of underground parking level. No other approval requirements from other regulatory agencies are anticipated.

APPENDICES

Appendix A HYDRAULIC ANALYSIS

851 Richmond Road - Domestic Water Demand Estimates

- Based on Roderick Lahey Architect Inc Site plan June 6, 2017

Building ID	Area (m^2)	Population	Daily Rate of Demand [1]	Avg Day Demand		Max Day Demand		Peak Hour Demand	
				(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Residential	11,424	227.5	350	55.3	0.92	138.2	2.30	304.1	5.07
Total Site :				**55.3**	**0.92**	**138.2**	**2.30**	**304.1**	**5.07**

1 Water demand criteria used to estimate peak demand rates for residential areas are as follows:

maximum day demand rate = 2.5 x average day demand rate

maximum hour demand rate = 2.2 x maximum day demand rate

From:	Balima, Nadege
To:	Rathnasooriya, Thakshika
Subject:	RE: Hydraulic Boundary Conditions - 851 Richmond Road
Date:	Tuesday, June 27, 2017 3:06:47 PM
Attachments:	image001.gif 851 Richmond June 2017.pdf

Hi Shika,
I have just received the results of the boundary condition request for the site in subject. Please find them below.

The following are boundary conditions, HGL, for hydraulic analysis at 851 Richmond (zone 1W) assumed to be connected to the 203mm on Richmond (see attached PDF for location).

Minimum HGL = 108.6

Maximum HGL = 116.2m

MaxDay (2.3 L/s) + FireFlow (83 L/s) = 99.0m

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.

Please refer to Guidelines and Technical bulletin ISDTB-2014-02 concerning basic day demands greater than 0.5 L/s.

Please let me know if you have questions.

Regards,

Nadège Balima, P.Eng., M.P.M., LEED Green Assoc.
Project Manager, Infrastructure Approvals
Development Review Services (West)
613.580.2424 ext. 13477

From: Rathnasooriya, Thakshika [mailto:Thakshika.Rathnasooriya@stantec.com]
Sent: Tuesday, June 27, 2017 11:33 AM
To: Balima, Nadege <Nadege.Balima@ottawa.ca>
Subject: RE: Hydraulic Boundary Conditions - 851 Richmond Road

Hi Nadege,

Is it possible to have a status update on the hydraulic boundary conditions for this site?

Thank you,

Shika Rathnasooriya
Engineering Intern
Stantec
400 - 1331 Clyde Avenue, Ottawa ON K2C 3G4
Phone: (613) 724-4081
Thakshika.Rathnasooriya@stantec.com

From: Balima, Nadege [mailto:Nadege.Balima@ottawa.ca]
Sent: Friday, June 23, 2017 8:52 AM
To: Rathnasooriya, Thakshika <Thakshika.Rathnasooriya@stantec.com>
Subject: RE: Hydraulic Boundary Conditions - 851 Richmond Road

Good morning Shika,
I have forwarded your request for processing and will get back to you as soon as I have results.
Thanks,

Nadège Balima, P.Eng., M.P.M., LEED Green Assoc.
Project Manager, Infrastructure Approvals
Development Review Services (West)
613.580.2424 ext. 13477

From: Rathnasooriya, Thakshika [mailto:Thakshika.Rathnasooriya@stantec.com]
Sent: Wednesday, June 21, 2017 1:50 PM
To: Balima, Nadege <Nadege.Balima@ottawa.ca>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: Hydraulic Boundary Conditions - 851 Richmond Road

Hello Nadege,

I am looking for watermain hydraulic boundary conditions for the proposed site at 851 Richmond Road. We anticipate connecting to the existing 200mm watermain on Richmond Road.

Attached are the FUS calculations for the proposed building. The intended land use is residential, for a 11 storey apartment building comprising 132 units with 61 two-bedrooms units and 71 one-bedroom units.

Estimated domestic demands and fire flow requirements for the site are as follows:
Average Day Demand – 0.92L/s
Max Day Demand – 2.30L/s

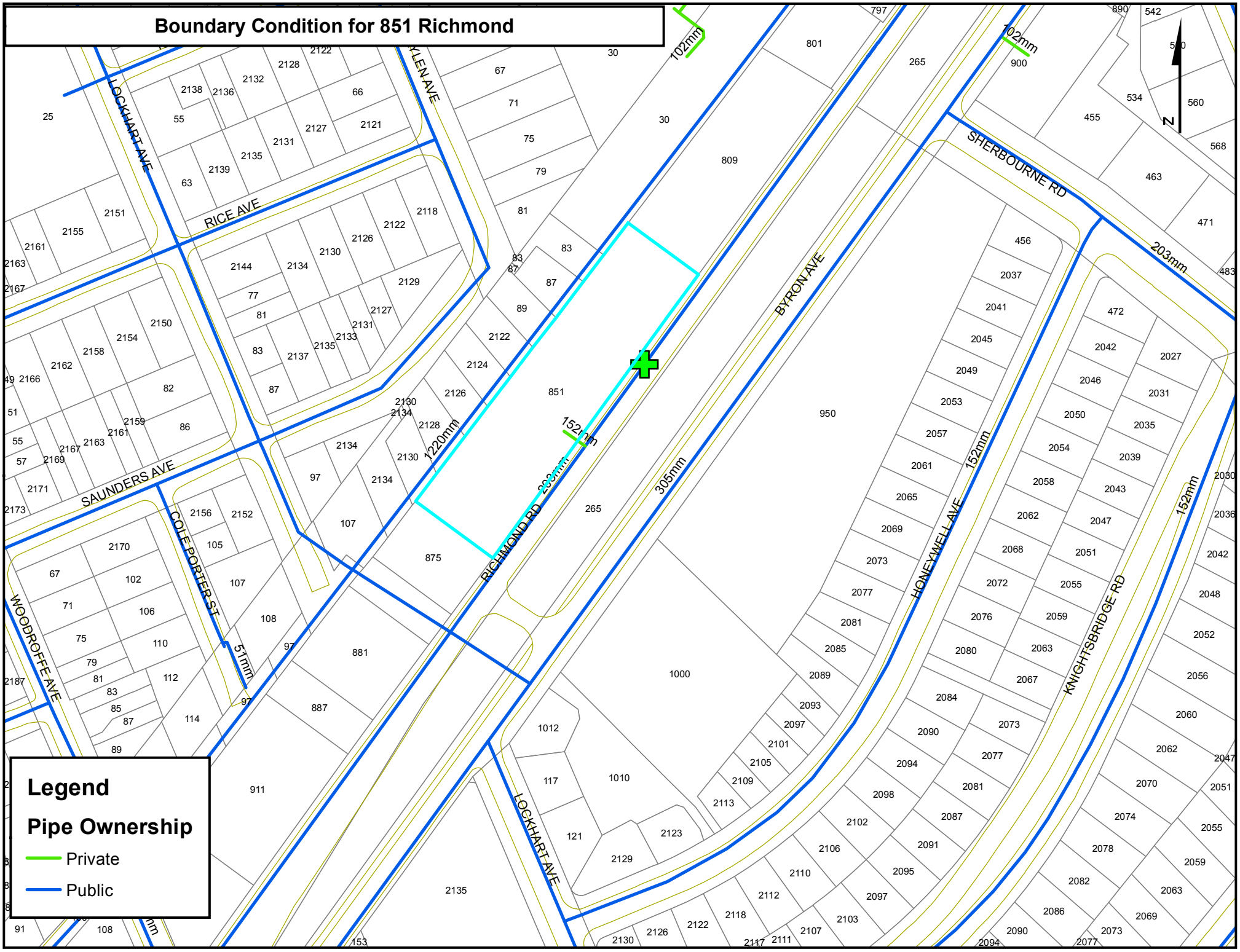
Peak Hour Demand – 5.07L/s
Fire Flow Requirement per FUS - 83L/s (2 hour fire separation between each floor)

Thanks,

Shika Rathnasooriya
Engineering Intern
Stantec
400 - 1331 Clyde Avenue, Ottawa ON K2C 3G4
Phone: (613) 724-4081
Thakshika.Rathnasooriya@stantec.com

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.


Boundary Condition for 851 Richmond
Legend
Pipe Ownership
Private
Public
RICHMOND RD
BYRON AVE
SHERBOURNE RD
HONEYWELL AVE
KNIGHTSBRIDGE RD
LOCKHART AVE
RICE AVE
SAUNDERS AVE
COLE PORTER ST
WOODROFFE AVE
851
809
950
265
875
881
887
911
1000
1010
1012
102mm
152mm
203mm
305mm
1220mm
51mm
N

APPLICATION FOR A FIRE ROUTE DESIGNATION

Property Location

851 RICHMOND ROAD OTTAWA

Municipal or Lot No. *Street* *City*

RESIDENTIAL *Occupancy*

Classification or Use of Building(s)

"851 INFILL"

Identifying Name of Building(s)/Condominium/Shopping Centre

Reason for Application

☐ Fire Chief's Orders ☑ Property Owner/Agent's request

Identification

Details	Applicant/Agent	Property Owner
Name		HOMESTEAD LAND HOLDINGS
Street		80 JOHNSON ST.
Apt. No.		
City	SAME	KINGSTON
Postal Code		K7L 1X7
Phone (Business)		613-546-0589
Fax		613-546-2969

All of the statements and representations contained in the attached documents filed in support of this application shall be deemed part of this application for all purposes. Fire route plan details must comply with the specific requirements of the Ontario Building Code and the Fire Route Plan Requirements document provided by the City of Ottawa.

Declaration

I, the undersigned ALBERTO MENENDEZ am the, ☑ property owner, ☑ authorized agent of the property named in the above application, and I certify the truth of all statements or representations contained herein. I, understand that the designation of the proposed fire route shall not be deemed a waiver of any of the provisions of any City of Ottawa by-law or Provincial legislation, notwithstanding including in or omitted from the plans or other material filed in support of or in connection with the above application.

Signature of Owner or Authorized Agent

Sworn before me in the City of Kingston in the Province of Ontario, this 4th day of January 20 18.

Kimberly Adams LSUC # P02827 *Notary Public/Commissioner for Oaths*

Office Use

Date Application Received: _____ dd/mm/yy

Plan circulated for internal comment: _____ dd/mm/yy Requested Return Date: _____ dd/mm/yy

By-law sent for approval: _____ dd/mm/yy Council approved date: _____ dd/mm/yy

By-law No.: _____ Applicant informed of fire route approval _____ dd/mm/yy

Stantec

FUS Fire Flow Calculation Sheet

Stantec Project #: 160401329
Project Name: FUS Protocol Test Drive
Date: 3/29/2018
Fire Flow Calculation #: 1
Description: 851 RICHMOND ROAD

Notes: Floor assemblies to be 2hr fire separations per OBC 3.2.2.42

Step	Task	Notes						Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Non-Combustible Construction						0.8	-
2	Determine Ground Floor Area of One Unit	-						1134	-
	Determine Number of Adjoining Units	-						1	-
3	Determine Height in Storeys	Does not include floors >50% below grade or open attic space						1	-
4	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min						-	6000
5	Determine Occupancy Charge	Limited Combustible						-15%	5100
6	Determine Sprinkler Reduction	Conforms to NFPA 13						-30%	-2040
		Standard Water Supply						-10%	
		Not Fully Supervised or N/A						0%	
		% Coverage of Sprinkler System						100%	
7	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	-	-
		North	> 45	21.2	1	0-30	Wood Frame or Non-Combustible	0%	1785
		East	> 45	50.9	0	0-30	Wood Frame or Non-Combustible	0%	
		South	3.1 to 10	21.2	11	> 120	Wood Frame or Non-Combustible	20%	
		West	10.1 to 20	49.9	2	91-120	Wood Frame or Non-Combustible	15%	
8	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min							5000
		Total Required Fire Flow in L/s							83.3
		Required Duration of Fire Flow (hrs)							2.00
		Required Volume of Fire Flow (m^3)							600

From: Therkelsen, Jennifer
To: Alberto Menendez; Evans, Allan
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments
Date: Thursday, February 01, 2018 1:24:23 PM
Attachments: image002.png
image003.png

Good afternoon,

We are doing just fine ☺

There is nothing further required from you at this point just please let me know when you are close to completion of the project and we will finalize the process at that time.

Very Best,

Jennifer Therkelsen
Coordinator, By-law & Regulatory Services / Coordonnateur, Services des règlements municipaux
Tel / tél. : 613-580-2424, ext. / poste 23873

By-law email sig final3NEW2014 (3)

From: Alberto Menendez [mailto:AMenendez@homestead.ca]
Sent: Thursday, February 01, 2018 10:10 AM
To: Therkelsen, Jennifer <Jennifer.Therkelsen@ottawa.ca>; Evans, Allan <Allan.Evans@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

Good morning Jennifer,

How are we doing with this matter?

Alberto Menéndez, P.Eng. | Assistant VP Construction
Homestead Land Holdings Limited
Cell: (613) 217-9846

From: Alberto Menendez
Sent: January 29, 2018 2:20 PM
To: 'Therkelsen, Jennifer' <Jennifer.Therkelsen@ottawa.ca>; Evans, Allan <Allan.Evans@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

Hi…

Is the application you are referring to the one that was attached to the Site Plan Comments (see attached)?

Alberto Menéndez, P.Eng. | Assistant VP Construction
Homestead Land Holdings Limited
Cell: (613) 217-9846

From: Therkelsen, Jennifer [mailto:Jennifer.Therkelsen@ottawa.ca]
Sent: January 29, 2018 2:14 PM
To: Alberto Menendez <AMenendez@homestead.ca>; Evans, Allan <Allan.Evans@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

Hello,

Oh ok that Changes things a bit, we ask that you do put forth an application then we hold it on file until the construction is completed, when the final inspection is conducted we are notified that it is in compliance and then we proceed with finalizing the process.

Hope that helps,

Jennifer Therkelsen
Coordinator, By-law & Regulatory Services / Coordonnateur, Services des règlements municipaux
Tel / tél. : 613-580-2424, ext. / poste 23873

By-law email sig final3NEW2014 (3)

From: Alberto Menendez [mailto:AMenendez@homestead.ca]
Sent: Monday, January 29, 2018 1:57 PM
To: Therkelsen, Jennifer <Jennifer.Therkelsen@ottawa.ca>; Evans, Allan <Allan.Evans@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

Hi Jennifer,

Thank you for your email.

This entire process was started by our request to obtain site plan approval for this particular site. The project has not yet started as we are still in the site plan stage. The Site Plan Comments (attached) received under item #6 - Engineering/General requested the following (the highlighted yellow section has been added):

Please complete the attached Fire Route Form and send to Jennifer.Therkelsen@ottawa.ca after the fire route has been confirmed by Allan.Evans@ottawa.ca in order to add the fire route to the By-law. Please cc myself and the file lead as confirm that the form has been submitted.

The question was initially directed at Allan (as you are aware) who directed it to you. I am still confused as to what exactly needs to be done at this stage of the process and I am hoping that either you or Allan can clarify this for me please.

Thank you once again.

Alberto Menéndez, P.Eng. | Assistant VP Construction
Homestead Land Holdings Limited
Cell: (613) 217-9846

From: Therkelsen, Jennifer [mailto:Jennifer.Therkelsen@ottawa.ca]
Sent: January 29, 2018 1:23 PM
To: Alberto Menendez <AMenendez@homestead.ca>; Evans, Allan <Allan.Evans@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

Good afternoon,

Apologies for the delay, the process is still the same, I have received your application thank you. One question for you now are the signs erected?

I have attached for your information the By-law and in Schedule B it specifies what they are to look like (bilingual is a key) and other provisions, once they are erected By-law & Regulatory Services attends the site for another inspection, then we send the information to our other City Partners for final approval.

Thank you,
Jenn

Jennifer Therkelsen
Coordinator, By-law & Regulatory Services / Coordonnateur, Services des règlements municipaux
Tel / tél. : 613-580-2424, ext. / poste 23873

From: Alberto Menendez [mailto:AMenendez@homestead.ca]
Sent: Friday, January 26, 2018 3:16 PM
To: Evans, Allan <Allan.Evans@ottawa.ca>
Cc: Therkelsen, Jennifer <Jennifer.Therkelsen@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

Hello Allan / Jennifer,

Any news on the email below?

Thanks.

Alberto Menéndez, P.Eng. | Assistant VP Construction
Homestead Land Holdings Limited
Cell: (613) 217-9846

From: Evans, Allan [mailto:Allan.Evans@ottawa.ca]
Sent: January 18, 2018 4:15 PM
To: Alberto Menendez <AMenendez@homestead.ca>
Cc: Therkelsen, Jennifer <Jennifer.Therkelsen@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

Aha – okay. So I think this is part of the new process Jenn worked out in regards to fire routes registration – this is my first one so I'm uncertain how to proceed.

Jenn – do I have to wait for the final submission to approve, or do I just look at the site plans, or is it automatic approval unless I say otherwise?

A

Regards,

Allan Evans
Fire Protection Engineer
Ottawa Fire Service
1445 Carling Avenue
Ottawa, ON, K1Z 7L9

Follow me on Twitter: @FFSnack
☎ (613) 913-2747

Did you know? That as of October 15th, 2015, all residential occupancies that contain at least one fuel-burning appliance (e.g., gas water heater or gas furnace), fireplace or an attached garage require the installation of a CO alarm outside all sleeping areas.

Learn More at: http://www.mcscs.jus.gov.on.ca/english/FireMarshal/CarbonMonoxideAlarms/QuestionsandAnswers/OFM_COAlarms_QandA.html

cid:image002.jpg@01CD27B1.5A4A8420

From: Alberto Menendez [mailto:AMenendez@homestead.ca]
Sent: Thursday, January 18, 2018 4:00 PM
To: Evans, Allan <Allan.Evans@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

It is a new build and the site plan was filed with the City (1st submission). The 2nd submission will occur during the month of February.

Alberto Menéndez, P.Eng. | Assistant VP Construction
Homestead Land Holdings Limited
Cell: (613) 217-9846

From: Evans, Allan [mailto:Allan.Evans@ottawa.ca]
Sent: January 18, 2018 3:49 PM
To: Alberto Menendez <AMenendez@homestead.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

There is supposed to be a site plan with the fire route signage and where the actual fire route is I believe. That's the one I care about. Is this a new build? So site plan filed with city, etc?

Regards,

Allan Evans
Fire Protection Engineer
Ottawa Fire Service
1445 Carling Avenue
Ottawa, ON, K1Z 7L9

Follow me on Twitter: @FFSnack
☎ (613) 913-2747

Did you know? That as of October 15th, 2015, all residential occupancies that contain at least one fuel-burning appliance (e.g., gas water heater or gas furnace), fireplace or an attached garage require the installation of a CO alarm outside all sleeping areas.

Learn More at: http://www.mcscs.jus.gov.on.ca/english/FireMarshal/CarbonMonoxideAlarms/QuestionsandAnswers/OFM_COAlarms_QandA.html

cid:image002.jpg@01CD27B1.5A4A8420

From: Alberto Menendez [mailto:AMenendez@homestead.ca]
Sent: Thursday, January 18, 2018 11:18 AM
To: Evans, Allan <Allan.Evans@ottawa.ca>
Cc: Therkelsen, Jennifer <Jennifer.Therkelsen@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

Hi Allan,

Attached if it helps is the Fire route Designation Application we were asked to provide.

Please advise.

Thanks.

Alberto Menéndez, P.Eng. | Assistant VP Construction
Homestead Land Holdings Limited
Cell: (613) 217-9846

From: Evans, Allan [mailto:Allan.Evans@ottawa.ca]
Sent: January 18, 2018 9:19 AM
To: Alberto Menendez <AMenendez@homestead.ca>

Cc: Therkelsen, Jennifer <Jennifer.Therkelsen@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

I'm not sure to be honest. This process has been evolving over the past year so maybe things have changed. Previously, a fire route would be submitted to Jennifer and she would check it out (actually go to location) and then forward to me for review. Maybe now you are supposed to send me the sheet first?

Jenn?

Regards,

Allan Evans
Fire Protection Engineer
Ottawa Fire Service
1445 Carling Avenue
Ottawa, ON, K1Z 7L9

Follow me on Twitter: @FFSnack
☎ (613) 913-2747

Did you know? That as of October 15th, 2015, all residential occupancies that contain at least one fuel-burning appliance (e.g., gas water heater or gas furnace), fireplace or an attached garage require the installation of a CO alarm outside all sleeping areas.

Learn More at:
http://www.mcscs.jus.gov.on.ca/english/FireMarshal/CarbonMonoxideAlarms/QuestionsandAnswers/OFM_COAlarms_QandA.html

cid:image002.jpg@01CD27B1.5A4A8420

From: Alberto Menendez [mailto:AMenendez@homestead.ca]
Sent: Monday, January 08, 2018 10:14 AM
To: Evans, Allan <Allan.Evans@ottawa.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

The attachment is simply the Application For A Fire Route Designation it references in the comment sent which application appears on the last page of the comments provided by the City (see attached).

Alberto Menéndez, P.Eng. | Assistant VP Construction
Homestead Land Holdings Limited
Cell: (613) 217-9846

From: Evans, Allan [mailto:Allan.Evans@ottawa.ca]
Sent: January 8, 2018 10:00 AM
To: Alberto Menendez <AMenendez@homestead.ca>
Subject: RE: 851 Richmond Road - Response to First Round of Site Plan Comments

No attachment ☺

Regards,

Allan Evans
Fire Protection Engineer
Ottawa Fire Service
1445 Carling Avenue
Ottawa, ON, K1Z 7L9

Follow me on Twitter: @FFSnack
☎ (613) 913-2747

Did you know? That as of October 15th, 2015, all residential occupancies that contain at least one fuel-burning appliance (e.g., gas water heater or gas furnace), fireplace or an attached garage require the installation of a CO alarm outside all sleeping areas.

Learn More at:
http://www.mcscs.jus.gov.on.ca/english/FireMarshal/CarbonMonoxideAlarms/QuestionsandAnswers/OFM_COAlarms_QandA.html

cid:image002.jpg@01CD27B1.5A4A8420

From: Alberto Menendez [mailto:AMenendez@homestead.ca]
Sent: Monday, January 08, 2018 9:59 AM
To: Evans, Allan <Allan.Evans@ottawa.ca>
Subject: 851 Richmond Road - Response to First Round of Site Plan Comments

Good morning Allan,

One of the notes referenced in the above subject line under item #6 of the Engineering/General comments is shown below (the highlighted yellow section has been added):

Please complete the attached Fire Route Form and send to Jennifer.Therkelsen@ottawa.ca after the fire route has been confirmed by Allan.Evans@ottawa.ca in order to add the fire route to the By-law. Please cc myself and the file lead as confirm that the form has been submitted.

I am not certain what is actually required by you to confirm the fire route as noted. Would you please elaborate?

Thank you in advance.

Homestead.ca

Alberto Menéndez, P. Eng. | Assistant Vice President of Construction
Homestead Land Holdings Limited
80 Johnson Street, Kingston, ON, K7L 1X7
p: 613.546.3146 | f: 613.546.5637

Join our team! Visit homestead.ca/careers and start your new career!

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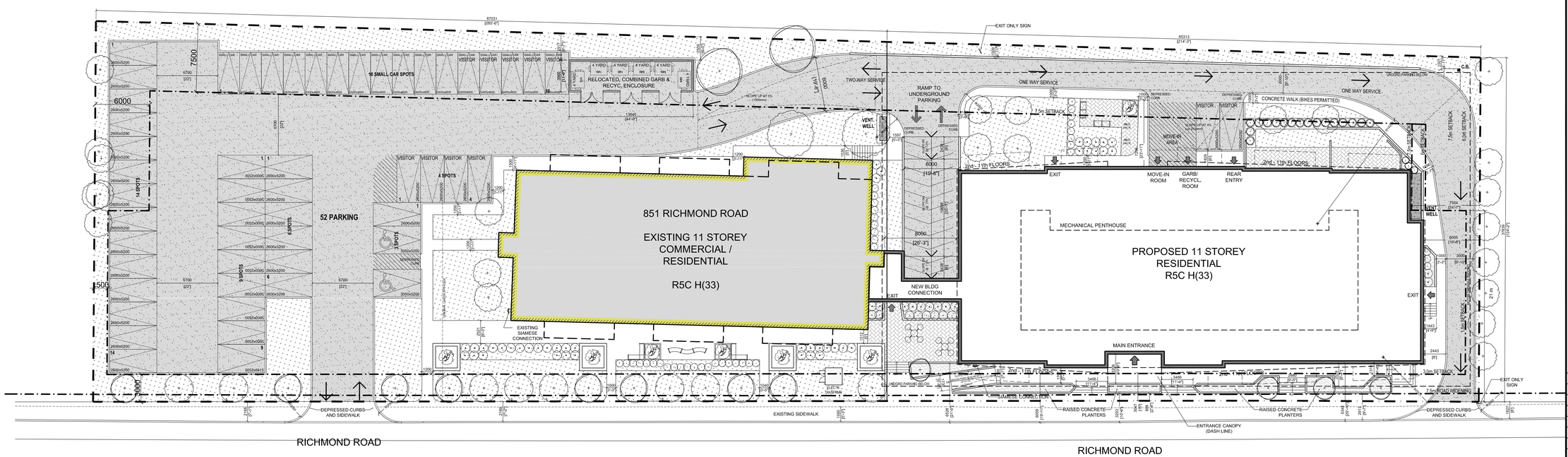
Appendix B PROPOSED SITE PLAN

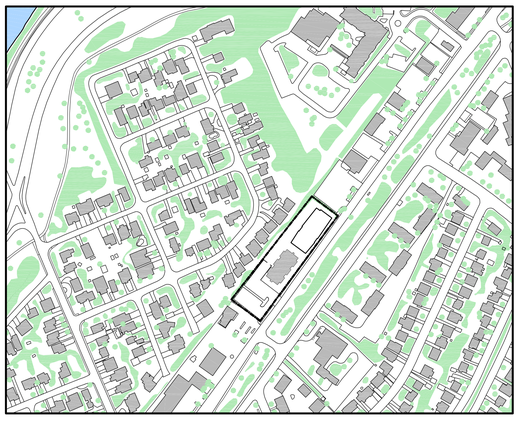


0m 5 10 20

SCALE 1: 200

1 A01 SITE PLAN

SCALE = 1 : 200



2 A01 KEY PLAN

SCALE = 1 : 3000

LEGEND

- CONCRETE UNIT PAVERS SURFACE
- ASPHALT PAVING
- CONCRETE SIDEWALK
- SOFT LANDSCAPING
- TWO WAY VEHICLE CIRCULATION
- MAIN ENTRANCE
- ENTRANCE AND/OR FIRE EXIT
- BOLLARD STYLE BIKE RACK
- PROPERTY LINE
- ZONING SETBACKS

PROJECT INFORMATION

ZONING	R5C H(33)
FULL SITE AREA	6,060 sq. m. (65,233) sq. ft.
FULL SITE OPEN AREA 33.9%	2,054 sq. m. (22,106) sq. ft.
NEW BLDG SITE AREA	2,537 sq. m. (27,316) sq. ft.
NEW BLDG OPEN AREA 34.1%	865 sq. m. (9,315) sq. ft.
BUILDING HEIGHT	33.0 m
RICHMOND ROAD SETBACK	3.0 m
REAR YARD SETBACK	7.5 m
INTERIOR YARD SETBACK	1.5 m

PROJECT STATISTICS

BUILDING HEIGHT		33.0 m
AVERAGE MEAN GRADE	(GEOD. ELEV.)	XX.XX

GROSS BUILDING - AREAS
(CITY OF OTTAWA'S ZONING DEFINITION)

PARKING LEVEL (TYPICAL)		2,200 sq. m. (23,688) sq. ft.
GROUND FLOOR		1,095 sq. m. (11,788) sq. ft.
TYP. RESID. FLOORS 2nd -11th FLOOR	10 x 1,138 sq. m. 10 x (12,257) sq. ft.	11,380 sq. m. (122, 570) sq. ft.
AMENITY/ MECH FLOOR		N/A
TOTAL AREA (ABOVE GRADE)		12,475 sq. m. (134,279) sq. ft.

UNIT STATISTICS

STUDIO - GUEST SUITE	1
1 BEDROOM - DWELLING UNIT	50
2 BEDROOM - DWELLING UNIT	72
TOTAL	123

AMENITY AREAS
(CITY OF OTTAWA'S ZONING DEFINITION)

REQUIRED	
6.0m2/DWELLING UNIT	732 sq. m. (7,879) sq. ft.
PROVIDED	
EXTERNAL AT GRADE	920 sq. m. (9,905) sq. ft.
GROUND FLOOR AMENITY	249 sq. m. (2,675) sq. ft.
BALCONIES 2nd -11th FLOOR	894 sq. m. (9, 627) sq. ft.
TOTAL AMENITY	2,063 sq. m. (22,207) sq. ft.

CAR PARKING

REQUIRED

RESIDENCE	0.5 PER UNIT (12 EXEMPT)	55
VISITOR	0.1 PER UNIT (12 EXEMPT)	11
ACCESSIBLE		2
TOTAL		68

PROVIDED

RESIDENCE	160
VISITOR	11
ACCESSIBLE	4
TOTAL	175

LOCATION OF PARKING

PROPOSED BUILDING P1 LEVEL	58
PROPOSED BUILDING P2 LEVEL	63
PROPOSED BUILDING EXTERIOR AT GRADE	54
TOTAL	175

BICYCLE PARKING

REQUIRED

RESIDENCE	- 0.5 PER UNIT (122 UNITS)	61

PROVIDED

UNDERGROUND	76
EXTERIOR AT GRADE	0
TOTAL	76

STORAGE UNITS

PROVIDED

GROUND FLOOR	73
TOTAL	73

CLIENT
Homestead Land Holdings Ltd.
80 Johnson Street
Kingston, ON, K7L 1X7
Tel: (613) 546-3146
Fax: (613) 546-5637

ARCHITECT
Roderick Lahey Architect Inc.
56 Beech Street
Ottawa, ON Canada, K1S 3J6
Tel: (613) 724-9932
Fax: (613) 724-1209

URBAN PLANNER
FoTenn Consultants Inc.
223 Mcleod Street
Ottawa, ON Canada, K2P 0Z8
Tel: (613) 730-5709
Fax: (613) 730-1136

SURVEYOR
Annis O'Sullivan Vollebekk Ltd.
Ontario Land Surveyors
14 Concourse Gate, Suite 500
Nepean, ON Canada, K2E 7S6
Tel: (613) 727-0850 Fax: (613) 727-1079

CIVIL
Stantec Consulting Ltd.
400-1331 Clyde Avenue
Ottawa, ON Canada
Tel: (613) 722-4420

LANDSCAPE ARCHITECT
Wentworth Landscapes
13392 Loyalist Parkway R.R.1
Picton, ON Canada, K0K 2T0
Tel: (613) 547 3772

STRUCTURE
Goodeve Structural Inc.
77 Auriga Drive, Suite 18
Ottawa, ON Canada, K2E 7Z7
Tel: (613) 226-4558

No.	DESCRIPTION	DATE
8		
7		
6		
5	RESUBMISSION FOR SITE PLAN APPROVAL	Aug 13, 18
4	ISSUED FOR COORDINATION	July 17, 18
3	ISSUED FOR COORDINATION	July 17, 18
2	ISSUED FOR FOUNDATION PERMIT	JULY 12, 18
1	RESUBMISSION FOR SITE PLAN APPROVAL	Mar 29, 18

REVISIONS:

ARCHITECT SEAL: ONTARIO ASSOCIATION OF ARCHITECTS — RODERICK J. LAHEY — LICENCE 4375

NORTH ARROW:

CLIENT: HOMESTEAD

ARCHITECT: rla / architecture — roderick lahey architect inc.

PROJECT TITLE:
851 RICHMOND ROAD
OTTAWA ONTARIO

PROJECT No.: 1724
DRAWN: P.E.
CHECKED: K.R.
SCALE: 1:1

SHEET TITLE:
SITE PLAN

SHEET No.
A-SP

PAGE NUMBER: 0 OF 0

PLOT DATE: Monday, August 13, 2018 8:57:51 AM PLOTTED BY: Kris Rothwell
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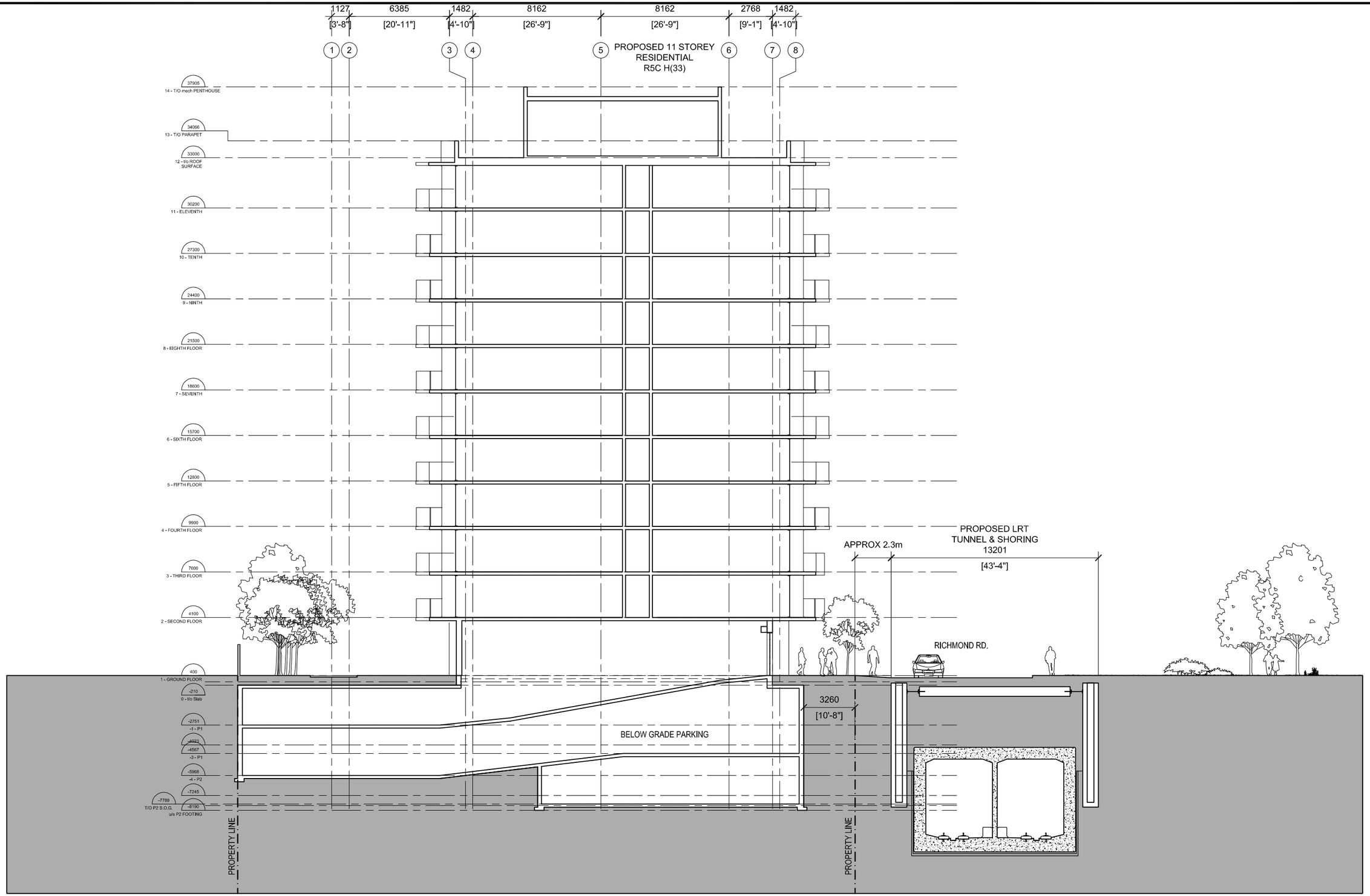


RODERICKLAHEY ARCHITECT INC

TRANSVERSE BUILDING SECTION & LRT

SCALE TO FIT date:August 11, 2017

851 RICHMOND ROAD
OTTAWA ONTARIO

SHEET #
a300
PROJ. # 1705

Appendix C SANITARY SEWER CALCULATIONS

Stantec

SUBDIVISION:

851 RICHMOND ROAD

DATE: 2018/03/29
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY: AMP

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401329

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (COMM., INST.):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / SINGLE	3.4	INSTITUTIONAL	28,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / 1 BED APT	1.4	INFILTRATION	0.33 l/s/Ha		
PERSONS / 2 BED APT	2.1				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE								
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	UNITS SINGLE	1 BED APT	2 BED APT	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
BLDG	STUB	1	0.25	0	50	72	221	0.25	221	4.00	2.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.25	0.25	0.08	2.95	3.5	200	PVC	SDR 35	2.00	47.3	**6.24%**	1.49	0.70
																												200							

david schaeffer engineering ltd

120 Iber Road, Suite 103
Ottawa, Ontario K2S 1E9
Tel. (613)836-0856
Fax (613) 836-7183
www.DSEL.ca

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES

FOR

OCEF CORP
809 RICHMOND ROAD

CITY OF OTTAWA

PROJECT NO.: 16-850

DECEMBER 2016 – REV 2

APPENDIX C

Wastewater Collection

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 0.360 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.10**	**L/s**

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	120	168
2 Bedroom	2.1	117	246
3 Bedroom	3.1		0
Average	1.8		0

Total Pop	**414**	
Average Domestic Flow	**1.68**	**L/s**
Peaking Factor	**4.00**	
Peak Domestic Flow	**6.71**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate		No. of Units	Avg Wastewater (L/s)
Commercial floor space*	5	$L/m^2/d$	860	0.10
Hospitals	900	L/bed/d		0.00
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d		0.00
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow	**0.10**
Peak Institutional / Commercial Flow	0.15
Peak Industrial Flow**	0.00
Peak I/C/I Flow	**0.15**

** assuming a 12 hour commercial operation*

*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**1.78 L/s**
Total Estimated Peak Dry Weather Flow Rate	**6.86 L/s**
Total Estimated Peak Wet Weather Flow Rate	**6.96 L/s**

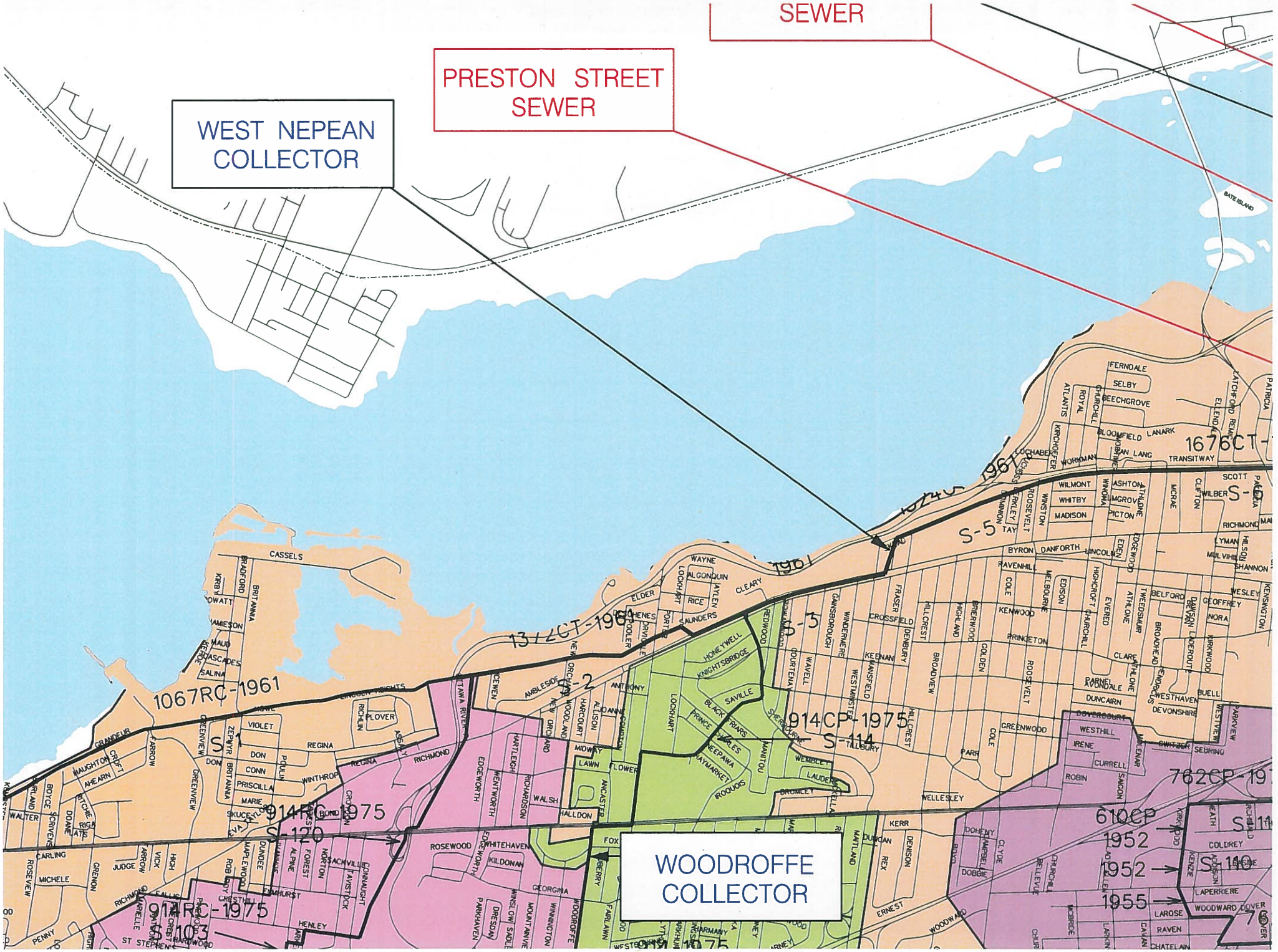
OCEF Corp
809 Richmond Road
Proposed Development

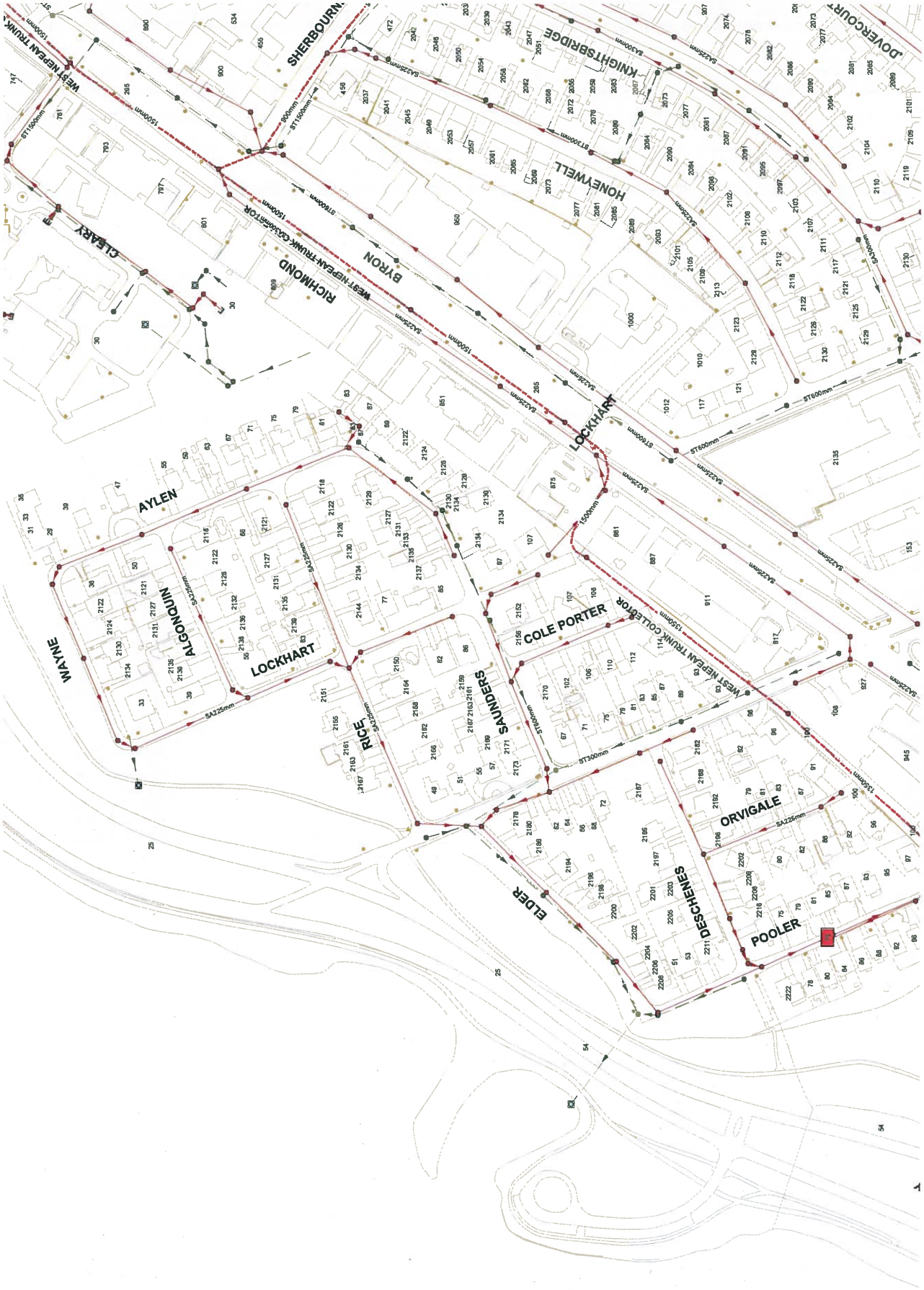
PROJECT:
LOCATION: **809 Richmond Road**
FILE REF: **16-850**
DATE: **18-Mar-16**

DESIGN PARAMETERS

Avg. Daily Flow Res.	350	L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0		Infiltration / Inflow	0.28	L/s/ha
Avg. Daily Flow Comm	50,000	L/ha/d	Peak Fact. Comm.	1.5	Min. Pipe Velocity	0.60	m/s full flowing
Avg. Daily Flow Instit.	50,000	L/ha/d	Peak Fact. Instit.	1.5	Max. Pipe Velocity	3.00	m/s full flowing
Avg. Daily Flow Indust	35,000	L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013	

Location			Residential Area and Population									Commercial		Institutional		Industrial			Infiltration				Pipe Data							
Area ID	Up	Down	Area	Number of Units				Pop.	Cumulative		Peak.	Q_{res}	Area	Accu.	Area	Accu.	Area	Accu.	Q_{C+I+I}	Total	Accu.	Infiltration	Total	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
				by type					Area	Pop.	Fact.			Area		Area		Area		Area	Area	Flow	Flow								
			(ha)	Singles	Semi's	Town's	Apt's		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(-)
A	UPSTREAM	N1	0.470	2				7.0	0.470	7.0	4.00	0.11	1.29	1.29		0.00		0.00	1.1	1.760	1.760	0.493	1.73	225	0.90	395.0	0.040	0.056	1.07	42.6	0.04
B	N1	N2	0.000				199	358.0	0.470	365.0	4.00	5.91	1.24	2.53		0.00		0.00	2.2	1.240	3.000	0.840	8.95	225	0.90	208.0	0.040	0.056	1.07	42.6	0.21
C	N2	N3	0.160					0.0	0.630	365.0	4.00	5.91	0.18	2.71		0.00		0.00	2.4	0.340	3.340	0.935	9.20	225	4.80	30.0	0.040	0.056	2.47	98.4	0.09


SEWER
PRESTON STREET SEWER
WEST NEPEAN COLLECTOR
WOODROFFE COLLECTOR
1676CT-
1372CT-1961
1067RC-1961
914RC-1975
S-120
914RC-1975
S-103
914CP-1975
S-114
762CP-19
610CP
1952
1952
1955
S-1
S-2
S-3
S-5
S-7
S-10
S-11
CASSELS
WAYNE
ELDER
CLEARY
FERNDALE
SELBY
BEECHGROVE
BLOOMFIELD
LANARK
TRANSITWAY
SCOTT
WILMONT
WHITBY
MADISON
ASHTON
MGROVE
PICTON
RICHMOND
BYRON
DANFORTH
LINCOLN
RAVENHILL
KENWOOD
PRINCETON
DUNCAIRN
DOVERCOURT
WESTHILL
GREENWOOD
CROSSFIELD
DENBURY
HILLCREST
BROADVIEW
GOLDEN
ROOSEVELT
MELBOURNE
EDISON
HIGHCROFT
EVERED
TWEEDSMUIR
ATHLONE
BELFORD
BROADHEAD
WESTHAVEN
DEVONSHIRE
BUELL
WESTVIEW
PARKVIEW
SEBRING
CURRELL
IRENE
ROBIN
SAGON
KERR
DENISON
REX
DURHAM
MAITLAND
WELLESLEY
LAUDER
BROMLEY
WEMBLEY
SHERBOURNE
SAVILLE
KNIGHTSBRIDGE
HONEYWELL
ANTHONY
ALLISON
HARCOURT
WOODLAND
ORCHARD
AMBLESIDE
MIDWAY
LAWN
FLOWER
ANCASTER
HALLDON
FOX
BERRY
FARLAWN
WOODROFFE
ROSEWOOD
WHITEHAVEN
KILDONAN
GEORGINA
PARKHAVEN
DRESDEN
WINNINGTON
MOUNTAINVIEW
WINSLOW
SADLER
EDGEWORTH
WENTWORTH
HARTLEIGH
RICHARDSON
WALSH
RICHMOND
REGINA
VIOLET
ZEPHYR
DON
CONN
PRISCILLA
MARIE
SKUCE
BRITANNIA
PLOVER
RICHLIN
ASHLEY
GRANDEUR
CROFT
HAUGHTON
AHEARN
WALTER
BOYCE
SCRIVENS
CARLING
ROSEVIEW
MICHELE
GRENON
JUDGE
ARROW
VICK
HIGH
RICHMOND
ROBERTSON
CRESTHILL
MAPLEWOOD
DUNDEE
ALPINE
FOREST
NORTON
HAVILLAND
HAVISTOCK
CONNAUGHT
HENLEY
ST STEPHEN
PENNY
DOHENY
CAMPBELL
DOBBIE
CLYDE
BELLEVUE
CHURCHILL
MCBRIDE
ERNEST
WOODWARD
COLDREY
KEENE
LAPERRIERE
WOODWARD COVER
LAROSE
RAVEN
CHATELAIN
CAVAN
LARKIN
LATCHFORD
PATRICIA
ELLENDALE
BATE ISLAND


SHERBOURN
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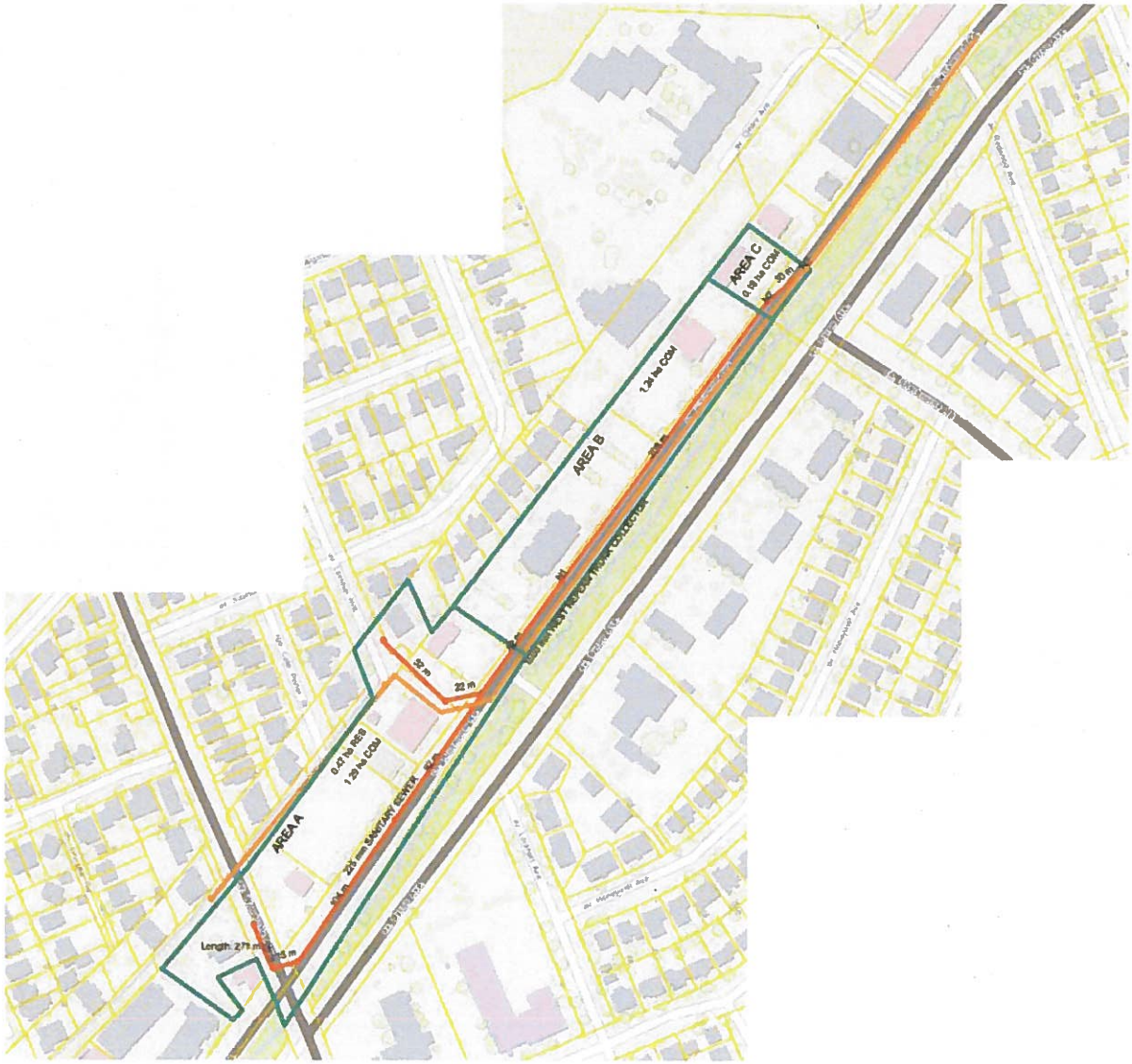
DOVERCOURT
HONEYWELL
WEST NEPEAN TRUNK
CLEARY
RICHMOND
BYRON
LOCKHART
AYLEN
ALGONQUIN
WAYNE
LOCKHART
RICE
SAUNDERS
COLE PORTER
WEST NEPEAN TRUNK COLLECTOR
ORVIGALE
ELDER
DESCHENES
POOLER

809 Richmond Road - Sanitary Analysis



Appendix D STORMWATER MANAGEMENT CALCULATIONS

Stantec

851 RICHMOND ROAD

DATE: 2018/06/29
REVISION: 3
DESIGNED BY: WAJ
CHECKED BY: NPC

STORM SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401329

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min
BEDDING CLASS B

LOCATION			DRAINAGE AREA																				PIPE SELECTION												
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETER (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
L203A	CB 203	102	0.08	0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.065	0.065	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	13.8	28.9	200	200	CIRCULAR	PVC	-	1.00	33.3	**41.5%**	1.05	0.84	0.57
EX-BLDG, L202A	102	101	0.10	0.00	0.00	0.07	0.00	0.75	0.00	0.00	0.90	0.075	0.140	0.000	0.000	0.000	0.000	0.063	0.063	10.57	74.68	101.27	118.70	173.50	0.0	0.0	59.4	42.2	375	375	CIRCULAR	PVC	-	0.50	116.6	**50.9%**	1.11	0.95	0.74
	101	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.140	0.000	0.000	0.000	0.000	0.000	0.063	11.31	72.12	97.75	114.56	167.42	0.0	0.0	57.3	69.3	375	375	CIRCULAR	PVC	-	0.50	116.6	**49.2%**	1.11	0.94	1.23
RAMP, BLDG1, BLDG2, BLDG3, BLDG4, BLDG5, BLDG6, BLDG7, BLDG8, BLDG9, L201A	100	EX CSP	0.14	0.00	0.00	0.00	0.12	0.68	0.00	0.00	0.00	0.095	0.235	0.000	0.000	0.000	0.000	0.000	0.063	12.54	68.25	92.44	108.30	158.24	10.8	10.8	83.0	3.4	375	375	CIRCULAR	CSP	-	2.00	233.1	**35.6%**	2.21	1.70	0.03
																				12.58									375	375									

Stantec

851 RICHMOND ROAD

DATE: 2018/06/29
REVISION: 3
DESIGNED BY: WAJ
CHECKED BY: NPC

STORM SEWER DESIGN SHEET

(City of Ottawa)

(Free Flow Analysis)

FILE NUMBER: 160401329

DESIGN PARAMETERS

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MANNING'S n = 0.013
MINIMUM COVER: 2.00 m
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BEDDING CLASS B

LOCATION			DRAINAGE AREA																					PIPE SELECTION											
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETER (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
L203A	CB 203	102	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.81	0.000	0.000	0.000	0.000	0.000	0.000	0.065	0.065	10.00	76.81	104.19	122.14	178.56	0.0	0.0	32.1	28.9	200	200	CIRCULAR	PVC	-	1.00	33.3	**96.5%**	1.05	1.09	0.44
EX-BLDG, L202A	102	101	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.81	0.000	0.000	0.000	0.000	0.000	0.000	0.138	0.203	10.44	75.15	101.92	119.46	174.62	0.0	0.0	98.4	42.2	375	375	CIRCULAR	PVC	-	0.50	116.6	**84.4%**	1.11	1.11	0.64
	101	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.203	11.08	72.90	98.83	115.82	169.28	0.0	0.0	95.4	69.3	375	375	CIRCULAR	PVC	-	0.50	116.6	**81.8%**	1.11	1.10	1.05
RAMP, BLDG1-9, L201A	100	EX CSP	0.00	0.00	0.00	0.14	0.12	0.00	0.00	0.00	0.68	0.000	0.000	0.000	0.000	0.000	0.000	0.095	0.298	12.13	69.49	94.14	110.30	161.17	10.8	10.8	144.0	3.4	375	375	CIRCULAR	CSP	-	2.00	233.1	**61.8%**	2.21	2.01	0.03
																				12.16									375	375								

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG1
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	4	0	0	0.025
0.050	0.0006	0.0006	0	0.050	14	0	0	0.050
0.075	0.0008	0.0008	1	0.075	33	1	1	0.075
0.100	0.0009	0.0009	2	0.100	58	1	2	0.100
0.125	0.0011	0.0011	4	0.125	90	2	4	0.125
0.150	0.0013	0.0013	7	0.150	130	3	7	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.2	334.4	0.2	0.09289
0.8	726.1	0.6	0.29459
1.9	1178.4	1.1	0.62191
3.7	1665.2	1.8	1.08445
6.5	2173.6	2.7	1.68823

Rooftop Storage Summary

Total Building Area (sq.m)		186
Assume Available Roof Area (sq.	70%	130.2
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		7
Estimated 100 Year Drawdown Time (h)		1.7

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m) L/s

	Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.097	0.148	0.150
Volume (cu.m)	1.8	6.3	6.5
Draintime (hrs)	0.6	1.7	

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG2
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	2	0	0	0.025
0.050	0.0006	0.0006	0	0.050	10	0	0	0.050
0.075	0.0008	0.0008	1	0.075	22	0	1	0.075
0.100	0.0009	0.0009	1	0.100	40	1	1	0.100
0.125	0.0011	0.0011	3	0.125	62	1	3	0.125
0.150	0.0013	0.0013	4	0.150	90	2	4	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.1	230.1	0.1	0.06392
0.5	499.7	0.4	0.20273
1.3	810.9	0.8	0.42798
2.6	1145.9	1.3	0.74629
4.5	1495.8	1.9	1.16179

Rooftop Storage Summary

Total Building Area (sq.m)		128
Assume Available Roof Area (sq.	70%	89.6
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		4
Estimated 100 Year Drawdown Time (h)		1.0

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m) L/s

	Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.088	0.140	0.150
Volume (cu.m)	1.0	3.7	4.5
Draintime (hrs)	0.3	1.0	

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG3
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	2	0	0	0.025
0.050	0.0006	0.0006	0	0.050	10	0	0	0.050
0.075	0.0008	0.0008	1	0.075	22	0	1	0.075
0.100	0.0009	0.0009	1	0.100	40	1	1	0.100
0.125	0.0011	0.0011	3	0.125	62	1	3	0.125
0.150	0.0013	0.0013	4	0.150	89	2	4	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.1	228.3	0.1	0.06342
0.5	495.8	0.4	0.20114
1.3	804.6	0.8	0.42464
2.6	1137.0	1.3	0.74046
4.4	1484.1	1.9	1.15272

Rooftop Storage Summary

Total Building Area (sq.m)		127
Assume Available Roof Area (sq.	70%	88.9
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		4
Estimated 100 Year Drawdown Time (h)		1.0

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m)	L/s Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.088	0.140	0.150
Volume (cu.m)	0.9	3.7	4.4
Draintime (hrs)	0.3	1.0	

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG4
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	3	0	0	0.025
0.050	0.0006	0.0006	0	0.050	12	0	0	0.050
0.075	0.0008	0.0008	1	0.075	26	0	1	0.075
0.100	0.0009	0.0009	2	0.100	46	1	2	0.100
0.125	0.0011	0.0011	3	0.125	72	1	3	0.125
0.150	0.0013	0.0013	5	0.150	104	2	5	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.2	267.9	0.2	0.07441
0.6	581.7	0.5	0.23599
1.5	944.0	0.9	0.4982
3.0	1333.9	1.5	0.86873
5.2	1741.2	2.2	1.3524

Rooftop Storage Summary

Total Building Area (sq.m)		149
Assume Available Roof Area (sq.	70%	104.3
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		5
Estimated 100 Year Drawdown Time (h)		1.2

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m) L/s

	Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.092	0.144	0.150
Volume (cu.m)	1.3	4.7	5.2
Draintime (hrs)	0.4	1.2	

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG5
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	3	0	0	0.025
0.050	0.0006	0.0006	0	0.050	13	0	0	0.050
0.075	0.0008	0.0008	1	0.075	29	1	1	0.075
0.100	0.0009	0.0009	2	0.100	51	1	2	0.100
0.125	0.0011	0.0011	3	0.125	80	2	3	0.125
0.150	0.0013	0.0013	6	0.150	116	2	6	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.2	296.6	0.2	0.0824
0.7	644.1	0.5	0.26133
1.7	1045.3	1.0	0.55169
3.3	1477.2	1.6	0.96202
5.7	1928.2	2.4	1.49762

Rooftop Storage Summary

Total Building Area (sq.m)		165
Assume Available Roof Area (sq.	70%	115.5
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		6
Estimated 100 Year Drawdown Time (h)		1.4

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m) L/s

	Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.094	0.146	0.150
Volume (cu.m)	1.5	5.4	5.8
Draintime (hrs)	0.5	1.4	

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG6
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	4	0	0	0.025
0.050	0.0006	0.0006	0	0.050	16	0	0	0.050
0.075	0.0008	0.0008	1	0.075	36	1	1	0.075
0.100	0.0009	0.0009	2	0.100	63	1	2	0.100
0.125	0.0011	0.0011	4	0.125	99	2	4	0.125
0.150	0.0013	0.0013	7	0.150	143	3	7	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.2	366.8	0.2	0.10188
0.9	796.4	0.6	0.3231
2.1	1292.4	1.2	0.68209
4.1	1826.3	2.0	1.1894
7.1	2383.9	3.0	1.85161

Rooftop Storage Summary

Total Building Area (sq.m)		204
Assume Available Roof Area (sq.	70%	142.8
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		7
Estimated 100 Year Drawdown Time (h)		1.9

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m) L/s

	Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.099	0.150	0.150
Volume (cu.m)	2.1	7.2	7.2
Draintime (hrs)	0.7	1.9	

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG7
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	2	0	0	0.025
0.050	0.0006	0.0006	0	0.050	7	0	0	0.050
0.075	0.0008	0.0008	0	0.075	15	0	0	0.075
0.100	0.0009	0.0009	1	0.100	26	1	1	0.100
0.125	0.0011	0.0011	2	0.125	41	1	2	0.125
0.150	0.0013	0.0013	3	0.150	60	1	3	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.1	152.8	0.1	0.04245
0.4	331.8	0.3	0.13462
0.9	538.5	0.5	0.28421
1.7	761.0	0.8	0.49558
3.0	993.3	1.3	0.7715

Rooftop Storage Summary

Total Building Area (sq.m)		85
Assume Available Roof Area (sq.	70%	59.5
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		3
Estimated 100 Year Drawdown Time (h)		0.6

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m)	L/s Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.081	0.131	0.150
Volume (cu.m)	0.5	2.0	3.0
Draintime (hrs)	0.2	0.6	

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG8
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	2	0	0	0.025
0.050	0.0006	0.0006	0	0.050	7	0	0	0.050
0.075	0.0008	0.0008	0	0.075	15	0	0	0.075
0.100	0.0009	0.0009	1	0.100	26	1	1	0.100
0.125	0.0011	0.0011	2	0.125	41	1	2	0.125
0.150	0.0013	0.0013	3	0.150	60	1	3	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.1	152.8	0.1	0.04245
0.4	331.8	0.3	0.13462
0.9	538.5	0.5	0.28421
1.7	761.0	0.8	0.49558
3.0	993.3	1.3	0.7715

Rooftop Storage Summary

Total Building Area (sq.m)		85
Assume Available Roof Area (sq.	70%	59.5
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		3
Estimated 100 Year Drawdown Time (h)		0.6

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m) L/s

	Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.081	0.131	0.150
Volume (cu.m)	0.5	2.0	3.0
Draintime (hrs)	0.2	0.6	

Project #160401329, 851 RICHMOND ROAD
Roof Drain Design Sheet, Area BLDG9
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0003	0	0.025	1	0	0	0.025
0.050	0.0006	0.0006	0	0.050	3	0	0	0.050
0.075	0.0008	0.0008	0	0.075	7	0	0	0.075
0.100	0.0009	0.0009	0	0.100	12	0	0	0.100
0.125	0.0011	0.0011	1	0.125	19	0	1	0.125
0.150	0.0013	0.0013	1	0.150	28	1	1	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.0	71.9	0.0	0.01998
0.2	156.2	0.1	0.06335
0.4	253.4	0.2	0.13374
0.8	358.1	0.4	0.23322
1.4	467.4	0.6	0.36306

Rooftop Storage Summary

Total Building Area (sq.m)		40
Assume Available Roof Area (sq.	70%	28
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		1
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		1
Estimated 100 Year Drawdown Time (h)		0.2

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m) L/s

	Open	75%	**50%**	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	**2yr**	**100yr**	**Available**
Qresult (cu.m/s)	0.001	0.001	-
Depth (m)	0.054	0.111	0.150
Volume (cu.m)	0.1	0.6	1.4
Draintime (hrs)	0.0	0.2	

Stormwater Management Calculations

File No: **160401329**
Project: **851 RICHMOND ROAD**
Date: **28-Aug-18**

SWM Approach:
Targets as per 40 Cleary Avenue Stormwater Management Report
Dated January 2007

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"	Runoff Coefficient "C"	"A x C"	Overall Runoff Coefficient
Uncontrolled - Non-Tributary	UNC-1	Hard	0.063	0.9	0.057	
		Soft	0.047	0.2	0.009	
		Subtotal	0.11		0.066	0.600
Uncontrolled - Tributary	L203A	Hard	0.070	0.9	0.063	
		Soft	0.010	0.2	0.002	
		Subtotal	0.08		0.0648	0.810
Uncontrolled - Tributary	L202A	Hard	0.079	0.9	0.071	
		Soft	0.021	0.2	0.004	
		Subtotal	0.1		0.075	0.750
Uncontrolled - Tributary	L201A	Hard	0.079	0.9	0.071	
		Soft	0.041	0.2	0.008	
		Subtotal	0.12		0.0792	0.660
Uncontrolled - Tributary	EXBLDG	Hard	0.070	0.9	0.063	
		Soft	0.000	0.2	0.000	
		Subtotal	0.07		0.063	0.900
Uncontrolled - Tributary	RAMP	Hard	0.017	0.9	0.015	
		Soft	0.003	0.2	0.001	
		Subtotal	0.02		0.0156	0.780
Roof	BLDG9	Hard	0.004	0.9	0.004	
		Soft	0.000	0.2	0.000	
		Subtotal	0.004		0.0036	0.900
Roof	BLDG8	Hard	0.009	0.9	0.008	
		Soft	0.000	0.2	0.000	
		Subtotal	0.0085		0.00765	0.900
Roof	BLDG7	Hard	0.009	0.9	0.008	
		Soft	0.000	0.2	0.000	
		Subtotal	0.0085		0.00765	0.900
Roof	BLDG6	Hard	0.020	0.9	0.018	
		Soft	0.000	0.2	0.000	
		Subtotal	0.0204		0.01836	0.900
Roof	BLDG5	Hard	0.017	0.9	0.015	
		Soft	0.000	0.2	0.000	
		Subtotal	0.0165		0.01485	0.900
Roof	BLDG4	Hard	0.015	0.9	0.013	
		Soft	0.000	0.2	0.000	
		Subtotal	0.0149		0.01341	0.900
Roof	BLDG3	Hard	0.013	0.9	0.011	
		Soft	0.000	0.2	0.000	
		Subtotal	0.0127		0.01143	0.900
Roof	BLDG2	Hard	0.013	0.9	0.012	
		Soft	0.000	0.2	0.000	
		Subtotal	0.0128		0.01152	0.900
Roof	BLDG1	Hard	0.019	0.9	0.017	
		Soft	0.000	0.2	0.000	
		Subtotal	0.0186		0.01674	0.900
Total			**0.617**		**0.469**	
Overall Runoff Coefficient= C:						**0.76**

Total Roof Areas	**0.117 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.390 ha**
Total Tributary Area to Outlet	**0.507 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.110 ha**
Total Site	**0.617 ha**

Stormwater Management Calculations

Project #160401329, 851 RICHMOND ROAD
Modified Rational Method Calculatons for Storage

2 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

2 YEAR Predevelopment Target Release from Portion of Site

Targets as per 40 Cleary Avenue Stormwater Management Report Dated January 2007

Subdrainage Area:
Area (ha): 0.6000

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	Qtarget (L/s)
10	76.81	**267.8**

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.11
C: 0.60

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	14.1	14.1		
20	52.03	9.5	9.5		
30	40.04	7.3	7.3		
40	32.86	6.0	6.0		
50	28.04	5.1	5.1		
60	24.56	4.5	4.5		
70	21.91	4.0	4.0		
80	19.83	3.6	3.6		
90	18.14	3.3	3.3		
100	16.75	3.1	3.1		
110	15.57	2.9	2.9		
120	14.56	2.7	2.7		

Subdrainage Area: L203A — Uncontrolled - Tributary
Area (ha): 0.08
C: 0.81

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	13.8	13.8		
20	52.03	9.4	9.4		
30	40.04	7.2	7.2		
40	32.86	5.9	5.9		
50	28.04	5.1	5.1		
60	24.56	4.4	4.4		
70	21.91	3.9	3.9		
80	19.83	3.6	3.6		
90	18.14	3.3	3.3		
100	16.75	3.0	3.0		
110	15.57	2.8	2.8		
120	14.56	2.6	2.6		

Subdrainage Area: L202A — Uncontrolled - Tributary
Area (ha): 0.10
C: 0.75

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	16.0	16.0		
20	52.03	10.8	10.8		
30	40.04	8.3	8.3		
40	32.86	6.9	6.9		
50	28.04	5.8	5.8		
60	24.56	5.1	5.1		
70	21.91	4.6	4.6		
80	19.83	4.1	4.1		
90	18.14	3.8	3.8		
100	16.75	3.5	3.5		
110	15.57	3.2	3.2		
120	14.56	3.0	3.0		

Subdrainage Area: L201A — Uncontrolled - Tributary
Area (ha): 0.12
C: 0.66

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	16.9	16.9		
20	52.03	11.5	11.5		
30	40.04	8.8	8.8		
40	32.86	7.2	7.2		
50	28.04	6.2	6.2		
60	24.56	5.4	5.4		
70	21.91	4.8	4.8		
80	19.83	4.4	4.4		
90	18.14	4.0	4.0		
100	16.75	3.7	3.7		
110	15.57	3.4	3.4		
120	14.56	3.2	3.2		

Subdrainage Area: EXBLDG — Uncontrolled - Tributary
Area (ha): 0.07
C: 0.90

Project #160401329, 851 RICHMOND ROAD
Modified Rational Method Calculatons for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.56
20	119.95
30	91.87
40	75.15
50	63.95
60	55.89
70	49.79
80	44.99
90	41.11
100	37.90
110	35.20
120	32.89

100 YEAR Predevelopment Target Release from Portion of Site

Targets as per 40 Cleary Avenue Stormwater Management Report Dated January 2007

Subdrainage Area:
Area (ha): 0.6000
Allowable C-Value 0.90

tc (min)	I (100 yr) (mm/hr)	Q100yr (L/s)
10	178.56	**267.8**

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.11
C: 0.75

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	41.0	41.0		
20	119.95	27.5	27.5		
30	91.87	21.1	21.1		
40	75.15	17.2	17.2		
50	63.95	14.7	14.7		
60	55.89	12.8	12.8		
70	49.79	11.4	11.4		
80	44.99	10.3	10.3		
90	41.11	9.4	9.4		
100	37.90	8.7	8.7		
110	35.20	8.1	8.1		
120	32.89	7.5	7.5		

Subdrainage Area: L203A — Uncontrolled - Tributary
Area (ha): 0.08
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	39.7	39.7		
20	119.95	26.7	26.7		
30	91.87	20.4	20.4		
40	75.15	16.7	16.7		
50	63.95	14.2	14.2		
60	55.89	12.4	12.4		
70	49.79	11.1	11.1		
80	44.99	10.0	10.0		
90	41.11	9.1	9.1		
100	37.90	8.4	8.4		
110	35.20	7.8	7.8		
120	32.89	7.3	7.3		

Subdrainage Area: L202A — Uncontrolled - Tributary
Area (ha): 0.10
C: 0.94

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	46.5	46.5		
20	119.95	31.3	31.3		
30	91.87	23.9	23.9		
40	75.15	19.6	19.6		
50	63.95	16.7	16.7		
60	55.89	14.6	14.6		
70	49.79	13.0	13.0		
80	44.99	11.7	11.7		
90	41.11	10.7	10.7		
100	37.90	9.9	9.9		
110	35.20	9.2	9.2		
120	32.89	8.6	8.6		

Subdrainage Area: L201A — Uncontrolled - Tributary
Area (ha): 0.12
C: 0.83

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	49.1	49.1		
20	119.95	33.0	33.0		
30	91.87	25.3	25.3		
40	75.15	20.7	20.7		
50	63.95	17.6	17.6		
60	55.89	15.4	15.4		
70	49.79	13.7	13.7		
80	44.99	12.4	12.4		
90	41.11	11.3	11.3		
100	37.90	10.4	10.4		
110	35.20	9.7	9.7		
120	32.89	9.1	9.1		

Subdrainage Area: EXBLDG — Uncontrolled - Tributary
Area (ha): 0.07
C: 1.00

Stormwater Management Calculations

Project #160401329, 851 RICHMOND ROAD
Modified Rational Method Calculatons for Storage

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	13.5	13.5		
20	52.03	9.1	9.1		
30	40.04	7.0	7.0		
40	32.86	5.8	5.8		
50	28.04	4.9	4.9		
60	24.56	4.3	4.3		
70	21.91	3.8	3.8		
80	19.83	3.5	3.5		
90	18.14	3.2	3.2		
100	16.75	2.9	2.9		
110	15.57	2.7	2.7		
120	14.56	2.6	2.6		

Subdrainage Area: RAMP — Uncontrolled - Tributary
Area (ha): 0.02
C: 0.78

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	3.3	3.3		
20	52.03	2.3	2.3		
30	40.04	1.7	1.7		
40	32.86	1.4	1.4		
50	28.04	1.2	1.2		
60	24.56	1.1	1.1		
70	21.91	1.0	1.0		
80	19.83	0.9	0.9		
90	18.14	0.8	0.8		
100	16.75	0.7	0.7		
110	15.57	0.7	0.7		
120	14.56	0.6	0.6		

Subdrainage Area: BLDG9 — Roof
Area (ha): 0.004 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	0.8	0.7	0.1	**0.1**	53.5	0.00
20	52.03	0.5	0.5	0.0	0.0	39.1	0.00
30	40.04	0.4	0.4	0.0	0.0	31.0	0.00
40	32.86	0.3	0.3	0.0	0.0	25.8	0.00
50	28.04	0.3	0.3	0.0	0.0	22.1	0.00
60	24.56	0.2	0.2	0.0	0.0	19.4	0.00
70	21.91	0.2	0.2	0.0	0.0	17.3	0.00
80	19.83	0.2	0.2	0.0	0.0	15.7	0.00
90	18.14	0.2	0.2	0.0	0.0	14.3	0.00
100	16.75	0.2	0.2	0.0	0.0	13.2	0.00
110	15.57	0.2	0.2	0.0	0.0	12.3	0.00
120	14.56	0.1	0.1	0.0	0.0	11.5	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	53.5	0.05	0.7	0.1	1.4	0.0

Subdrainage Area: BLDG8 — Roof
Area (ha): 0.009 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	1.6	0.8	0.8	**0.5**	80.6	0.00
20	52.03	1.1	0.8	0.3	0.4	75.3	0.00
30	40.04	0.9	0.7	0.1	0.2	63.2	0.00
40	32.86	0.7	0.6	0.1	0.1	52.1	0.00
50	28.04	0.6	0.6	0.0	0.1	44.9	0.00
60	24.56	0.5	0.5	0.0	0.1	39.8	0.00
70	21.91	0.5	0.5	0.0	0.1	35.9	0.00
80	19.83	0.4	0.4	0.0	0.0	32.7	0.00
90	18.14	0.4	0.4	0.0	0.0	30.1	0.00
100	16.75	0.4	0.4	0.0	0.0	27.9	0.00
110	15.57	0.3	0.3	0.0	0.0	26.0	0.00
120	14.56	0.3	0.3	0.0	0.0	24.4	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	80.6	0.08	0.8	0.5	3.0	0.0

Subdrainage Area: BLDG7 — Roof
Area (ha): 0.009 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	1.6	0.8	0.8	**0.5**	80.6	0.00
20	52.03	1.1	0.8	0.3	0.4	75.3	0.00
30	40.04	0.9	0.7	0.1	0.2	63.2	0.00
40	32.86	0.7	0.6	0.1	0.1	52.1	0.00
50	28.04	0.6	0.6	0.0	0.1	44.9	0.00
60	24.56	0.5	0.5	0.0	0.1	39.8	0.00
70	21.91	0.5	0.5	0.0	0.1	35.9	0.00
80	19.83	0.4	0.4	0.0	0.0	32.7	0.00
90	18.14	0.4	0.4	0.0	0.0	30.1	0.00
100	16.75	0.4	0.4	0.0	0.0	27.9	0.00
110	15.57	0.3	0.3	0.0	0.0	26.0	0.00
120	14.56	0.3	0.3	0.0	0.0	24.4	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	80.6	0.08	0.8	0.5	3.0	0.0

Project #160401329, 851 RICHMOND ROAD
Modified Rational Method Calculatons for Storage

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	34.7	34.7		
20	119.95	23.3	23.3		
30	91.87	17.9	17.9		
40	75.15	14.6	14.6		
50	63.95	12.4	12.4		
60	55.89	10.9	10.9		
70	49.79	9.7	9.7		
80	44.99	8.8	8.8		
90	41.11	8.0	8.0		
100	37.90	7.4	7.4		
110	35.20	6.9	6.9		
120	32.89	6.4	6.4		

Subdrainage Area: RAMP — Uncontrolled - Tributary
Area (ha): 0.02
C: 0.98

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	9.7	9.7		
20	119.95	6.5	6.5		
30	91.87	5.0	5.0		
40	75.15	4.1	4.1		
50	63.95	3.5	3.5		
60	55.89	3.0	3.0		
70	49.79	2.7	2.7		
80	44.99	2.4	2.4		
90	41.11	2.2	2.2		
100	37.90	2.1	2.1		
110	35.20	1.9	1.9		
120	32.89	1.8	1.8		

Subdrainage Area: BLDG9 — Roof
Area (ha): 0.004 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	2.0	1.0	1.0	**0.6**	110.6	0.00
20	119.95	1.3	1.0	0.4	0.4	102.1	0.00
30	91.87	1.0	0.9	0.2	0.3	86.7	0.00
40	75.15	0.8	0.8	0.1	0.2	71.9	0.00
50	63.95	0.7	0.7	0.0	0.1	58.0	0.00
60	55.89	0.6	0.6	0.0	0.0	48.2	0.00
70	49.79	0.6	0.5	0.0	0.0	43.1	0.00
80	44.99	0.5	0.5	0.0	0.0	39.1	0.00
90	41.11	0.5	0.5	0.0	0.0	35.8	0.00
100	37.90	0.4	0.4	0.0	0.0	33.1	0.00
110	35.20	0.4	0.4	0.0	0.0	30.8	0.00
120	32.89	0.4	0.4	0.0	0.0	28.8	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	110.6	0.11	1.0	0.6	1.4	0.0

Subdrainage Area: BLDG8 — Roof
Area (ha): 0.009 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	4.2	1.1	3.1	1.9	127.7	0.00
20	119.95	2.8	1.1	1.7	**2.0**	131.1	0.00
30	91.87	2.2	1.1	1.0	1.9	128.2	0.00
40	75.15	1.8	1.1	0.7	1.6	122.7	0.00
50	63.95	1.5	1.0	0.5	1.4	115.5	0.00
60	55.89	1.3	1.0	0.3	1.2	108.3	0.00
70	49.79	1.2	1.0	0.2	0.9	101.4	0.00
80	44.99	1.1	0.9	0.2	0.8	93.7	0.00
90	41.11	1.0	0.9	0.1	0.6	86.3	0.00
100	37.90	0.9	0.8	0.1	0.5	79.6	0.00
110	35.20	0.8	0.8	0.1	0.4	73.4	0.00
120	32.89	0.8	0.7	0.0	0.3	66.9	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	131.1	0.13	1.1	2.0	3.0	0.0

Subdrainage Area: BLDG7 — Roof
Area (ha): 0.009 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	4.2	1.1	3.1	1.9	127.7	0.00
20	119.95	2.8	1.1	1.7	**2.0**	131.1	0.00
30	91.87	2.2	1.1	1.0	1.9	128.2	0.00
40	75.15	1.8	1.1	0.7	1.6	122.7	0.00
50	63.95	1.5	1.0	0.5	1.4	115.5	0.00
60	55.89	1.3	1.0	0.3	1.2	108.3	0.00
70	49.79	1.2	1.0	0.2	0.9	101.4	0.00
80	44.99	1.1	0.9	0.2	0.8	93.7	0.00
90	41.11	1.0	0.9	0.1	0.6	86.3	0.00
100	37.90	0.9	0.8	0.1	0.5	79.6	0.00
110	35.20	0.8	0.8	0.1	0.4	73.4	0.00
120	32.89	0.8	0.7	0.0	0.3	66.9	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	131.1	0.13	1.1	2.0	3.0	0.0

Stormwater Management Calculations

Project #160401329, 851 RICHMOND ROAD
Modified Rational Method Calculatons for Storage

Subdrainage Area: BLDG6 — Roof
Area (ha): 0.020 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	3.9	0.9	3.0	1.8	93.7	0.00
20	52.03	2.7	0.9	1.7	**2.1**	98.9	0.00
30	40.04	2.0	0.9	1.1	2.0	97.8	0.00
40	32.86	1.7	0.9	0.8	1.8	94.4	0.00
50	28.04	1.4	0.9	0.5	1.6	90.3	0.00
60	24.56	1.3	0.9	0.4	1.4	85.9	0.00
70	21.91	1.1	0.8	0.3	1.2	81.5	0.00
80	19.83	1.0	0.8	0.2	1.0	77.3	0.00
90	18.14	0.9	0.8	0.2	0.8	72.5	0.00
100	16.75	0.9	0.7	0.1	0.7	67.1	0.00
110	15.57	0.8	0.7	0.1	0.6	62.2	0.00
120	14.56	0.7	0.7	0.1	0.5	57.7	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	98.9	0.10	0.9	2.1	7.1	0.0

Subdrainage Area: BLDG5 — Roof
Area (ha): 0.017 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	3.2	0.9	2.3	1.4	91.3	0.00
20	52.03	2.1	0.9	1.2	**1.5**	94.3	0.00
30	40.04	1.7	0.9	0.8	1.4	91.4	0.00
40	32.86	1.4	0.9	0.5	1.2	86.7	0.00
50	28.04	1.2	0.8	0.3	1.0	81.6	0.00
60	24.56	1.0	0.8	0.2	0.8	76.4	0.00
70	21.91	0.9	0.8	0.1	0.6	70.0	0.00
80	19.83	0.8	0.7	0.1	0.5	63.6	0.00
90	18.14	0.7	0.7	0.1	0.4	57.9	0.00
100	16.75	0.7	0.6	0.0	0.3	52.5	0.00
110	15.57	0.6	0.6	0.0	0.2	48.5	0.00
120	14.56	0.6	0.6	0.0	0.2	45.6	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	94.3	0.09	0.9	1.5	5.8	0.0

Subdrainage Area: BLDG4 — Roof
Area (ha): 0.015 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	2.9	0.9	2.0	1.2	90.0	0.00
20	52.03	1.9	0.9	1.0	**1.3**	91.8	0.00
30	40.04	1.5	0.9	0.6	1.1	88.1	0.00
40	32.86	1.2	0.8	0.4	0.9	82.8	0.00
50	28.04	1.0	0.8	0.2	0.7	77.2	0.00
60	24.56	0.9	0.8	0.2	0.6	70.2	0.00
70	21.91	0.8	0.7	0.1	0.4	63.1	0.00
80	19.83	0.7	0.7	0.1	0.3	56.7	0.00
90	18.14	0.7	0.6	0.0	0.2	51.0	0.00
100	16.75	0.6	0.6	0.0	0.2	47.2	0.00
110	15.57	0.6	0.6	0.0	0.2	44.2	0.00
120	14.56	0.5	0.5	0.0	0.1	41.5	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	91.8	0.09	0.9	1.3	5.2	0.0

Subdrainage Area: BLDG3 — Roof
Area (ha): 0.013 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	2.4	0.9	1.6	**0.9**	87.7	0.00
20	52.03	1.7	0.9	0.8	0.9	87.7	0.00
30	40.04	1.3	0.8	0.4	0.8	82.5	0.00
40	32.86	1.0	0.8	0.2	0.6	76.3	0.00
50	28.04	0.9	0.7	0.1	0.4	67.8	0.00
60	24.56	0.8	0.7	0.1	0.3	59.7	0.00
70	21.91	0.7	0.6	0.0	0.2	52.6	0.00
80	19.83	0.6	0.6	0.0	0.1	47.5	0.00
90	18.14	0.6	0.6	0.0	0.1	43.8	0.00
100	16.75	0.5	0.5	0.0	0.1	40.7	0.00
110	15.57	0.5	0.5	0.0	0.1	38.1	0.00
120	14.56	0.5	0.5	0.0	0.1	35.8	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	87.7	0.09	0.9	0.9	4.4	0.0

Subdrainage Area: BLDG2 — Roof
Area (ha): 0.013 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	2.5	0.9	1.6	1.0	87.8	0.00

Project #160401329, 851 RICHMOND ROAD
Modified Rational Method Calculatons for Storage

Subdrainage Area: BLDG6 — Roof
Area (ha): 0.020 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	10.1	1.2	9.0	5.4	135.3	0.00
20	119.95	6.8	1.2	5.6	6.7	146.2	0.00
30	91.87	5.2	1.3	4.0	7.1	149.8	0.00
40	75.15	4.3	1.3	3.0	**7.2**	150.5	0.00
50	63.95	3.6	1.3	2.4	7.1	149.8	0.00
60	55.89	3.2	1.2	1.9	6.9	148.2	0.00
70	49.79	2.8	1.2	1.6	6.7	146.0	0.00
80	44.99	2.6	1.2	1.3	6.4	143.7	0.00
90	41.11	2.3	1.2	1.1	6.1	141.2	0.00
100	37.90	2.1	1.2	1.0	5.8	138.5	0.00
110	35.20	2.0	1.2	0.8	5.4	135.9	0.00
120	32.89	1.9	1.2	0.7	5.1	133.1	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	150.5	0.15	1.3	7.2	7.1	0.1

Subdrainage Area: BLDG5 — Roof
Area (ha): 0.017 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	8.2	1.2	7.0	4.2	134.0	0.00
20	119.95	5.5	1.2	4.3	5.1	143.5	0.00
30	91.87	4.2	1.2	3.0	**5.4**	145.8	0.00
40	75.15	3.4	1.2	2.2	5.3	145.3	0.00
50	63.95	2.9	1.2	1.7	5.1	143.5	0.00
60	55.89	2.6	1.2	1.4	4.9	140.9	0.00
70	49.79	2.3	1.2	1.1	4.6	138.0	0.00
80	44.99	2.1	1.2	0.9	4.3	134.9	0.00
90	41.11	1.9	1.1	0.7	4.0	131.7	0.00
100	37.90	1.7	1.1	0.6	3.7	128.4	0.00
110	35.20	1.6	1.1	0.5	3.4	125.2	0.00
120	32.89	1.5	1.1	0.4	3.1	121.1	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	145.8	0.15	1.2	5.4	5.8	0.0

Subdrainage Area: BLDG4 — Roof
Area (ha): 0.015 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	7.4	1.2	6.2	3.7	133.3	0.00
20	119.95	5.0	1.2	3.8	4.5	142.0	0.00
30	91.87	3.8	1.2	2.6	**4.7**	143.6	0.00
40	75.15	3.1	1.2	1.9	4.6	142.5	0.00
50	63.95	2.6	1.2	1.4	4.3	140.1	0.00
60	55.89	2.3	1.2	1.1	4.1	137.1	0.00
70	49.79	2.1	1.2	0.9	3.8	133.8	0.00
80	44.99	1.9	1.1	0.7	3.5	130.3	0.00
90	41.11	1.7	1.1	0.6	3.2	126.8	0.00
100	37.90	1.6	1.1	0.5	2.9	122.7	0.00
110	35.20	1.5	1.1	0.4	2.6	118.3	0.00
120	32.89	1.4	1.0	0.3	2.4	114.0	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	143.6	0.14	1.2	4.7	5.2	0.0

Subdrainage Area: BLDG3 — Roof
Area (ha): 0.013 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	6.3	1.1	5.2	3.1	132.0	0.00
20	119.95	4.2	1.2	3.0	3.6	139.4	0.00
30	91.87	3.2	1.2	2.0	**3.7**	139.8	0.00
40	75.15	2.7	1.2	1.5	3.5	137.7	0.00
50	63.95	2.3	1.2	1.1	3.3	134.5	0.00
60	55.89	2.0	1.1	0.8	3.0	130.7	0.00
70	49.79	1.8	1.1	0.6	2.7	126.7	0.00
80	44.99	1.6	1.1	0.5	2.4	122.0	0.00
90	41.11	1.5	1.1	0.4	2.2	116.7	0.00
100	37.90	1.3	1.0	0.3	1.9	111.7	0.00
110	35.20	1.2	1.0	0.3	1.7	107.0	0.00
120	32.89	1.2	1.0	0.2	1.4	102.4	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	139.8	0.14	1.2	3.7	4.4	0.0

Subdrainage Area: BLDG2 — Roof
Area (ha): 0.013 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	6.4	1.1	5.2	3.1	132.0	0.00

Stormwater Management Calculations

Project #160401329, 851 RICHMOND ROAD
Modified Rational Method Calculatons for Storage

20	52.03	1.7	0.9	0.8	**1.0**	87.9	0.00
30	40.04	1.3	0.8	0.4	0.8	82.8	0.00
40	32.86	1.1	0.8	0.3	0.6	76.6	0.00
50	28.04	0.9	0.7	0.2	0.5	68.3	0.00
60	24.56	0.8	0.7	0.1	0.3	60.2	0.00
70	21.91	0.7	0.7	0.1	0.2	53.1	0.00
80	19.83	0.6	0.6	0.0	0.2	47.8	0.00
90	18.14	0.6	0.6	0.0	0.1	44.1	0.00
100	16.75	0.5	0.5	0.0	0.1	41.0	0.00
110	15.57	0.5	0.5	0.0	0.1	38.3	0.00
120	14.56	0.5	0.5	0.0	0.1	36.0	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	87.9	0.09	0.9	1.0	4.5	0.0

Subdrainage Area: BLDG1 — Roof
Area (ha): 0.019 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	3.6	0.9	2.7	1.6	92.7	0.00
20	52.03	2.4	0.9	1.5	**1.8**	97.0	0.00
30	40.04	1.9	0.9	0.9	1.7	95.0	0.00
40	32.86	1.5	0.9	0.6	1.5	91.1	0.00
50	28.04	1.3	0.9	0.4	1.3	86.6	0.00
60	24.56	1.1	0.8	0.3	1.1	81.9	0.00
70	21.91	1.0	0.8	0.2	0.9	77.2	0.00
80	19.83	0.9	0.8	0.2	0.7	71.8	0.00
90	18.14	0.8	0.7	0.1	0.6	66.0	0.00
100	16.75	0.8	0.7	0.1	0.5	60.7	0.00
110	15.57	0.7	0.7	0.1	0.4	55.8	0.00
120	14.56	0.7	0.6	0.0	0.3	51.4	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	97.0	0.10	0.9	1.8	6.5	0.0

SUMMARY TO OUTLET

		Vrequired	Vavailable*		
Tributary Area	0.507 ha				
100yr Roof Flow to Sewer	7.7				
100yr Uncontrolled Flow to Sewer	63.5 L/s	0	0 m^3	Ok	
Non-Tributary Area	0.110 ha				
Total 100yr Non-Tributary Flow	14.1 L/s				
Total Area	0.617 ha				
Total 2yr Flow	85.3 L/s				
Target	267.8 L/s				

Project #160401329, 851 RICHMOND ROAD
Modified Rational Method Calculatons for Storage

20	119.95	4.3	1.2	3.1	3.7	139.5	0.00
30	91.87	3.3	1.2	2.1	**3.7**	140.0	0.00
40	75.15	2.7	1.2	1.5	3.6	138.0	0.00
50	63.95	2.3	1.2	1.1	3.3	134.8	0.00
60	55.89	2.0	1.1	0.8	3.0	131.0	0.00
70	49.79	1.8	1.1	0.7	2.7	127.1	0.00
80	44.99	1.6	1.1	0.5	2.5	122.5	0.00
90	41.11	1.5	1.1	0.4	2.2	117.3	0.00
100	37.90	1.3	1.0	0.3	1.9	112.3	0.00
110	35.20	1.3	1.0	0.3	1.7	107.5	0.00
120	32.89	1.2	1.0	0.2	1.5	103.0	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	140.0	0.14	1.2	3.7	4.5	0.0

Subdrainage Area: BLDG1 — Roof
Area (ha): 0.019 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	9.2	1.2	8.1	4.8	134.8	0.00
20	119.95	6.2	1.2	5.0	6.0	145.0	0.00
30	91.87	4.8	1.2	3.5	6.3	148.1	0.00
40	75.15	3.9	1.3	2.6	**6.3**	148.3	0.00
50	63.95	3.3	1.2	2.1	6.2	147.1	0.00
60	55.89	2.9	1.2	1.7	6.0	145.1	0.00
70	49.79	2.6	1.2	1.4	5.7	142.7	0.00
80	44.99	2.3	1.2	1.1	5.4	140.0	0.00
90	41.11	2.1	1.2	0.9	5.1	137.2	0.00
100	37.90	2.0	1.2	0.8	4.8	134.3	0.00
110	35.20	1.8	1.1	0.7	4.5	131.3	0.00
120	32.89	1.7	1.1	0.6	4.1	128.4	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	148.3	0.15	1.3	6.3	6.5	0.0

SUMMARY TO OUTLET

		Vrequired	Vavailable*		
Tributary Area	0.507 ha				
100yr Roof Flow to Sewer	10.7 L/s				
100yr Uncontrolled Flow to Sewer	179.8 L/s	0	0 m^3	Ok	
Non-Tributary Area	0.110 ha				
Total 100yr Non-Tributary Flow	41.0 L/s				
Total Area	0.617 ha				
Total 100yr Flow	231.4 L/s				
Target	267.8 L/s				

Brief Stormceptor Sizing Report - 851 Richmond Road

Project Information & Location			
Project Name	851 Richmond Road	**Project Number**	160401329
City	Ottawa	**State/ Province**	Ontario
Country	Canada	**Date**	6/29/2018
Designer Information		**EOR Information (optional)**	
Name	Neal Cody	**Name**	
Company	Stantec Consulting Ltd.	**Company**	
Phone #	780-969-3263	**Phone #**	
Email	neal.cody@stantec.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	851 Richmond Road
Target TSS Removal (%)	80
TSS Removal (%) Provided	81
Recommended Stormceptor Model	STC 750

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 300	72
STC 750	81
STC 1000	82
STC 1500	83
STC 2000	86
STC 3000	87
STC 4000	90
STC 5000	90
STC 6000	92
STC 9000	94
STC 10000	94
STC 14000	96
StormceptorMAX	Custom

Sizing Details

Drainage Area	
Total Area (ha)	0.50
Imperviousness %	85.7

Rainfall	
Station Name	OTTAWA MACDONALD-CARTIER INT'L A
State/Province	Ontario
Station ID #	6000
Years of Records	37
Latitude	45°19'N
Longitude	75°40'W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

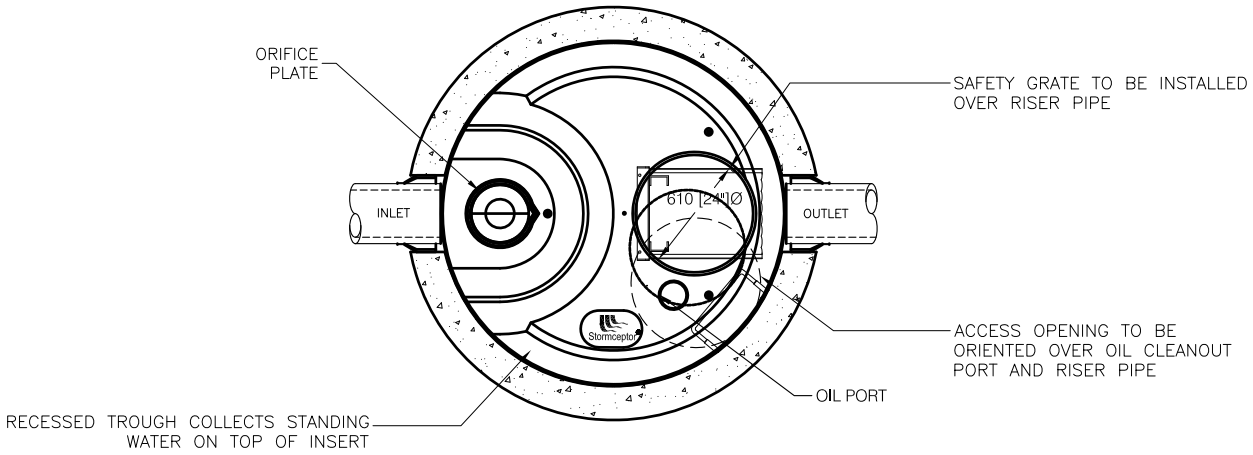
Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

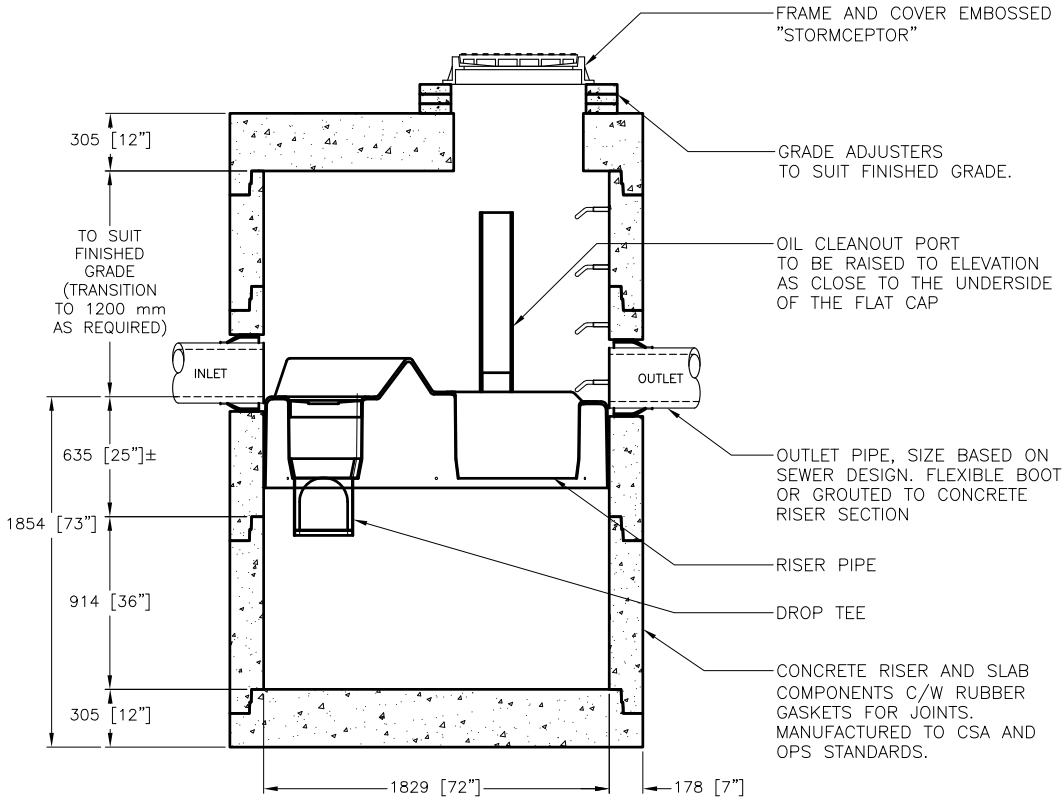
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

DRAWING NOT TO BE USED FOR CONSTRUCTION



PLAN VIEW



SECTION VIEW

Stormceptor®

imbrium
WWW.IMBRIUMSYSTEMS.COM
7037 RIDGE ROAD SUITE 350, HANOVER, MD 21076
USA 888-279-8826 CA 800-565-4801 INTL +1-416-960-9900

STC 750
STANDARD MODEL
####

REV #	DATE	REVISION DESCRIPTION	BY

SHEET NUMBER 1 OF 1

DATE:######## | SCALE: 40 | PROJECT No.: ##### | DRAWN: ### | CHECKED: ###

STORMWATER MANAGEMENT REPORT
RIVER PARKWAY PRESCHOOL CENTRE

40 CLEARY AVENUE

CITY OF OTTAWA

August 2006
Revised January 2007

Prepared for:

RIVER PARKWAY PRESCHOOL CENTRE
30 Cleary Avenue
Ottawa, Ontario
K2A 3Z9

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED
Consulting Engineers, Architects & Planners
864 Lady Ellen Place
Ottawa, Ontario
K1Z 5M2

JLR 19616-05

STORMWATER MANAGEMENT REPORT
RIVER PARKWAY PRESCHOOL CENTRE
40 CLEARY AVENUE
CITY OF OTTAWA

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- LIST OF APPENDICES -

1.0 INTRODUCTION

J.L. Richards & Associates Limited has been retained to develop a Site Servicing and Grading Plan for a preschool, known as the River Parkway Preschool Centre (RPPC) that will be situated in the southwest quadrant of the First Unitarian Congregation of Ottawa property at 40 Cleary Avenue. The proposed five classroom preschool will be a one-storey slab on grade structure with a sloped roof, and have an approximate building area of 1070m^2. The site currently drains to an existing swale located north of the proposed building site.

2.0 STORM DESIGN CRITERIA

The storm flows generated by the development are to be captured and conveyed to the existing 450 mm diameter storm sewer on Cleary Avenue. The City of Ottawa requires that the post-development peak flow rate be controlled to a 5-year flow with a runoff coefficient of 0.4 and a time of concentration of 20 minutes. Based on the City of Ottawa criteria, the post-development peak flow rate was calculated to be 37.5 L/s (refer to Appendix 'A' for Stormwater Management Calculations). There are two areas of the proposed site that will flow unrestricted to an existing swale within the First Unitarian Congregation of Ottawa property. The two unrestricted areas are located at the south side of the proposed building (Sub-Catchment Area A) and the southwest corner of the property (Sub-Catchment Area B); the 100-year unrestricted flows are 12.7 L/s and 6.0 L/s, respectively. The unrestricted flows have been removed from the post-development peak flow rate and, therefore, the allowable release rate to the existing 450 mm diameter storm sewer is 18.8 L/s.

In addition to controlling the flow from the site to the 5-year allowable release rate, the City of Ottawa also requires that the 5-year and 100-year post-development flows be detained on site, with an allowable depth of ponding to a maximum of 150 mm and 300 mm, respectively. To fulfil the storm design criteria, an Inlet Control Device (ICD), combined with on-site storage, has been incorporated into the storm servicing of the site.

3.0 PROPOSED STORM SEWER SERVICING

3.1 Water Quantity

The River Parkway Preschool Centre will be developed with a mix of surfaces, including rooftop, parking and play areas, as well as landscaped areas (refer to Appendix 'A' for the Drainage Area Plan D-ST1). As a result, the overall imperviousness of the site will increase under post-development conditions. Stormwater management measures will be employed to ensure that the 1:5 year and 1:100 year peak flows conveyed to the local storm sewer do not exceed the allowable flow rate of 18.8 L/s.

The storm flows generated by this development are to be captured and conveyed by the proposed storm sewers within the parking lot of the Preschool Centre to the existing 450 mm diameter storm sewer on Cleary Avenue (refer to Appendix 'B' for Site Servicing Plan S1). The existing 450 mm diameter storm sewer flows east to an existing 1500 mm diameter storm sewer on Cleary Avenue.

The proposed storm sewers for this site were sized using the Rational Method with an inlet time of 10 minutes. A 5-year unrestricted flow of 50 L/s was calculated (refer to Appendix 'B' for the Storm Sewer Design Sheet). Since this flow exceeds the maximum allowable flow rate of 18.8 L/s, the storm sewer flows will be restricted using an ICD. It is proposed to utilize a Hydrovex® 125 VHV-2 ICD in the downstream catch basin manhole (CB MH3) in order to limit the rate of flow to a maximum allowable release rate of 18.0 L/s, based on a maximum head of 3.15 metres (refer to Appendix 'C' for the Hydrovex® curves).

The site was also designed to accommodate on-site storage to detain the 5-year and 100-year peak flow rates, while releasing to the maximum allowable release rate. The roof of the RPPC will be sloped and, therefore, rooftop storage has not been incorporated into the design. All downspouts outlet to the surface, with the exception of those along the west side of the building which flow to a subsurface rainwater leader and are conveyed by a storm sewer to the controlled system. All on-site storage will be contained within the parking lot, sewers and catch basins. The 5-year and 100-year storage volumes required are 28.1 m^3 and 65.1 m^3, respectively. The maximum

available 5-year and 100-year storage volumes are 32.2 m^3 and 67.1 m^3, respectively (refer to Appendix 'A' for the Ponding Plan SWM-1).

There is currently an existing culvert that outlets stormwater from the parking lots of the Lord Richmond apartment building to the southwest quadrant of the First Unitarian Church property. The Lord Richmond stormwater then flows northeast through a series of swales and culverts, within the area of the proposed building, and is ultimately conveyed north along the existing swale. It is proposed to redirect these flows away from the RPPC using a storm sewer and outlet downstream into the existing swale north of the RPPC. The storm sewer that will redirect the stormwater from the Lord Richmond property has been sized for the 100-year storm and a time of concentration of 10 minutes. The storm sewer has also been sized to accommodate the 100-year storm runoff from the adjacent residential development, and Kristy's property located to the west of the site (Sub-Catchment Area B).

The runoff generated by the 100-year storm event on the south side of the building (Sub-Catchment Area A) will flow north along the proposed swale to a storm sewer. This storm sewer has been sized for the 100-year storm event and a time of concentration of 10 minutes. The storm sewer will outlet to an existing swale on the north side of the proposed building. By piping the stormwater runoff via a storm sewer, the First Unitarian Church can continue to utilize the area north of the proposed building for parking.

3.2 Erosion and Sedimentation Control Measures

During construction of the site servicing, appropriate erosion and sediment control measures, as outlined in MNR's "Guidelines on Erosion and Sediment Control for Urban Construction Sites" will be implemented to trap sediment on site. Drawing S1 outlines the proposed sedimentation control measures (refer to Notes 4 and 5).

As a minimum, the following erosion and sedimentation control measures will be provided:

- Supply and install silt fence barrier (per OPSD 219.110) along all property boundaries prior to construction.

- Filter cloth to be placed under all catch basin and manhole covers for temporary sediment control during construction.

- Supply and install a silt fence barrier to enclose all borrow and stockpile areas resulting from topsoil stripping activities or any excavating activities (i.e., exact location to be determined during construction) associated with the construction of the proposed parking lot and site servicing.

Furthermore, if dewatering and pumping operations become necessary, construction of a detention trap will be carried out to detain groundwater and promote settling of sediments.

4.0 SUMMARY

Storm servicing for the proposed Preschool Centre consists of an underground storm sewer collection system located in the parking lot and roadway along Cleary Avenue, which conveys flows east to the existing 450 mm diameter storm sewer on Cleary Avenue.

The downstream catch basin will be equipped with a Hydrovex® ICD, restricting the flows to a maximum of 18.0 L/s and the runoff generated by the 5-year and 100-year storm events will be stored on site within the parking lot, sewers and catch basins.

The existing swale passing through the site, which conveys stormwater from the Lord Richmond apartment building parking lot, will be redirected around the proposed building by way of a storm sewer that outlets to an existing swale.

Prepared by: _____
Kim Doyle, P.Eng.

Reviewed by: _____
Guy Forget, P.Eng.

Total 1:5 year flow:

$$Q = 2.78CIA$$

$$I = \frac{998.071}{(T_c + 6.053)^{0.814}}$$

T_c = 20 mins
I = 70.25 mm/hr
C = 0.400
A = 0.48 ha

Q = 37.5 L/s

100 year unrestricted flow:

Sub-Catchment Area A (South side of the proposed building)

$$Q = 2.78CIA$$

$$I = \frac{998.071}{(T_c + 6.053)^{0.814}}$$

T_c = 20 mins
I = 119.95 mm/hr
C = 0.543
A = 0.07 ha

Q = 12.7 L/s

Sub-Catchment Area B (Southwest Corner of the property)

$$Q = 2.78CIA$$

$$I = \frac{998.071}{(T_c + 6.053)^{0.814}}$$

T_c = 20 mins
I = 119.95 mm/hr
C = 0.200
A = 0.09 ha

Q = 6.0 L/s

1:5 year allowable flow:

Q = 18.8 L/s

APPENDIX 'B'

Storm Sewer Design Sheet and Site Servicing Plan S1

J.L. Richards
ENGINEERS · ARCHITECTS · PLANNERS

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

CITY OF OTTAWA

River Parkway Preschool Centre
30 Cleary Avenue
JLR PROJECT No.: 19616-01

Date: January 18, 2007

Designed by: KD
Checked by: PR

Subcatchment Area A: 100 Year IDF Curve
Manning's Coefficient (n) = 0.013

STREET	MANHOLE NUMBER		AREAS (ha)								1:100 YR PEAK FLOW GENERATION					SEWER DATA					
	From	To	0.20	0.30	0.40	0.45	0.50	0.60	0.90	1.00	2.78AR	2.78AR CUMM	Time min	Intens. mm/hr	Peak Flow (l/s)	Dia (mm)	Slope %	Q full (l/s)	V full (m/s)	Length (m)	Flow Time (min)
Swale	DI 1	MH 7	0.04						0.15	0.03	0.48	0.48	10.00	178.56	85.88	375	0.25	91.46	0.80	17.00	0.35
	MH 7	Headwall										0.48	10.35	175.39	84.35	375	0.25	91.46	0.80	12.20	0.25

Subcatchment Area B: 100 Year IDF Curve
Manning's Coefficient (n) = 0.013

STREET	MANHOLE NUMBER		AREAS (ha)								1:100 YR PEAK FLOW GENERATION					SEWER DATA					
	From	To	0.20	0.30	0.40	0.45	0.50	0.60	0.90	1.00	2.78AR	2.78AR CUMM	Time min	Intens. mm/hr	Peak Flow (l/s)	Dia (mm)	Slope %	Q full (l/s)	V full (m/s)	Length (m)	Flow Time (min)
Lord Richmond	CBMH 4	MH 4A	0.09				0.30		0.70		2.22	2.22	10.00	178.56	396.12	525	1.00	448.66	2.01	58.50	0.49
	MH 4A	Headwall										2.22	10.49	174.24	386.54	525	1.00	448.66	2.01	67.50	0.56

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Fax: 613 728 6012

CITY OF OTTAWA

River Parkway Preschool Centre
30 Cleary Avenue
JLR PROJECT No.: 19616-01

Date: January 18, 2007

Designed by: KD
Checked by: PR

Subcatchment Area C: 5 Year IDF Curve
Manning's Coefficient (n) = 0.013

STREET	MANHOLE NUMBER		AREAS (ha)								1:5 YR PEAK FLOW GENERATION					SEWER DATA					
	From	To	0.20	0.30	0.40	0.45	0.50	0.60	0.90	1.00	2.78AR	2.78AR CUMM	Time min	Intens. mm/hr	Peak Flow (l/s)	Dia (mm)	Slope %	Q full (l/s)	V full (m/s)	Length (m)	Flow Time (min)
Roof	roof	CB8								0.04	0.11	0.11	10.00	104.19	11.59	150	2.00	22.47	1.23	31.50	0.43
Rear Yard CB	CB 8	CBMH 9	0.04						0.02		0.07	0.07	10.43	101.99	7.37	200	1.00	34.22	1.06	31.50	0.50
Parking Lot	CBMH 9	CBMH 1	0.03						0.01		0.04	0.15	10.92	99.55	15.22	250	1.50	75.98	1.50	20.70	0.23
Parking Lot	CBMH 1	CBMH 2	0.01						0.04	0.02	0.16	0.31	11.15	98.47	30.93	300	1.00	100.88	1.38	24.50	0.30
Cleary	CBMH 2	CBMH 3	0.04						0.05	0.02	0.20	0.52	11.45	97.11	50.22	300	3.20	180.46	2.47	13.90	0.09
Cleary	CBMH 3	Ex										0.52	11.54	96.69	50.00	375	3.20	327.20	2.87	37.80	0.22

APPENDIX 'C'

Hydrovex® Curves

®Hydrovex®

VHV Vertical Vortex Flow Regulator

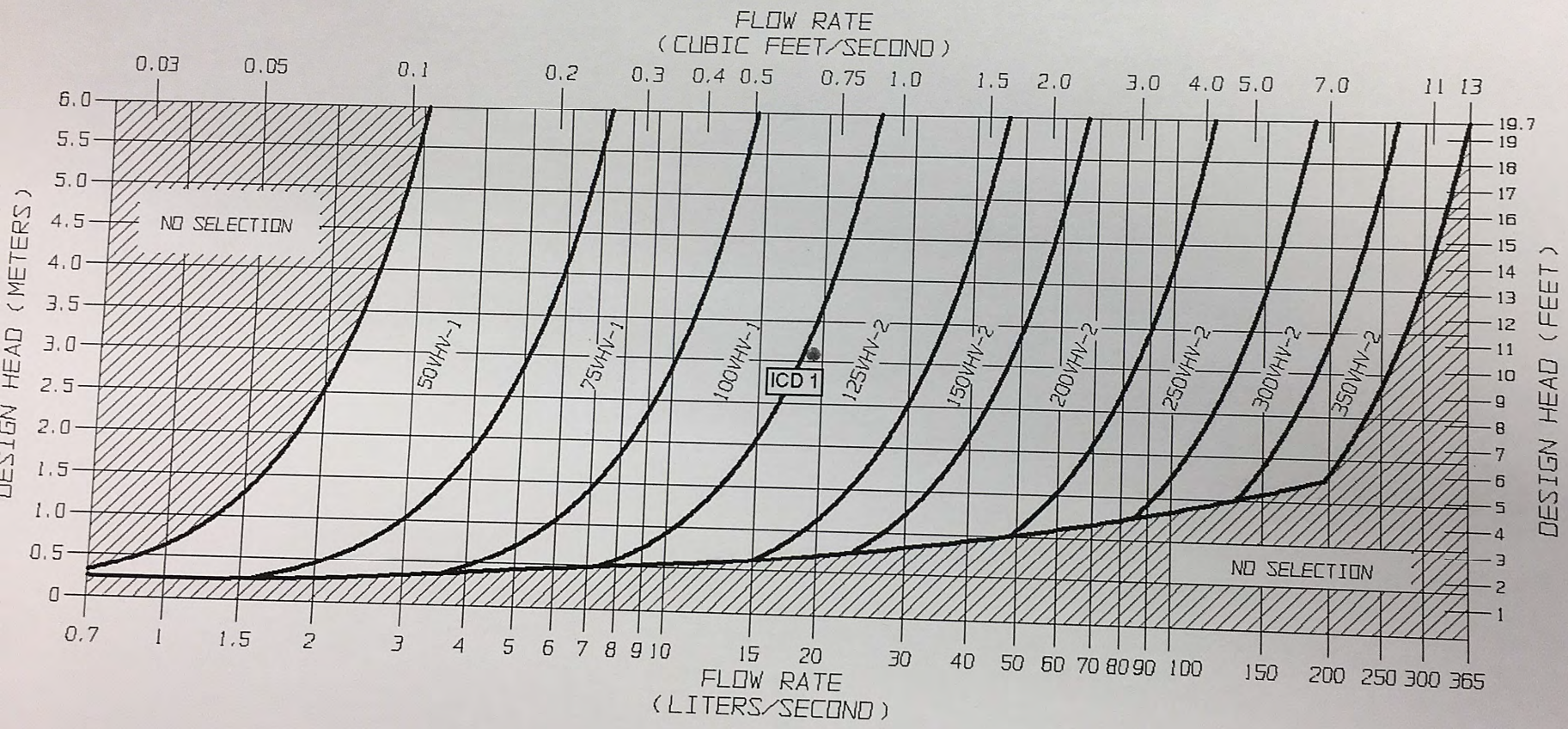
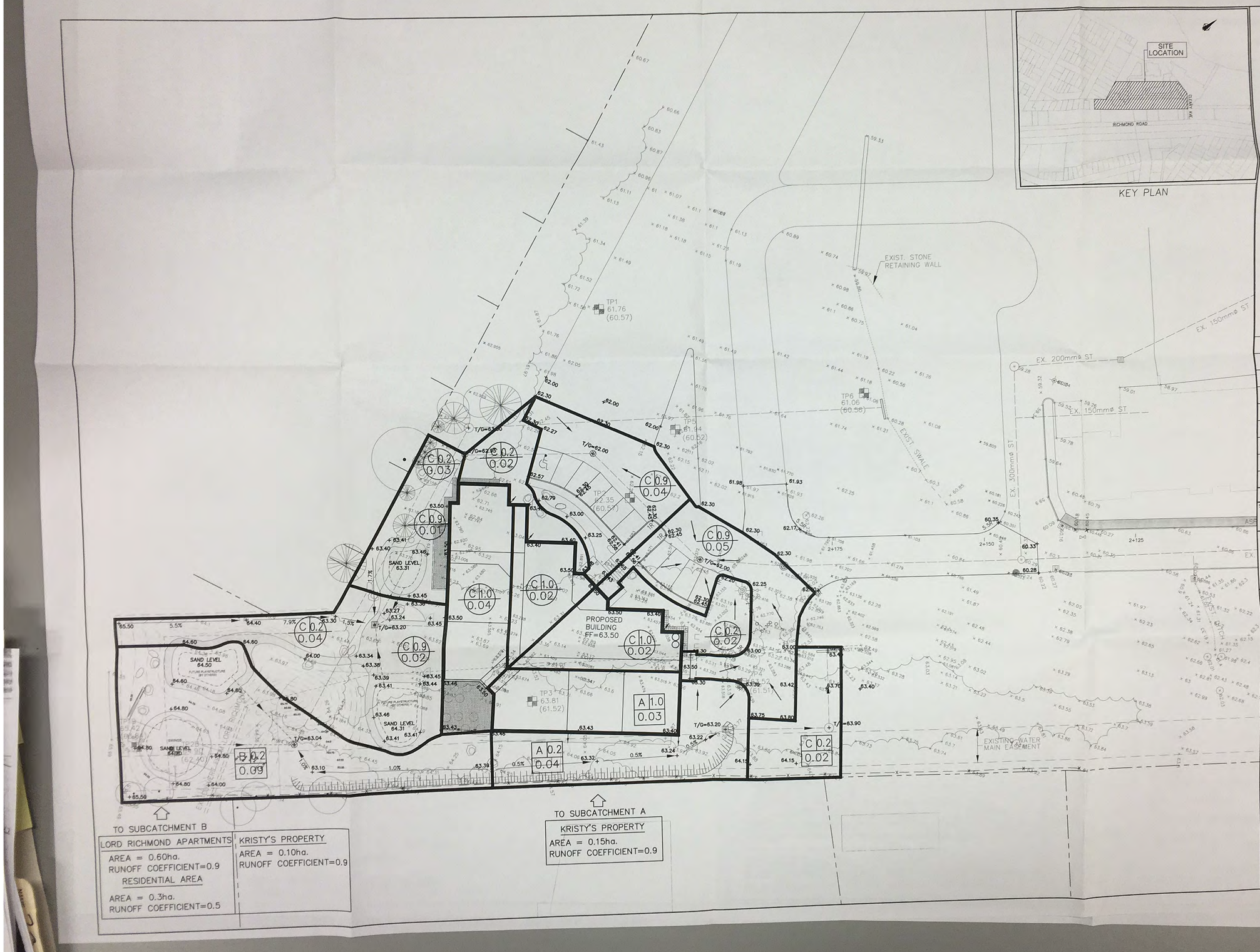


FIGURE 2 - VHV

JOHN MEUNIER INC.


SITE LOCATION
CLEARY AVE
RICHMOND ROAD
KEY PLAN
LEGEND
EXISTING CATCH BASIN
PROPOSED CATCH BASIN
PROPOSED CATCH BASIN / MANHOLE
PROPOSED CATCH BASIN / MANHOLE c/w ICD
HYDRANT & VALVE
SANITARY SEWER AND MANHOLE
STORM SEWER AND MANHOLE
62.30 EXISTING GRADE
62.30 PROPOSED GRADE
3:1 TERRACING
PROPOSED SWALE C/W 250mmø PERFORATED PIPE SUBDRAIN
DRAINAGE BOUNDARY
RESTRICTED SUBCATCHMENT
C 0.2 / 1.0
SUBCATCHMENT AREA
RUNOFF COEFFICIENT
AREA IN HECTARES
UNRESTRICTED SUBCATCHMENT
A 1.0 / 1.0
SUBCATCHMENT AREA
RUNOFF COEFFICIENT
AREA IN HECTARES
EXIST. STONE RETAINING WALL
EX. 200mmø ST
EX. 150mmø ST
EX. 300mmø ST
EXIST. SWALE
EXISTING WATER MAIN EASEMENT
PROPOSED BUILDING FF=63.50
TP1 61.76 (60.57)
TP2 61.35 (60.57)
TP3 63.81 (61.52)
TP4 61.04 (60.52)
TP6 61.06 (60.58)
C 0.2 0.03
C 0.2 0.02
C 0.9 0.04
C 0.9 0.01
C 1.0 0.02
C 1.0 0.04
C 0.9 0.05
C 0.9 0.02
C 0.2 0.04
C 0.2 0.02
B 0.2 0.09
A 1.0 0.03
A 0.2 0.04
C 0.2 0.02
SAND LEVEL 64.50
SAND LEVEL 63.31
SAND LEVEL 64.31
SAND LEVEL 64.00
SWINGS
FUTURE PLAYSTRUCTURE (BY OTHERS)
TO SUBCATCHMENT B
LORD RICHMOND APARTMENTS
AREA = 0.60ha.
RUNOFF COEFFICIENT=0.9
RESIDENTIAL AREA
AREA = 0.3ha.
RUNOFF COEFFICIENT=0.5
KRISTY'S PROPERTY
AREA = 0.10ha.
RUNOFF COEFFICIENT=0.9
TO SUBCATCHMENT A
KRISTY'S PROPERTY
AREA = 0.15ha.
RUNOFF COEFFICIENT=0.9
3 REVISED PER CITY COMMENTS 18/01/07
2 ISSUED FOR SITE PLAN APPROVAL 15/08/06
1 CLIENT REVIEW 07/04/06
NO. ISSUE DATE
SCALE: 1:250
J.L.Richards & Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012
PROFESSIONAL STAMP
PROJECT NORTH
PROJECT:
RIVER PARKWAY PRESCHOOL CENTRE
30 CLEARY AVENUE
Ottawa, Ontario
DRAWING:
STORM DRAINAGE PLAN
DESIGN: K.D
DRAWN: M.F.
CHECKED: G.F.
CAD FILE: 19616-01
PLOTTED: May 04, 2006
DRAWING NO.: D-ST1
J.L.R. JOB NO.: 19616

SITE LOCATION

RICHMOND ROAD

CLEARY AVE

KEY PLAN

LEGEND

- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN
- PROPOSED CATCH BASIN / MANHOLE
- PROPOSED CATCH BASIN / MANHOLE c/w ICD
- PROPOSED WATERMAIN, VALVE & HYDRANT
- EXISTING WATERMAIN, VALVE & HYDRANT
- WATERMAIN VALVE AND VALVE BOX
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED CATCH BASIN & LEAD
- HEADWALL
- 62.30 EXISTING GRADE
- 62.30 PRPOSED GRADE

DESIGN STORM	100 YEAR	441	PONDING AREA (m^2)
PONDING DEPTH (m)	0.23	35	PONDING VOLUME (m^3)

3	REVISED PER CITY COMMENTS	18/01/07
2	ISSUED FOR SITE PLAN APPROVAL	15/08/06
1	CLIENT REVIEW	07/04/06
NO.	ISSUE	DATE

SCALE: 1:250

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ENGINEERS ARCHITECTS PLANNERS

PROFESSIONAL STAMP

PROJECT NORTH

PROJECT NORTH

PROJECT:

RIVER PARKWAY
PRESCHOOL CENTRE
30 CLEARY AVENUE

Ottawa, Ontario

DRAWING:

PONDING PLAN

DESIGN: K.D	DRAWING NO.: SWM1
DRAWN: M.F.	
CHECKED: G.F.	
CAD FILE: 19616-01	J.L.R JOB NO: 19616
PLOTTED: May 04, 2006	

100 YEAR	300
0.3	30

5 YEAR	186
0.15	9.3

5 YEAR	138
0.15	6.9

100 YEAR	211
0.3	21.1

12.0m SETBACK

TP1 61.76 (60.57)

TP3 63.81 (61.52)

TP5 61.94 (60.52)

TP6 61.06 (60.56)

TP2 (61.51)

PROPOSED BUILDING FF=63.50

EXIST. STONE RETAINING WALL

SAND LEVEL 64.50

SAND LEVEL 63.31

SAND LEVEL 64.31

T/G= 59.28
INV.(N)= 57.47
INV.(E)= 57.45

EX. 200mmø ST

EX. 150mmø ST

EX. 300mmø ST

EX. 152mmø WM

CONNECT TO EXISTING MH1
T/G= 60.29
INV.(W)= 57.32
INV.(N)= 57.21

CONNECT TO EXISTING MH2
T/G= 62.24
INV.(N)= 58.42

EXIST. SWALE

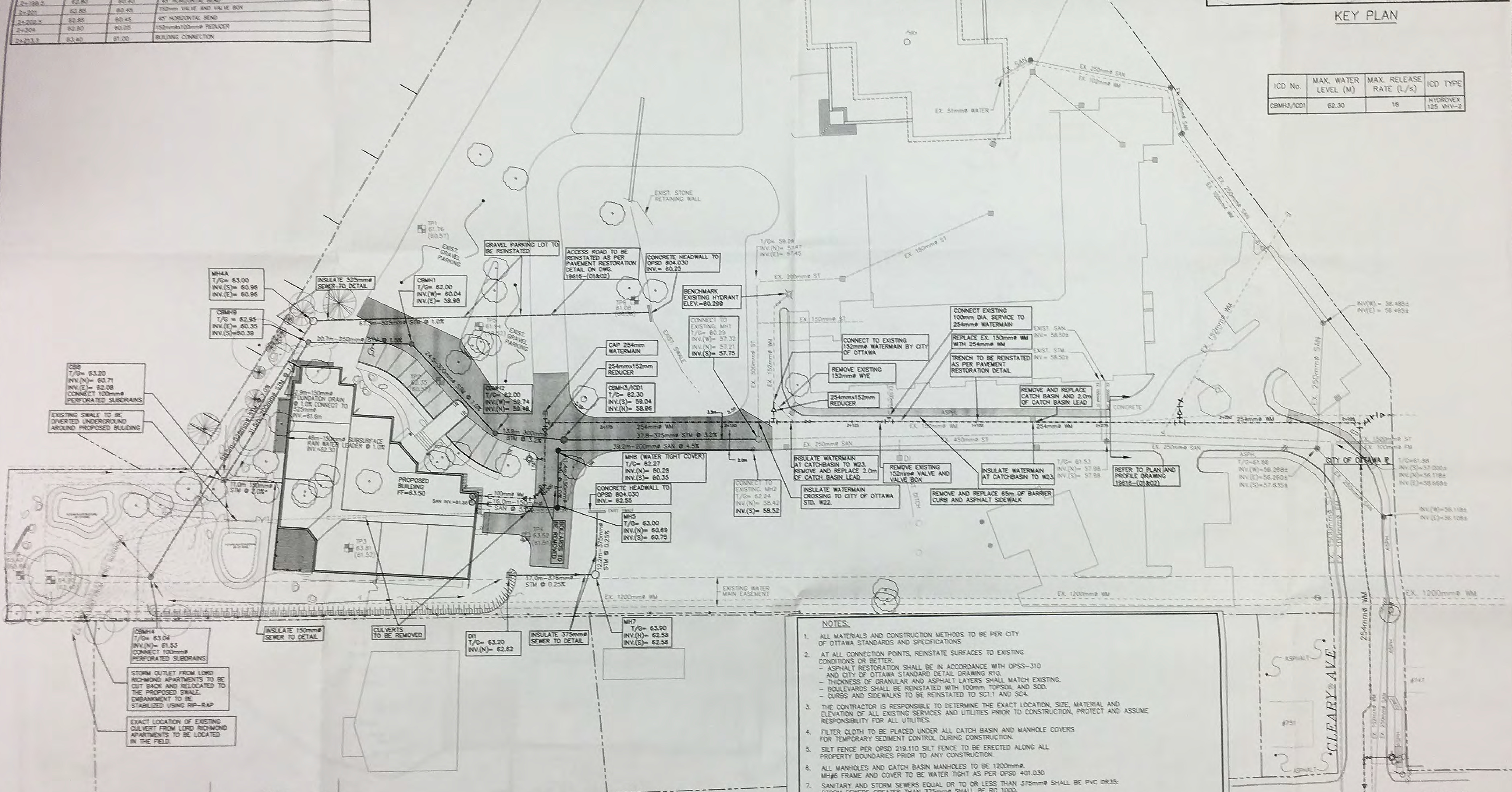
EX. 250mmø SAN

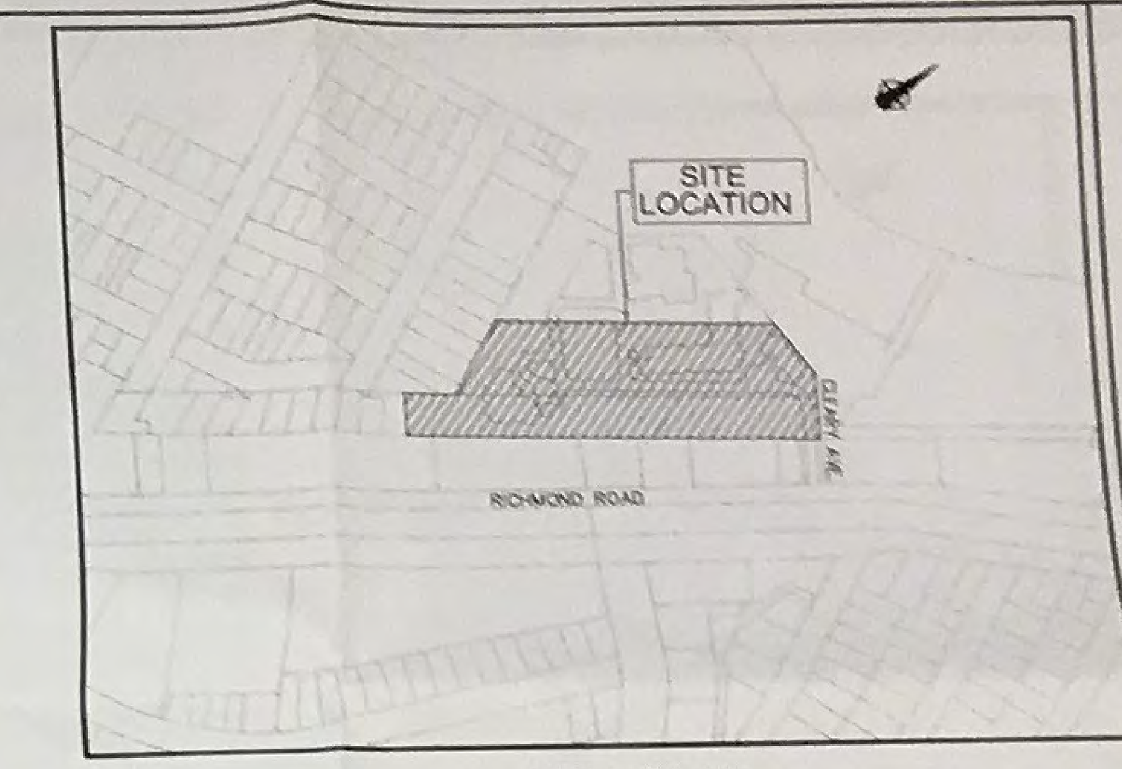
EX. 1200mmø WM

EXISTING WATER MAIN EASEMENT

AREA = 0.3ha.

WATERMAIN TABLE			
STATION	ELEVATION		DESCRIPTION
	FINISHED C/L ROAD GRADE	TOP OF WATERMAIN	
2+072.65	61.57	59.17	254mmø WATERMAIN (REFER TO DRAWINGS 19616-01&02
2+073.8	61.55	59.15	EXISTING 200mmø SANITARY SERVICE CROSSING (INV.=±58.40m)
2+074.8	61.55	59.15	EXISTING 150mmø STORM SERVICE CROSSING (INV.=±58.40m)
2+117.8	60.65	58.25	CONNECT EX. 100mmø WATER SERVICE TO 254mmø WATERMAIN
2+134	60.42	58.02	254mm VALVE AND VALVE BOX
2+140.0	60.33	57.93	254mmX152mm TEE
2+142.3	60.33	57.93	22.5° VERTICAL BEND
2+143.3	60.33	58.32	22.5° VERTICAL BEND
2+144.3	60.32	58.32	EXISTING 300mmø STORM SEWER CROSSING (INV.=±57.33m)
2+145.3	60.31	58.32	22.5° VERTICAL BEND
2+146.3	60.30	57.90	22.5° VERTICAL BEND
2+187	62.30	59.90	254mmX254mm TEE
2+188	62.30	59.90	254mmX152mm REDUCER
2+190	62.26	59.86	300mmø STORM SEWER CROSSING (INV.=58.16m)
2+194.0	62.29	59.89	152mmø x 152mmø HYDRANT TEE
2+198.5	62.80	60.40	45° HORIZONTAL BEND
2+201	62.85	60.45	152mm VALVE AND VALVE BOX
2+202.5	62.85	60.45	45° HORIZONTAL BEND
2+204	62.90	60.05	152mmøx100mmø REDUCER
2+213.3	63.40	61.00	BUILDING CONNECTION





KEY PLAN

ICD No.	MAX. WATER LEVEL (M)	MAX. RELEASE RATE (L/s)	ICD TYPE
CBMH3/ICD1	62.30	18	HYDROVEX 125 VHV-2

LEGEND

- EXISTING CATCH BASIN
- EXISTING WATERMAIN, VALVE & HYDRANT
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED CATCH BASIN / MANHOLE
- PROPOSED CATCH BASIN / MANHOLE c/w ICD
- HEADWALL
- PROPOSED WATERMAIN VALVE AND VALVE BOX
- PROPOSED WATERMAIN, VALVE & HYDRANT
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED CATCH BASIN & 200mmø CB LEAD
- TP4 63.52 EX. GROUND ELEVATION
- (61.51) ROCK ELEVATION
- 3:1 TERRACING
- PROPOSED 100mmø PERFORATED PIPE SUBDRAIN TO DETAIL L9
- PROPOSED SWALE C/W
- PROPERTY LINE
- EXISTING CULVERT
- ROOF DOWNSPOUT
- (M) WATER METER
- (R) REMOTE WATER METER

ASPHALT PAVEMENT STRUCTURE

LIGHT DUTY PARKING AREAS
- 50mm HL3
- 150mm GRANULAR 'A'
- 300mm GRANULAR 'B',TYPE II

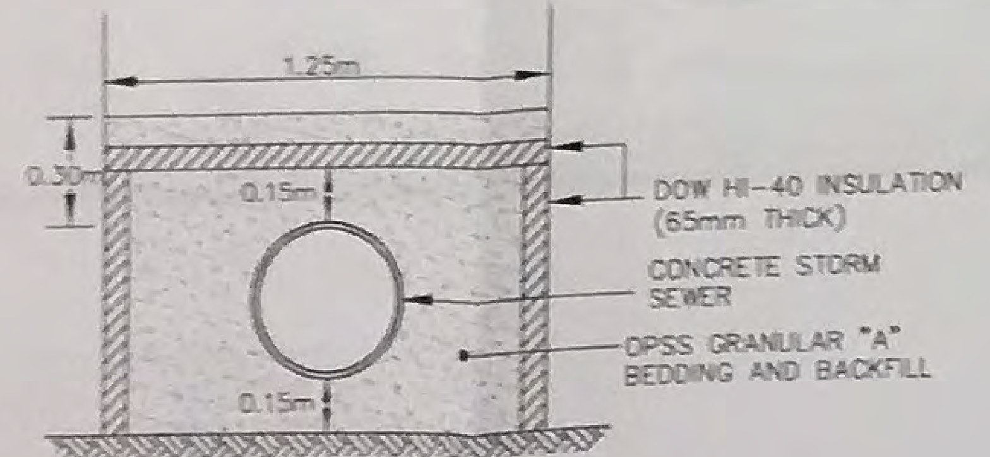
HEAVY DUTY ACCESS LANE
- 40mm HL3
- 50mm HL8
- 150mm GRANULAR 'A'
- 300mm GRANULAR 'B',TYPE II

NO.	ISSUE	DATE
7	REVISED PER CITY COMMENTS	18/01/07
6	ISSUED FOR BUILDING PERMIT	12/06/06
5	ISSUED FOR ADDENDUM	11/15/06
4	ISSUED FOR TENDER	11/01/06
3	ISSUED FOR CLIENT REVIEW	10/27/06
2	ISSUED FOR SITE PLAN APPROVAL	15/08/06
1	CLIENT REVIEW	07/04/06

SCALE: 1:400

NOTES:

1. ALL MATERIALS AND CONSTRUCTION METHODS TO BE PER CITY OF OTTAWA STANDARDS AND SPECIFICATIONS
2. AT ALL CONNECTION POINTS, REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
   - ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH OPSS-310 AND CITY OF OTTAWA STANDARD DETAIL DRAWING R10.
   - THICKNESS OF GRANULAR AND ASPHALT LAYERS SHALL MATCH EXISTING.
   - BOULEVARDS SHALL BE REINSTATED WITH 100mm TOPSOIL AND SOD.
   - CURBS AND SIDEWALKS TO BE REINSTATED TO SC1.1 AND SC4.
3. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING SERVICES AND UTILITIES PRIOR TO CONSTRUCTION, PROTECT AND ASSUME RESPONSIBILITY FOR ALL UTILITIES.
4. FILTER CLOTH TO BE PLACED UNDER ALL CATCH BASIN AND MANHOLE COVERS FOR TEMPORARY SEDIMENT CONTROL DURING CONSTRUCTION.
5. SILT FENCE PER OPSD 219.110 SILT FENCE TO BE ERECTED ALONG ALL PROPERTY BOUNDARIES PRIOR TO ANY CONSTRUCTION.
6. ALL MANHOLES AND CATCH BASIN MANHOLES TO BE 1200mmø. MH#6 FRAME AND COVER TO BE WATER TIGHT AS PER OPSD 401.030
7. SANITARY AND STORM SEWERS EQUAL OR TO OR LESS THAN 375mmø SHALL BE PVC DR35: STORM SEWERS GREATER THAN 375mmø SHALL BE RC 100D.
8. SANITARY SERVICE LATERAL TO BE PVC DR28.
9. WATERMAIN SHALL BE PVC DR18. CONNECTIONS TO EXISTING WATERMAIN ARE TO BE MADE USING 22.5° VERTICAL BENDS AS REQUIRED.
10. SERVICES TO BE TERMINATED 2.0m FROM THE BUILDING WALL (TYPICAL).
11. TWO(2)-3.0m LONG x 100mmø PERFORATED SUBDRAINS WRAPPED IN FILTER CLOTH SHALL BE INSTALLED AT EACH CATCH BASIN OR CBMH.
12. DITCH INLET SHALL BE IN ACCORDANCE WITH OPSD 705.030 COMPLETE WITH GRATING TYPE A AT 3:1 SLOPE.
13. HEADWALL SHALL BE IN ACCORDANCE WITH OPSD 804.030 COMPLETE WITH GRATING.
14. FOR DETAILED GRADING REFER TO DRAWING G1 , PREPARED BY J.L. RICHARDS AND ASSOCIATES LTD. FOR STORMWATER MANAGEMENT PLAN REFER TO THE REPORT , PREPARED BY J.L. RICHARDS AND ASSOCIATE LTD. FOR FOR GEOTECHNICAL REPORT REFER TO G9126-LET.01 , PREPARED BY PATERSON AND ASSOCIATES LTD. FOR LANDSCAPE DETAILS REFER TO DRAWING L1 AND L2 , PREPARED BY DOUGLAS ASSOCIATES LANDSCAPE ARCHITECTS LTD. FOR ARCHITECTURAL SITE PLAN REFER TO DRAWING A101 , PREPARED BY J.L. RICHARDS AND ASSOCIATES LTD.
15. SEWER AND WATERMAIN TRENCH TO BE CONSTRUCTED IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DETAIL DRAWINGS S6,S7 AND W17.



STORM SEWER INSULATION DETAIL

NOTE: INSULATE ALL STORM SEWERS WHERE THERE IS LESS THAN 2.0m COVER.

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

PROFESSIONAL STAMP

PROJECT NORTH

PROJECT:

RIVER PARKWAY
PRESCHOOL CENTRE
30 CLEARY AVENUE

Ottawa, Ontario

DRAWING:

SITE SERVICING PLAN

DESIGN: K.D	DRAWING NO.: S1
DRAWN: M.F.	
CHECKED: P.D.R.	
CAD FILE: 19616-01	J.L.R. JOB NO.: 19616
PLOTTED: OCTOBER 27, 2006	

Appendix E GEOTECHNICAL REPORT

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

patersongroup

Geotechnical Investigation

Proposed Multi-Storey Building
851 Richmond Road - Ottawa

Prepared For

Homestead Land Holdings Ltd.

October 3, 2017

Report: PG4163-1 Revision 1

Table of Contents

Page

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Homestead Land Holdings Ltd. (Homestead) to conduct a geotechnical investigation for the proposed multi-storey building to be located at 851 Richmond Road in the City of Ottawa (refer to Figure 1 - Key Plan presented in Appendix 2).

The objective of the investigation was 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.

Investigating the presence or potential presence of contamination on the subject property was not part of the scope of work of this present investigation. A report addressing environmental issues for the subject site was prepared under separate cover.

2.0 Proposed Project

It is our understanding that the proposed project consists of a multi-storey building with two underground parking levels encompassing the majority of the subject site.

3.0 Method of Investigation

3.1 Field Investigation

The field program for our geotechnical investigation was carried out on June 1, 2017. At that time, a total of six (6) boreholes were advanced to a maximum depth of 7.0 m. The borehole locations were determined in the field by Paterson personnel taking into consideration site features and underground services. The locations of the boreholes are shown on Drawing PG4163-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were put down using a track-mounted auger drill rig operated by a two person crew. All fieldwork was conducted under the full-time supervision of personnel from Paterson's geotechnical division under the direction of a senior engineer. The testing procedure consisted of augering and rock coring to the required depths and at the selected locations and sampling the overburden.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using two different techniques, namely, sampled directly from the auger flights (AU) or collected using a 50 mm diameter split-spoon (SS) sampler. Rock cores (RC) were obtained using 47.6 mm inside diameter coring equipment. All samples were visually inspected and initially classified on site. The auger and split-spoon samples were placed in sealed plastic bags, and rock cores were placed in cardboard boxes. All samples were transported to our laboratory for further examination and classification. The depths at which the auger, split spoon and rock core samples were recovered from the boreholes are shown as AU, SS and RC, respectively, on the Soil Profile and Test Data sheets presented 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 recovery value and a Rock Quality Designation (RQD) value were calculated for each drilled section of bedrock and are presented on the borehole logs. The recovery value is the length of the bedrock sample recovered over the length of the drilled section. The RQD value is the total length of intact rock pieces longer than 100 mm over the length of the core run. The values indicate the bedrock quality.

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

Groundwater

Monitoring wells and flexible standpipes 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 borehole locations were determined by Paterson personnel taking into consideration the presence of underground and aboveground services. The location and ground surface elevation at each borehole location was surveyed by Paterson personnel. The ground surface elevation at the borehole locations were surveyed with respect to a temporary benchmark (TBM), consisting of the top of catch basin located within the northeast corner the existing site. A geodetic elevation of 65.24 m was provided for the TBM by Homestead. The borehole locations and ground surface elevation at each borehole location are presented on Drawing PG4163-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

The soil samples and rock cores recovered from the subject site were examined in our laboratory to review the results of the field logging.

4.0 Observations

4.1 Surface Conditions

The subject site is currently occupied by at-grade parking for the adjacent multi-storey residential building to the west. The site is bordered to the north by an easement, which contains a large diameter watermain, followed by residential buildings, to the south by Richmond Road and to the east by at grade parking area. The ground surface across the site is relatively flat and at grade with the neighbouring properties.

4.2 Subsurface Profile

Generally, the subsurface profile encountered at the borehole locations consists of 60 to 100 mm thickness of asphalt overlying a granular layer, consisting of crushed stone with silt and sand with maximum thickness of 230 mm. The pavement structure lies atop a fill layer, consisting of loose to compact, brown to grey sand and gravel with trace to some silt and clay which extends to a depth of approximately 1.5 to 2.5 m. A native glacial till deposit was encountered underlying the abovenoted fill layers followed by a grey limestone bedrock. Generally, the bedrock quality consists of poor quality within the upper 0.5 to 1 m and fair to excellent quality at depth based on the RQD values. The upper portion of the bedrock was noted to consist of a weathered, poor quality bedrock. 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.

Based on available geological mapping, the bedrock in this area mostly consists of limestone with some shaly partings of the Ottawa formation with an overburden drift thickness of less than 5 m depth.

4.3 Groundwater

The measured groundwater levels in the monitoring wells and piezometers at the borehole locations are presented in Table 1. It should be further noted that the groundwater level could vary at the time of construction.

Table 1 - Summary of Groundwater Level Readings				
Test Hole Number	Ground Elevation (m)	Groundwater Levels (m)		Recording Date
		Depth	Elevation	
BH 1	66.03	2.93	63.10	June 8, 2017
BH 2	65.69	2.31	63.38	June 8, 2017
BH 3	65.44	3.72	61.72	June 8, 2017
BH 4	66.05	2.19	63.86	June 8, 2017
BH 5	65.79	3.20	62.59	June 8, 2017
BH 6	65.56	3.35	62.21	June 8, 2017

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is adequate for the proposed multi-storey building. The proposed building is expected to be founded on conventional footings placed on clean, surface sounded bedrock.

Bedrock removal will be required to complete the two (2) levels of underground parking. Line drilling and controlled blasting where large quantities of bedrock need to be removed is recommended. The blasting operations should be planned and completed under the guidance of a professional engineer with experience in blasting operations.

An alignment of a large diameter watermain runs within an easement along the north property boundary of the subject site. It is expected that the adjacent watermain could be subjected to potential vibrations associated with the bedrock blasting program. To ensure that no detrimental vibrations cause damage to the adjacent watermain, a vibration attenuation trench is recommended for the bedrock along the north excavation face, as well as a vibration monitoring and control program during the blasting and excavation work required for the proposed building excavation.

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

5.2 Site Grading and Preparation

Stripping Depth

Due to the relatively shallow bedrock depth at the subject site and the anticipated founding level for the proposed building, all existing overburden material will be excavated from within the proposed building footprint. Bedrock removal will be required for the construction of the parking garage levels.

Bedrock Removal

Based on the bedrock encountered in the area, it is expected that line-drilling in conjunction with hoe-ramming or controlled blasting will be required to remove the bedrock. In areas of weathered bedrock and where only a small quantity of bedrock is to be removed, bedrock removal may be possible by hoe-ramming.

Prior to considering blasting operations, the effects on the existing services, buildings and other structures should be addressed. A pre-blast or construction survey located in proximity of the blasting operations should be conducted prior to commencing construction. The extent of the survey should be determined by the blasting consultant and sufficient to respond to any inquiries/claims related to the blasting operations.

As a general guideline, peak particle velocity (measured at the structures) should not exceed 25 mm/s during the blasting program to reduce the risks of damage to the existing structures.

The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is an experienced blasting consultant.

Excavation side slopes in sound bedrock could be completed with almost vertical side walls. Where bedrock is of lower quality, the excavation face should be free of any loose rock. An area specific review should be completed by the geotechnical consultant at the time of construction to determine if rock bolting or other remedial measures are required to provide a safe excavation face for areas where low quality bedrock is encountered.

A vibration attenuation trench is recommended to be completed within the bedrock along the north property boundary. The construction of the vibration attenuation trench would require line drilling in a tight pattern on both sides of the proposed 1 m wide trench alignment and within the interior portion of the trench to the design underside of footing elevation. A hoe ram operation would be used to break up the bedrock and remove it from the trench. It is expected that the coreholes for the bedrock blasting program may not be possible within 1 to 2 m of the attenuation trench due to the presence of the drilled holes within the attenuation trench, which can cause an energy loss and blow-out during blasting if connected to the blast source by potential fractures within the bedrock. Therefore, a hoe ramming operation will most likely be required to complete the bedrock removal within the area adjacent to the attenuation trench.

Vibration Considerations

Construction operations could cause vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible should be incorporated in the construction operations to maintain a cooperative environment with the residents.

The following construction equipments could cause vibrations: piling equipment, hoe ram, compactor, dozer, crane, truck traffic, etc. The construction of the shoring system with soldier piles or sheet piling will require these pieces of equipments. Vibrations, caused by blasting or construction operations could cause detrimental vibrations on the adjoining buildings and structures. Therefore, it is recommended that all vibrations be limited.

Two parameters determine the recommended vibration limit, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). These guidelines are for current construction standards. These guidelines are above perceptible human level and, in some cases, could be very disturbing to some people, a pre-construction survey is recommended to minimize the risks of claims during or following the construction of the proposed building.

Vibration Monitoring and Control Plan

To ensure that no disturbance to the existing watermain occurs, a vibration monitoring and control plan (VMCP) is recommended during the excavation program. The purpose of the vibration monitoring and control plan is to provide measures to be implemented by the contractor to manage excavation operations and any other vibration sources during the construction for the proposed development. The VMCP will also provide a guideline for assessing results against the relevant vibration impact assessment criteria and recommendations to meet the required limits.

The monitoring program will incorporate real time results at the existing watermain segment adjacent to the subject site. The monitoring equipment should consist of a tri-axial seismograph, capable of measuring vibration intensities up to 254 mm/s at a frequency response of 2 to 250 Hz. At least two vibration monitoring devices should be placed adjacent to the existing watermain. It is recommended that the vibration monitoring devices be installed at invert level of the existing watermain and periodically inspected during the construction program.

A copy of the geotechnical report, which includes the VMCP should be provided to all parties involved with the construction for review. A meeting between Paterson and site contractor should be conducted prior to any excavation or construction of the subject site to review the following:

- ❑ Review the pre-condition/pre-construction survey;
- ❑ Control measures (i.e vibrations, noise);
- ❑ Monitoring locations;
- ❑ Tracking and reporting of excavation progress, and;
- ❑ Review procedure for exceedances (i.e vibrations, noise), complaints, evaluation and corrective measures.

When an event is triggered, Paterson will review the results and provide any necessary feedback. Otherwise, the vibration results will be summarized in the weekly report. The following table outlines the vibration limits for the adjacent watermain segment.

Table 2 - Structure Vibration Limits for adjacent Watermain Segment

Dominant Frequency Range (Hz)	Peak Particle Velocity (mm/s)	Event	Description of Event
<10	all	none	no action required
<40	>10	trigger level	Warning e-mail sent to contractor.
<40	≥15	exceedance level	Exceedance e-mail and phone call to the contractor. All operations are ceased to review on-site activities.
>40	>15	trigger level	Warning e-mail sent to contractor.
>40	≥20	exceedance level	Exceedance e-mail and phone call to the contractor. All operations are ceased to review on-site activities.

The monitoring protocol should include the following information:

Trigger Level Event
- ❑ Paterson will review all vibrations over the established warning level, and;
- ❑ Paterson will notify the contractor if any vibration occur due to construction activities and are close to exceedance level.

Exceedance Level Event
- ❑ Paterson will notify all the relevant stakeholders via email;
- ❑ Ensure monitors are functioning, and;
- ❑ Issue the vibration exceedance result.

Fill Placement

Fill used for grading beneath the building areas should consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill 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 proposed building areas should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Non-specified existing fill along with site-excavated soil can be used as general landscaping fill and beneath parking areas where settlement of the ground surface is of minor concern. In landscaped areas, 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. Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

5.3 Foundation Design

Bearing Resistance Values

Footings placed on a clean, surface sounded limestone bedrock surface can be designed using a factored bearing resistance value at ultimate limit states (ULS) of **2,500 kPa** incorporating a geotechnical resistance factor of 0.5.

A clean, surface-sounded bedrock bearing surface should be free of loose materials, and have no near surface seams, voids, fissures or open joints which can be detected from surface sounding with a rock hammer.

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 a sound bedrock bearing medium when a plane extending down and out from the bottom edge of the footing at a minimum of 1H:6V (or flatter) passes only through sound bedrock or a material of the same or higher capacity as the bedrock, such as concrete. A weathered bedrock bearing medium will require a lateral support zone of 1H:1V (or flatter).

Settlement

Footings bearing on an acceptable bedrock bearing surface and designed for the bearing resistance values provided herein will be subjected to negligible potential post-construction total and differential settlements.

5.4 Design for Earthquakes

A site specific shear wave velocity test was completed by Paterson to accurately determine the applicable seismic site classification for foundation design of the proposed building as presented in Table 4.1.8.4.A of the Ontario Building Code 2012. Two (2) shear wave velocity profiles from our on-site testing are presented in Appendix 2.

Field Program

The location of the seismic array was chosen to provide adequate coverage of the area. The seismic array testing location is presented in Drawing PG4163-1 - Test Hole Location Plan in Appendix 2.

At the seismic array location, Paterson field personnel placed 18 horizontal 4.5 Hz. geophones mounted to the surface by means of two 75 mm ground spikes attached to the geophone land case. The geophones were spaced at 2 m intervals and connected by a geophone spread cable to a Geode 24 Channel seismograph.

The seismograph was connected to a computer laptop and a hammer trigger switch attached to a 12 pound dead blow hammer. The hammer trigger switch sends a start signal to the seismograph. The hammer is used to strike an I-Beam seated into the ground surface, which creates a polarized shear wave. The hammer shots are repeated between five to ten times at each shot location to improve signal to noise ratio. The shot locations are also completed in forward and reverse directions (i.e.- striking both sides of the I-Beam seated parallel to the geophone array). The shot locations are located at 3,4.5 and 13.5 m away from the first, 3, 4.5, and 14 m away from the last geophone, and at the center of the seismic array.

The methods of testing completed by Paterson are guided by the standard testing procedures used by the expert seismologists at Carleton University and Geological Survey of Canada (GSC).

Data Processing and Interpretation

Interpretation for the shear wave velocity results were completed by Paterson personnel. Shear wave velocity measurement was made using reflection/refraction methods. The interpretation is performed by recovering arrival times from direct and refracted waves. The interpretation is repeated at each shot location to provide an average shear wave velocity, Vs_{30}, of the upper 30 m profile, immediately below the building's foundation.

Based on the test results, the average overburden seismic shear wave velocity is 248 m/s. Through interpretation, the bedrock has a shear wave velocity of 2,256 m/s. The Vs_{30} was calculated using the standard equation for average shear wave velocity from the Ontario Building Code (OBC) 2012.

The Vs_{30} was calculated using the standard equation for average shear wave velocity calculation from the Ontario Building Code (OBC) 2012, as presented below.

$$V_{s30} = \frac{Depth_{OfInterest}\,(m)}{\sum\left(\frac{(Depth_i\,(m)}{Vs_i\,(m/s)}\right)}$$

$$V_{s30} = \frac{30m}{\left(\frac{0.0m}{248m/s} + \frac{30.0m}{2{,}256m/s}\right)}$$

$$V_{s30} = 2{,}256m/s$$

Based on the results of the seismic testing, the average shear wave velocity, Vs_{30}, beneath the foundation is 2,256 m/s. Therefore, a **Site Class A** is applicable for design of the proposed buildings, as per Table 4.1.8.4.A of the OBC 2012. The soils underlying the subject site are not susceptible to liquefaction.

5.5 Basement Slab

All overburden soil will be removed for the proposed building and the basement floor slab will be founded on a bedrock medium. OPSS Granular A or Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab. It is recommended that the upper 200 mm of sub-slab fill consists of a 19 mm clear crushed stone.

In consideration of the groundwater conditions encountered during the investigation, a subfloor drainage system, consisting of lines of perforated drainage pipe subdrains connected to a positive outlet, should be provided in the clear stone backfill under the lower basement floor.

5.6 Basement Wall

It is expected that a portion of the basement walls are to be poured against a composite drainage blanket, which will be placed against the exposed bedrock face. A nominal coefficient of at-rest earth pressure of 0.05 is recommended in conjunction with a dry unit weight of 23.5 kN/m^3 (effective unit weight of 15.5 kN/m^3). A seismic earth pressure component will not be applicable for the foundation wall, which is to be poured against the bedrock face. It is expected that the seismic earth pressure will be transferred to the underground floor slabs, which should be designed to accommodate these pressures. A hydrostatic groundwater pressure should be added for the portion below the groundwater level.

Undrained conditions are anticipated (i.e. below the groundwater level). Therefore, the applicable effective unit weight of the retained soil should be 13 kN/m^3, where applicable. A hydrostatic pressure should be added to the total static earth pressure when calculating the effective unit weight.

Two distinct conditions, static and seismic, should be reviewed for design calculations. The parameters for design calculations for the two conditions are presented below.

Static Conditions

The static horizontal earth pressure (p_o) could be calculated with a triangular earth pressure distribution equal to $K_o \cdot \gamma \cdot H$ where:

K_o = at-rest earth pressure coefficient of the applicable retained soil, 0.5
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)

An additional pressure with a magnitude equal to $K_o \cdot q$ and acting on the entire height of the wall should be added to the above diagram for any surcharge loading, q (kPa), that may be placed at ground surface adjacent to the wall. The surcharge pressure will only be applicable for static analyses and should not be used in conjunction with the seismic loading case.

Actual earth pressures could be higher than the “at-rest” case if care is not exercised during the compaction of the backfill materials to maintain a minimum separation of 0.3 m from the walls with the compaction equipment.

Seismic Conditions

The total seismic force (P_{AE}) includes both the earth force component (P_o) and the seismic component (ΔP_{AE}).

The seismic earth force (ΔP_{AE}) could be calculated using $0.375 \cdot a_c \cdot \gamma \cdot H^2/g$ where:

a_c = $(1.45-a_{max}/g)a_{max}$
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)
g = gravity, 9.81 m/s^2

The peak ground acceleration, (a_{max}), for the Ottawa area is 0.32g according to OBC 2012. The vertical seismic coefficient is assumed to be zero.

The earth force component (P_o) under seismic conditions could be calculated using $P_o = 0.5\ K_o\ \gamma\ H^2$, where $K_o = 0.5$ for the soil conditions presented above.

The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$h = \{P_o \cdot (H/3) + \Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$

The earth forces calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per OBC 2012.

5.7 Pavement Structure

For design purposes, the pavement structure presented in the following tables could be used for the design of car parking areas and access lanes.

Table 3 - 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 4 - Recommended Pavement Structure - Access Lanes	
Thickness (mm)	**Material Description**
40	**Wear Course -** HL3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course -** HL8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
400	**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 to a competent layer and replaced with OPSS Granular B Type II material. Weak subgrade conditions may be experienced over service trench fill materials. This may require the use of a geotextile, such as Terratrack 200 or equivalent, thicker subbase or other measures that can be recommended at the time of construction as part of the field observation program.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable vibratory equipment, noting that excessive compaction can result in subgrade softening.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. It is expected that insufficient room is available for exterior backfill. It is suggested that this system could be as follows:

- ❑ Bedrock vertical surface (Hoe ram any irregularities and prepare bedrock surface. Shotcrete areas to fill in cavities and smooth out angular features at the bedrock surface);
- ❑ composite drainage layer

It is recommended that the composite drainage system (such as Miradrain G100N, Delta Drain 6000 or equivalent) extend down to the footing level. It is recommended that 150 mm diameter sleeves at 3 m centres be cast in the footing or at the foundation wall/footing interface to allow the infiltration of water to flow to the interior perimeter drainage pipe. The perimeter drainage pipe and underfloor drainage system should direct water to sump pit(s) within the lower basement area.

Underfloor Drainage

It is anticipated that underfloor drainage will be required to control water infiltration. For preliminary design purposes, we recommend that 100 or 150 mm in perforated pipes be placed at 6 m centres. The spacing of the underfloor drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed.

Foundation Backfill

Above the bedrock surface, 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 re-use as backfill against the foundation walls, unless used in conjunction with a drainage geocomposite, such as Miradrain G100N or Delta Drain 6000, connected to the perimeter foundation drainage system. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

6.2 Protection Against Frost Action

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

A minimum of 2.1 m thick soil cover (or equivalent) should be provided for other exterior unheated footings.

6.3 Excavation Side Slopes

Unsupported Excavations

The side slopes of excavations in the soil and fill overburden materials should be either 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 assumed 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. The subsoil at this site is considered to be mainly 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.

Temporary Shoring

The design and approval of the shoring system will be the responsibility of the shoring contractor and the shoring designer hired by the shoring contractor. It is the responsibility of the shoring contractor to ensure that the temporary shoring is in compliance with safety requirements, designed to avoid any damage to adjacent structures and include dewatering control measures. In the event that subsurface conditions differ from the approved design during the actual installation, it is the responsibility of the shoring contractor to commission the required experts to re-assess the design and implement the required changes. Furthermore, the design of the temporary shoring system should take into consideration, a full hydrostatic condition which can occur during significant precipitation events.

The temporary system could consist of soldier pile and lagging system or interlocking steel sheet piling. Any additional loading due to street traffic, construction equipment, adjacent structures and facilities, etc., should be included to the earth pressures described below. These systems could be cantilevered, anchored or braced. Generally, the shoring systems should be provided with tie-back rock anchors to ensure the stability. The shoring system is recommended to be adequately supported to resist toe failure, if required, by means of rock bolts or extending the piles into the bedrock through pre-augered holes if a soldier pile and lagging system is the preferred method.
The earth pressures acting on the shoring system may be calculated with the following parameters.

Table 5 - Soil Parameters

Parameters	Values
Active Earth Pressure Coefficient (K_a)	0.33
Passive Earth Pressure Coefficient (K_p)	3
At-Rest Earth Pressure Coefficient (K_o)	0.5
Dry Unit Weight (γ), kN/m^3	20
Effective Unit Weight (γ), kN/m^3	13

The active earth pressure should be calculated where wall movements are permissible while the at-rest pressure should be calculated if no movement is permissible. The dry unit weight should be calculated above the groundwater level while the effective unit weight should be calculated below the groundwater level.

The hydrostatic groundwater pressure should be included to the earth pressure distribution wherever the effective unit weight are calculated for earth pressures. If the groundwater level is lowered, the dry unit weight for the soil/bedrock should be calculated full weight, with no hydrostatic groundwater pressure component.

For design purposes, the minimum factor of safety of 1.5 should be calculated.

6.4 Pipe Bedding and Backfill

A minimum of 300 mm of OPSS Granular A should be placed for bedding for sewer or water pipes when placed on bedrock subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to a minimum of 300 mm above the pipe obvert should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts 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 reduce the potential 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 SPMDD.

6.5 Groundwater Control

Groundwater Control for Building Construction

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.

Infiltration levels are anticipated to be low through the excavation face. The groundwater infiltration will be controllable with open sumps and pumps.

A temporary MOE permit to take water (PTTW) will be required for this project if more than 50,000 L/day are to be pumped during the construction phase. A minimum of four to five months should be allocated for completion of the application and issuance of the permit by the MOE.

Long-term Groundwater Control

Our recommendations for the proposed building's long-term groundwater control are presented in Subsection 6.1. Any groundwater encountered along the building's perimeter or sub-slab drainage system will be directed to the proposed building's cistern/sump pit. Provided the proposed groundwater infiltration control system is properly implemented and approved by the geotechnical consultant at the time of construction, it is expected that groundwater flow will be low (i.e.- less than 50,000 L/day) with peak periods noted after rain events. A more accurate estimate can be provided at the time of construction, once groundwater infiltration levels are observed. It is anticipated that the groundwater flow will be controllable using conventional open sumps.

Impacts on Neighbouring Structures

Based on our observations, a local groundwater lowering is anticipated under short-term conditions due to construction of the proposed building. It should be noted that the extent of any significant groundwater lowering will take place within a limited range of the subject site due to the minimal temporary groundwater lowering.

The neighbouring structures are expected to be founded within native glacial till and/or directly over a bedrock bearing surface. No issues are expected with respect to groundwater lowering that would cause long term damage to adjacent structures surrounding the proposed building.

6.6 Winter Construction

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

Where excavations are completed in proximity of existing structures which may be adversely affected due to the freezing conditions. In particular, where a shoring system is constructed, the soil behind the shoring system will be subjected to freezing conditions and could result in heaving of the structure(s) placed within or above frozen soil. Provisions should be made in the contract document to protect the walls of the excavations from freezing, if applicable.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the installation of straw, propane heaters and tarpaulins or other suitable means. 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 difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be considered if such activities are to be completed during freezing conditions. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

The results of the analytical testing show that the sulphate content is less than 0.1%. This result indicates that Type 10 Portland cement (normal cement) would be appropriate for this site. The chloride content and pH of the samples 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 an aggressive corrosive environment.

7.0 Recommendations

It is recommended that the following be carried out once the master plan and site development are determined:

- ❑ Review master grading plan from a geotechnical perspective, once available.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ 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 placement of backfilling materials.
- ❑ 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 request, following the completion of a satisfactory material testing and observation 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 permission to review the grading plan once available. Also, our recommendations should be reviewed when the drawings and specifications are complete.

The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those of the test holes.

A soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, we request that we be notified 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 Homestead Land Developments or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Nathan Christie, P.Eng.

David J. Gilbert, P.Eng.

Report Distribution:

- ❑ Homestead Land Holdings Ltd. (3 copies)
- ❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 851 Richmond Road
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin (refer to Dwg. PG4163-1). Geodetic elevation = 65.24m.

FILE NO. PG4163

REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** June 1, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.03
Asphaltic concrete 0.08							
FILL: Brown sand and gravel 0.23		SS	1	42	21		
		SS	2	33	11	1	65.03
FILL: Brown sand and gravel, some silt		SS	3	36	50+		
						2	64.03
2.49		SS	4	71	50+		
Grey fractured limestone **BEDROCK** 3.02						3	63.03
		RC	1	85	69		
						4	62.03
BEDROCK: Fair to excellent quality, grey limestone							
		RC	2	100	100	5	61.03
5.92							
End of Borehole							
(GWL @ 2.93m - June 8, 2017)							

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

20 40 60 80

Monitoring Well 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
Prop. Multi-Storey Building - 851 Richmond Road
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin (refer to Dwg. PG4163-1). Geodetic elevation = 65.24m.

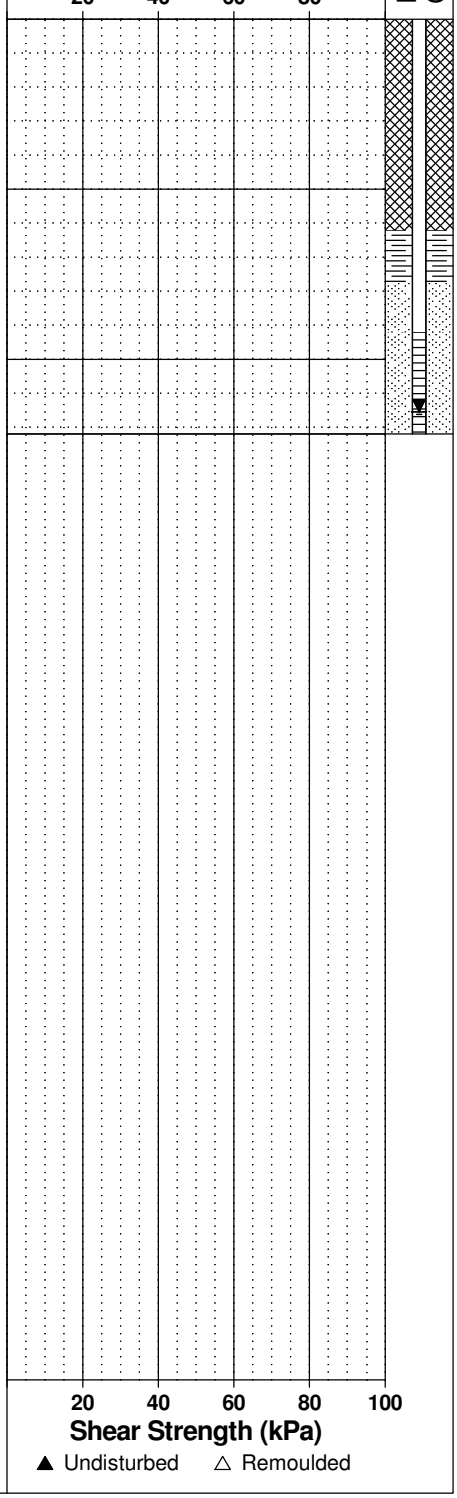
FILE NO. PG4163

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** June 1, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.10						0	65.69
FILL: Grey-brown sand, some silt		SS	1	62	11		
		SS	2	25	10	1	64.69
		SS	3	42	5		
						2	63.69
2.29							
Grey fractured limestone 2.44		SS	4	100	50+		
BEDROCK							
End of Borehole							
Practical refusal to augering at 2.44m depth							
(GWL @ 2.31m - June 8, 2017)							



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 851 Richmond Road
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin (refer to Dwg. PG4163-1). Geodetic elevation = 65.24m.

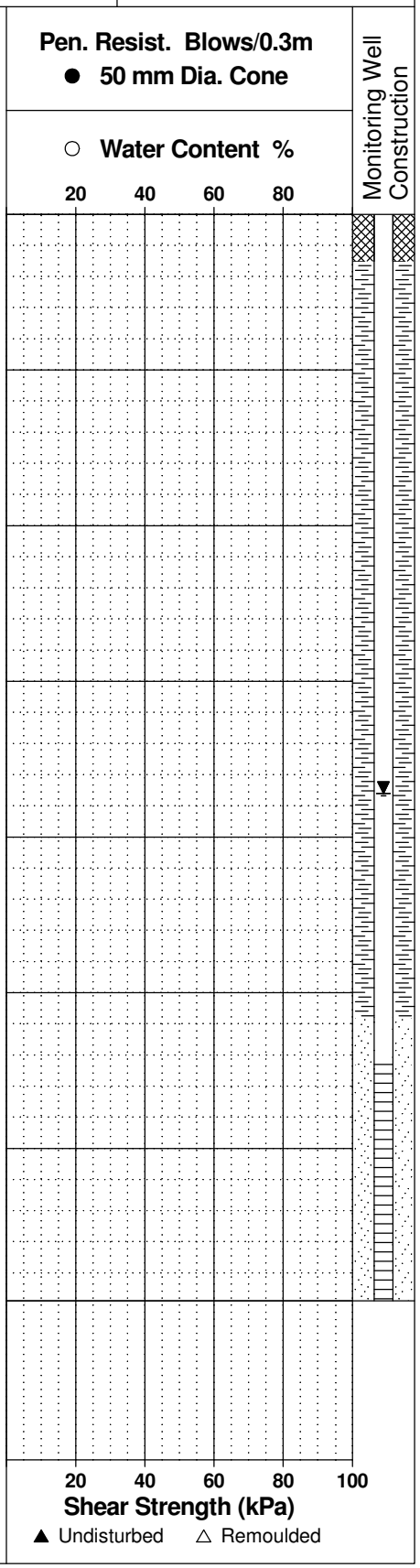
FILE NO. PG4163

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** June 1, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	65.44
Asphaltic concrete 0.09		SS	1	58	21		
FILL: Grey-brown sand, trace silt		SS	2	33	35	1	64.44
		SS	3	67	18	2	63.44
2.36		SS	4	88	50+		
GLACIAL TILL: Brown silty clay with sand, gravel, fractured rock and boulders		RC	1	94		3	62.44
		RC	2	67			
3.99		SS	5	100	50+	4	61.44
		RC	3	80	60	5	60.44
BEDROCK: Poor to excellent quality, grey limestone						6	59.44
		RC	4	100	96		
6.98							
End of Borehole							
(GWL @ 3.72m - June 8, 2017)							



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 851 Richmond Road
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin (refer to Dwg. PG4163-1). Geodetic elevation = 65.24m.

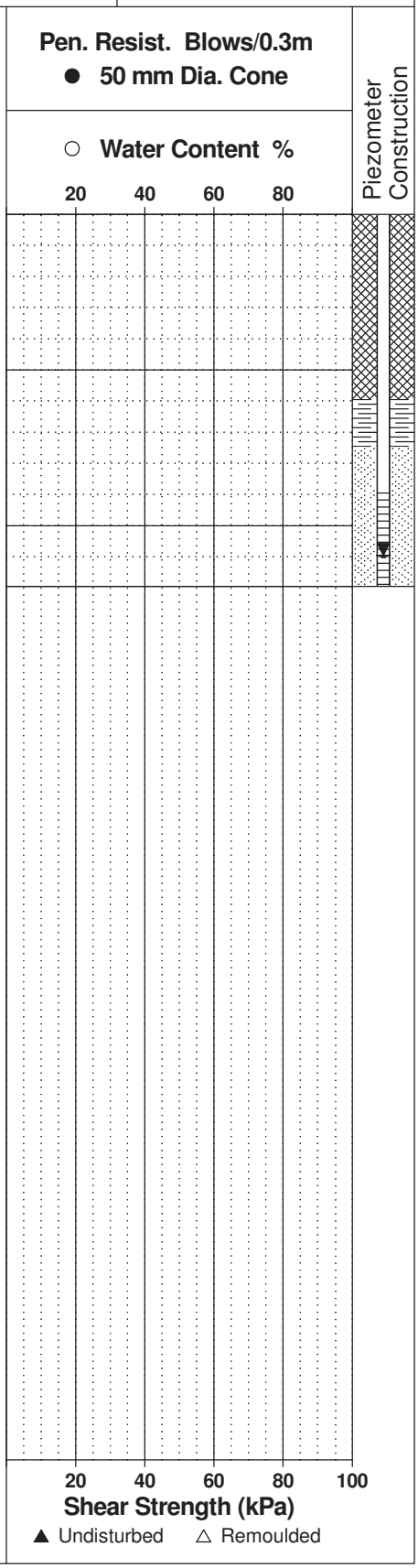
FILE NO. PG4163

REMARKS

HOLE NO. BH 4

BORINGS BY CME 55 Power Auger **DATE** June 1, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.05
Asphaltic concrete 0.09							
FILL: Grey-brown sand, trace silt		SS	1	75	20		
0.76							
FILL: Brown silty sand, some clay, trace gravel		SS	2	83	8	1	65.05
1.52							
GLACIAL TILL: Brown sandy silt, trace clay and gravel		SS	3	75	24	2	64.05
2.39		SS	4	100	50+		
End of Borehole							
Practical refusal to augering at 2.39m depth							
(GWL @ 2.19m - June 8, 2017)							



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 851 Richmond Road
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin (refer to Dwg. PG4163-1). Geodetic elevation = 65.24m.

FILE NO. PG4163

REMARKS

HOLE NO. BH 5

BORINGS BY CME 55 Power Auger **DATE** June 1, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	65.79
Asphaltic concrete 0.06		SS	1	46	57		
FILL: Brown sand with gravel, trace silt and clay		SS	2	42	11	1	64.79
1.52							
GLACIAL TILL: Brown sand with gravel, trace silt 2.06		SS	3	67	39	2	63.79
		RC	1	81	21		
BEDROCK: Very poor to fair quality, grey limestone						3	62.79
		RC	2	64	40		
						4	61.79
		RC	3	100	100	5	60.79
5.72							
End of Borehole							
(GWL @ 3.20m - June 8, 2017)							

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

20 40 60 80

Monitoring Well 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
Prop. Multi-Storey Building - 851 Richmond Road
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin (refer to Dwg. PG4163-1). Geodetic elevation = 65.24m.

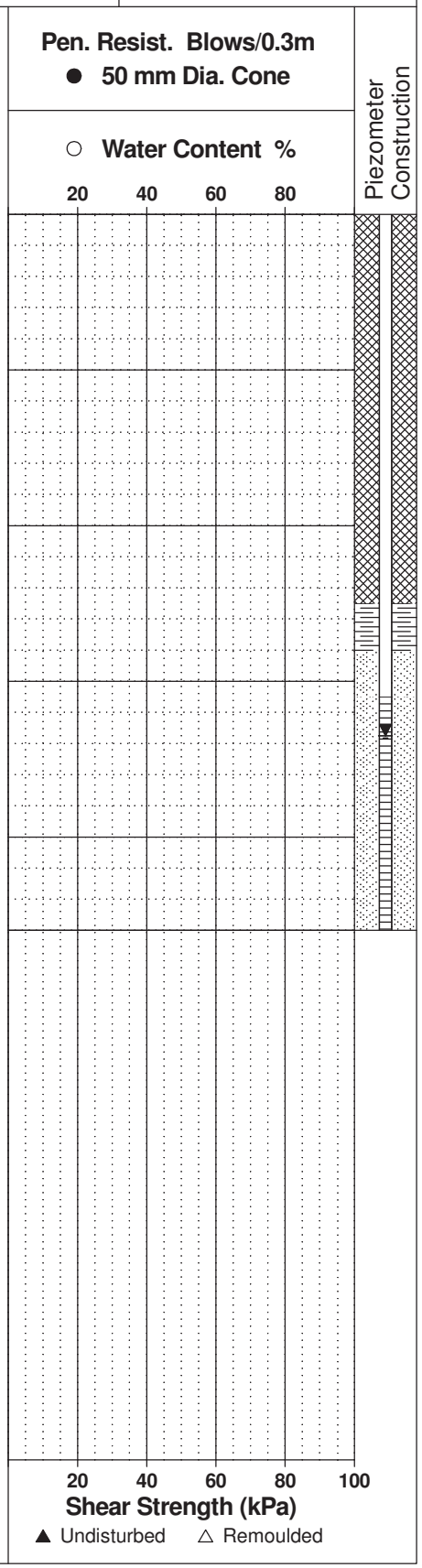
FILE NO. PG4163

REMARKS

HOLE NO. BH 6

BORINGS BY CME 55 Power Auger **DATE** June 1, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	65.56
Asphaltic concrete 0.08		SS	1	58	18		
FILL: Brown sand and gravel, trace silt		SS	2	50	45	1	64.56
		SS	3	42	17	2	63.56
2.29							
		SS	4	58	13	3	62.56
GLACIAL TILL: Brown silty sand with clay and gravel		SS	5	100	27		
		SS	6	100	52	4	61.56
4.60							
End of Borehole							
Practical refusal to augering at 4.60m depth							
(GWL @ 3.35m - June 8, 2017)							



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

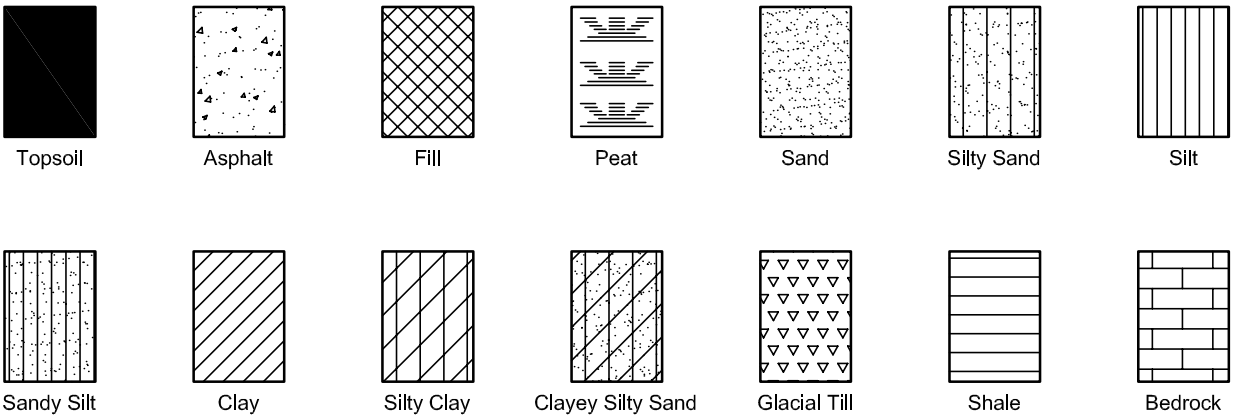
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void 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.

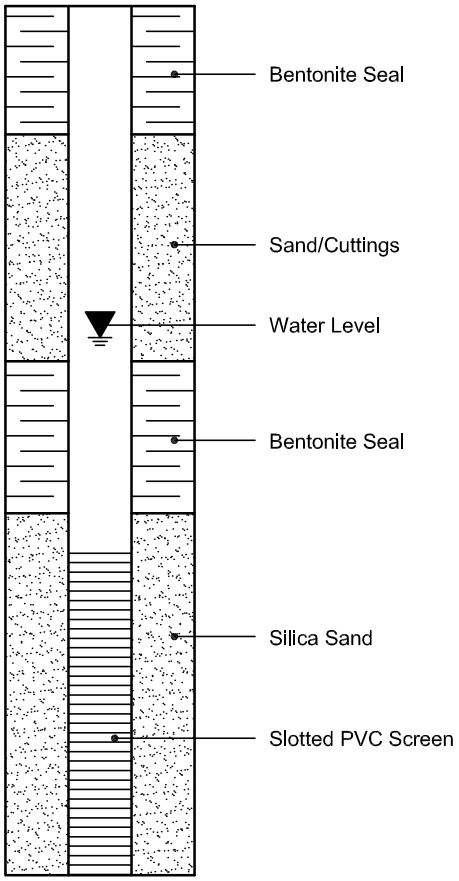
SYMBOLS AND TERMS (continued)

STRATA PLOT

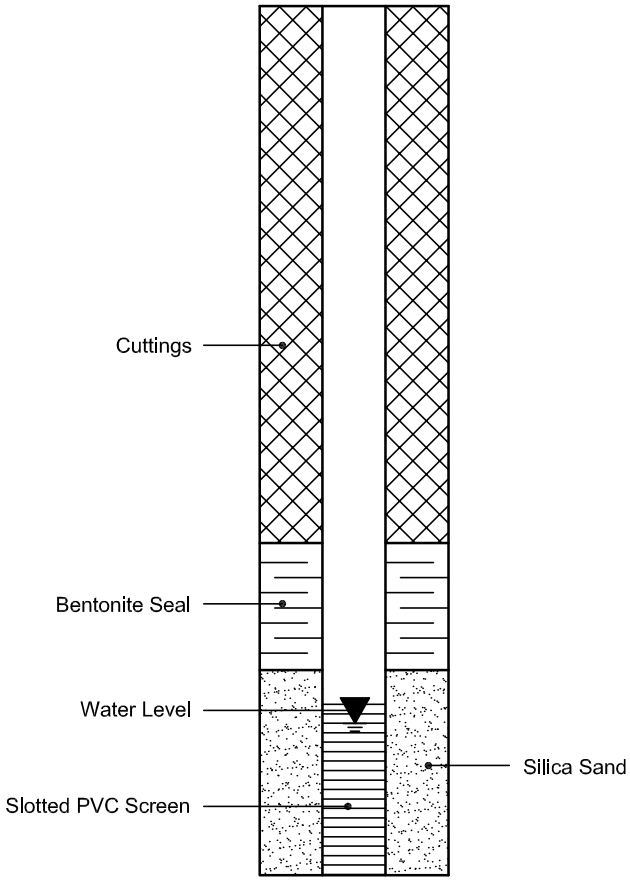


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



APPENDIX 2

FIGURE 1 - KEY PLAN

FIGURES 2 AND 3 - SEISMIC SHEAR WAVE VELOCITY PROFILES

DRAWING PG4163-1 - TEST HOLE LOCATION PLAN

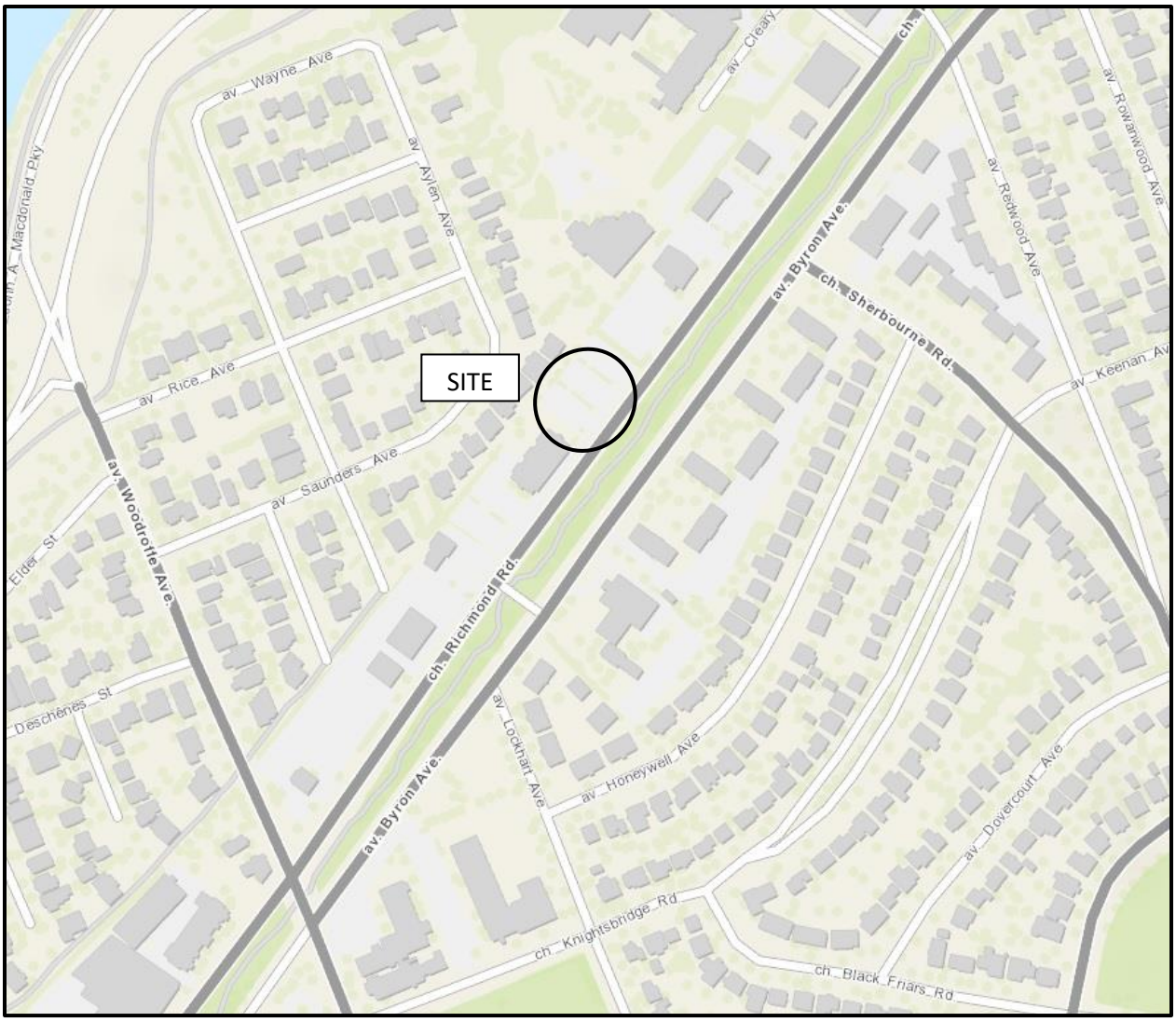


FIGURE 1

KEY PLAN

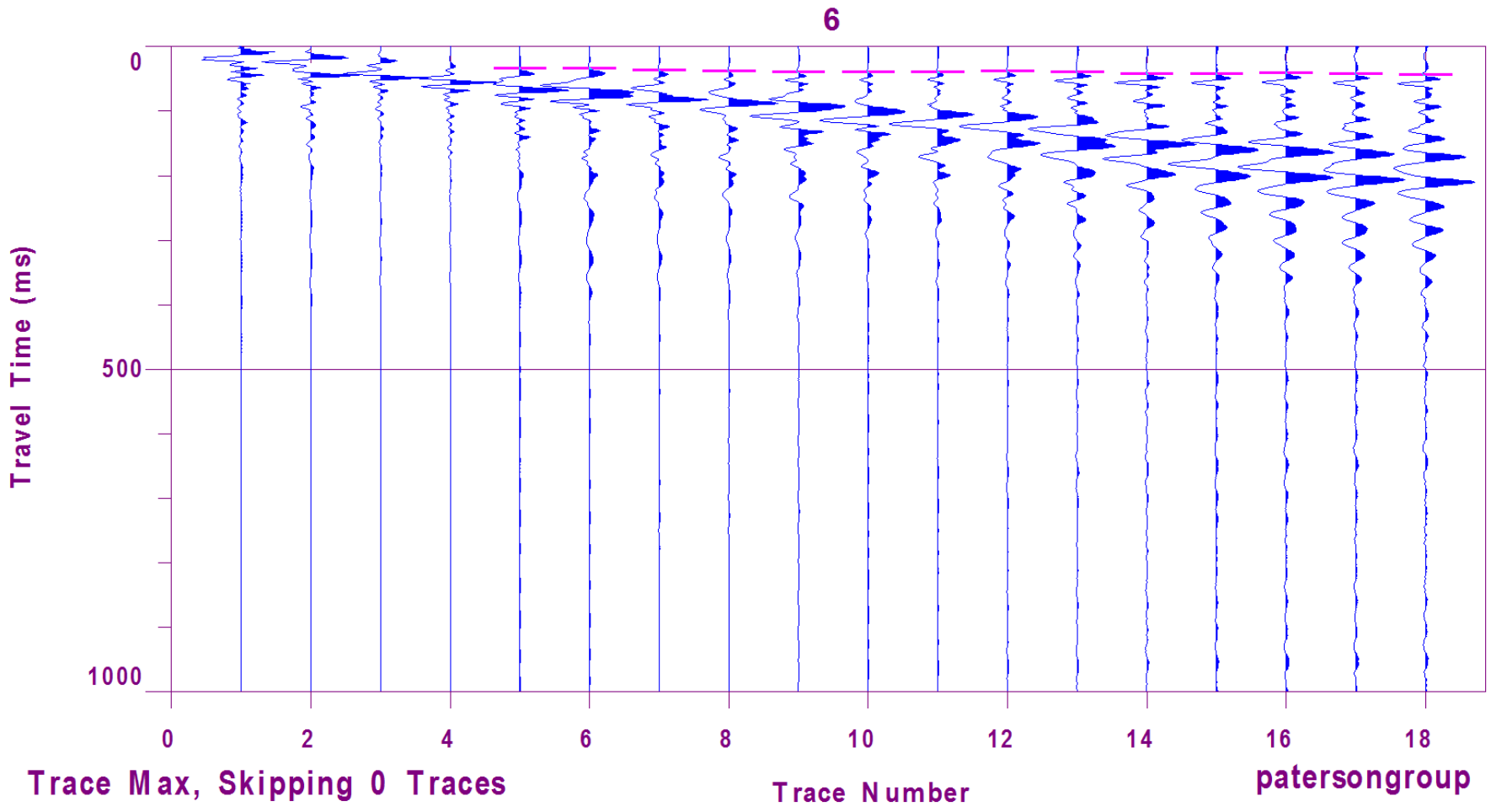


Figure 2 – Shear Wave Velocity Profile at Shot Location -3 m

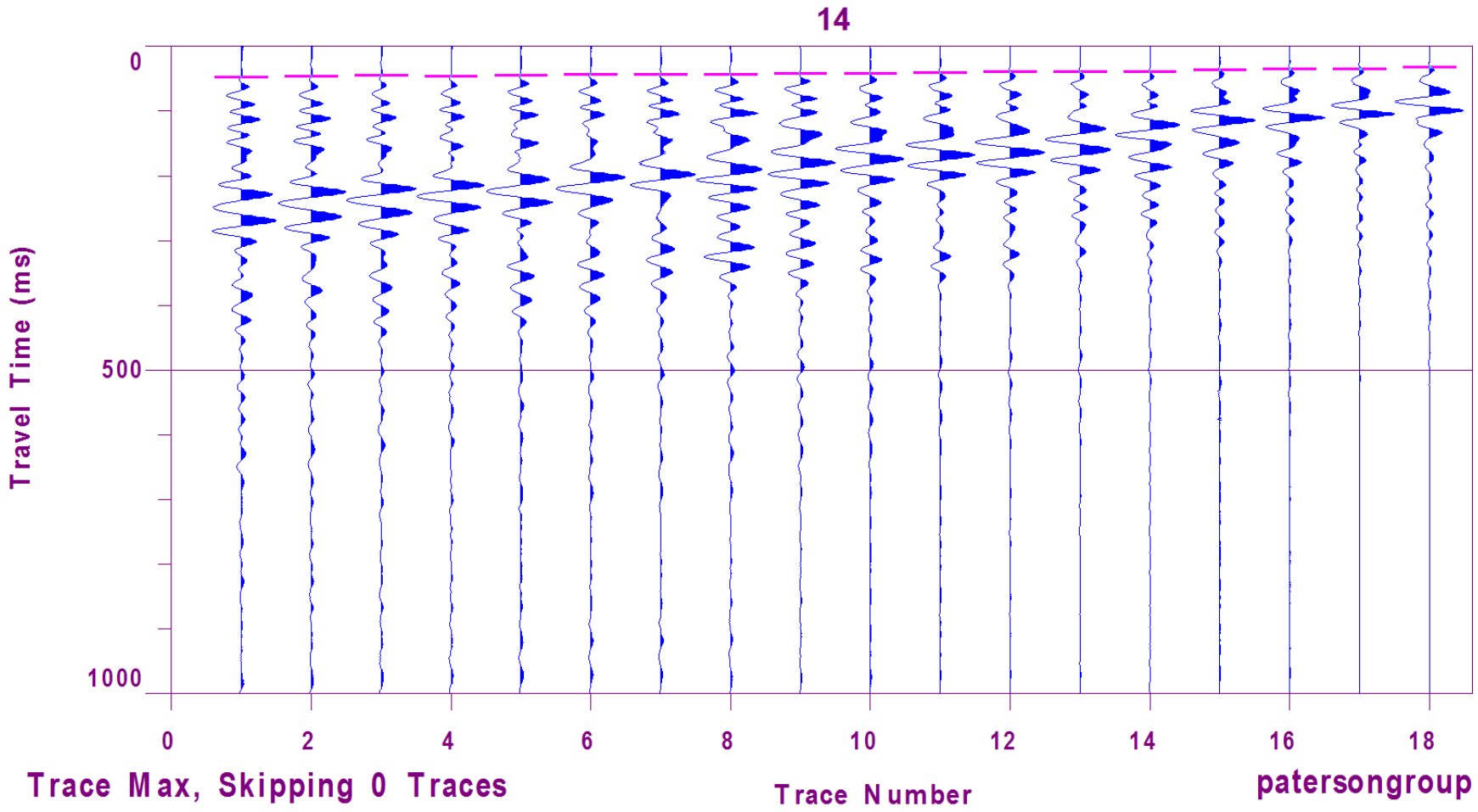
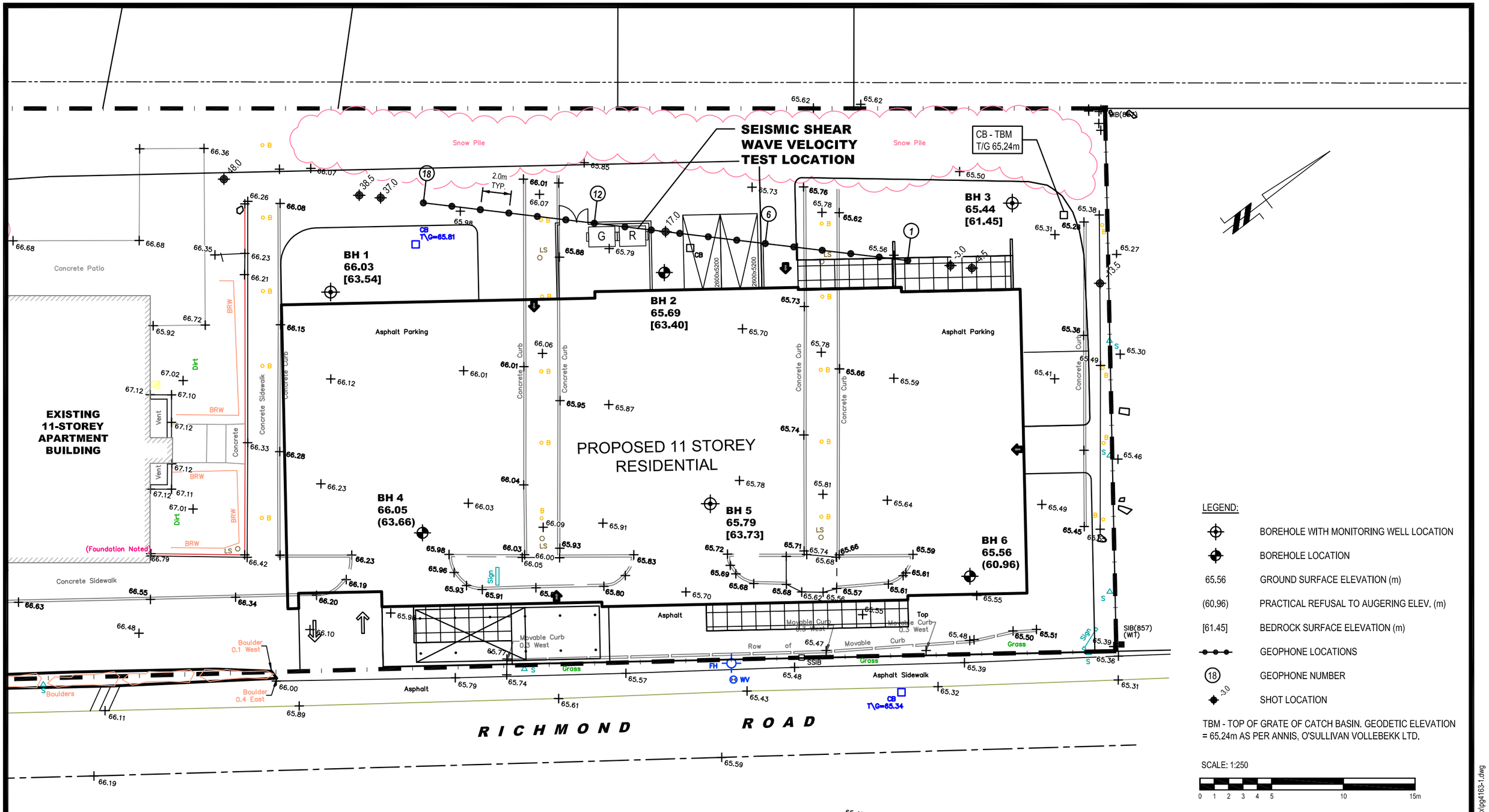


Figure 3 – Shear Wave Velocity Profile at Shot Location 48 m



LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- 65.56 GROUND SURFACE ELEVATION (m)
- (60.96) PRACTICAL REFUSAL TO AUGERING ELEV. (m)
- [61.45] BEDROCK SURFACE ELEVATION (m)
- GEOPHONE LOCATIONS
- (18) GEOPHONE NUMBER
- -3.0 SHOT LOCATION

TBM - TOP OF GRATE OF CATCH BASIN. GEODETIC ELEVATION = 65.24m AS PER ANNIS, O'SULLIVAN VOLLEBEKK LTD.

SCALE: 1:250

0 1 2 3 4 5 10 15m

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

HOMESTEAD LAND HOLDINGS

GEOTECHNICAL INVESTIGATION
PROP. MULTI-STOREY BUILDING - 851 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:250	Date: 06/2017
Drawn by: MPG	Report No.: PG4163-1
Checked by: NC	Dwg. No.: PG4163-1
Approved by: DJG	Revision No.: 0

p:\autocad drawings\geotechnical\pg4163-1.dwg

Appendix F CITY OF OTTAWA SERVICING STUDY CHECKLIST

Stantec

Development Servicing Study Checklist

Job#: 160401329

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	N/A	-	Introduction
Date and revision number of the report.	Y	-	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	1.0	
Plan showing the site and location of all existing services.	Y		Existing Condtions Plan
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.	Y		Appendix B
Summary of Pre-consultation Meetings with City and other approval agencies.	N/A		
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.	N/A		
Statement of objectives and servicing criteria.	Y		In each section
Identification of existing and proposed infrastructure available in the immediate area.	Y		In each section
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A		
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	N/A		
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to addresspotential impacts.	N/A		
Proposed phasing of the development, if applicable.	N/A		
Reference to geotechnical studies and recommendations concerning servicing.		9.0	Report and Appendix
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y		Appendix G Drawings
North arrow (including construction North)	N/A		Appendix G Drawings
Key plan	Y		Appendix G Drawings
Name and contact information of applicant and property owner	Y		Appendix G Drawings
Property limits including bearings and dimensions	Y		Appendix G Drawings
Existing and proposed structures and parking areas	Y		Appendix G Drawings
Easements, road widening and rights-of-way	Y		Appendix G Drawings
Adjacent street names	Y		Appendix G Drawings

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available	N/A	3.0	
Availability of public infrastructure to service proposed development	Y	3.0	
Identification of system constraints	Y	3.0	
Identify boundary conditions	Y	3.0	
Confirmation of adequate domestic supply and pressure	Y	3.0	

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.		3.0	Appendix A
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.	Y	3.0	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	N/A		
Address reliability requirements such as appropriate location of shut-off valves	N/A		
Check on the necessity of a pressure zone boundary modification.	N/A		
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		3.0	
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.	Y	3.0	
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.	Y	3.0	
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	3.0	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A		
4.3 Wastewater	**Addressed (Y/N/NA)**	**Section**	**Comments**
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).	Y	4.0	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A		
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A		
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	4.0	
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)	Y	4.0	Appendix C
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Y	4.0	Appendix C
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	4.0	
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A		

Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A		
Special considerations such as contamination, corrosive environment etc.	N		
4.4 Stormwater	**Addressed (Y/N/NA)**	**Section**	**Comments**
Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Y	5.0	
Analysis of available capacity in existing public infrastructure.	N		
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Y		Existing Conditions Plan
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.	Y	5.0	Appendix D
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	5.0	Appendix D
Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Y	5.0	Appendix D
Set-back from private sewage disposal systems.	N/A		
Watercourse and hazard lands setbacks.	N/A		
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N		
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A		
Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Y	5.0	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.	N		
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.	Y	5.0	Appendix D
Any proposed diversion of drainage catchment areas from one outlet to another.	N/A		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	N/A		
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A		
Identification of potential impacts to receiving watercourses	N/A		
Identification of municipal drains and related approval requirements.	N/A		
Descriptions of how the conveyance and storage capacity will be achieved for the development.	Y	5.0	Appendix D
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	N		
Inclusion of hydraulic analysis including hydraulic grade line elevations.	N		

Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	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.	N/A		
Identification of fill constraints related to floodplain and geotechnical investigation.	N/A		
4.5 Approval and Permit Requirements	**Addressed (Y/N/NA)**	**Section**	**Comments**
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	N/A		
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A		
Changes to Municipal Drains.	N/A		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A		
4.6 Conclusion	**Addressed (Y/N/NA)**	**Section**	**Comments**
Clearly stated conclusions and recommendations	Y	10.0	
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.	Y		Comment Response Letter Included Appendix H
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	Y		

Appendix G CORRESPONDENCE

File Number: D07-12-17-0135

December 14, 2017

FOTENN
223 McLeod Street
Ottawa, ON K2P 0Z8
Attn: Stephanie Morris

Sent via email to [morris@fotenn.com]

Dear Ms. Morris,

Re: Site Plan Control Comments – 851 Richmond Road

The following review comments are provided in response to the submission of the Site Plan Control application (D07-12-17-0135) for 851 Richmond Road. Please coordinate the changes made in response to the comments below across all plans as applicable.

City of Ottawa

Planning

General

1. Please add the file number (D07-12-17-0135) and approval block on all plans, as shown below.

APPROVED ☐ REFUSED ☐
THIS _____ DAY OF _____, 20____
_____
DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

2. All plans and drawings should be dimensioned in the metric system instead of imperial measurements.

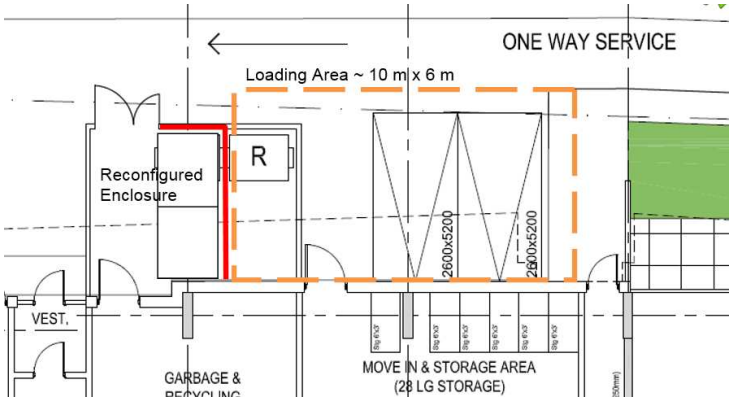
Site Plan

1. Please include the architect's seal.
2. Please provide a key plan showing the subject site's location on an aerial photograph.
3. Provide the legal description of the subject property, as well as the survey information used for the base plan.
4. Please including a zoning information table which includes all provisions of the R5C H(33) zoning applicable to the site, and the proposed values. This should include, but is not limited to, Parts 2, 4, 5, and 6 of the Zoning By-law. An example is provided below.

ZONING		
EXISTING ZONING	IL [1559] LIGHT INDUSTRIAL	
	REQUIRED	PROPOSED
MIN. FRONT YARD SETBACK	7.5m	15.0m
MIN. REAR YARD SETBACK	7.5m	57.0m
MIN. INTERIOR YARD SETBACK	7.5m	8.2m
MAX. BUILDING HEIGHT	18.0m	±5.1m
MIN. LOT AREA	2,000m2	13,507m2
MAX LOT COVERAGE	65%	26%
MAX. FLOOR SPACE INDEX	2	2
MIN. WIDTH OF LANDSCAPE AREA		

5. Please identify all building entrances; four entrances are not shown on the northern frontage.
6. Please identify the location of the two-way site access on the western portion of the site. As well, please consider providing a landscaped buffer to screen the surface parking lot from Byron Street and to provide a more positive pedestrian experience.
7. Please separate the calculations for resident and visitor parking totals and appropriately label the visitor parking spaces. If visitor parking is to be provided in the underground garage, please explain how secure access will function.
8. Please explain your rationale behind the central one-way access immediately to the west of the parking garage entrance. An additional one-way access is proposed on the eastern edge of the site; please consider removing the centre access and provide additional landscaping.
9. The eastern driveway does not meet the 3 m minimum width required; please remove the bike lane, as it is not necessary within the site.
10. If visitor parking is provided at the surface parking lot, pedestrian connectivity to the new building must be improved. Ensure that a continuous pathway is provided to link the surface lot with the new internal pathways proposed.
11. The covered entry walkway extends too far into the front yard setback. Per s. 65 of the Zoning By-law, the canopy may project 1.5 m into the front yard, but not closer than 0.6 m to the lot line.
12. Please provide a detail drawing of the two proposed garbage enclosures, and show the enclosures on the site plan. Consider adding a roof to the enclosures to screen the garbage and recycling bins.

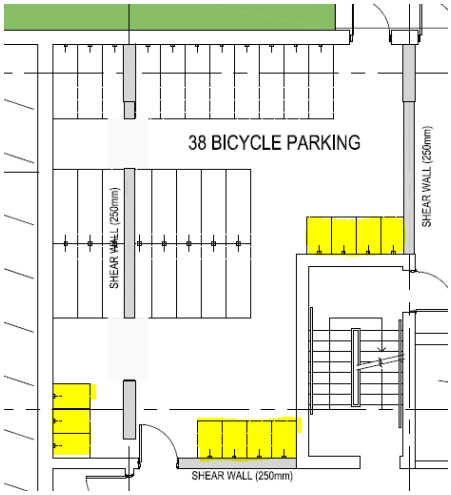
13. The two parking spaces provided on the northern edge of the building are immediately adjacent to the “Move In & Storage Area.” The two spaces provided are not large enough to accommodate mid-sized moving trucks (7 m length), which may result in the drive aisle being obstructed. Please reconfigure this area to accommodate moving vehicles (sketch provided below).



14. Bicycle parking comments:

    a. Per s. 100, bicycle parking spaces must be set aside for and used exclusively for that purpose. Therefore, storage lockers cannot be counted towards the bicycle parking total unless they are labelled as such, and dimensioned per s. 111.

    b. The highlighted bicycle parking spaces do not meet the minimum size required per s. 111. Please correct, and identify what type of racks or locking points will be provided.



    c. Please provide outdoor bicycle racks for the use of visitors.

15. Please extend the northern concrete walkway to the west and south to the rear entrance.

16. Please delineate the extent of the underground parking garage on the plan.

17. Is any lighting proposed for the pathways at the rear of the building? If so, please identify it on the plan.

18. All depressed curbs must be shown on the Site Plan.

19. Is any fencing proposed along the eastern property line?

Urban Design

Site Plan/Landscape Plan:

1. Is there adequate soil volumes for the trees proposed above the parking garage at the rear of the site?
2. Entrance to the parking garage – relocate to the rear of side of the building to eliminate the additional crossing of the sidewalk on Richmond Road.
3. What treatment is proposed in front of the surface parking lot that is being retained? Access to this parking lot should be limited to one location with proper access. A landscape buffer should be provided across the frontage of this parking lot in accordance with Zoning By-law standards.
4. Label all hard surface area by material proposed – concrete, asphalt, pavers etc.
5. Why is such a large garbage and recycling area proposed at the rear of the building?
6. Is an enclosure proposed for the garbage for the existing building? If so what is proposed?
7. Is the fenced enclosure required at the rear of the new building as there is a garbage room at grade?

Elevations / Built Form

1. Clearly define a base, middle and top for the building.
2. Increase the height of the base of the building through external treatment including the second floor.
3. Treatment of balconies should be re-considered. General concern that this building and the existing building can be read as one very long slab building. The approach to balconies may assist in creating two distinct looking buildings.
4. Separation distance between the two buildings is not ideal and does not meet high rise design guidelines. Consideration should be given to increase this distance to the greatest extent possible.
5. The material proposed for the base of the building should be clearly identified on the elevations.

Urban Design Review Panel

These are notes taken by City staff during the meeting; formal notes from the Panel will follow.

1. The overall design of the building is very similar to that of the adjacent structure. Please differentiate the proposed development with a unique design.
2. The ground floor appears to be very squat and compressed; please improve the base of the building.
3. Treat each of the four facades in a slightly different manner; the south façade especially needs improvement. Give the slot more emphasis, possibly by aligning the entrance with it.
4. Be careful not to create a pock-marked façade through the use of panelling.
5. The north façade needs to be calmer for the adjacent residents; decrease the visual noise by insetting the balconies.

6. The east façade should include more balconies and glazing.
7. The building should have a defined base, middle, and top. Adjust the treatment of the upper floors to break the boxy massed form.
8. Consider grouping and framing the balconies.
9. Relocate the parking garage entrance to the back of the building, to minimize pedestrian conflicts.
10. Please integrate sustainable design into the building, perhaps with a green roof.

Engineering

General

1. All exterior light fixtures must be included and approved as part of the site plan approval. Therefore, the lights must be clearly identified by make, model and part number. All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the applicant must provide certification from an acceptable professional engineer. The location of all exterior fixtures, a table showing the fixture types (including make, model, part number), and the mounting heights must be included on one of the plans.
2. Is there any easement on this property? If so, please clearly show and label all the easement(s) on all plans. Please provide a copy of the easement document.
3. Please note that additional review fees will be applicable for the 4th and subsequent reviews.
4. The City file number for this application is D07-12-17-0135. Please place this number on all drawings (bottom right side –vertically outside the border).
5. The City plan number of this application is 17519. Please place this number on all drawings, horizontally at the bottom right side (Plan No. 17519).
6. Please complete the attached Fire Route Form and send to Jennifer.Therkelsen@ottawa.ca after the fire route has been confirmed by Allan.Evans@ottawa.ca in order to add the fire route to the By-law. Please cc myself and the file lead as confirm that the form has been submitted.
7. Clearly show the property line on all drawings, on all sides of the property and add the line style in the legend.
8. Please provide a full size drainage area plan for the existing condition for the entire site. On this plan, show the drainage area and runoff coefficient for each sub-catchment area. Also, add the overland flow route arrows on this plan. Provide a detailed composite runoff coefficient (c) calculation for each of the sub-catchment area and include it in the Appendix of the Site Servicing and Stormwater Management Brief. Clearly show and label the stormwater conveyance system outside the property line of this site.
9. Based on the available information, the downstream public stormwater conveyance system was designed and constructed prior to the year 1970 and assumed to be designed to

convey the 2-year flow. Therefore, the runoff from the expansion/redevelopment area must be controlled to the 2-year pre-development condition with C=0.5.

10. As per discussion with the City Legal services, the owner/applicant has no rights to outlets the stormwater runoff to a private property on the north side, without any easement or legal agreement with the adjacent property owner. In order to outlet and to convey flow through a private land, please obtain an easement and enters into a joint use and maintenance agreement with the adjacent property owner(s).

Site Servicing and Stormwater Management Brief

1. Section 4.0; paragraph 3 talks about DSEL's report that analyzed the capacity of the sanitary sewer on Richmond Road. Please include excerpts from this report to show the existing sanitary sewer on Richmond Rd. has additional capacity to receive sanitary flow from the proposed building.
2. Section 5.2, paragraph 1; sentence 2 states that existing 375 mm diameter CSP discharges into an existing ditch in the existing Children's Centre to the north. However, what is shown on drawing no. EX-1 does not agree with the description. Please review and revise. Do you have permission to convey stormwater through the adjacent property on the north (Children's Centre)?
3. Section 5.2, paragraph 1; sentence 3 talks about a 15 m long conveyance ditch. Who owns and maintains this ditch? If the portion of the conveyance system is owned and maintained by a private entity and do not have an agreement with the adjacent property owner, an alternative outlet is required for the proposed development.
4. Section 5.3; the stormwater management criteria that summarized in this section does not quite match the criteria that was given to you by the previous City project manager. Review and revise.
5. Section 5.4; It appears that the proposed oil and grit separator is only providing the quality treatment for the runoff from the proposed development area. Please explain the reason for not providing the quality treatment for the runoff from the existing area in the south? Please consult with the Conservation Authority to confirm whether this approach is acceptable to them.
6. Provide detailed calculations to show how the composite runoff coefficient (C) of the existing site is determined.
7. Section 5.4.4.2; sentence 1 states that it is proposed to detain stormwater within a 20 m3 cistern below grade with a maximum controlled release rate of 29.7 L/s to the gravity service provided. It is not clear how you are controlling this release rate. Please elaborate.
8. Section 5.4.4 talks about rooftop storage and subsurface (cistern) storage. However, there is no discussion about surface storage provided on the north and west side of the proposed building as shown on the Grading Plan. Please review and revise.
9. Please provide stormwater management for the entire site, not just the expansion area (.31 ha).

Site Servicing Plan

1. There are 2 proposed catch basins (CB 201 & CB 202) shown west of the proposed building. However, there are no catch basin leads shown on the plan to convey the stormwater captured by the CBs. Review and revise.

2. Please show the storm sewers that conveys stormwater from the underground cistern to the outlet.

Storm Drainage Plan

1. Is there a reason for redirecting the minor flow from the south of the property to the internal plumbing of the proposed building?
2. A drainage area shown at the north-west corner of the property does not have an identification no., drainage area nor runoff coefficient. Please provide.
3. Drainage area of the ramp shown as 0.00. Please review and revise.

Grading Plan

1. Provide at least 0.3 m freeboard between the high point at the underground parking entrance and the gutter elevation at the north side of Richmond Road to prevent the gutter flow from entering the parking garage.
2. It is not clear whether the large flow arrows shown on the plan and in the legend represents major overland flow route or not. Since the post-development runoff for the 1:100year storm event will be controlled to the calculated allowable release rate, no major overland flow route is required for the expansion area; only emergency overland flow route is required. Therefore, please revise the text associated with the large flow arrow shown in the legend. Major overland flow route is only required for the existing building and the surrounding area (outside the expansion area).
3. There are two pavement designs (car parking areas and local roads) shown on this plan. Clearly delineate these 2 areas with different hatchings.

Transportation

Traffic Engineering

1. The volumes used in the analysis do not reflect current conditions. WB volumes appear statistically low and SB left turn volumes statistically high (PM count). Although not demonstrated in the Synchro Analysis, the WB queues from Richmond Road /Woodroffe Avenue may block the site access during PM peak periods. This should be reviewed and documented.
2. Richmond Road corridor will be redesigned as part of Stage 2 LRT and traffic conditions will be significantly changed.

Street Lighting

1. No comments with initial Transportation Brief and Site Plan for this circulation. Street Lighting reserves the right to make future comments based on subsequent submissions.
2. Future considerations are as follows:
3. If there are any proposed changes to the existing roadway geometry, the City of Ottawa Street Light Asset Management Group is required to provide a full street light design. Upon completion of proposed roadway geometry design changes, please submit digital Micro Station drawings with proposed roadway geometry changes to the Street Lighting Department, so that we may proceed with the detailed street light design and coordination with the Street Light maintenance provider and all necessary parties. Be advised that the

applicant will be 100% responsible for all costs associated with any Street Light design because of the roadway geometry change.

4. Existing underground streetlight plant at this location. Street light plant must be maintained and protected at all times. Please maintain a minimum of 0.6 m horizontal and 0.3 m vertical clearance from existing street light underground plant. Please maintain a minimum 1.5 m horizontal clearance from all existing street light surface features.
5. Alterations and/or repairs are required where the existing street light plant is directly, indirectly or adversely affected by the scope of work under this circulation, due to the proposed road reconstruction process. All street light plant alterations and/or repairs must be performed by the City of Ottawa's Street Light maintenance provider.
6. Be advised that the applicant will be 100% responsible for all costs associated with any relocations/modifications to the existing street light plant.
7. Please contact Ontario One Call for locates prior to excavation.
8. Please contact Iain Brock who can be reached at 613-580-2424 extension 15885.

Transportation Engineering Services

1. A site in a Transit Oriented Development (TOD) area is an excellent candidate for submission of the new multi-modal TIA guidelines.
2. Although Richmond Road is a spine route, the report does not propose any cycling infrastructure upgrades for the frontage. In addition, with the planned reconstruction of Richmond Road in this area following construction of the LRT Stage 2 works, the north side will include cycle tracks. This should be documented in the report and there may be some resulting impact along the site frontage and across the accesses.
3. The mode shares used in the report are not appropriate for a TOD area. Future mode shares should include 65% transit use. The 1.5% growth rate used for the trip generation growth rate should be explained in detail.
4. There is a ROW protection on Richmond Road.
5. The two-way underground garage access must be 6.7m wide.

Development Review – Transportation Engineering Services

1. Show the line work (sidewalk, curbs, pavement markings etc) for Richmond Road.
2. Show curb radii.
3. Show all lane widths, including the bike lane, and sidewalk widths.
4. The entrance to the parking garage and the lane between the two buildings in in contravention of the Private Approach By-law; requires a minimum of 9 m between any two way vehiclur acces and a one away access. Section 25 (f).
5. The site plan shows two one-way entrance in for the surface lot; how do the cars get out?
6. The garbage facilities at the back of the proposed building will need to conform to Part 4 – Parking, Queuing and Loading Provisions of the Zoning By-law Table 113B for aisle width of loading spaces at 90 degrees (9m).
7. It should be demonstrated how the site plan will work with the LRT Stage 2 works.

8. Other developments – a 14-story development is being proposed at 929 Richmond Rd, this should be considered.
9. Is a separated EB turning lanes required to accommodate the traffic into this site from Richmond?

Noise & Vibration

1. Section 7.0 and 7.3 last paragraphs - These two paragraphs must be revised; they refer to "minimizing the amount of noise on any Outdoor Living Area" and "It is not anticipated that earth berms or sound barriers will be required for this development". It is stated in sections 2.0 and 7.1 that there are no dedicated Outdoor Living Area, therefore the two previous statements should not be included. Earth berms or sound barriers are only to mitigate noise for Outdoor Living Areas.
2. Will there be any exposed mechanical equipment on this building? Is there any exposed mechanical equipment in the vicinity that ay affect the tenants of this building? If so, then a stationary noise analysis is required. Otherwise the section about Stationary Noise in section 3.0 should be removed.
3. Stamson Calculations and Table 10 – Please clarify what the 10m barrier is.
4. Provide a map that displays the distances and angle between the receivers and the sources.

Forestry

1. A tree permit is needed prior to tree removal; one will be provided once the submitted tree-related materials are approved.
2. A plan is required that links the tree numbers in the tree inventory report to the site – we need to know where each tree is. Please indicate on the plan which trees are to be removed and which are to be retained.
3. The submitted materials must also account for any trees on neighboring properties that have a critical root zone extending onto the development area.
4. All City-owned trees must be identified.
5. Tree protection fencing must be shown around all retained trees that are close to the area that is being developed.

Building Code Services

1. The maximum distance a fire hydrant is permitted to be from the building's fire department connection is 45 metres, and shall be along an unobstructed path of travel, as per Article 3.2.5.16. via 3.2.5.5., of the Ontario Building Code. Unfortunately, BCSB was unable to identify the location of the fire department connection, in order to verify the design as being O.B.C. compliant in this regard.
2. Note: as indicated on the provided site plan, the existing building at 851 Richmond is shown on the new site plan to have the access lane in front of the building removed for road widening and so on. Please insure that the Fire Department Connection (F.D.C.) located at on the west end at the south portion of the wall is still in compliance with the O.B.C. for fire

access routes and unobstructed path of travel for the firefighters from the hydrant to the F.D.C.

3. Please be aware that as shown on the drawings submitted for Site Plan Control Approval, the location of the building on-site may require shoring during the construction stage and possibly permanent encroachment consent. If so, please contact The ROW Permit Office (Right Of Way) at 613-580-2424 x16000 to enquire/obtain a temporary and/or permanent encroachment letter as the shoring is to be adjacent to city property.

Waste Collection Services

1. Please dimension the garbage room.
2. A 6-meter access way is required for waste collection vehicles, or containers will have to be pulled to the closest accessible area.
3. This location will get City container service; the following containers are required:

   Garbage: 4 x 4 yard bins

   Fibre: 1 x 4 yard bin

   Glass metal plastic: 1 x 2 yard bin

   Organics: 2 x 240L carts

External Agencies

Ottawa Catholic School Board

1. The Ottawa Catholic School Board has no objection to the proposed site plan control proposal for the property located at 851 Richmond Road.

Hydro Ottawa

1. The Owner is advised that there is medium voltage underground infrastructure along the South/East side of the property.
   a. Prior to the commencement of any excavation, the Owner shall arrange for an underground cable locate by contacting Ontario One Call at 1-800-400-2255, not less than seven (7) working days prior to excavating. There shall be no mechanical excavation within one and a half meters (1.5m) of any Hydro Ottawa underground plant unless the exact position of plant is determined by hand digging methods.
   b. The Owner shall inform Hydro Ottawa of any acute shock construction process or rubbelization to be used during construction, and apply Hydro Ottawa's work procedure UDS0022 "Protecting Electrical Distribution Plant & Support Structures from Vibrations Caused by Construction Activity" which can be found at https://hydroottawa.com/accounts-and-billing/contractors-and-developers/guide/miscellaneous.

c. The Owner shall not use steel curb and sidewalk form support pins in the vicinity of Hydro Ottawa underground plant for electrical safety.

2. The Owner shall be responsible for all costs for feasible relocations, protection or encasement of any existing Hydro Ottawa plant.
3. 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.
4. The Owner shall be responsible for servicing the buildings within the property. Only one service entrance per property shall be permitted.
5. The Owner shall convey, at their cost, all required easements as determined by Hydro Ottawa.
6. The Owner shall contact Hydro Ottawa to discuss electrical servicing for the property. By Hydro Ottawa commenting on this proposal, Hydro Ottawa has not committed to, or approved the electrical servicing of the proposed development.
7. The Owner shall enter an Installation and Service agreement with Hydro Ottawa.
8. 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.
9. 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.
10. For details on electrical servicing, please contact Design&Construction@hydroottawa.com.

Please provide a resubmission that addresses each of the comments or issues. Ten copies of all plans and studies are required. A cover letter must be included that states how each of the comments are addressed on the resubmission. All addenda or revisions to any studies, or drawings, shall be accompanied by a *.pdf copy (either by CD or USB). Engineering questions can be answered by Santhosh Kuruvilla at Santhosh.Kuruvilla@ottawa.ca or at 613-580-2424 ext. 27599. Please contact Laurel McCreight at Laurel.McCreight@ottawa.ca or at 613-580-2424 ext. 16587 if you have any other questions.

Ben Crooks
Planning Assistant
Development Review West

APPLICATION FOR A FIRE ROUTE DESIGNATION

Property Location

_____

Municipal or Lot No. *Street* *City*

_____*Occupancy*

Classification or Use of Building(s)

_____

Identifying Name of Building(s)/Condominium/Shopping Centre

Reason for Application

☐ Fire Chief's Orders ☐ Property Owner/Agent's request

Identification

Details	Applicant/Agent	Property Owner
Name		
Street		
Apt. No.		
City		
Postal Code		
Phone (Business)		
Fax		

All of the statements and representations contained in the attached documents filed in support of this application shall be deemed part of this application for all purposes. Fire route plan details must comply with the specific requirements of the Ontario Building Code and the Fire Route Plan Requirements document provided by the City of Ottawa.

Declaration

I, the undersigned _____ am the, ☐ property owner, ☐ authorized agent of the property named in the above application, and I certify the truth of all statements or representations contained herein. I, understand that the designation of the proposed fire route shall not be deemed a waiver of any of the provisions of any City of Ottawa by-law or Provincial legislation, notwithstanding including in or omitted from the plans or other material filed in support of or in connection with the above application.

_____

Signature of Owner or Authorized Agent

Sworn before me in the _____ of_____ in the Province of Ontario, this _____day of _____20_____.

_____

Notary Public/Commissioner for Oaths

Office Use

Date Application Received:_____

dd/mm/yy

Plan circulated for internal comment: _____ Requested Return Date:_____

dd/mm/yy dd/mm/yy

By-law sent for approval: _____Council approved date: _____

dd/mm/yy dd/mm/yy

By-law No.: _____Applicant informed of fire route approval_____

dd/mm/yy

March 28, 2018
File: 160401329

Attention: **Ben Crooks/Santhosh Kuruvilla**
City of Ottawa
110 Laurier Ave. W., 4th floor
Ottawa, Ontario
KIP IJI

Dear Santhosh,

Reference: **D07-12-17-0135 1st Submission Engineering Review Comments, Site Plan Control-851 Richmond Road**

The following summarizes Stantec's response to comments as received from the City of Ottawa for the 1st Submission Engineering Review Comments, dated December 14, 2017:

Engineering

General

1. All exterior light fixtures must be included and approved as part of the site plan approval. Therefore, the lights must be clearly identified by make, model and part number. All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the applicant must provide certification from an acceptable professional engineer. The location of all exterior fixtures, a table showing the fixture types (including make, model, part number), and the mounting heights must be included on one of the plans.

   Response: Site lighting plan has been revised accordingly

2. Is there any easement on this property? If so, please clearly show and label all the easement(s) on all plans. Please provide a copy of the easement document.

   Response: There are no easements on the property.

Reference: 1st Submission Response – 851 Richmond Road

3. Please note that additional review fees will be applicable for the 4th and subsequent reviews.

   Response: Noted

4. The City file number for this application is D07-12-17-0135. Please place this number on all drawings (bottom right side –vertically outside the border).

   Response: City file number included on all drawings.

5. The City plan number of this application is 17519. Please place this number on all drawings, horizontally at the bottom right side (Plan No. 17519).

   Response: City Plan number included on all drawings.

6. Please complete the attached Fire Route Form and send to Jennifer.Therkelsen@ottawa.ca after the fire route has been confirmed by Allan.Evans@ottawa.ca in order to add the fire route to the By-law. Please cc myself and the file lead as confirm that the form has been submitted.

   Response: The form has been submitted to the City on February 20, 2018

7. Clearly show the property line on all drawings, on all sides of the property and add the line style in the legend.

   Response: Property line included on plan and labeled in legend.

8. Please provide a full size drainage area plan for the existing condition for the entire site. On this plan, show the drainage area and runoff coefficient for each sub-catchment area. Also, add the overland flow route arrows on this plan. Provide a detailed composite runoff coefficient (c) calculation for each of the sub-catchment area and include it in the Appendix of the Site Servicing and Stormwater Management Brief. Clearly show and label the stormwater conveyance system outside the property line of this site.

   Response: full side drainage area plan of existing conditions provided with this submission, including flow routes. C values have been calculated and confirmed by Stantec based on ratio of hard surface vs soft surface for each area.

9. Based on the available information, the downstream public stormwater conveyance system was designed and constructed prior to the year 1970 and assumed to be designed to convey the 2-year flow. Therefore, the runoff from the

expansion/redevelopment area must be controlled to the 2-year pre-development condition with C=0.5.

Response: Calculations have been revised to control to 2yr predevelopment level with Capped C =0.5. Note that the current site C value is 0.85 for area tributary to the existing rear outlet. As a result of the Capped C-value of 0.5 there will be approximately 40% less flow to the existing outlet under post development conditions.

10. As per discussion with the City Legal services, the owner/applicant has no rights to outlets the stormwater runoff to a private property on the north side, without any easement or legal agreement with the adjacent property owner. In order to outlet and to convey flow through a private land, please obtain an easement and enters into a joint use and maintenance agreement with the adjacent property owner(s).

    Response: Following 1st submission, additional plans and reports have been provided by J.L. Richards for the 40 Cleary Avenue Preschool Site which was approved by the City in 2008/2009. The reports indicate that 100yr outflow drainage for the 851 Richmond Road site was accounted for in the 2008 analysis and was reviewed and approved by the City. Excerpts from information made available from J.L.Richards have been included in Appendix D. J.L. Richards was however, not able to locate the storm drainage plan or the supporting SWM calculations so the exact release rate provided for 851 Richmond Road is not known. A request for additional information has been made to the City but the drainage area plans associated with the application have not been made available. We again request the city provide the drainage plans for this previous application at 40 Cleary Avenue so that the downstream target can be confirmed which we expect would be well above the capped C-value 2yr predevelopment rate.

.

Site Servicing and Stormwater Management Brief

1. Section 4.0; paragraph 3 talks about DSEL's report that analyzed the capacity of the sanitary sewer on Richmond Road. Please include excerpts from this report to show the existing sanitary sewer on Richmond Rd. has additional capacity to receive sanitary flow from the proposed building.

    Response: Excerpts from DSEL report included in Sanitary Appendix C

2. Section 5.2, paragraph 1; sentence 2 states that existing 375 mm diameter CSP discharges into an existing ditch in the existing Children's Centre to the north.

Reference: 1st Submission Response – 851 Richmond Road

However, what is shown on drawing no. EX-1 does not agree with the description. Please review and revise. Do you have permission to convey stormwater through the adjacent property on the north (Children's Centre)?

Response: See response #10 from general comments. Storm drainage was accounted for during development of the 40 Cleary Avenue site which was reviewed and approved by the City.

3. Section 5.2, paragraph 1; sentence 3 talks about a 15 m long conveyance ditch. Who owns and maintains this ditch? If the portion of the conveyance system is owned and maintained by a private entity and do not have an agreement with the adjacent property owner, an alternative outlet is required for the proposed development.

   Response: There is no alternative outlet for the site. The site drainage flowing to 40 Cleary Avenue was included as part of their 2008/2009 site plan application.

4. Section 5.3; the stormwater management criteria that summarized in this section does not quite match the criteria that was given to you by the previous City project manager. Review and revise.

   Response: Section revised to 2yr level of service.

5. Section 5.4; It appears that the proposed oil and grit separator is only providing the quality treatment for the runoff from the proposed development area. Please explain the reason for not providing the quality treatment for the runoff from the existing area in the south? Please consult with the Conservation Authority to confirm whether this approach is acceptable to them.

   Response: OGS unit resized to provide quality control for the existing parking area as well as the proposed apartment development area.

6. Provide detailed calculations to show how the composite runoff coefficient (C) of the existing site is determined.

   Response: C values have been calculated based on ratio of hard vs soft surface and have been confirmed by Stantec.

7. Section 5.4.4.2; sentence 1 states that it is proposed to detain stormwater within a 20 m3 cistern below grade with a maximum controlled release rate of 29.7 L/s to the gravity service provided. It is not clear how you are controlling this release rate. Please elaborate.

Reference: 1st Submission Response – 851 Richmond Road

Response: The internal cistern will be designed by the mechanical consultant with a pump designed to discharge to a controlled release rate as specified in the Stantec report.

8. Section 5.4.4 talks about rooftop storage and subsurface (cistern) storage. However, there is no discussion about surface storage provided on the north and west side of the proposed building as shown on the Grading Plan. Please review and revise.

   Response: Storm drainage for these areas will be directed via catchbasin/floor drains to the internal cistern without the use of parking lot storage.

9. Please provide stormwater management for the entire site, not just the expansion area (.31 ha).

   Response: Stormwater management has been provided for the entire drainage area to the 40 Cleary Avenue outlet. Note that due to the City requirement for a capped C-value the post development discharge for the site will be approximately 40% less under post development vs pre-development conditions.

Site Servicing Plan

1. There are 2 proposed catch basins (CB 201 & CB 202) shown west of the proposed building. However, there are no catch basin leads shown on the plan to convey the stormwater captured by the CBs. Review and revise.

   Response: The proposed CB's are directly above the 1st level of underground parking and will outlet internally to the proposed cistern. Discharge from the proposed catchbasin/floor drains will be coordinated with the mechanical consultant.

2. Please show the storm sewers that conveys stormwater from the underground cistern to the outlet.

   Response: Outlet now shown from external OGS unit.

Storm Drainage Plan

Reference: 1st Submission Response – 851 Richmond Road

1. Is there a reason for redirecting the minor flow from the south of the property to the internal plumbing of the proposed building?
   Response: Minor flows from the existing parking now directed to external storm sewer. All other flows directed to internal cistern to allow for controlling of flows to meet required release rate.

2. A drainage area shown at the north-west corner of the property does not have an identification no., drainage area nor runoff coefficient. Please provide.

   Response: Revised.

3. Drainage area of the ramp shown as 0.00. Please review and revise.

   Response: Revised.

Grading Plan

1. Provide at least 0.3 m freeboard between the high point at the underground parking entrance and the gutter elevation at the north side of Richmond Road to prevent the gutter flow from entering the parking garage.

   Response: Entrance ramp previously located along Richmond Road now moved to rear of building.

2. It is not clear whether the large flow arrows shown on the plan and in the legend represents major overland flow route or not. Since the post-development runoff for the 1:100year storm event will be controlled to the calculated allowable release rate, no major overland flow route is required for the expansion area; only emergency overland flow route is required. Therefore, please revise the text associated with the large flow arrow shown in the legend. Major overland flow route is only required for the existing building and the surrounding area (outside the expansion area).

   Response: Revised on plan and legend.

3. There are two pavement designs (car parking areas and local roads) shown on this plan. Clearly delineate these 2 areas with different hatchings.
   4. Response: Areas delineated on proposed grading plan and shown on Legend.

Reference: 1st Submission Response – 851 Richmond Road

Regards,

STANTEC CONSULTING LTD.

Sheridan Gillis
Project Manager Urban Land Engineering
Phone: 613-725-5551
Sheridan.Gillis@stantec.com

Neal Cody, P.Eng.
Water Resources Engineer
Phone: 780-969-3263
Neal.Cody@stantec.com

w:\active\160401329_851 richmond road\design\correspondence\city of ottawa\1st submission response letter\2018-03-28_ eng 1st submission comments response.docx

From:	Lucie Dalrymple
To:	Gillis, Sheridan
Cc:	Moroz, Peter; Marsh Frère; Guy Forget
Subject:	RE: River Parkway Preschool - 40 Cleary Avenue
Date:	Wednesday, March 28, 2018 9:07:32 AM
Attachments:	image001.png JLR_sig_logo_715c24bf-568b-46ae-8040-22d550fc23e3.png plan01.tif 19616-05 SWM Plan RiverParkwayPreschoolCentre ClearyAve rev jan 07 (2).pdf Sheet_0003.PDF Sheet_0004.PDF Sheet_0001.PDF Sheet_0002.PDF

Hi Sheridan,

Please find attached the following PDF copies of the documents we had on file:

- JLR 19616 - SWM Report, dated January 2007
- JLR 19616 - Dwg S1, Rev.9: 25/08/09
- JLR 19616 – Dwg G1, Rev.8: 25/08/09
- JLR 19616 – Dwg 01, Rev.9: 25/08/09
- JLR 19616 – Dwg 02, Rev.9: 25/08/09

Note that we did not find a complete copy of the report and that the drawings attached do not seem to form a complete set of drawings. Please also note that the building footprint displayed on the drawings may not be in this exact location in the field due to on-site constraints encountered during construction.

Regards,

Lucie

Lucie Dalrymple, P.Eng.
Associate
Senior Civil Engineer

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

From: Gillis, Sheridan [mailto:Sheridan.Gillis@stantec.com]
Sent: March 26, 2018 3:53 PM
To: Lucie Dalrymple
Cc: Moroz, Peter
Subject: River Parkway Preschool - 40 Cleary Avenue

Hi Lucy,
I'm not sure if you're the best person to be asking but I'm looking for a SWM report (or servicing/swm) for a pre-school at 40 Cleary Avenue which J.L. Richards prepared in 2007 (sorry you're our primary go-to for all things J.L.Richards). I've included the Site Servicing Plan for the site for reference. We're in the process of preparing a report for the Lord Richmond Apartments which drains to the southwest corner of the preschool and want to make sure we're matching any targets that had previously been set.
If you have any questions feel free to call,
Thank you,

Sheridan Gillis

Project Manager, Urban Land Engineering
Stantec
400 - 1331 Clyde Avenue Ottawa ON K2C 3G4
Phone: (613) 725-5551

Mobile: (613) 799-1363
sheridan.gillis@stantec.com

Design with community in mind

File Number: D07-12-17-0135

May 1, 2018

FOTENN
223 McLeod Street
Ottawa, ON K2P 0Z8
Attn: Stephanie Morris

Sent via email to [morris@fotenn.com]

Dear Ms. Morris,

Re: Site Plan Control Comments – 851 Richmond Road

The following review comments are provided in response to the second submission of the Site Plan Control application (D07-12-17-0135) for 851 Richmond Road. Please coordinate the changes made in response to the comments below across all plans as applicable.

City of Ottawa

Urban Design

Outstanding UDRP recommendations – Further exploration and response requested:

1. The Panel is of the opinion that the proposed building could transition better between the five storey building on one side, and the slab apartment building on the other, by better articulating its façades, and by shifting massing and height. A deliberate articulation of the side and rear facades, as well as staggering the height from the east to west side, would reduce the 'wall' effect along Richmond Road, created by the proposed building.

2. The Panel is of the opinion that a base, middle and top expression would result in a better overall design of this building. Consider manipulating the mass with diverse treatments on the two top floors.

3. Ground floor height seems squat. The Panel recommends increasing the height of the ground floor, perhaps to two stories, in order to improve the impact of the building on its associated streetscape.

4. The Panel advises that more glazing be added to the east elevation in order to improve the exterior design of the building, and take advantage of views toward the Ottawa River and the downtown core of the city.

Additional staff concerns based on revised proposal:

5. Main building entrance should be closer to grade, and ramp/or lift should be internalized if necessary.

6. Amenity units facing Richmond Road should be as close to the grade of the public right of way to allow for potential future commercial use and higher ceiling heights.

7. Consider the treatment of the second floor balconies and their impact on the space below. What treatment would be proposed for the underside of these balconies?

8. Landscaping/street trees should be provided across the frontage of the new building to create a consistent streetscape treatment across the entire site.

Engineering

General

9. All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the applicant must provide certification from an acceptable professional engineer. **Still outstanding.**

10. Please complete the attached **Fire Route Form** and send to Jennifer.Therkelsen@ottawa.ca after the fire route has been confirmed by Allan.Evans@ottawa.ca in order to add the fire route to the By-law. Please cc myself and the file lead as confirm that the form has been submitted. **Please forward this email to us.**

11. Storm Drainage Plan for 30/40 Cleary is available at the City. Please make a copy and include it in the Site Servicing and Stormwater Management Brief.

12. Has 40 Cleary Ave. site plan received MOECC ECA for servicing more than one parcel? 40 Cleary required an MOECC ECA for servicing 2 parcels in order for this site to convey stormwater on to their site. Please provide a copy of this ECA.

Site Servicing and Stormwater Management Brief

13. Section 4.0; paragraph 3 talks about DSEL's report that analyzed the capacity of the sanitary sewer on Richmond Road. Please include excerpts from this report to show the existing sanitary sewer on Richmond Rd. has additional capacity to receive sanitary flow from the proposed building. **Still outstanding. The title page of the report or the sewer design sheet is not found in Appendix C.**

14. Page 3.1, last paragraph; as per Technical Bulletin ISD-2010-2, the normal operating pressure range is between 350 Kpa and 480 Kpa, not between 345 and 552 Kpa. Please review and revise.

15. Page 4.1; second last paragraph states that detailed sanitary sewage calculations are included in Appendix C. However, detailed wastewater peak flow calculations is not found in Appendix C. Please include.

16. Page 5.1, section 5.2; last sentence of the first paragraph states that an existing conveyance system conveys flow from this site to the Ottawa River. However, based on the GeoOttawa, it appears that there is no conveyance system exists between the end of the 525mm private storm

sewer and the public sewer on Cleary Ave. Please demonstrate by providing a drawing to show that there is a conveyance system exists between the private sewer and the public sewer.

17. Page 5.1, section 5.2.1; second sentence states that on-site sewer for 40 cleary Ave. discharges to the municipal sewer on Cleary Ave. and ultimately to the Ottawa River. However, based on the City of Ottawa sewer network map, there is no connection between the private sewer (525 mm) and the public sewer on Cleary Ave. Please review and clarify.

18. Section 5.4; please revise sentence 4 to clarify that the proposed OGS unit will provide quality control for the existing parking area as well as the proposed apartment development area.

19. Page 5.4, sections 5.4.4.1; revise the word “retain” to “detain” in the first sentence.

20. Page 5.4, first paragraph of section 5.4.4.1; if the proposed plan is to detain stormwater on the roof top of the existing building, please consult and confirm this with the architect/engineer that it is possible and revise this paragraph accordingly.

21. Page 5.4, notes above Table 4 and Table 6; revise the word “retention” to “detention”.

22. Page 5.5 through 5.6; please add an additional column to all tables (Tables 8, 9, 10, 11, 12, and 13) and show the available storage for all of the drainage areas.

23. Table 13 shows the 100-year Q-release for the area ID UNC-1 is 1.1 L/s. However, Appendix D shows a different release rate (1.24 L/s). Review and revise.

24. Is there surface ponding in drainage area L201A? Is there an ICD proposed within the CB 201?

25. Please provide flow curves for the ICDs located at the CBs 204 and 203 and clearly show the head and the associated flows for the 2-year and the 100-year storm events.

26. Page 5.7; section 5.5 indicates that oil and grit separator unit is located within the underground parking structure. It is not clear how the total allowable release rate from the site is conveyed through the oil & grit separator to remove the 80% TSS while the flow from drainage areas L204A and L203A is directly conveyed to the outlet pipe. Please clarify.

27. Page 5.7, section 5.5; please specify the treatment capacity (L/s), sediment storage capacity (m3), and oil storage capacity of the proposed oil & grit separator.

<u>Site Servicing Plan</u>

28. There are 2 proposed catch basins (CB 201 & CB 202) shown west/north of the proposed building. However, there are no catch basin leads shown on the plan to convey the stormwater captured by these CBs (previous comment). If these inlets are floor drains and located on the parking garage floor, please remove them from this plan.

29. Please clarify the location of the Oil&Grit separator. Please make it clear on this plan.

30. Please show flow arrows on all the storm sewers. It is not clear how the stormwater flow is conveyed to the cistern and the flow is conveyed to the outlet culvert from the cistern. Clearly show the conveyance system with flow arrows.

31. Please do not specify the service connection to the water main as TVS type. Service connection to the watermain be identified as “to be determined in the field by the City”.

32. Cleary show the outlets for the foundation drain and the roof drains.

Storm Drainage Plan

33. Please show the locations of all the roof drains on the existing and proposed buildings. Also, show the sub-catchment area for each of the roof drain, 5-year and 100-year ponding area.

34. Provide a roof drain table for each building with the information shown on the attached Table (see attached).

Grading Plan

35. Large solid flow arrow that shown under the legend represents the direction of major system flow 2 YR -100 YR. Based on the on-site ponding and other storage provided on site, the runoff from the major storm events (up to 100-year storm) is detained on the site. If this is the case, please remove this flow arrow from the drawing.

36. Do you have permission from the adjacent property owner to convey emergency overland flow through 40 Cleary Ave? Please provide a consent letter.

37. If any of the proposed retaining wall is greater than 1.0 m high, please submit design details and drawings signed and sealed by a structural engineer.

38. Clearly show the emergency (overland flow greater than 100-year) overland flow route for the entire site.

39. A portion of the emergency overland flow is directed to the underground parking via the ramp. This design is not acceptable. The emergency overland flow should be re-directed external to the building.

40. Is the heavy duty asphalt symbol shown under the legend existing or proposed? Please clarify.

41. Are you removing and replacing the existing asphalt pavement on the existing parking lot on the west/south side of the existing building?

42. Provide additional spot elevations and/or flow arrows on the west/south drive isle to clarify what portion of the drainage area L203A sheet drains to CB203. Is it consistent with the Storm Drainage Plan?

43. Surface ponding on site is not allowed for the 2-year storm event. Is there ponding at CB204 during a 2-year storm event?

Erosion Control Plan and Detail Sheet

44. Please provide silt fence on all sides of the site (except at the access points). Based on the existing grades, there is sheet drain onto Richmond Rd.

Transportation

45. To be provided.

Forestry

46. L1 – Landscape Plan – please replace Katsara species; ensure all species are appropriate for Ottawa's climate; ensure trees along Richmond are salt tolerant

47. Given the proposed development, the tree removals are justified; a tree removal permit is required and I will issue one when appropriate.

Building Code Services

48. Fire department connection and fire route have still not been clarified.

- Fire Department Connection – not shown (both buildings).
- Fire Access route- not indicated. Or clarified.

Waste Collection Services

49. How wide is the door leading to the garbage room ? It has to be at least 2.2 meters.

Please provide a resubmission that addresses each of the comments or issues. Three copies of each plan and three copies of each studies are required. A cover letter must be included that states how each of the comments are addressed on the resubmission. All addenda or revisions to any studies, or drawings, shall be accompanied by a *.pdf copy (either by CD or USB). Engineering questions can be answered by Mark Fraser at Mark.Fraser@ottawa.ca or at 613-580-2424 ext. 27791. Please contact me at Laurel.McCreight@ottawa.ca or at 613-580-2424 ext 16587 if you have any other questions.

Laurel McCreight Planner II
Development Review West

ROOF DRAIN TABLE: AREA A-2 (ROOF DRAINS 1 to 10)						
AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	5-YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	100-YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
A-2	RD 1 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	11 cm	0.95 L/s	14 cm
A-2	RD 2 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
A-2	RD 3 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
A-2	RD 4 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
A-2	RD 5 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
A-2	RD 6 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.95 L/s	14 cm
A-2	RD 7 (RD-100-A-ADJ)	FULLY EXPOSED	1.34 L/s	11 cm	1.89 L/s	15 cm
A-2	RD 8 (RD-100-A-ADJ)	FULLY EXPOSED	1.34 L/s	11 cm	1.89 L/s	15 cm
A-2	RD 9 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	11 cm	0.95 L/s	14 cm
A-2	RD 10 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	11 cm	0.95 L/s	14 cm

June 29, 2018
File: 160401329

Attention: Laurel McCreight/Santhosh Kuruvilla
City of Ottawa
110 Laurier Ave. W., 4th floor
Ottawa, Ontario K1P 1J1

Dear Santhosh,

Reference: D07-12-17-0135 2nd Submission Engineering Review Comments, Site Plan Control-851 Richmond Road

The following summarizes Stantec's response to comments as received from the City of Ottawa for the 2nd Submission Engineering Review Comments, dated May 1, 2018.

Engineering

General

1. All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the applicant must provide certification from an acceptable professional engineer. Still outstanding.
   R. Please see sight lighting photometrics plan prepared by electrical consultant for confirmation.

2. Please complete the attached Fire Route Form and send to Jennifer.Therkelsen@ottawa.ca after the fire route has been confirmed by Allan.Evans@ottawa.ca in order to add the fire route to the By-law. Please cc myself and the file lead as confirm that the form has been submitted. Please forward this email to us.
   R. Correspondence included in Appendix A

3. Storm Drainage Plan for 30/40 Cleary is available at the City. Please make a copy and include it in the Site Servicing and Stormwater Management Brief.
   R. Stormwater Management Report provided by the City and included in Appendix D. Reference plans from 40 Cleary Avenue SWM report also included in Appendix D.

4. Has 40 Cleary Ave. site plan received MOECC ECA for servicing more than one parcel? 40 Cleary required an MOECC ECA for servicing 2 parcels in order for this site to convey stormwater on to their site. Please provide a copy of this ECA.
   R. Correspondence regarding ECA for 40 Cleary Avenue has been included in Appendix H. The 851 Richmond Road site does not accept drainage from an adjacent property, is a

Reference: 2nd Submission Response – 851 Richmond Road

private site, and non-industrial use therefore is exempt from requiring an ECA under Ontario Regulation 525/98.

Site Servicing and Stormwater Management Brief

5. Section 4.0; paragraph 3 talks about DSEL's report that analyzed the capacity of the sanitary sewer on Richmond Road. Please include excerpts from this report to show the existing sanitary sewer on Richmond Rd. has additional capacity to receive sanitary flow from the proposed building. Still outstanding. The title page of the report or the sewer design sheet is not found in Appendix C.
   R. Title Page of Report and sewer design sheet now included in Appendix C

6. Page 3.1, last paragraph; as per Technical Bulletin ISD-2010-2, the normal operating pressure range is between 350 kPa and 480 kPa, not between 345 and 552 kPa. Please review and revise.
   R. Report revised accordingly.

7. Page 4.1; second last paragraph states that detailed sanitary sewage calculations are included in Appendix C. However, detailed wastewater peak flow calculations is not found in Appendix C. Please include.
   R. Sanitary sewer analysis is now included in Appendix C

8. Page 5.1, section 5.2; last sentence of the first paragraph states that an existing conveyance system conveys flow from this site to the Ottawa River. However, based on the GeoOttawa, it appears that there is no conveyance system exists between the end of the 525mm private storm sewer and the public sewer on Cleary Ave. Please demonstrate by providing a drawing to show that there is a conveyance system exists between the private sewer and the public sewer.
   R. Review of the 40 Cleary Avenue SWM report (see Appendix D) and further site investigation on May 25, 2018 indicates that the 851 Richmond Road Site (identified as Lord Richmond Apartments in 40 Cleary Avenue Report) discharges to a 525mm storm sewer on the 40 Cleary Avenue property and is then conveyed through a series of swales and ditches eventually outletting to the Ottawa River. The site servicing plan and stormwater management plan for 40 Cleary Avenue have been included in Appendix D for reference.

9. Page 5.1, section 5.2.1; second sentence states that on-site sewer for 40 Cleary Ave. discharges to the municipal sewer on Cleary Ave. and ultimately to the Ottawa River. However, based on the City of Ottawa sewer network map, there is no connection between the private sewer (525 mm) and the public sewer on Cleary Ave. Please review and clarify.
   R. Report revised - see comment #8.

10. Section 5.4; please revise sentence 4 to clarify that the proposed OGS unit will provide quality control for the existing parking area as well as the proposed apartment development area.
    R. Report revised in section 5.5 to acknowledge this.

Reference: 2nd Submission Response – 851 Richmond Road

11. Page 5.4, sections 5.4.4.1; revise the word "retain" to "detain" in the first sentence.
    R. Report revised.

12. Page 5.4, first paragraph of section 5.4.4.1; if the proposed plan is to detain stormwater on the roof top of the existing building, please consult and confirm this with the architect/engineer that it is possible and revise this paragraph accordingly.
    R. Due to the higher allowable release rate that was determined from the background documentation, it is no longer proposed to detain stormwater on the roof of the existing building.

13. Page 5.4, notes above Table 4 and Table 6; revise the word "retention" to "detention".
    R. Revised.

14. Page 5.5 through 5.6; please add an additional column to all tables (Tables 8, 9, 10, 11, 12, and 13) and show the available storage for all of the drainage areas.
    R. Stormwater is now only being proposed to be detained on the proposed building's roof, therefore the other tables have been removed. Table 4 & 5 have been revised to add the additional column indicating available storage.

15. Table 13 shows the 100-year Q-release for the area ID UNC-1 is 1.1 L/s. However, Appendix D shows a different release rate (1.24 L/s). Review and revise.
    R. The areas have been removed from the Appendix D tributary calculations sheets and drawing. The Richmond Road flows are now quantified in Table 6 and 7 of the report.

16. Is there surface ponding in drainage area L201A? Is there an ICD proposed within the CB 201?
    R. There is no longer any surface ponding proposed, however the ponding extents are still shown on the drawing as defined by the grading spill points. No ICDs have been proposed on site as they are not required to meet the quantity control target. The minor system has been sized for the 2-year event, once the pipes have reached maximum flow capacity they will act as ICD's and surface ponding and major system flow will be as indicated on drawing GP-1.

17. Please provide flow curves for the ICDs located at the CBs 204 and 203 and clearly show the head and the associated flows for the 2-year and the 100-year storm events.
    R. Not applicable - ICDs are no longer proposed.

18. Page 5.7; section 5.5 indicates that oil and grit separator unit is located within the underground parking structure. It is not clear how the total allowable release rate from the site is conveyed through the oil & grit separator to remove the 80% TSS while the flow from drainage areas L204A and L203A is directly conveyed to the outlet pipe. Please clarify.

Reference: 2nd Submission Response – 851 Richmond Road

R. The OGS is located outside of the building structure – the report has been revised to reflect this. Existing parking areas discharge directly to the OGS unit (a notch in the P1 Parking garage structure is required to accommodate the location of the OGS unit). Flows directed internally from the proposed expansion area will also be directed to the OGS units providing for quality control treatment of the entire 851 Richmond Road site.

19. Page 5.7, section 5.5; please specify the treatment capacity (L/s), sediment storage capacity (m3), and oil storage capacity of the proposed oil & grit separator.
R. This has been added as Table 10.

Site Servicing Plan

20. There are 2 proposed catch basins (CB 201 & CB 202) shown west/north of the proposed building. However, there are no catch basin leads shown on the plan to convey the stormwater captured by these CBs (previous comment). If these inlets are floor drains and located on the parking garage floor, please remove them from this plan.
R. These previously-noted CBs have been now identified as Area Drains. The Area Drains are placed above the P1 Parking Deck and are directed internally before being pumped to the OGS unit.

21. Please clarify the location of the Oil&Grit separator. Please make it clear on this plan.
R. Location now clarified on plans – see very north corner of site.

22. Please show flow arrows on all the storm sewers. It is not clear how the stormwater flow is conveyed to the cistern and the flow is conveyed to the outlet culvert from the cistern. Clearly show the conveyance system with flow arrows.
R. Additional Flows areas included on plans.

23. Please do not specify the service connection to the water main as TVS type. Service connection to the watermain be identified as "to be determined in the field by the City".
R. Plans revised.

24. Cleary show the outlets for the foundation drain and the roof drains.
R. Outlet shown at northeast corner of the building.

Storm Drainage Plan

25. Please show the locations of all the roof drains on the existing and proposed buildings. Also, show the sub-catchment area for each of the roof drain, 5-year and 100-year ponding area.
R. Roof Drainage plans and elevations were not yet available from the mechanical consultant.

26. Provide a roof drain table for each building with the information shown on the attached Table (see attached).

Reference: 2nd Submission Response – 851 Richmond Road

R. Roof Drainage plans and elevations were not yet available from the mechanical consultant.

Grading Plan

27. Large solid flow arrow that shown under the legend represents the direction of major system flow 2 YR -100 YR. Based on the on-site ponding and other storage provided on site, the runoff from the major storm events (up to 100-year storm) is detained on the site. If this is the case, please remove this flow arrow from the drawing.
    R. Plans revised.

28. Do you have permission from the adjacent property owner to convey emergency overland flow through 40 Cleary Ave? Please provide a consent letter.
    R. Although flows up to the 100yr event are conveyed to 40 Cleary Avenue, grading has been revised to ensure that emergency overland flow is now directed to Richmond Road via the proposed entrance at the east side of the proposed building.

29. If any of the proposed retaining wall is greater than 1.0 m high, please submit design details and drawings signed and sealed by a structural engineer.
    R. Plans to be provided.

30. Clearly show the emergency (overland flow greater than 100-year) overland flow route for the entire site.
    R. Flow arrows now included on plans.

31. A portion of the emergency overland flow is directed to the underground parking via the ramp. This design is not acceptable. The emergency overland flow should be re-directed external to the building.
    R. Overland flow revised.

32. Is the heavy-duty asphalt symbol shown under the legend existing or proposed? Please clarify.
    R. Plans revised to indicate proposed.

33. Are you removing and replacing the existing asphalt pavement on the existing parking lot on the west/south side of the existing building?
    R. Yes, a new storm sewer and new asphalt will be installed within the existing parking lot.

34. Provide additional spot elevations and/or flow arrows on the west/south drive isle to clarify what portion of the drainage area L203A sheet drains to CB203. Is it consistent with the Storm Drainage Plan?
    R. Additional existing elevations included with submission plans. Yes, the grading plan is consistent with the storm drainage plan.

Reference: 2nd Submission Response – 851 Richmond Road

35. Surface ponding on site is not allowed for the 2-year storm event. Is there ponding at CB204 during a 2-year storm event?
    R. No, no longer applicable.

Erosion Control Plan and Detail Sheet

36. Please provide silt fence on all sides of the site (except at the access points). Based on the existing grades, there is sheet drain onto Richmond Rd.
    R. The surface from the existing site onto Richmond Road is hardscaped with asphalt – therefore silt fence cannot be installed. Once excavation of the parking structure begins the site elevations will be lower than the Richmond Road tie-in elevations and sheet flow will not be possible.

Regards,

STANTEC CONSULTING LTD.

Sheridan Gillis
Project Manager Urban Land Engineering
Phone: 613-725-5551
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Neal Cody, P.Eng.
Water Resources Engineer
Phone: 780-969-3263
Neal.Cody@stantec.com

August 28, 2018
File: 160401329

Attention: **Laurel McCreight/Santhosh Kuruvilla**
City of Ottawa
110 Laurier Ave. W., 4th floor
Ottawa, Ontario K1P 1J1

Dear Santhosh,

Reference: **D07-12-17-0135 851 Richmond Road Site Plan Control – 3rd Engineering Review**

The following summarizes Stantec's response to comments as received from the City of Ottawa for the 3rd Submission Engineering Review Comments, dated July 23, 2018.

Engineering

General

1. All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the applicant must provide certification from an acceptable professional engineer. Still outstanding.

   R/ To be addressed by Site Electrical Consultant

Site Servicing and Stormwater Management Brief

1. Page 4.1, section 4.0; is the peak factor (4.0) shown in Table 2 correct? Please check the calculation based on the new Harmon equation provided in Technical Bulletin ISTB-2018-01. If it is incorrect, review and revise all the numbers associated the correct peak factor.

   R/ Peak factor is calculated correctly including new correction factor from ISTB-2018-01

2. Section 5.2; please revise paragraph one based on the response provided to comment #8 (second submission response dated June 29, 2018).

   R/Section 5.2 revised to further clarify existing outlet.

3. What use is being proposed on the first floor of the new building? If it is something other than a residential use, please include the wastewater flow generated from the first floor based on the Appendix 4-A of the latest Ottawa Sewer Design Guideline.

Reference: 3rd Submission Response – 851 Richmond Road

R/ Flows based on proposed unit numbers from available floor plans. There is no ground floor commercial proposed for the site.

4. Section 5.2, bullet no. 4; what does it mean by provide a storm outlet for the existing development to the south? Please clarify.

   R/ "Existing Development" was in reference to existing Lord Richmond Apartment. Section has been clarified.

5. Last paragraph on page 5.2 indicates that the oil grit separator is located at the north-east corner of the building. Please clarify whether the oil and grit separator is located within the building or not.

   R/Oil Grit Separator is located outside the building. The OGS unit is clearly labeled as exterior on plans and noted as "just outside the underground parking structure" within the report.

6. Page 5.3, section 5.4.1; paragraph2 talks about an uncontrolled drainage area fronting Richmond Road, however, no information is provided on the Storm Drainage Plan or in Appendix D about this subcatchment or subarea. Please review and revise.

   R. Refer to area EXT-1 as per drawing SD-1. Appendix D has been revised accordingly.

7. Appendix D, modified rational method table provided for the 2-year storm; please correct the headings of column 2 from "I (5yr)" to "I (2yr)".

   R. Revised as noted.

8. Page 5.4; section 5.4.4.2 talks about a new catch basin (CB204), but this catch basin is not shown on any of the drawings. Please review and revise.

   R/Revised – reference was to CB 203 as opposed to CB204.

9. Pages 5.4, 5.5; section 5.4.5 talks about the uncontrolled area fronting the Richmond Road. However, the Storm Drainage Area Plan does not show any information for this subcatchment area (UNC-1). Please review and revise. Also, include the Q release calculation for this subcatchment area in the Appendix D.

   R. See comment response 6.

10. Section 5.5; paragraph one states that the ultimate outlet for this site is Rideau River. Is the ultimate outlet Rideau River or the Ottawa River?

    R/Revised

Reference: 3rd Submission Response – 851 Richmond Road

11. Appendix D; include the overall runoff coefficient calculation for the subcatchment area UNC-1.

    R. See comment response 6.

12. Appendix D, storm sewer design sheet; per my discussion with Sheridan Gillis (Stantec), please correct the values in the column heading "AxC" for the area id numbers EX-BLDG, L202A and RAMP, BLDG,L201A.

    R. Refer to column AxC (100-YEAR) and ACCUM. AxC (100YR) in the storm sewer design sheet for flows from subcatchment EX-BLDG.

13. Please demonstrate that the proposed storm sewers will act as a restrictor pipe during the 100-year storm, for its intended purpose. If it works as a restrictor pipe, please delineate the 100-year ponding area on the Grading Plan (preferred option) or on the Storm Drainage Plan and show the maximum ponding depth (m), maximum ponding elevation and the total volume stored (m3) for all the surface pondings.

    R/ Pipes have been designed to be free flowing in the 100yr condition. Additional 100yr design sheet included in appendix D for reference.

14. If the 100-year ponding area is going to be shown on the Storm Drainage Plan, please add the existing and proposed spot elevations to this plan as shown on the Grading Plan.

    R. 100 year ponding is only shown on the Grading Plan.

Storm Drainage Plan

1. Please show the locations of all the roof drains for the proposed building. Also, show the sub-catchment area for each of the roof drain, 5-year and 100-year ponding area. Still outstanding

   R/ Roof Drainage table included on plan SD-1, and locations of roof drains now shown on drawings. Drawing SD-1 details individual roof drain catchments based on most recent architectural plans. 100yr ponding below maximum 150mm allowable depth based on OBC criteria.

2. Provide a roof drain table for the proposed building with the information shown on the attached Table. Still outstanding

   R/ Updated Roof Drain table included on plan SD-1.

3. The southern boundary line of the subcatchment area L203A shown is not consistent with the Grading Plan. The southern boundary line should follow the proposed barrier curb on the south side. Please review, revise, and make all the necessary changes as required.

Reference: 3rd Submission Response – 851 Richmond Road

R. Subcatchments have been revised as noted.

4. Which inlet structure captures the runoff from the subcatchment area L201A?

   R. Area Drain 201.

Grading Plan

1. Please provide several flow arrows and associated slopes on the north and west side of the existing building.

   R. Slopes have been added along the pathway. Terracing has been shown where necessary.

2. Portion of the area between the front of the existing building and the Richmond right-of-way exceeds the maximum slope (7%). Please limit the maximum slope to 7%.

   R. Additional terracing has been shown to provide maximum slopes of 7%.

3. Is there a barrier curb proposed at the north property line? If there is , clearly show and label the T/C and B/C elevations of the barrier curb next to the Richmond Road.

   R. Barrier curb is proposed 1.3m south of the north property line. No barrier curb is proposed along Richmond Road. T/C and B/C labels have been added to all curbs.

4. If any of the proposed retaining wall is greater than 1.0 m high, please submit design details and drawings signed and sealed by a structural engineer. Still outstanding

   R/Walls greater that 1.0m in height are noted to be designed by Structural Engineering on proposed grading plan.

Regards,

STANTEC CONSULTING LTD.

Sheridan Gillis
Project Manager Urban Land Engineering
Phone: 613-725-5551
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Neal Cody, P.Eng.
Water Resources Engineer
Phone: 780-969-3263
Neal.Cody@stantec.com

Reference: 3rd Submission Response – 851 Richmond Road

Appendix H DRAWINGS