Robinson
Land Development

3750 North Bowesville Road
Ottawa, ON
Site Servicing Study

Prepared For:

Jennings Real Estate Corporation

Prepared By:

Robinson Land Development

Our Project No. 22028
April 2022
Revised October 2022

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LEGAL NOTIFICATION

This report was prepared by Robinson Land Development for the account of **Jennings Real Estate Corporation.**

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1.0 INTRODUCTION

Robinson Land Development have been retained by Jennings Real Estate Corporation to complete a site servicing study for the redevelopment of the property located at 3750 North Bowesville Road in the City of Ottawa. The 0.68 hectare subject property is bound by North Bowesville Road to the east, an existing parking garage to the north, an existing commercial building to the west, and the Ottawa Hunt and Golf Club to the south (refer to **Figure 1 – Key Plan** following page 1).

This report will provide details on the proposed servicing and stormwater management designs required in support of the Zoning By-Law Amendment (ZBLA). Specifically, the report will provide an assessment on the adequacy of the existing municipal infrastructure available to service the redevelopment of the property.

A pre-consultation meeting was held with the City of Ottawa on April 13th, 2021 to discuss the requirements for the proposed redevelopment. A copy of the pre-consultation notes is provided in **Appendix A**.

2.0 GUIDELINES, STUDIES AND REPORTS

The servicing and stormwater management designs for the subject site will be prepared in keeping with the following documents:

- **Sewer Design Guidelines**, City of Ottawa, Second Edition, October 2012 (herein referred to as Ottawa Design Guidelines).
    - **Technical Bulletin PIEDTB-2016-01,** City of Ottawa, September 6, 2016.
    - **Technical Bulletin ISTB-2018-01**, City of Ottawa, March 21, 2018.
    - **Technical Bulletin ISTB-2018-03**, City of Ottawa, March 21, 2018.

- **Ottawa Design Guidelines**, Water Distribution, City of Ottawa, First Edition, July 2010 (herein referred to as Ottawa Water Design Guidelines).
    - **Technical Bulletin ISD-2010-2, City of Ottawa, December 15, 2010.**
    - **Technical Bulletin ISDTB-2014-02, City of Ottawa, May 27, 2014.**
    - **Technical Bulletin ISTB-2018-02, City of Ottawa, March 21, 2018.**

- **Design Guidelines for Sewage Works**, Ministry of the Environment, 2008 (herein referred to as MECP Design Guidelines).

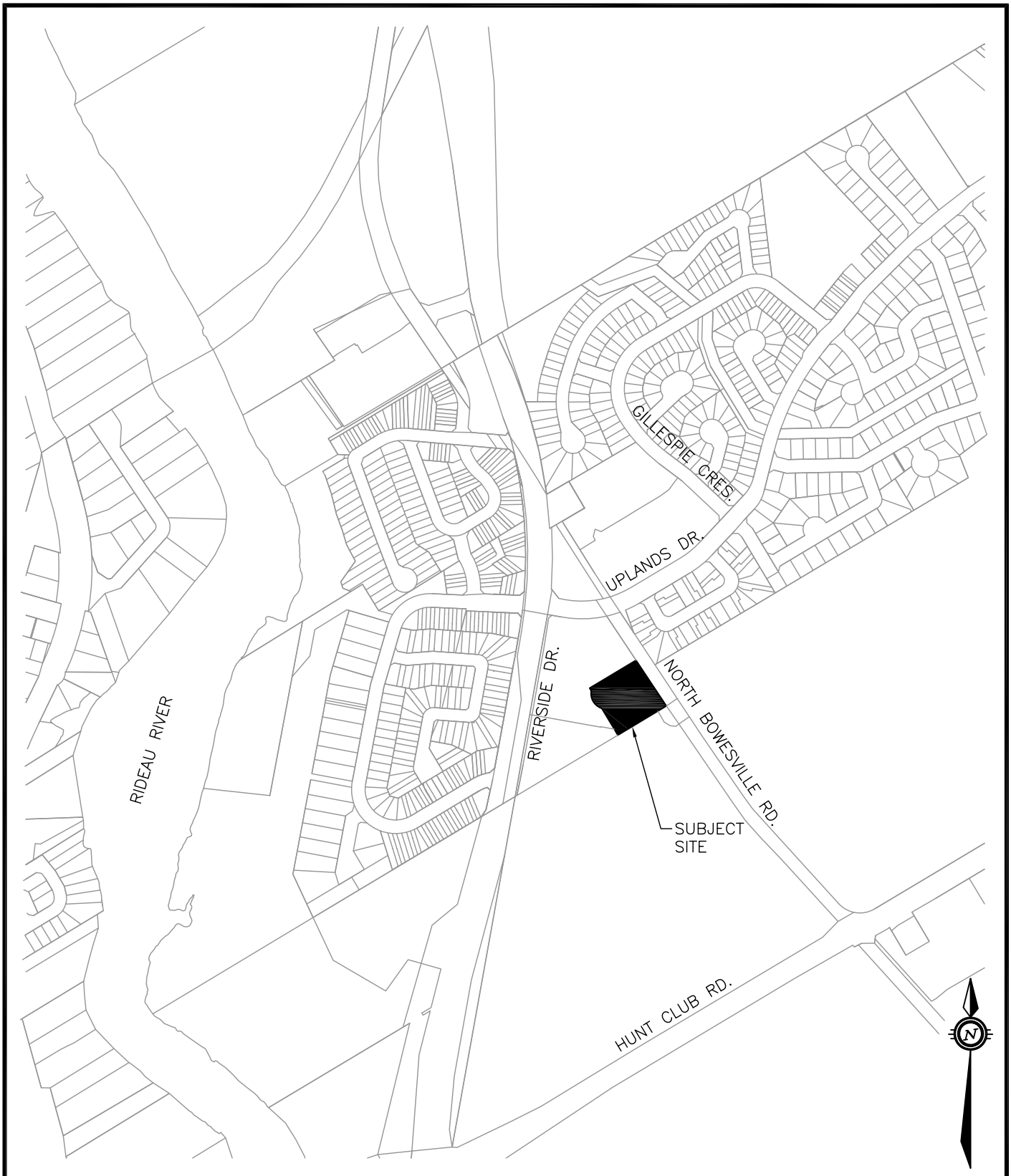
- **Water Supply for Public Fire Protection**, Fire Underwriters Survey, 2020 (herein referred to as FUS Guidelines).

- **Ontario Building Code Compendium**, Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010 (herein referred to as OBC).

- **Geotechnical Investigation, Proposed Multi-Storey Building, 3750 North Bowesville Road, Ottawa, Ontario**, Paterson Group, May 27, 2021 (herein referred to as the Paterson Report).

3.0 EXISTING CONDITIONS

The subject site is currently zoned General Mixed-Use [GM F(1.0) H(44)] but will require an amendment to permit an increased floor space index (FSI).



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scale N.T.S.	3750 NORTH BOWESVILLE ROAD	project no. 22028
date 01/04/22		
drawn by BLM	KEY PLAN	FIG 1

Under existing conditions, the site contains a 2-storey commercial use building (Tudor Hall, approximate 1,860 m^2 footprint) surrounded by asphalt surface parking areas. Existing trees and landscaping are provided around the perimeter of the property, however, the site consists mostly of impervious area. Access to the site is provided by two entrance connections to North Bowesville Road.

Refer to **Figure 2 – Existing Conditions** below for an aerial view of the site in its current development state.

Figure 2 – Existing Conditions

Existing municipal infrastructure is available within the North Bowesville Road right-of-way adjacent to the subject site as follows:

- An existing 406 mm diameter D.I. watermain
- An existing 600 mm concrete sanitary sewer
- An existing 300 mm concrete storm sewer

Refer to the Bowesville Road plan and profile drawings (prepared by the City of Ottawa) in **Appendix A** for more details.

4.0 DEVELOPMENT PROPOSAL

The proposed redevelopment is to include two 14-storey residential towers with a connecting amenity building area. The South Building is to be constructed as part of phase 1 and the North Building is to be constructed as part of phase 2 of the redevelopment. The existing on-site building is to be demolished. Access to the main building entrances will be provided by a new entrance connection to North Bowesville Road. Access to the underground parking garage will be provided by a secondary entrance to the south. Proposed landscaping will reduce the weighted runoff coefficient of the site from a pre-development value of 0.86 to a redevelopment value of 0.70. The redevelopment will provide a total of 394 apartment units which will consist

of bachelor, one-bedroom and two-bedroom units. The redevelopment will be serviced with new water, sanitary and storm services via connections to the existing municipal infrastructure located within the North Bowesville Road right-of-way. Refer to the Site Plan, prepared by Hobin Architecture, in **Appendix A** for more details.

5.0 WATER SERVICING

5.1 Existing System

An existing 406 mm diameter D.I. watermain is available within the North Bowesville Road right-of-way adjacent to the subject site. The existing watermain system is located within the City of Ottawa 2W2C pressure zone. The existing building currently receives water supply from a 203 mm diameter water service connection to the existing 406 mm diameter watermain.

5.2 Water Supply

Domestic water supply for the subject site will be provided by a new 203 mm diameter service connection to the existing 406 mm diameter watermain located within the North Bowesville Road right-of-way. The existing 203 mm diameter water service for the existing building will be utilized as a secondary water service for the proposed development. A new isolation valve will be required on the existing 406 mm diameter watermain between the locations of the proposed and existing services. Proposed connections shall be made in accordance with the current Ottawa Water Design Guidelines.

5.3 Water Demands

Water demands for the subject site have been calculated in accordance with current Ottawa Water Design Guidelines and Technical Bulletins using the following parameters:

- Average Day Demand — 280 L/person/day
- Max. Daily Demand — 2.5 x Avg. Day
- Max. Hour Demand — 2.2 x Max. Day
- Unit Count — Total 394 apartment units (provided by Developer)
  - Bachelor — 40 units
  - 1-Bedroom — 198 units
  - 2-Bedroom — 156 units
- Per Unit Populations — Ottawa Sewer Design Guidelines Table 4.2
  - Bachelor — 1.4 persons/unit
  - 1-Bedroom — 1.4 persons/unit
  - 2-Bedroom — 2.1 persons/unit
- Maximum Pressure — 80 psi
- Minimum Pressure — 40 psi

Using the above parameters, water demands for the proposed redevelopment have been calculated as follows:

Population = (40 units x 1.4 persons/unit) + (198 units x 1.4 persons/unit) + (156 units x 2.1 persons/unit) = **660.8 persons**

Average Day Demand = (660.8 persons) x (280 L/person/day) / 86400 s/day = **2.14 L/s**

Maximum Daily Demand = (2.5) x (2.14 L/s) = **5.35 L/s**

Maximum Hour Demand = (2.2) x (5.35 L/s) = **11.77 L/s**

Since the average day demand of 2.14 L/s exceeds 0.58 L/s (50 m^3/day maximum as per ISTB-2021-03), two water services, separated by an isolation valve, will be required to avoid the creation of a vulnerable service area in accordance with current Ottawa Water Design Guidelines. The existing 203 mm diameter water service which currently provides water supply to the existing building will be utilized as the secondary water service for the proposed development (to be further assessed during detailed design).

5.4 Fire Protection & Hydrant Coverage

The construction of the proposed 14-storey tower buildings will require the installation of an automatic sprinkler system for fire protection. In accordance with the Ontario Building Code (OBC), the unobstructed distance from the fire department connection (i.e. siamese) to a hydrant must not exceed 45 metres (OBC Section 3.2.5.16).

An existing municipal hydrant is located on the eastside of North Bowesville Road, approximately 20 metres from the northeast property corner of the subject site. However, the distance from the existing hydrant to the proposed siamese connections will exceed 45 metres and therefore the installation of a new hydrant will be required. To avoid a conflict between the hydrant and the underground parking garage which encompasses most of the site, a new municipal hydrant located along North Bowesville Road is proposed. The new hydrant will receive water supply via a new 152 mm diameter connection to the existing 406 mm diameter watermain on North Bowesville Road. The optimum location for the on-site hydrant will be determined during detailed design. A conceptual hydrant location is shown on the Conceptual Servicing Plan (DWG. 22028-S1) provided in **Appendix A**.

Fire flow requirements for the subject site have been calculated in accordance with the current FUS guidelines (2020). The total required fire flow has been calculated to be 7,000 Lpm. Refer to the FUS calculations provided in **Appendix B** for more details.

5.5 Boundary Conditions

Anticipated water demands and fire flows were provided to the City of Ottawa as part of the boundary condition request. The City provided the following boundary conditions for the subject site:

- Minimum HGL 124.0 m
- Maximum HGL 131.8 m
- Max. Day plus Fire Flow 127.7 m (116.67 L/s)

The above noted boundary conditions were incorporated into the hydraulic model developed for the subject site. Refer to the boundary conditions provided by the City in **Appendix B**.

5.6 Model Results

A water distribution hydraulic model was created using H2OMap Water software. The hydraulic model incorporated the conceptual watermain layout, proposed hydrant location and the boundary conditions provided by the City. The model results are summarized in **Table 1** below:

Table 1 – Water Model Results

Demand Condition	Model Results
Peak Hour	36.0 psi
Maximum Pressure	46.0 psi
Max. Day Plus Fire Flow	45,000 Lpm

As indicated in **Table 1** above, the modelled pressure for peak hour demand is expected to be slightly below the minimum requirement of 40 psi. A booster pump system within the proposed building will be required to meet minimum pressures. Since the modelled pressure under maximum pressure conditions is below 80 psi, a pressure reducing valve (PRV) will not be required. The available fire flow from the proposed hydrant on North Bowesville Road was assessed using the overall City Water Model since the use of boundary conditions would not provide a realistic value. The available fire flow during a maximum day demand at 20 psi residual pressure was determined to be 45,000 Lpm. This high value for available fire flow is due to the 406 mm diameter looped watermains in the area, as well as the 610 mm diameter watermain on Hunt Club Road. The available fire flow from the existing system far exceeds the total required fire flow of 7,000 Lpm calculated using current FUS guidelines. Therefore, the existing watermain system is adequate to provide water supply for domestic use and fire protection. Refer to the water model outputs provided in **Appendix B** for more details.

6.0 SANITARY SERVICING

6.1 Existing System

An existing 600 mm diameter sanitary sewer is available within the North Bowesville Road right-of-way adjacent to the subject site. Wastewater flows are conveyed north to the existing sanitary sewer system located on Uplands Drive. The existing building is assumed to have an existing sanitary service connection to the existing 600 mm diameter sewer, however, no details on the location are known at this time. During detailed design, the location of the existing service will be determined and will be abandoned in accordance with current City standards. No history of capacity constraints within the existing 600 mm diameter sanitary sewer system were identified by the City of Ottawa during pre-consultation meetings.

6.2 Sanitary Sewer Design

The redevelopment of the subject site will require a new sanitary service connection to the existing 600 mm diameter sanitary sewer located within the North Bowesville Road right-of-way. The proposed sanitary sewers will be designed in accordance with current Ottawa Design Guidelines using the following parameters:

- Average Residential Flow — 280 L/person/day
- Peaking Factor — 3.33 (Harmon Equation)
- Extraneous Flow Allowance — 0.33 L/s/ha
- Site Area — 0.68 ha
- Unit Count — Total 394 apartment units (provided by Developer)
  - Bachelor — 40 units
  - 1-Bedroom — 198 units
  - 2-Bedroom — 156 units
- Per Unit Populations — Ottawa Sewer Design Guidelines Table 4.2
  - Bachelor — 1.4 persons/unit

  - 1-Bedroom 1.4 persons/unit
  - 2-Bedroom 2.1 persons/unit
- Minimum Sewer Diameter 200 mm
- Full Flow Velocity 0.60 m/s to 3.0 m/s

Using the above parameters, the peak sanitary design flow for the proposed redevelopment has been calculated as follows:

Population = (40 units x 1.4 persons/unit) + (198 units x 1.4 persons/unit) + (156 units x 2.1 persons/unit) = **660.8 persons**

Peak Population Flow = (3.33) x (280 L/person/day) x (660.8 persons) / 86400 s/day
= **7.13 L/s**

Extraneous Flow = (0.68 ha) x (0.33 L/s/ha) = **0.22 L/s**

Peak Design Flow = (7.13 L/s) + (0.22 L/s) = **7.35 L/s**

The peak sanitary design flow for the proposed redevelopment has been calculated to be 7.35 L/s. A 200 mm diameter sanitary sewer installed at a slope of 1.08% will have a capacity of approximately 34.12 L/s (21.5 percent full) and therefore will be adequate to convey peak sanitary design flows from the proposed redevelopment. Refer to the sanitary sewer design sheet provided in **Appendix B**.

Based on the Bowesville Road design drawings (provided in **Appendix A**), the existing 600 mm diameter sanitary sewer adjacent to the subject site has a pipe slope of 0.50%. A 600 mm diameter sewer installed at a slope of 0.50% would have a capacity of 434.61 L/s. Given that the peak sanitary design flow from the proposed development would only account for approximately 1.7% of the total pipe capacity and no capacity constraints have been identified by the City, it is reasonable that the existing system is adequate to support the proposed redevelopment. Refer to the Conceptual Servicing Plan (DWG. 22028-S1) provided in **Appendix A**.

7.0 STORM SEWER DESIGN

7.1 Existing System

The upstream end of an existing 300 mm diameter storm sewer is located within the North Bowesville Road right-of-way adjacent to the northeast property corner of the subject site. The existing 300 mm diameter storm sewer conveys stormwater north to an existing 525 mm storm sewer on North Bowesville Road before being conveyed to the existing storm sewer system on Uplands Drive. The existing storm sewer system on North Bowesville Road appears to collect surface runoff from the right-of-way and a portion of the adjacent property. Under current site conditions, runoff from the subject site is captured by multiple catch basin structures and assumed to be conveyed uncontrolled and untreated to the existing storm sewer system on North Bowesville Road. No history of capacity constraints within the existing storm sewer system were identified by the City of Ottawa during pre-consultation meetings.

7.2 Storm Sewer Design

The redevelopment of the subject site will require a new on-site storm sewer system to capture stormwater runoff and convey it to the existing storm sewer system located within the North Bowesville Road right-of-way. The on-site storm sewer system will be designed using the following design parameters:

- Minimum Storm Sewer Diameter 250 mm
- Level of Service 5 Year Design Event
- Rainfall Intensity City of Ottawa IDF Curve Equations
- Peak Flow Rational Method (Q = 2.78CiA)
- Full Flow Velocity 0.80 m/s to 3.0 m/s

The on-site storm sewers will be designed to have capacity to convey the full 5 year peak design flow in keeping with the level of service for the immediate downstream receiver (i.e. North Bowesville Road sewers) and pre-consultation meeting notes (provided in **Appendix A**). The 5 year peak design flow for the subject site has been calculated to be approximately 138.31 L/s. Based on the Bowesville Road design drawings (provided in **Appendix A**), the existing 300 mm diameter storm sewer adjacent to the subject site has a pipe slope of 1.08%. A 300 mm diameter sewer installed at a slope of 1.08% would have a capacity of only 100.60 L/s. Therefore, the existing 300 mm diameter storm sewer does not have capacity to convey the full 5 year peak design flow from the subject site in addition to the external flows which are also conveyed to the sewer under current conditions.

Since the existing 300 mm diameter storm sewer on North Bowesville Road will not have sufficient capacity to convey peak flows from the subject site, a 52 m extension of the existing 525 mm storm sewer on North Bowesville Road will be required to service the redevelopment. A 525 mm diameter storm sewer installed at a slope of 0.25% will have a full flow capacity of 215.25 L/s. The 5 year peak design flow from the subject site of 138.31 L/s would account for approximately 64% of the total pipe capacity and therefore is considered adequate to service the redevelopment. During detailed design, the tributary drainage area from the right-of-way and adjacent properties will need to be reviewed and assessed to ensure that the proposed sewer extension is adequately sized. Refer to the storm sewer design sheet provided in **Appendix B** and the Conceptual Servicing Plan (DWG. 22028-S1) provided in **Appendix A**.

In accordance with the Paterson Report, a perimeter foundation drainage system will be required for the proposed building. The foundation drainage system will require a positive outlet, such as a gravity connection to a storm sewer or sump pump pit. Given the depth of the proposed building foundation compared to the existing storm sewer system on North Bowesville Road, a sump pump pit will be required.

7.3 ECA Requirements

As noted by the City of Ottawa, an Environmental Compliance Approval (ECA) application will be required for an extension of the storm sewer system on North Bowesville Road. The application would be for municipal sewage works (storm sewers). To our knowledge, the City of Ottawa has not yet received a Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) and therefore the application would proceed under a Transfer of Review (TOR) with the City. The application would be required at the Site Plan Control stage of the development process

8.0 STORMWATER MANAGEMENT DESIGN

8.1 Design Criteria

Through pre-consultation with the City of Ottawa and Rideau Valley Conservation Authority (RVCA) and based on current Ottawa Design Guidelines, the following stormwater management design criteria are proposed for the redevelopment of the subject site:

- Control post-development outflows from the site to the 5 year pre-development level.

- Provide on-site storage (in excess of the allowable release rate) for all storm events up to and including the 100 year design storm.
- Limit ponding areas to a maximum depth of 0.30 metres.
- Provide a major overland flow route for events exceeding the 100 year design storm.
- Provide enhanced level (80% TSS removal) quality control of stormwater runoff.
- Incorporate low impact development (LID) measures where possible to do so.

The above noted quantity and quality stormwater management design criteria will be incorporated into the on-site design as detailed in the sections below.

8.2 Allowable Release Rate

In keeping with the design criteria outlined for the redevelopment of the subject site, stormwater outflows must be controlled to the 5 year pre-development level. The 5 year pre-development flow for the subject site has been calculated as follows:

Site Area (A) = 0.68 ha
Runoff Coefficient (C) = 0.50 (As per City design guidelines Section 8.3.7.3)
5 Year Rainfall Intensity (i) = 104.2 mm/hr (City of Ottawa IDF curve equations, T_c=10 min)
Flow (Q) = 2.78CiA (Rational Method)

5 Year Pre-Development Flow = 2.78 x (0.50) x (104.2) x (0.68) = 98.5 L/s

As calculated above, outflows from the subject site must be controlled to 98.5 L/s for all design events up to and including the 100 year design storm event.

8.3 Quantity Control

To restrict the site's stormwater runoff to the allowable release calculated above, quantity control measures must be incorporated into the stormwater management design. Stormwater runoff will be controlled by implementing the following design features:

- Runoff from surface parking and/or landscape areas will be controlled by inlet control devices (ICDs) installed in the outlets of the on-site catch basins.
- Runoff from proposed roof areas will be controlled by roof drains (to be designed by the Mechanical Engineer during detailed design).

During detailed design, the ICDs will be appropriately sized based on an available head and allowable outflow. Free flow drainage areas which are conveyed "uncontrolled" off-site must also be accounted for at the detailed designs stage.

8.4 Quantity Storage

In keeping with the design criteria outlined for the redevelopment of the subject site, flows in excess of the 5 year pre-development flow must be contained on-site for all storm events up to and including the 100 year design storm event. On-site stormwater storage will be provided by implementing the following design features:

- Provide surface storage (to a maximum depth of 0.30 m) at all catch basin locations.
- Provide rooftop storage at the proposed building locations (details to be confirmed by Mechanical Engineer during detailed design).
- Provide underground storage (within pipes or an underground storage tank).

Preliminary quantity storage volumes have been calculated based on a runoff coefficient of 0.70 (from current Site Plan surface details) for the redeveloped site and an allowable release rate of 98.5 L/s. In accordance with Section 5.4.5.2.1 of the Ottawa Design Guidelines, the 100 year runoff coefficient has been increased by 25% to a maximum value of 1.0 (C_{100} = 0.70 x 1.25 = 0.88). The required storage volumes for the 2 year, 5 year and 100 year design events have been summarized in **Table 2** below:

Table 2 – Required Storage Volumes

Design Event	Required Storage Volume (m^3)
2 Year	2.1
5 Year	23.9
100 Year	124.8

During detailed design, required storage volumes will be calculated for each individual drainage area using an allocated outflow. Refer to the storage volume table provided in **Appendix B**.

8.5 Quality Control

In keeping with the design criteria outlined for the redevelopment of the subject site, enhanced level (80% TSS removal) quality control of stormwater runoff must be provided. Quality control is proposed to be provided by a stormwater treatment unit installed inline with the on-site storm sewer system. The treatment unit will provide quality control of the site's runoff prior to discharging into the existing storm sewer system located within the North Bowesville Road right-of-way. During detailed design, the treatment unit will be appropriately sized based on site specific parameters and a target treatment level (i.e. enhanced, 80% TSS removal).

Additional quality cleansing may be provided by the implementation of low impact development (LID) measures. The suitability of LID measures will be reviewed during detailed design based on site specific parameters such as the seasonally high groundwater level and depth to bedrock.

9.0 CONCLUSIONS

It has been demonstrated that the proposed redevelopment of the property located at 3750 North Bowesville Road can be accomplished in accordance with current Ottawa Design Guidelines and can be accommodated within the existing municipal infrastructure systems. The proposed servicing and stormwater management designs will be achieved by implementing the following key features:

- Domestic water supply will be provided by a new 203 mm diameter service connection to the existing 406 mm diameter watermain located within the North Bowesville Road right-of-way. The existing 203 mm diameter water service will provide a secondary water supply service.
- Water supply for fire protection will be provided by a new municipal hydrant located along North Bowesville Road.

- Wastewater flows will be conveyed by a new 200 mm diameter sanitary sewer to the existing 600 mm diameter sanitary sewer located within the North Bowesville Road right-of-way.
- A new storm sewer system will capture stormwater runoff and convey flows to the existing storm system located within the North Bowesville Road right-of-way.
- An extension of the existing 525 mm diameter storm sewer on North Bowesville Road will be required.
- Stormwater outflows will be controlled to the 5 year pre-development level.
- On-site stormwater storage will be provided for all storm events up to and including the 100 year design storm event.
- Enhanced level (80% TSS removal) quality control will be provided by an inline stormwater treatment unit.
- Implementation of LID measures (where possible to do so).

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Appendix A

Pre-Consultation Meeting Notes

Bowesville Road Plan and Profile Drawings (prepared by City of Ottawa)

Site Plan
(prepared by Hobin Architecture)

Conceptual Servicing Plan
(DWG. 22028-S1)

Good afternoon Nathan and Brian,

Please refer to the below notes regarding the Pre-Application Consultation Meeting held on April 13, 2021 for the site at 3750 North Bowesville Road.

Project:
During the meeting, a proposal is to redevelop the property with a high-rise residential development was discussed. Several different massing options were explored, including: two 14-storey towers atop a mid-rise podium base, two 14-storey towers with a row of townhomes fronting on Bowesville Road, and two 14-storey towers with a row of townhomes fronting the Ottawa Hunt and Golf Club property to the south of the site. A range of 316 to 346 dwelling units are proposed for the development options. The existing two-storey building used as a banquets and events venue will be demolished.

Below are staff's preliminary comments:

Policies/Designations of the site

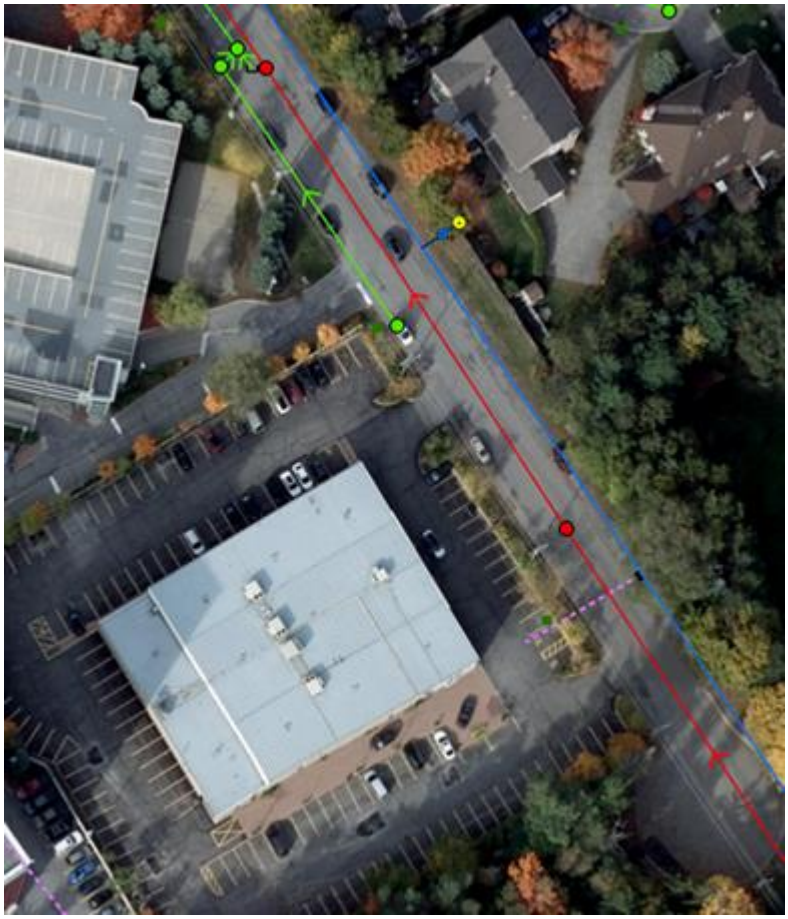
- Official Plan – designated General Urban Area
- Secondary Plan – designated as Commercial by the Hunt Club Secondary Plan
- Applicable Design Guidelines – Design Guidelines for High-rise Developments
- Zoning – General Mixed Use, GM F(1.0) H(44)
    - Within Area C for Minimum Parking Requirements (Schedule 1A)

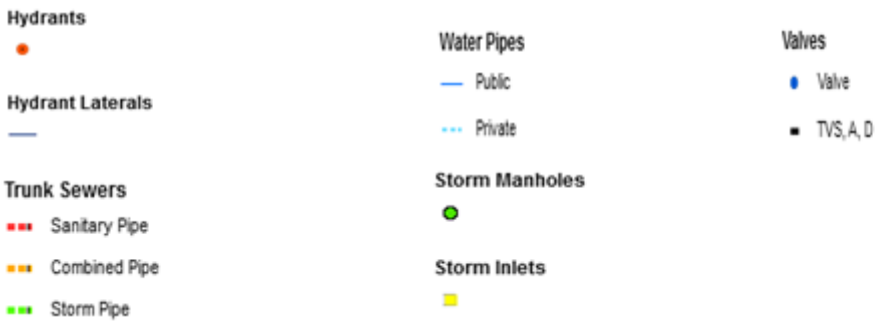
Engineering

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

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans
2. Servicing and site works shall be in accordance with the following documents:
    - Ottawa Sewer Design Guidelines (October 2012) and all the Technical Bulletins including, Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
    - Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
    - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
    - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
    - City of Ottawa Environmental Noise Control Guidelines (January, 2016)
    - City of Ottawa Park and Pathway Development Manual (2012)
    - City of Ottawa Accessibility Design Standards (2012)
    - Ottawa Standard Tender Documents (latest version)
    - Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x 44455
4. The Stormwater Management Criteria, for the subject site, is to be based on the following:
    - The 2-yr storm or 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
    - Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.
    - The pre-development (existing) runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
    - A calculated time of concentration (Cannot be less than 10 minutes).
    - Please contact RVCA for specific water quality requirement (discharge to Rideau River).
5. Deep Services:





i. *A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:*
    a. Connections (Sewers on Bowesville North - Preferred):
        i. Existing 525 mm dia. STM (Conc.)
        ii. 406 mm dia. Watermain (DI)
        iii. 600 mm dia. SAN (Conc.)

ii. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*

iii. *Connections to trunk sewers and easement sewers are typically not permitted. Connection to the trunk storm on Riverside is permitted for this site plan*

iv. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).*

v. *Review provision of a high-level sewer.*

vi. *Provide information on the type of connection permitted*

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

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

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

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

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

e. No submerged outlet connections.

6. The existing sanitary sewer capacity should be investigated as the proposed development will greatly increase the sanitary flows generated from the property. Please provide the sanitary flows with the first submission.

7. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
    i. Location of service
    ii. Type of development and the amount of fire flow required (as per FUS, 1999).
    iii. Average daily demand: ___ l/s.
    iv. Maximum daily demand: ___l/s.
    v. Maximum hourly daily demand: ___ l/s.
    vi. Hydrant location and spacing to meet City's Water Design guidelines.
    vii. Water supply redundancy will be required for more than 50 m3/day water demand.
8. Phase 1 Environmental Site Assessment (ESA) and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04. The ESA may provide recommendations where site contamination may be present. The recommendations from the ESA need to be coordinated with the servicing report to ensure compliance with the Sewer Use By-Law.
9. MECP ECA Requirements – The eligibility for an ECA will depend on the ultimate ownership structure for the buildings.
   All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP);
    a. Consultant determines if an approval for sewage works under Section 53 of OWRA is required. Consultant then determines what type of application is required and the City's project manager confirms. (If the consultant is not clear if an ECA is required, they will work with the City to determine what is required. If the consultant it is still unclear or there is a difference of opinion only then will the City PM approach the MECP.
    b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.
    c. Pre-consultation is not required. d. Standard Works ToR Draft ECA's are sent to the local MECP office (moeccottawasewage@ontario.ca).for information only
    d. Additional ToR draft ECAs require a project summary/design brief and require a response from the local MECP (10 business day window)

   NOTE: Site Plan Approval, or Draft Approval, is required before an application is sent to the MECP.
10. Water supply redundancy will be required for more than 50 m^3/day water demand. Provide watermain looped connection or with isolation valve to meet this requirement.
11. Per the RVCA, as the stormwater outlet is less than 1 km from the site, there is a water quality requirement of 80% total suspended solids removal. The applicant is encouraged to incorporate Low Impact Development (LID) measures into the stormwater management plan for this site.
12. General Engineering Submission requirements:

a. As per section 53 of the Professional Engineers Act, O. Reg 941/40, R.S.O. 1990, all documents prepared by engineers must be signed and dated on the seal.
b. All required plans are to be submitted on standard A1 size sheets (594mm x 841mm) sheets, utilizing a reasonable and appropriate metric scale as per City of Ottawa Servicing and Grading Plan Requirements: title blocks are to be placed on the right of the sheets and not along the bottom. Engineering plans may be combined, but the Site Plans must be provided separately. Plans shall include the survey monument used to confirm datum. Information shall be provided to enable a non-surveyor to locate the survey monument presented by the consultant.
c. All required plans & reports are to be provided in *.pdf format (at application submission and for any, and all, re-submissions)

- Feel free to contact Eric Harrold (Eric.Harrold@ottawa.ca) and Tyler Cassidy (Tyler.Cassidy@ottawa.ca) should you have any follow up questions about the engineering conditions.

Planning

- This site represents an opportunity for redevelopment, and we appreciate the use of underground parking in a suburban setting.
- We like the concept showing the townhomes oriented along the frontage of N. Bowesville Road and appreciate the transition of this design with the surrounding community and its creation of an active streetscape.
- The zoning permits 44m heights but restricts FSI to 1.0. A rezoning to permit an increase in FSI may be supported, provided the design demonstrates an appropriate built form for the site. Urban Design and Policy review will inform an appropriate built form, transition and subsequent permitted FSI.
- Please submit an as of right building envelope, as well as an as of right FSI as a mid-rise building.
- Please also include an as of right density calculation with the submission and note that S.37 Community Benefits are triggered if rezoning results in more than a 25% density increase.
- Provide an aggregated high-quality amenity area, ideally featuring an outdoor space.
- We would like to see tree retention & additional landscaping features where possible, as well as street trees along N. Bowesville. Please consult with Hydro Ottawa on required landscaping setbacks from the overhead hydro wires.
- The site is located within the Airport Vicinity Development Zone and 25 Line Noise Control Feasibility Study; please consult with the Airport Authority throughout the review process. The building design will have to address the noise concerns.
- Sun Shadow and Wind Study are required due to a rezoning to increased density, please see terms of references attached.
- As the Secondary Plan contemplates commercial uses on this site, we would welcome a mixed-use design incorporating a local commercial use.
- Please consult with ward councilor, Riley Brockington, and the registered community groups before application submission. Registered community groups in this area are Hunt Club Community Organization/Hunt Club- Riverside Park Community Centre, Riverside Park Community and Recreation Association, and Uplands on the Rideau Association.

Urban Design

- The approach to locating parking underground is appreciated. Any surface parking should be limited to visitor and drop/off parking.
- Please provide additional information regarding the requested increase in FSI from the current 1.0 and provide massing associated with the as-of-right FSI in a mid-rise built form to assist in staff analysis
- What is the proposed floor plate of the tower portion of the development? Please advise.
- The proposed increase in FSI will need to be supported with a schedule to be included as part of the Zoning-By-law Amendment.
- Please provide a design brief. A terms of reference will be provided.
- Please address the high-rise design guidelines as part of your urban design brief.
- Please ensure appropriate separation and setbacks from existing and possible future context including the golf course lands to the south.
- Please consider the site design of the abutting IBM property and design your site to link and interact with this site vs. turning your back to this site or locating parking along these edges.
- Scenario 2 provided by Hobin Architecture is heading in the right direction, as there is no large connected u-shaped podium, townhomes/low rise fronting on North Bowesville Road and the towers are oriented to face north/south vs. east/west
- Please ensure tree retention and protection in all scenarios.
- Consideration of a useful outdoor amenity area should be taken, that has adequate light and is not considerably impacted by wind.
- Please provide a sidewalk on North Bowesville Road to connect to the pathway at the southern end of the cul-de-sac.

Transportation

- A TIA is required for this development. Proceed to the scoping report as soon as possible. Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4.
- An update to the TRANS Trip Generation Manual has been completed (October 2020). This manual (attached) is to be utilized for this TIA.
- The intersection of Uplands/Riverside is operating at or near capacity. Transportation Demand Management strategies to minimize the development's impact on the intersection will be important at both the ZBLA and SPA stages, whether concurrent or not.
- Provide a sidewalk along the development's frontage and consider providing sidewalk to Uplands Drive along the west side of North Bowesville Road to encourage sustainable transportation.
- There is an existing pedestrian connection to 3735 Riverside Drive, describe how/if this be closed and how will this pedestrian/cycling demand be managed?
- Noise Impact Studies are required for the following:
    - Road
    - Stationary
- As the site proposed is residential, AODA legislation applies for all areas accessible to the public (i.e. outdoor pathways, parking, etc.). Consider using the City's Accessibility Design Standards.

Airport Authority

- See in the attached email (Dated April 13th) comments from the Ottawa International Airport Authority. Please continue to consult with the Airport Authority as your proposal continues to develop.

- Airport planner contact is Delroy Brown, Delroy.Brown@yow.ca

Environmental Planning

- No triggers for an EIS.

RVCA

- The downstream outlet for stormwater is less than 1km from the site. Therefore, a water quality objective of enhanced (80% TSS removal) is required.
- The applicant is encouraged to incorporate LID measures into the stormwater management plan for this site.

Parks & Facilities Planning

The comments from Parks and Facilities Planning Services are as follows:

- **Cash-in-lieu will be required**. Based on the Parkland Dedication By-law, the parkland dedication rate for townhouses is 1 hectare (10,000 m^2) per 300 dwelling units. The rate for apartment uses is 1 hectare per 300 dwelling units to a maximum of 10% of the area of the site being developed. A preliminary estimate of the parkland dedication requirement for the four development options is shown in the table below. For the purposes of preparing a high-level estimate for the parkland dedication requirements for Options 1 and 2, it is assumed that 20% of the site will be developed for townhouses and 80% for apartment uses.

Option	Parkland Dedication Requirement for Townhouses	Parkland Dedication for Apartments	Total Parkland Dedication Requirement
1	12 dwelling units x 1 ha per 300 dwelling units = 400 m^2	6,753 m^2 x 80% of site being developed for apartments x 10% rate for apartments = 540 m^2	940 m^2
2	10 units x 1 ha per 300 dwelling units = 333 m^2	6,753 m^2 x 80% of site being developed for apartments x 10% rate for apartments = 540 m^2	873 m^2
3	N/A	6,753 m^2 x 10% rate for apartments = 675 m^2	675 m^2
4	N/A	6,753 m^2 x 10% rate for apartments = 675 m^2	675 m^2

^{2} to 940 m^2 of land for the four options. The final parkland dedication requirement would depend on the final land uses that are approved through the site plan application, the final number and type of dwelling units, and the proportion of the site allocated to apartments and other potential land uses such as retail and service commercial uses.

The estimated parkland dedication requirement for all four options exceeds the minimum size of 400m^2 for an urban plaza, which is the smallest park type described in the City's Park Development Manual.

- The site is located within 1,000m of three existing parks:

a. Riverwood Park: located approximately 300m to the west of the site and west of Riverside Drive, including a playground area on the north side of Kimberwick Crescent;
b. Uplands Riverside Park: located on the west side of Riverside Drive approximately 250m to the west of the site, including a playground, soccer field and basketball court; and
c. Uplands Park: located on the north side of Uplands Drive approximately 1,000m east of the site, including a playground, public tennis/pickleball courts and a basketball key.

There is an existing signalized intersection at the Riverside Drive / Uplands Drive / Kimberwick Crescent intersection that future residents can use to cross Riverside Drive to access Riverwood Park and Uplands Riverside Park.

- The potential dedication of a park block in the range of 675 m^2 to 940 m^2 for an urban plaza was considered for the site. According to the City's Park Development Manual, urban plazas are intended to be located in the Inner-Urban Core, in Mixed-use Centres and Town Centres, and along Mainstreets. The site is designated as General Urban Area in the Official Plan and does not meet the locational criteria for an urban plaza. Further, the site is not well situated for a public park. It is relatively isolated at the end of a cul-de-sac street with a location adjacent to a parking garage and drive aisle for the neighbouring office development and with limited visibility from Uplands Drive. In addition, there are three existing parks within walking distance of the site that are available to serve the recreation needs of future residents. Due to these reasons, cash-in-lieu of parkland dedication is recommended for the proposed development rather than the conveyance of a park block.
- For the proposed townhouses, the parkland dedication rate for cash-in-lieu of parkland is 1 hectare per 500 dwelling units as per subsection 42(6.01) of the Planning Act. The cash-in-lieu of parkland dedication rate for apartments is 1 hectare per 500 dwelling units to a maximum of 10% of the area of the site being developed.
- Please note that the City's Parkland Dedication By-law is proposed to be replaced in 2022. If the new Parkland Dedication By-law comes into effect prior to the approval of the site plan application, the cash-in-lieu of parkland requirement will be determined in accordance with the provisions of the new By-law.
- In the event that the proposed development triggers a community benefit requirement under Section 37 of the Planning Act, we will need further discussions if there are projects are being considered that would affect a City park or recreation facility.

Forestry & Trees

TCR requirements are as follows:

- a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
  - an approved TCR is a requirement of Site Plan approval.
  - The TCR information can be combined with the Landscape Plan
- As of January 1 2021, any removal of privately or publicly (City) owned trees 10cm or larger in diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.
  - Please note on the LP if there are no trees greater than 10cm in diameter
- The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR

    - If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
    - Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
- The TCR must list all trees on site by species, diameter and health condition
- The TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site
- Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
- If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
- All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
    a) the location of tree protection fencing must be shown on a plan
    b) show the critical root zone of the retained trees
    c) if excavation will occur within the critical root zone, please show the limits of excavation
- the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site and Ottawa's urban forest canopy.
- For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

Landscape Plan and Tree Planting Requirements are as follows:

- For additional information on the following please contact adam.palmer@ottawa.ca
- Minimum Setbacks
    - Maintain 1.5m from sidewalk or MUP/cycle track.
    - Maintain 2.5m from curb
    - Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
    - Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing.
    - Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

Tree specifications

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
- Plant native trees whenever possible
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Hard surface planting

- Curb style planter is highly recommended

- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade

Soil Volume

- Please ensure adequate soil volumes are met:

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

Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines if in areas with sensitive Marine Clay.

This proposal is subject to a **Site Plan Control application** (Complex, Manger Approval), and a **Minor Zoning By-Law Amendment**. The required Plans & Study List is attached to this email.

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

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

We are happy to discuss further or answer any follow-up questions.

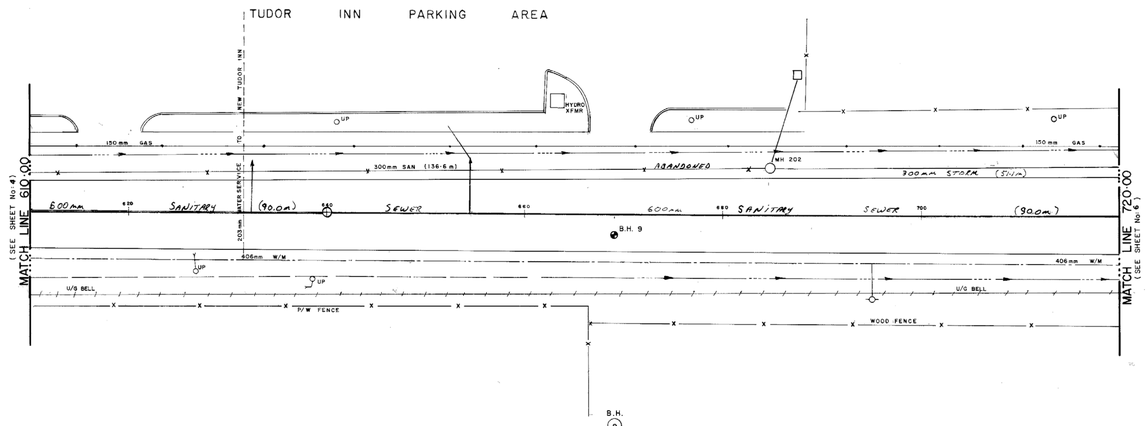
All the best,

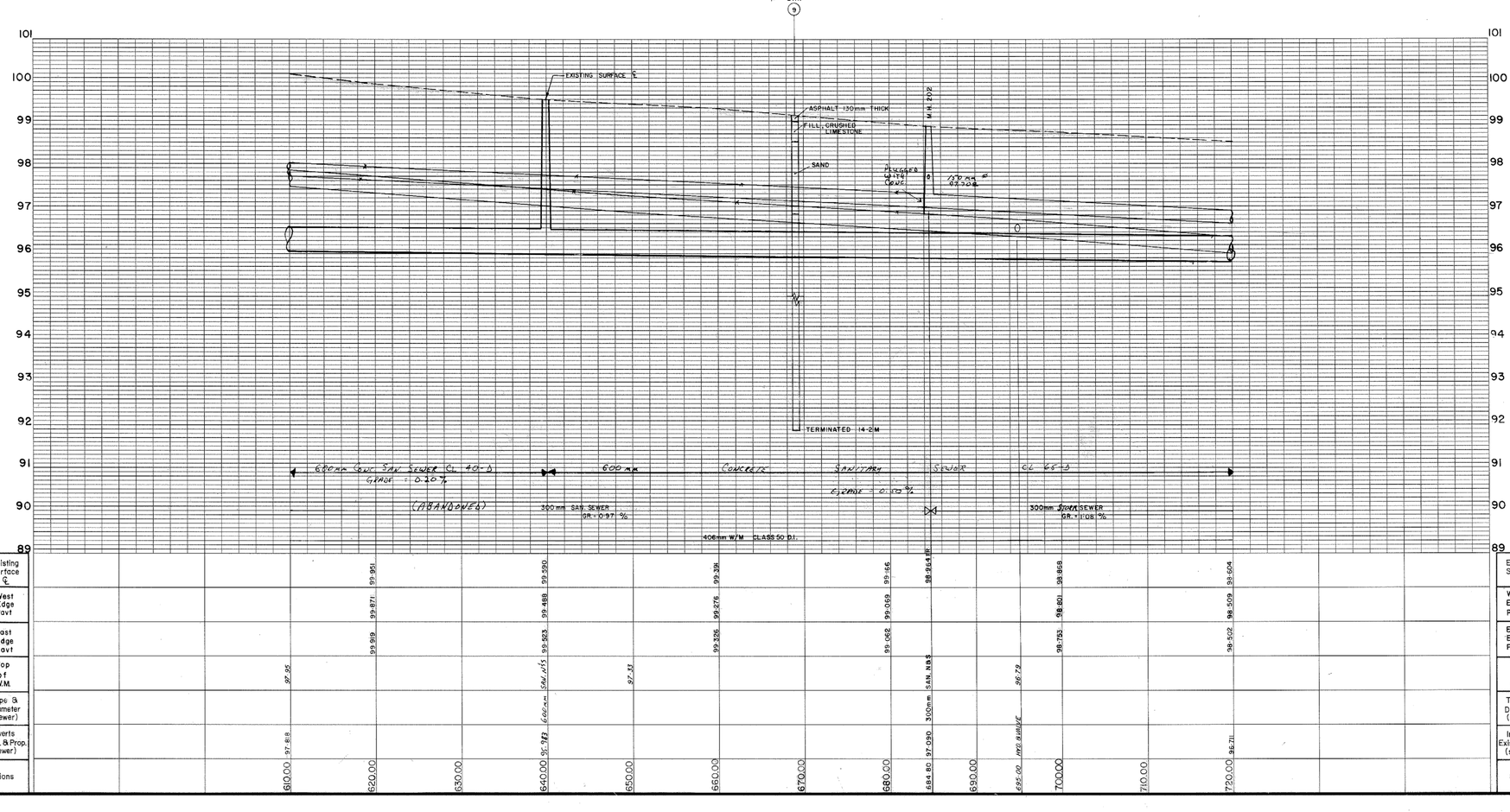
Sarah Ezzio
Planner I **|** Urbaniste I
Development Review (South Services) **|** Examen des projets d'aménagement (services sud)
Planning, Infrastructure and Economic Development **|** Services de planification, d'infrastructure et de développement économique

City of Ottawa | Ville d'Ottawa
☎ 613.580.2400 ext./poste 23493
ottawa.ca/planning / ottawa.ca/urbanisme

2664 (5 of 7)

BOWESVILLE ROAD





Elevations	610.00	620.00	630.00	640.00	650.00	660.00	670.00	680.00	684.80	690.00	695.00	700.00	710.00	720.00
Existing Surface ℄		99.951		99.590		99.334	99.166		98.964			98.869		98.604
West Edge Pavt		99.871		99.488		99.276	99.059					98.801		98.509
East Edge Pavt		99.919		99.523		99.326	99.062					98.793		98.502
Top of W.M.	97.95			SAN. MH 3	97.33			SAN. MH 3			96.79			
Type & Diameter (sewer)				600mm SAN				300mm SAN			INC. BANK			
Inverts Exist. & Prop. (sewer)	97.88			95.782				97.090						96.71
Stations	610.00	620.00	630.00	640.00	650.00	660.00	670.00	680.00	684.80	690.00	695.00	700.00	710.00	720.00

Revisions:

No.	Date	Description	Drawn By	Appr'd By
1	FEB '96	FINAL ACHIEVEMENTS	DJF	

Final Measurements:

Construction Type: SANITARY SEWER & ROAD	Inspector: T. CONNORS, D. BROWN & V. MAN
Work Commenced: SEPT. 93	Instrumentman: T. CONNORS
Work Completed: JULY 94	Field Book #: 5470 & 5471
Contractor: COLALTI CONST.	Date: 27-SEPT-96
Drafting Revisions: T. CONNORS	Checked By:

Designed By	Date	Checked By	Date
Survey Detail By	Date	Checked By	Date
Drafting By	Date	Checked By	Date

Chief Design & Const. Eng.

LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO 96/09/12

Notes:

- Utilities shown are taken from best available records. Contractor is requested to check with all utility companies before digging.
- Soil information shown is not guaranteed and contractors are advised to collect additional soils information as deemed necessary.
- Reference bench mark:
- Proposed storm and sanitary sewers may be constructed in a common trench provided that a minimum horizontal distance of 460mm is maintained between outside barrels of pipe.
- All pipes shall conform to the Canadian Standards Association (C.S.A.) A257.2 reinforced concrete sewer pipe with approved rubber gaskets.
- A minimum of 460 mm vertical clearance to be maintained between sewers and watermains where practical.
- Borehole soil descriptions are not based on sieve analysis but on visual inspection only, except where otherwise noted.
- Soil information taken from:
- Date of television inspection:
- This plan supercedes (in whole or in part) plan no:
- Actual rock line recorded during construction of existing sewer.
- Registered plan no.:
- Caution, while illustrations and utilities shown are taken from best available information, they cannot be guaranteed.
- When reduced, the scale of this drawing is approximately 1:400 horizontally and 1:81 vertically. Do not scale this plan.
- See additional notes on sheet No.1.

City of Ville d' **Ottawa**

Department Of Engineering And Works
Engineering Branch
Design And Construction Division
1600 SCOTT STREET · OTTAWA ONTARIO · K1Y 4N7

Commissioner	Branch Director
D.G. Curry P. Eng.	W.R. Cole P. Eng.

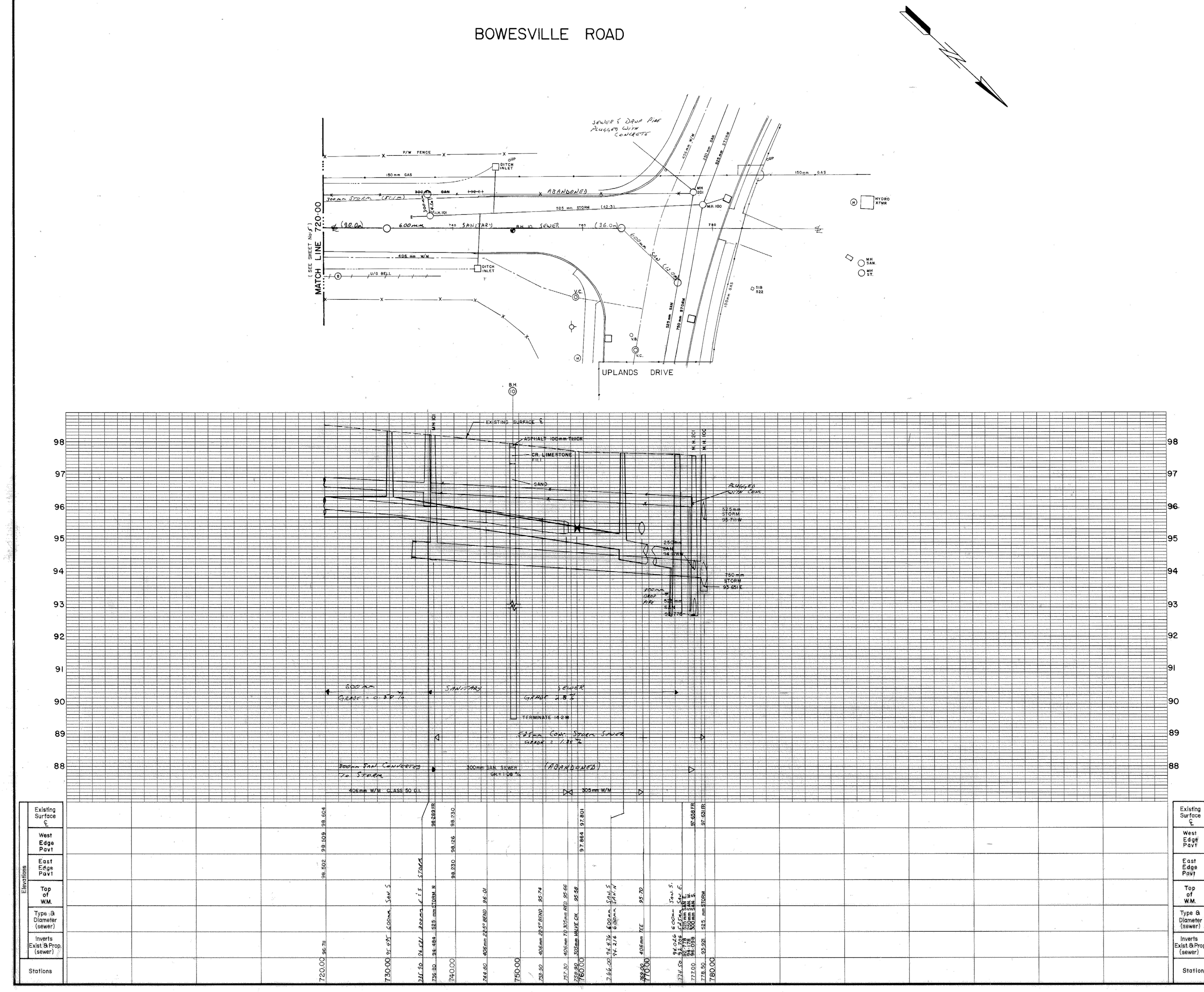
BOWESVILLE ROAD

FROM CH. 610.00 TO 710.00

Contract No.:	Survey Books:	Scales: (SEE NOTE)	Plan No:
93C 2664	5470 · 5471	HOR. 1:250 VERT. 1:50	2664
			Sheet 5 of 7

Z664 (6 of 7)

BOWESVILLE ROAD



Revisions:

No.	Date	Description	Drawn By	Appr'd By
1	FEB/96	FINAL MEASUREMENTS		

Final Measurements:

Construction Type: SANITARY SEWER & ROAD	Inspector: T. CONNORS, D. BROWN, L. VIAU
Work Commenced: SEPT. 93	Instrumentman: T. CONNORS
Work Completed: JULY 94	Field Book #: 5470 & 5471
Contractor: COLAUTTI CONST.	Date: 27-SEPT.-94
Drafting Revisions: T. CONNORS	Checked By

Designed By	Date	Checked By	Date
Survey Detail By	Date	Checked By	Date
Drafting By	Date	Checked By	Date

Chief Design & Const. Eng.

LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO
95/08/16

Notes:

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- Reference bench mark:
- Proposed storm and sanitary sewers may be constructed in a common trench provided that a minimum horizontal distance of 460mm is maintained between outside barrels of pipe.
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- See additional notes on sheet No. 1.

City of / Ville d' Ottawa

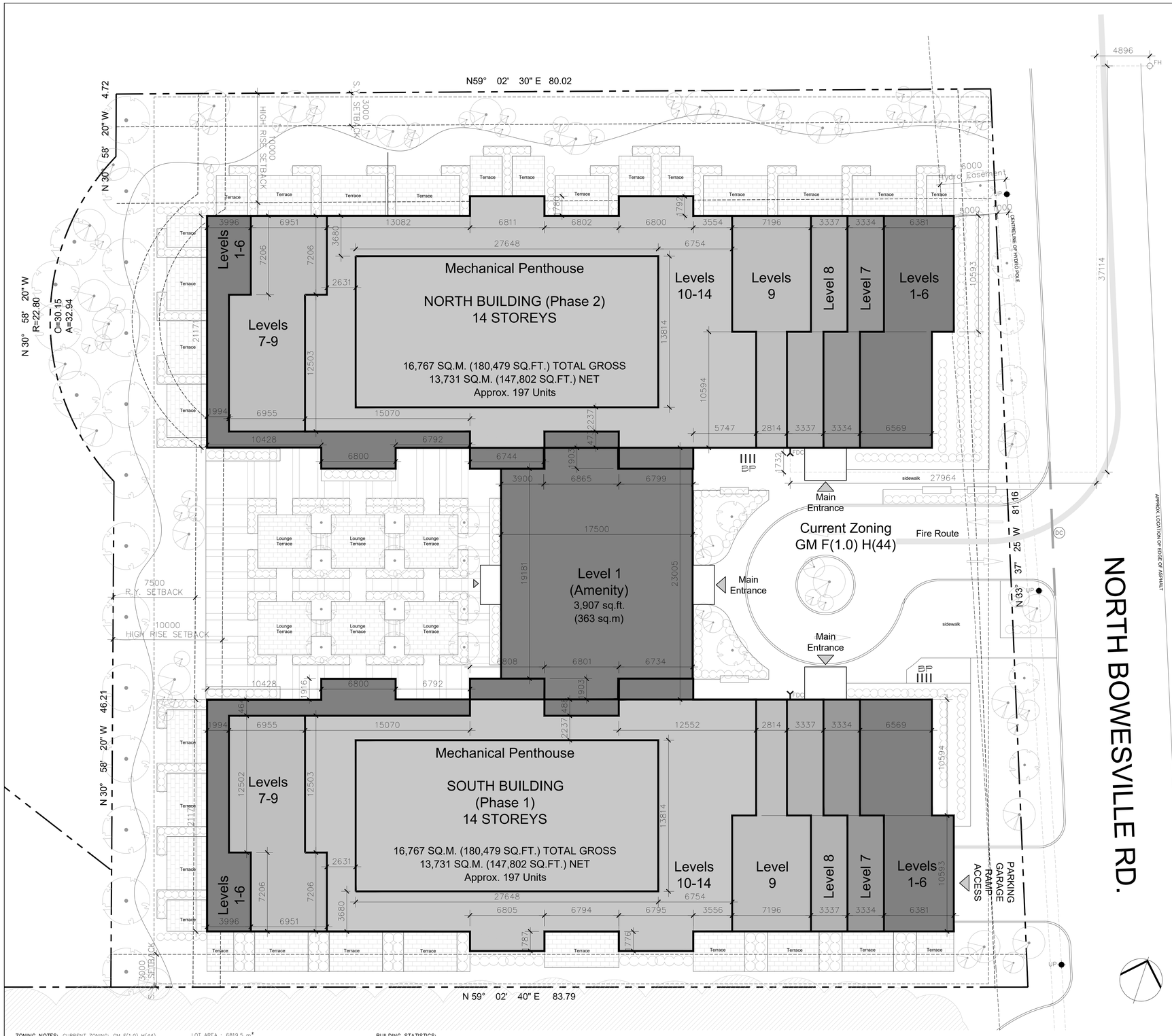
Department Of Engineering And Works
Engineering Branch
Design And Construction Division
1600 SCOTT STREET · OTTAWA ONTARIO · K1Y 4N7

D.G. Curry P. Eng. — Commissioner	W.R. Cole P. Eng. — Branch Director

BOWESVILLE ROAD

FROM CH. 720·00 TO UPLANDS DRIVE

Contract No.:	Survey Books:	Scales: (SEE NOTE)	Plan No:
93C 2664	5470 · 5471	HOR. 1:250 VERT. 1:50	2664 Sheet 6 of 7



LOCATION PLAN

BUILDING PARKING REQUIREMENTS

PROPOSED FIRE ROUTE
PROPOSED BUILDING
FH EXISTING FIRE HYDRANT
BP BIKE PARKING SPACE
UP EXISTING UTILITY POLE
FDC FIRE DEPARTMENT CONNECTION
EDGE OF SIDEWALK
PROPERTY LINE
SETBACK
DC PROPOSED DEPRESSED CURB DETAIL TO CITY OF OTTAWA STANDARD SC-7
CURB TO BE REBUILT
ROLL CURB
CONC. CURB DETAIL TO CITY OF OTTAWA STANDARDS

0 10 20 25

SCALE 1 : 150

ZONING NOTES: CURRENT ZONING: GM F(1.0) H(44) LOT AREA : 6819.5 m²

DEVELOPMENT STATS PHASE 1 + PHASE 2	REQUIRED	PROPOSED
LOT WIDTH		81.16m IRREGULAR
LOT DEPTH		83.7m IRREGULAR
FRONT YARD SETBACK BOWESVILLE	3m	VARIES
REAR YARD SETBACK	7.5m	VARIES
SIDE YARD SETBACK	3m	VARIES
INTERIOR SIDE YARD SETBACK	3m	VARIES
TOTAL DEVELOPMENT FSI = 33,534 SQ.M.(TOTAL DEVELOPMENT GFA)/6819.5 SQ.M.(TOTAL SITE AREA) = 4.92		
PHASE 1 (SOUTH BUILDING) FSI = 16,767 SQ.M.(PHASE 1 GFA)/6819.5 SQ.M.(TOTAL SITE AREA) = 2.46		
PHASE 2 (NORTH BUILDING) FSI = 16,767 SQ.M.(PHASE 2 GFA)/6819.5 SQ.M.(TOTAL SITE AREA) = 2.46		

BUILDING STATISTICS:

SOUTH BUILDING PHASE 1	PROPOSED		
TOTAL UNIT COUNT			197
STUDIOS	20	10%	
1 BEDROOM	99	50%	
1 BEDROOM + DEN		%	
2 BEDROOM (1 INBOARD BED)		%	
2 BEDROOM	78	40%	
2 BEDROOM + DEN		%	
NUMBER OF STOREYS			14 STOREYS
MAXIMUM HEIGHT			44m
AREA – TOTAL GFA			+/- 13,512 SQ.M.
REQUIRED AMENITY SPACE REQUIREMENT: 197 UNITS X 6 SQ.M. = 1,182 SQ.M. TOTAL AMENITY REQUIRED; REQUIRED AMENITY SPACE TO BE COMMON – 591 SQ.M.; PROVIDED COMMON AMENITY SPACE – 591 SQ.M.			

NORTH BUILDING PHASE 2	PROPOSED		
TOTAL UNIT COUNT			197
STUDIOS	20	10%	
1 BEDROOM	99	50%	
1 BEDROOM + DEN		%	
2 BEDROOM (1 INBOARD BED)		%	
2 BEDROOM	78	40%	
2 BEDROOM + DEN		%	
NUMBER OF STOREYS			14 STOREYS
MAXIMUM HEIGHT			44m
AREA – TOTAL GFA			+/- 13,237 SQ.M.
REQUIRED AMENITY SPACE REQUIREMENT: 197 UNITS X 6 SQ.M. = 1,182 SQ.M. TOTAL AMENITY REQUIRED; REQUIRED AMENITY SPACE TO BE COMMON – 591 SQ.M.; PROVIDED COMMON AMENITY SPACE – 591 SQ.M.			

TOTAL DEVELOPMENT – REQUIRED AMENITY SPACE: 394 UNITS X 6 SQ.M. = 2,364 SQ.M.

REQUIRED AMENITY SPACE TO BE COMMON – 1,182 SQ.M
REQUIRED PRIVATE AMENITY SPACE – 1,182 SQ.M.

TOTAL DEVELOPMENT – PROVIDED AMENITY SPACE: 2,364 SQ.M.

PROVIDED AMENITY SPACE TO BE COMMON – 1,182 SQ.M
PROVIDED PRIVATE AMENITY SPACE – 1,182 SQ.M.

1. BUILDING PARKING REQUIRED: PARKING RATIO OF 1.2/UNIT (473 RESIDENTIAL PARKING REQUIRED FOR 394 UNITS)

LAND USE	PROVIDED VEHICLE PARKING
RENTAL	287 RESIDENTIAL PARKING SPACES PROVIDED FOR 394 UNITS (0.7/UNIT) * LOCATED IN UNDERGROUND PARKING GARAGE

2. REQUIRED VISITOR PARKING: VISITOR PARKING RATIO OF 0.2/UNIT (79 VISITOR PARKING FOR 394 UNITS)

LAND USE	PROVIDED VISITOR PARKING
CONDO	40 VISITOR PARKING SPACES PROVIDED FOR 394 UNITS (0.1/UNIT) * LOCATED IN PARKING GARAGE AND AT GRADE
TOTAL PARKING PROVIDED	327 TOTAL PARKING PARKING SPACES (INTERIOR)

3. BUILDING BICYCLE PARKING REQUIRED: 0.5 BICYCLE STALLS PER UNIT (197 STALLS REQUIRED FOR 394 UNITS).

PROVIDED BICYCLE PARKING
197 BICYCLE PARKING SPACES PROVIDED FOR 394 UNITS (0.5/UNIT) * LOCATED IN UNDERGROUND PARKING GARAGE AND AT GRADE

JENNINGS REAL ESTATE

PROJECT TEAM

ARCHITECT
HOBIN ARCHITECTURE
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T 613-238-7200

PLANING
FOTENN CONSULTANTS INC.
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ANGELA JONKMAN
T 613-254-9643 X209

LANDSCAPE ARCHITECT
xxx

TRANSPORTATION
CGH Transportation
JOHN KINGSLEY
T 613-410-8243

ENVIRONMENTAL
GRADIENT WIND ENGINEERING
JUSTIN FERRARO
T 613-836-0634

SURVEYOR
xxx

no.	date	revision
2	22-09-16	ISSUED FOR REZONING SUB. NO. 2
1	22-04-13	ISSUED FOR REZONING

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

Hobin Architecture Incorporated
63 Pamilla Street
Ottawa, Ontario
Canada K1S 3K7
T: 613-238-7200
F: 613-235-2005
E: mail@hobinarc.com
hobinarc.com
HOBIN ARCHITECTURE

PROJECT/LOCATION:
3750 NORTH BOWESVILLE
OTTAWA ON.

DRAWING TITLE:
SITE PLAN

DRAWN BY:	DATE:	SCALE:
PB	22-09-16	1:150

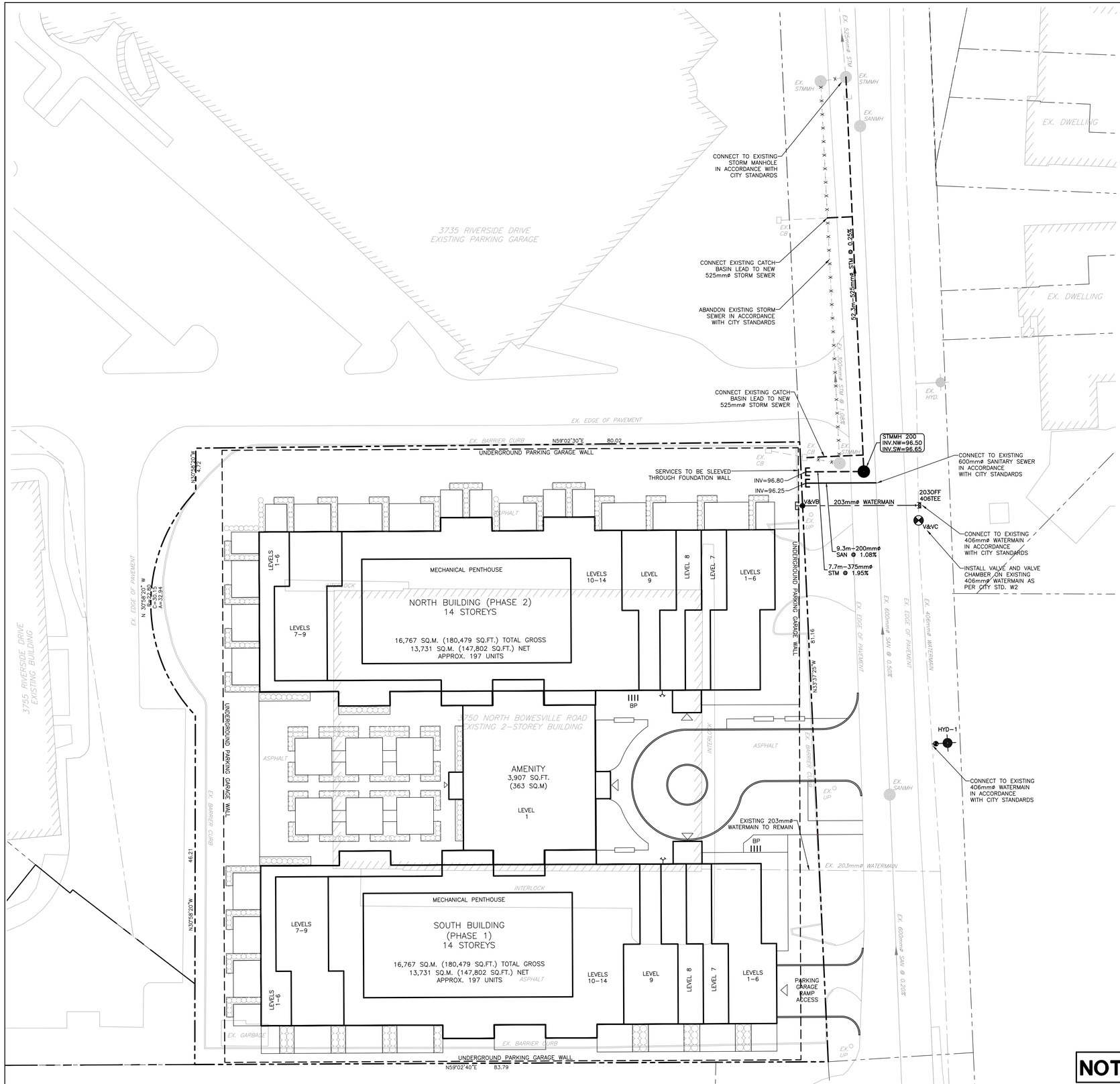
PROJECT: 2115

DRAWING NO.: A1.00

REVISION NO.:

ONTARIO ASSOCIATION OF ARCHITECTS
JOHN J. HOBIN
LICENCE 3049

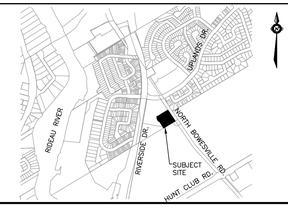
None
2115



NOT FOR CONSTRUCTION

LEGEND

- PROPERTY BOUNDARY
- EXISTING HYDRANT
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- EXISTING CATCH BASIN
- WATERMAIN
- HYDRANT
- V&VB — VALVE & VALVE BOX
- V&VC — VALVE & VALVE CHAMBER
- SIAMESE
- SANITARY SEWER & MANHOLE
- STORM SEWER & MANHOLE
- PROPOSED ABANDONMENT



KEY PLAN

NOTES

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

Robinson
Land Development

350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

LICENSED PROFESSIONAL ENGINEER
Oct. 7/22
B.L. MACKECHNIE
100199554
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
OCT. 7, 2022
A.H. JONKMAN
PROVINCE OF ONTARIO

NO.	REVISION DESCRIPTION	DATE	BY
2	REVISED PER COMMENTS	07/10/22	AHJ
1	ISSUED FOR ZBLA	12/04/22	AHJ

SCALE
0 2m 4m 10m
HORIZONTAL 1:250

PROPOSED RESIDENTIAL DEVELOPMENT

3750 NORTH BOWESVILLE ROAD
OTTAWA, ON

CONCEPTUAL SERVICING PLAN

DESIGN	BLM
CHECKED	AHJ
DRAWN	BLM
CHECKED	AHJ
APPROVED	AHJ
PROJECT No.	22028
SURVEY	
DATED	OCTOBER 2022
DWG. No:	22028-S1

Appendix B

FUS Calculations

Boundary Conditions

Water Model Outputs

Sanitary Sewer Design Sheet

Storm Sewer Design Sheet

Storage Volume Table

Project Name:	3750 Bowesville
Project Location:	3750 North Bowesville Road, Ottawa
Project No:	22028
Date:	07-Oct-22
Building Type:	14-Storey Residential Apartment
Building Being Considered:	North and South Building

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	Type of Construction	**Options**	**C**	Non-Combustible Construction (Type II)	0.8	
		Wood Frame (Type V)	1.5			
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Single Largest Floor Area				3337	m^2
	25% of Two Immediately Adjoining Floors				1487.5	m^2
	Total Effective Floor Area				**4,824.5**	**m^2**
C	**Fire Flow**				**12,000**	**L/min**
D	Occupancy Class	**Options**	**Charge**	Limited Combustible	-0.15	
		Non-combustible	-0.25			
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**-1800**	**L/min**
	Fire Flow				**10,200**	**L/min**
E	Sprinkler Protection	**Options**	**Charge**	Automatic Sprinkler Protection	-0.30	
		Automatic Sprinkler Protection	-0.30			
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	Yes	-0.10	
		Full Supervision of the Sprinkler System	-0.10	No	0.00	
	Sprinkler Reduction				**-4,080**	**L/min**
F	**Exposures**					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinkler Systems				Yes	
	Exposed Building Fully Protected with Automatic Sprinkler Systems				Yes	
	Exposed Wall Length				47	m
	Exposed Wall No. of Storeys				9	
	Length-Height Factor of Exposed Wall				423	m.storeys
	Construction Type of Exposed Wall	**Options**		Noncombustible or Fire Resistive with Unprotected Openings		
		Wood Frame				
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance			**Both BLDGs sprinklered; No exposure**	26.7	m
	West Side Exposure Charge				**0.00**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinkler Systems				No	
	Exposed Building Fully Protected with Automatic Sprinkler Systems				No	
	Exposed Wall Length				46.5	m
	Exposed Wall No. of Storeys				3	
	Length-Height Factor of Exposed Wall				139.5	m.storeys
	Construction Type of Exposed Wall	**Options**		Noncombustible or Fire Resistive with Unprotected Openings		
		Wood Frame				
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance			**+3m; see note 4**	21.8	m
	North Side Exposure Charge				**0.04**	
	East Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinkler Systems				No	
	Exposed Building Fully Protected with Automatic Sprinkler Systems				No	
	Exposed Wall Length				27.2	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				54.4	m.storeys
	Construction Type of Exposed Wall	**Options**		Wood Frame		
		Wood Frame				
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**Separation > 30m; No exposure**	37.7	m
	East Side Exposure Charge			**0.00**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinkler Systems			No	
	Exposed Building Fully Protected with Automatic Sprinkler Systems			No	
	Exposed Wall Length				m
	Exposed Wall No. of Storeys				
	Length-Height Factor of Exposed Wall			0	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive with Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**No exposure**	31	m
	South Side Exposure Charge			**0.00**	
	Total Exposure Charage			**0.04**	**< 0.75**
	Increase for Exposures			**408**	**L/min**
G	**Total Required Fire Flow**			**7,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Step B, floor areas used are conservative values as they include the exterior footprint.

3. Step B, assumed properly protected vertical openings.

4. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Brandon Mackechnie

From: Harrold, Eric <eric.harrold@ottawa.ca>
Sent: August 11, 2022 9:53 AM
To: Brandon Mackechnie
Cc: Angela Jonkman; Modi, Urja
Subject: RE: 3750 North Bowesville Rd - Boundary Conditions
Attachments: 3750 North Bowesville Road August 2022.pdf

"CAUTION: External Sender"
Hi Brandon – Conveniently, I received the boundary conditions for this application this morning:

The following are boundary conditions, HGL, for hydraulic analysis at 3750 North Bowesville Road (zone 2W2C) assumed to be connected to the 406 mm on North Bowesville Road (see attached PDF for location).

Both Connections:
Min HGL: 124.0
Max HGL: 131.8
Max Day + FF (116.67 L/s): 127.7 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.

Best,
Eric
Eric Harrold, P.Eng
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West, Ottawa, ON
613.580.2424 ext. 21447, eric.harrold@ottawa.ca

*** OUT OF OFFICE NOTICE – Please note that I will be out of office from September 16th through 28th, inclusive ***

From: Modi, Urja <urja.modi@ottawa.ca>
Sent: August 11, 2022 7:46 AM
To: Brandon Mackechnie <bmackechnie@rcii.com>
Cc: Angela Jonkman <ajonkman@rcii.com>; Harrold, Eric <eric.harrold@ottawa.ca>
Subject: RE: 3750 North Bowesville Rd - Boundary Conditions

Hi Brandon,

My apologies for the delay in getting back to you. The resubmission can proceed without the boundary conditions, however, the comment will remain required and outstanding, and will need to be satisfied prior to Site Plan Approval. Should boundary conditions impact other comments, those comments too will need to be addressed prior to Site Plan Approval.

Additionally, my last day with the City will be August 19th, Sean Moore will lead this file after my departure. Please ensure to copy him and the engineer (Eric Harrold) on correspondence.

Thank you,

Urja Modi
Planner I | Urbaniste I
Development Review (South Services) | Examen des projets d'aménagement (services sud)
Planning, Real Estate and Economic Development | Direction générale de la planification, des biens immobiliers et du développement économique

City of Ottawa | Ville d'Ottawa
☎ 613.580.2424 ext./poste 16912
ottawa.ca/planning / ottawa.ca/urbanisme

Please note that I am working from home due to the uncertainties of the COVID-19 pandemic, and email is the best way to reach me.

From: Brandon Mackechnie <bmackechnie@rcii.com>
Sent: August 05, 2022 9:17 AM
To: Modi, Urja <urja.modi@ottawa.ca>
Cc: Angela Jonkman <ajonkman@rcii.com>
Subject: RE: 3750 North Bowesville Rd - Boundary Conditions

Hi Urja,

We have requested boundary conditions from the City as was requested in City review comment A3 of the attached letter. However, the City is currently inundated with boundary condition requests and the turn around time can be up to two months. In light of the delay to receive boundary conditions, can you please confirm if the resubmission for the Zoning By-Law Amendment can precede before the boundary conditions are received?

Thanks,

Brandon MacKechnie, P.Eng. | Project Engineer
Robinson Consultants 350 Palladium Drive, Suite 210, Ottawa ON, K2V 1A8
T.(613) 592-6060 ext. 130 | rcii.com

From: Modi, Urja <urja.modi@ottawa.ca>
Sent: July 28, 2022 3:04 PM
To: Brandon Mackechnie <bmackechnie@rcii.com>

Cc: Harrold, Eric <eric.harrold@ottawa.ca>
Subject: RE: 3750 North Bowesville Rd - Boundary Conditions

"CAUTION: External Sender"
Hi Brandon,

The engineer for this file is Eric Harrold. He is copied on this email.

Thanks,

Urja Modi
Planner I | Urbaniste I
Development Review (South Services) | Examen des projets d'aménagement (services sud)
Planning, Real Estate and Economic Development | Direction générale de la planification, des biens immobiliers et du développement économique

City of Ottawa | Ville d'Ottawa
☎ 613.580.2424 ext./poste 16912
ottawa.ca/planning / ottawa.ca/urbanisme

Please note that I am working from home due to the uncertainties of the COVID-19 pandemic, and email is the best way to reach me.

From: Brandon Mackechnie <bmackechnie@rcii.com>
Sent: July 28, 2022 2:32 PM
To: Modi, Urja <urja.modi@ottawa.ca>
Subject: 3750 North Bowesville Rd - Boundary Conditions

Hi Urja,

We would like to request boundary conditions for the 3750 North Bowesville Road development. Could you please provide me with the contact information for the correct Project Manager to make the request to?

Thanks,

Brandon MacKechnie, P.Eng. | Project Engineer
Robinson Consultants
350 Palladium Drive, Suite 210, Ottawa ON, K2V 1A8
T.(613) 592-6060 ext. 130 | rcii.com

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'

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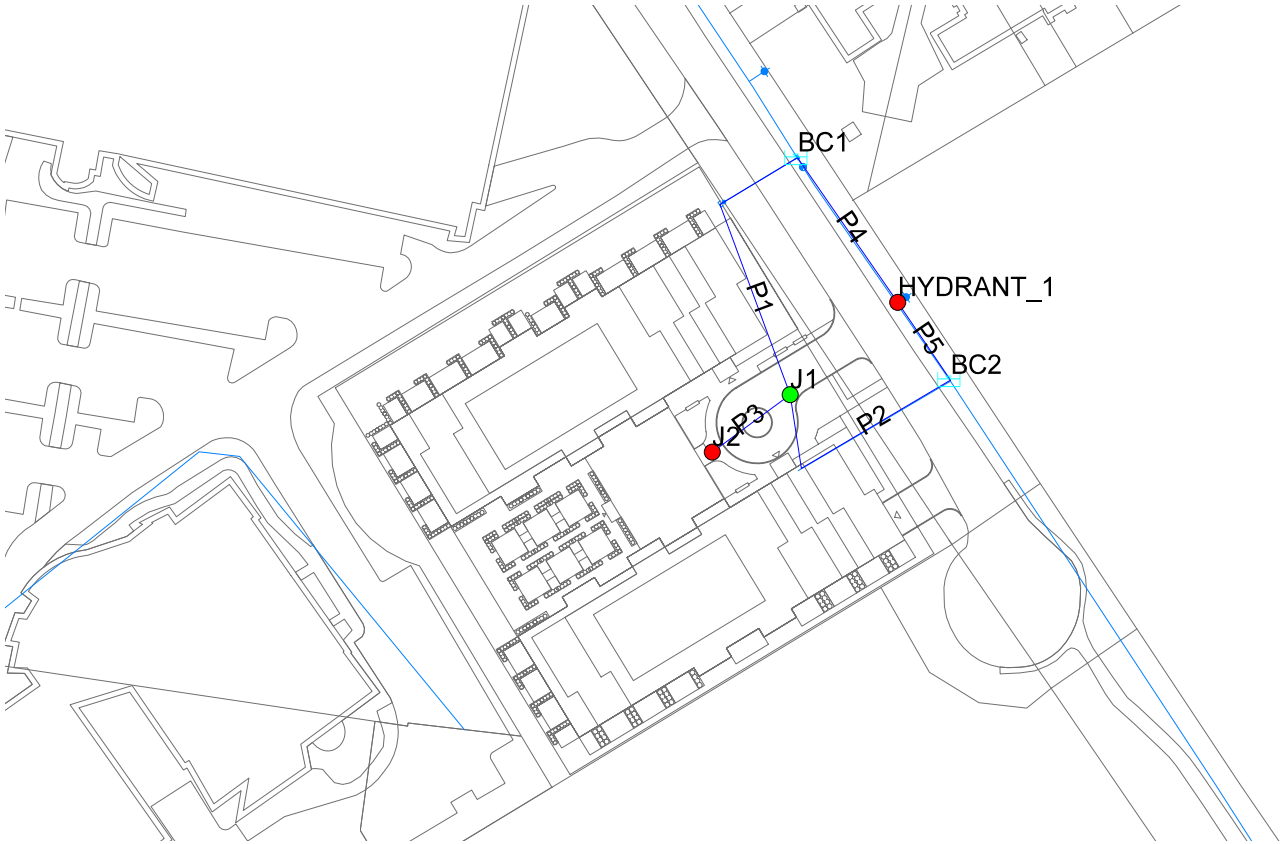
Boundary Conditions for 3750 North Bowesville Road
n North Bowesville Rd
406
203
152
Connection 1
Connection 2
3735
3750
N
Legend
PRIVATE
PUBLIC
City of Ottawa

3750 North Bowesville Model



JUNCTION (MOTYPE)
- Active
- Domain

TANK (MOTYPE)
- Active Tank
- Domain Tank
- Active Reservoir
- Domain Reservoir

PIPE (MOTYPE)
- Active Pipe
- Domain Pipe
- Active Check Valve
- Domain Check Valve

PUMP (MOTYPE)
- Active
- Domain

VALVE (MOTYPE)
- Active
- Domain

22028_Water.dxf

22028_Base.dxf

Prepared By:

Date: 06/10/2022 2:36:25 PM

	PIPE: ID (Char)	PIPEHYD: LENGTH (Num)	PIPEHYD: DIAMETER (Num)	PIPEHYD: ROUGHNESS (Num)	LINK: ID (Char)	LINK: FROM (Char)	LINK: TO (Char)
1	P1	52.55	203.00	110.00	P1	BC1	J1
2	P2	44.40	203.00	110.00	P2	BC2	J1
3	P3	17.35	203.00	110.00	P3	J1	J2
4	P4	31.53	406.00	120.00	P4	BC1	HYDRANT_1
5	P5	16.83	406.00	120.00	P5	BC2	HYDRANT_1

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
1		HYDRANT_1	0.00	99.44	124.80	36.05
2		J1	0.00	99.44	124.79	36.03
3		J2	11.80	99.44	124.77	36.00

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
1		HYDRANT_1	0.00	99.44	131.80	46.00
2		J1	0.00	99.44	131.80	46.00
3		J2	2.10	99.44	131.80	46.00

SANITARY SEWER DESIGN SHEET
for
3750 NORTH BOWESVILLE ROAD, CITY OF OTTAWA

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM./INST. FLOW		RESIDENTIAL FLOW			PEAK DESIGN FLOW (L/s)	PIPE						
			UNIT COUNT			INDIVIDUAL		CUMULATIVE														
STREET	FROM MH	TO MH	BACHELOR	1-BEDROOM	2-BEDROOM	POP.	AREA (ha)	POP.	AREA (ha)	PEAK FACTOR	PEAK FLOW (L/s)	PEAK FACTOR	PEAK POP. FLOW (L/s)	EXTRAN. FLOW (L/s)		LENGTH (m)	DIAMETER (mm)	SLOPE (%)	CAPACITY (L/s)	VELOCITY (m/s)	EXCESS CAPACITY (L/s)	PERCENT FULL
TO NORTH BOWESVILLE ROAD SEWER																						
PARKING LOT	BLDG	EX MAIN	40	198	156	660.8	0.68	660.8	0.68			3.33	7.125	0.22	7.35	9.3	200.00	1.08	34.12	1.09	26.77	21.54
NORTH BOWESVILLE	*EX MH*	*EX MH*														*90.0*	*600.00*	*0.50*	*434.61*	*1.54*	*434.61*	

DESIGN PARAMETERS

			Per Unit Populations:		
Average Daily Flow =	280	L/person/day	Single Family	3.4	persons/unit
Comm./Inst. Flow =	28000	L/ha/day	Semi-detached	2.7	persons/unit
Industrial Flow =			Duplex	2.3	persons/unit
Maximum Residential Peak Factor =	4.0		Townhouse	2.7	persons/unit
Harmon - Correction Factor (K) =	0.8		Apartments:		
Comm./Inst. Peak Factor =	1.5		Bachelor	1.4	persons/unit
Extraneous Flow =	0.33	L/s/ha	1 Bedroom	1.4	persons/unit
Minimum Velocity =	0.6	m/s	2 Bedroom	2.1	persons/unit
Maximum Velocity =	3.0	m/s	3 Bedroom	3.1	persons/unit
			Average Apt.	1.8	persons/unit

STORM SEWER DESIGN SHEET
3750 NORTH BOWESVILLE ROAD, CITY OF OTTAWA

LOCATION				AREA (ha)		INDIV. 2.78AR	ACCUM. 2.78AR	TIME OF CONC. (min)	5 YR RAINFALL INTENSITY (mm/hr)	5 YR PEAK FLOW (L/s)	PROPOSED SEWER						
DRAINAGE AREA	STREET NAME	FROM MH	TO MH	TOTAL AREA	C						PIPE DIA. (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL
PROPOSED	PARKING LOT	BLDG	200	0.68	0.70	1.33	1.33	10.00	104.19	138.31	375.00	1.95	7.7	245.08	2.22	0.06	56%
PROPOSED	BOWESVILLE	200	*EX MH*	0.00	0.00	0.00	1.33	10.06	103.89	137.90	525.00	0.25	52.3	215.25	0.99	0.88	64%
EXISTING	*BOWESVILLE*	*EX MH*	*EX MH*	*0.68*	*0.70*	*1.33*	*1.33*	*10.00*	*104.19*	*138.31*	*300.00*	*1.08*	*51.1*	*100.60*	*1.42*	*0.60*	*137%*

Design Parameters

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Peak flows calculated using the Rational Method.
   Q = 2.78CIA, where:
   Q = Peak Flow (L/s)
   A = Drainage Area (ha)
   I = Rainfall Intensity (mm/hr)
   C = Runoff Coefficient
3. Manning's roughness coefficient = 0.013
4. Full flow velocity: MIN 0.8 m/s; MAX 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)

IDF curve equations (Intensity in mm/hr)

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
50 year Intensity = $1569.580 / (\text{Time in min} + 6.014)^{0.820}$
25 year Intensity = $1402.884 / (\text{Time in min} + 6.018)^{0.819}$
10 year Intensity = $1174.184 / (\text{Time in min} + 6.014)^{0.816}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Flow and Storage Volume Calculations

Area (ha) = 0.68
C = 0.70
C (100 YR) = 0.88

Release Rate (L/s) = 98.5

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	**10**	**76.8**	**102.0**	**98.5**	**3.5**	**2.1**
	15	61.8	82.0	98.5	-16.5	-14.8
	20	52.0	69.1	98.5	-29.4	-35.3
	25	45.2	60.0	98.5	-38.5	-57.8
	30	40.0	53.2	98.5	-45.3	-81.6
	35	36.1	47.9	98.5	-50.6	-106.3
5 Year	**10**	**104.2**	**138.3**	**98.5**	**39.8**	**23.9**
	15	83.6	110.9	98.5	12.4	11.2
	20	70.3	93.3	98.5	-5.2	-6.3
	25	60.9	80.8	98.5	-17.6	-26.5
	30	53.9	71.6	98.5	-26.9	-48.4
	35	48.5	64.4	98.5	-34.1	-71.6
100 Year	10	178.6	296.3	98.5	197.8	118.7
	15	**142.9**	**237.1**	**98.5**	**138.6**	**124.8**
	20	120.0	199.0	98.5	100.5	120.7
	25	103.8	172.3	98.5	73.8	110.7
	30	91.9	152.4	98.5	53.9	97.1
	35	82.6	137.0	98.5	38.5	80.9