



## **Stormwater Management Report and Servicing Brief**

Apartment Building  
770-774 Bronson Ave  
Ottawa, Ontario

Prepared for:

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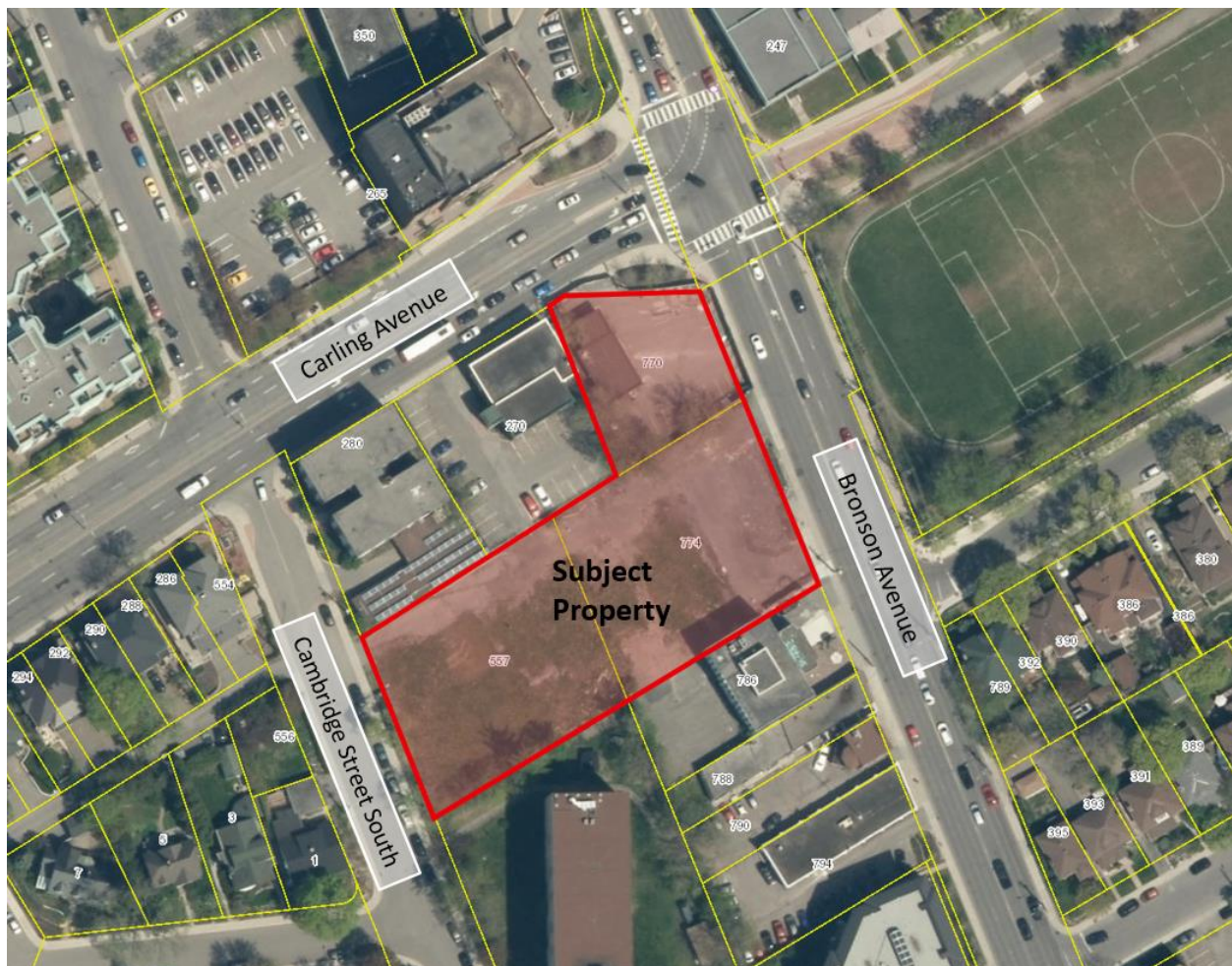
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## 1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Katasa Group to complete a Stormwater Management Analysis and Servicing Brief for the ultimate development of a mixed-use residential high rise, which will consist of a 22-storey tower and a 9-storey tower. The site is located at 770-774 Bronson Avenue and 557 Cambridge Street South.

The subject property consists of three (3) lots that are legally described as Lots 3, 4, 37 and part of lots 1, 2, 38, in registered plan 28. The subject lots are designated Arterial Mainstreet in the City of Ottawa and are zoned AM10[2373] and AM1[2003] S296 (Arterial Mainstreet Subzone1, Exception 2006, Schedule 296).



**Figure 1: Aerial View of Proposed Development**

The subject property, as a whole, has approximately 64 m frontage along Bronson Avenue, 32 m frontage along Carling Avenue, and 40 m frontage along Cambridge Street South. The total site area is approximately **0.456 ha**.

The proposed development will be constructed in 2 phases. Phase 1 includes a 22-storey mixed-use residential building and Phase 2 includes a 9-storey residential building, consisting altogether of a total of **224** units, **71** units of which are dedicated to student housing. The 22-storey building





in Phase 1 includes **71** student units, **117** residential units and **1097m<sup>2</sup>** of amenity space. There is also a proposed café located on the main level of this building with an area of approximately 105m<sup>2</sup>. The 9-storey building in Phase 2 includes **90** residential units and **457m<sup>2</sup>** of amenity space. Both buildings will share a 2-level underground parking garage. The two (2) levels of underground parking extend below the majority of the site. It is proposed that the entirety of the underground parking will be constructed during Phase 1 of the project and the 9-storey building will be constructed in Phase 2. Refer to the **Site Plan** included in **Appendix F** for more details.

This report has been prepared in consideration of the terms and conditions noted above and with the civil drawings prepared for the new development. Should there be any changes in the design features, which may relate to the stormwater considerations, LRL Associates Ltd. should be advised to review the report recommendations.

## 2 EXISTING SITE AND DRAINAGE DESCRIPTION

The subject site measures **0.456 ha** and currently consists of a 1-storey commercial automobile building with paving and gravel covering the majority of the site. Elevations of existing site range between 73.59 m at southwest corner to 76.10 m at the northwest corner of the site.

Sewer and watermain mapping, along with as-built information collected from the City of Ottawa indicate the following existing infrastructure located within the adjacent right-of-ways:

### **Bronson Avenue:**

- 610 mm diameter UCI feedermain
- 127 mm diameter UCI watermain
- 375 mm diameter concrete combined sewer

### **Carling Avenue:**

- 406 mm diameter UCI watermain
- 300 mm diameter concrete combined sewer

### **Cambridge Street South:**

- 203 mm diameter PVC watermain
- 250 mm diameter PVC combined sewer

## 3 SCOPE OF WORK

As per applicable guidelines, the scope of work includes the following:

### **Stormwater management**

- Calculate the allowable stormwater release rate.
- Calculate the anticipated post-development stormwater release rates.
- Demonstrate how the target quantity objectives will be achieved.



### **Water services**

- Calculate the expected water supply demand at average and peak conditions.
- Calculate the required fire flow as per the Fire Underwriters Survey (FUS) method.
- Confirm the adequacy of water supply and pressure during peak flow and fire flow.
- Describe the proposed water distribution network and connection to the existing system.

### **Sanitary services**

- Describe the existing sanitary sewers available to receive wastewater from the building.
- Calculate peak flow rates from the development.
- Describe the proposed sanitary sewer system.
- Review impact of increased sanitary flow on downstream sanitary sewer.

## **4 REGULATORY APPROVALS**

An MECP Environmental Compliance Approval is expected to be required for installation of the proposed storm and sanitary sewers within the site. A Permit to Take Water is not anticipated to be required for pumping requirements for sewer installation. The Rideau Valley Conservation Authority will need to be consulted in order to obtain municipal approval for site development. No other approval requirements from other regulatory agencies are anticipated.

## **5 WATER SUPPLY AND FIRE PROTECTION**

### **5.1 Existing Water Supply Services and Fire Hydrant Coverage**

The subject property lies within the City of Ottawa 1W water distribution network pressure zone. Surrounding the property there is an existing 610 mm and 127 mm watermains within Bronson Avenue, a 406mm watermain within Carling Avenue, and a 203 mm watermain within Cambridge Street. There are currently two (2) existing fire hydrants within 45 m from the proposed Siamese connections; one within Bronson Avenue and another within the Cambridge Street right-of-way. There are several existing hydrants available to service the development; refer to **Appendix B** for the fire hydrant locations.

### **5.2 Water Supply Servicing Design**

According to the City of Ottawa Water Distribution Guidelines (Technical Bulletin ISDTB-2014-02), since the subject site has more than 50 residential units, it is required to be connected with two water service laterals for redundancy and to avoid creation of vulnerable service area. Inside the building the laterals will be looped and are to be designed by the mechanical engineer at the detailed design stage. The proposed water servicing should meet both domestic and fire protection water service. Considering the presence of automatic sprinkler system inside the building and a recommended size to service the sprinkler system, the subject property is proposed to be serviced via two (2) 150 mm diameter service connections that will be connected within the site by mechanical. One of the services will be connected to the 406 mm watermain located within



Carling Avenue for Phase 1, and the second service will be connected to the 203 mm watermain within Cambridge Street South for Phase 2. Refer to Site Servicing Plan C.401 in **Appendix E** for servicing layout and connection points.

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

**Table 1: City of Ottawa Design Guidelines 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
Other Commercial Average Daily Demand	2.8 L/m <sup>2</sup> /d
Restaurant	125 L/seat/d
Average Daily Demand	280 L/d/per
Office	75 L/9.3m <sup>2</sup> /d
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*

The interior layout and architectural floor plans have been reviewed, and it was determined that the 22-storey building will house **78** 1-bedroom units, **39** two-bedroom units, and **71** student housing units which consist of a total of 225 beds. The 9-storey building will house **69** studio/1-bedroom units, and **21** two-bedroom units. Based on the City of Ottawa Design guidelines for population projection, this translates to approximately **416.1** residents in Phase 1 and **140.7** residents in Phase 2. Tables 2 and Table 3 below summarize the proposed development as interpreted using Table 4.1 of the City of Ottawa Design Guidelines, and Appendix 4-A of the Sewer Design Guidelines.

**Table 2: Phase 1- Residential Population Estimate**

Proposed Unit type	Persons Per Unit	Number of Units	Population
1 Bedroom Apartment	1.4	78	109.2
2 Bedroom Apartment	2.1	39	81.9
Boarding/Student Housing	1 Person/bed	225 beds	225.0
<b>Total Residential Population</b>			<b>416.1</b>



**Table 3: Phase 2 - Residential Population Estimate**

Proposed Unit type	Persons Per Unit	Number of Units	Population
Studio/1 Bedroom	1.4	3	4.2
2 Bedroom Apartment	1.4	66	92.4
3 Bedroom Apartment	2.1	21	44.1
<b>Total Residential Population</b>			140.7

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

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

Where,

$q$  = average water consumption (L/capita/day)

$P$  = design population (capita)

$M$  = Peak factor

The following factors were used in calculations as per Table 3-3 in the MOE:

**Phase 1** (22-storey building)

- Maximum Daily Demand Residential Factor = **3.1**
- Maximum Daily Demand Commercial Factor = **1.5**
- Peak Hour Demand Residential Factor = **4.7**
- Peak Hour Demand Commercial Factor = **1.8**

**Phase 2** (9-storey building)

- Maximum Daily Demand Residential Factor = **5.0**
- Maximum Daily Demand Commercial Factor = **1.5**
- Peak Hour Demand Residential Factor = **7.4**
- Peak Hour Demand Commercial Factor = **1.8**

Using the above-mentioned factors and design parameters listed in Table 1, anticipated demands were calculated as follows:

**Phase 1** (22-storey building)

- Average daily domestic water demand is **1.40** L/s,
- Maximum daily demand is **4.31** L/s, and
- Maximum hourly is **6.41** L/s.

**Phase 1** (22-storey building)



- Average daily domestic water demand is **0.47 L/s**,
- Maximum daily demand is **2.29 L/s**, and
- Maximum hourly is **3.42 L/s**.

Refer to **Appendix B** for water demand calculations.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand, as indicated in the boundary request correspondence included in **Appendix B**. Table 4 below summarizes boundary conditions for the proposed development.

**Table 4: Summary of Anticipated Demands and Boundary Conditions**

Design Parameter	Previous Anticipated Demand (Revised Demands) (L/s)	Boundary Conditions @ Carling Avenue* for Previous Demands (m H <sub>2</sub> O / kPa)
<b>Average Daily Demand</b>	1.91(1.89)	114.7 / 381.6
<b>Max Day + Fire Flow (per FUS)</b>	4.73+350 (4.68 + 333.33)	107.9 / 314.9
<b>Peak Hour</b>	10.38 (10.26)	106.6 / 302.1
*Assumed Ground elevation at connection point = 75.80 m.		
Water demand calculation per City of Ottawa Water Design guidelines. See <b>Appendix B</b> for details.		

Calculated average day demand has decreased by 0.02 L/s (approximately 1%) since boundary conditions were requested. As indicated in Table 4, pressures in all scenarios meet the required pressure range stated in Table 1 as per City of Ottawa Design Guidelines. Refer to **Appendix B** for Boundary Conditions.

The estimated fire flow for the proposed buildings was calculated in accordance with *ISTB-2018-02*. The following parameters were provided by the Architect, see **Appendix A** for collaborating correspondence:

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

The fire flow demand for the site was estimated to be **23,000 L/min**, see **Appendix B** for details.

There are at least thirteen (**13**) existing fire hydrants in close proximity to the proposed buildings that are available to provide the required fire flow demands of 23,000 L/min. Refer to **Appendix B** for fire hydrant locations. Table 5 below summarizes the aggregate fire flow of the contributing hydrants in close proximity to the proposed development based on Table 18.5.4.3 of *ISTB-2018-02*.





**Table 5: Fire Protection Summary Table**

Building	Fire Flow Demand (L/min)	Fire Hydrants(s) within 75m	Fire Hydrant(s) within 150m	Fire Hydrant(s) within 300m	Available Combined Fire Flow (L/min)
Proposed multi-storey building	23,000	3	4	6	(3 x 5678) + (4 x 3785) + (6 x 2839) = 46,369

The total available fire flow from contributing hydrants is equal to at least **49,208 L/min** which is sufficient to provide adequate fire flow for the proposed development. A certified fire protection system specialist will need to be employed to design the building's fire suppression system and confirm the actual fire flow demand.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

## 6 SANITARY SERVICE

### 6.1 Existing Sanitary Sewer Services

There is an existing 375 mm dia. combined sewer within Bronson Avenue, and another 250 mm dia. combined sewer within Cambridge Street South across the subject site.

The post-development wet total flow was calculated to be **7.52 L/s**, combined for Phase 1 and 2, as a result of the proposed residential population and a small portion of infiltration. Refer to **Appendix C** for further information on the calculated sanitary flows.

### 6.2 Sanitary Sewer Servicing Design

The proposed development will be serviced via two (2) 150 mm dia. sanitary service laterals; one service dedicated for each phase of the development. Proposed wastewater flow from Phase 1 of the development was calculated to be **5.59 L/s**, which will be conveyed to the existing 375 mm dia. combined sewer within Bronson Avenue. Proposed wastewater flow from Phase 2 was calculated to be **1.93 L/s**, which will be conveyed to the existing 250 mm dia. combined sewer within Cambridge Street South. Refer to LRL drawing C.401 for the proposed sanitary servicing.

The parameters used to calculate the anticipated sanitary flows are; residential average population per unit of 1.4 person for single units and 2.1 persons for two-bedroom units, 3.1 persons per unit for three-bedroom units, a residential daily demand of 280 L/p/day, a residential peaking factor of 4.0 and a total infiltration rate of 0.33 L/s/ha. Based on these parameters and the total site area of 0.456 ha, the total anticipated sanitary flow was estimated to be **7.83 L/s**. Refer to **Appendix C** for the site sanitary sewer design sheet.



## 7 STORMWATER MANAGEMENT

### 7.1 Existing Stormwater Infrastructure

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system as such, approvals for the proposed development within this area are under the approval authority of the City of Ottawa.

In pre-development conditions, drainage from subject lots are divided where approximately 60% of the subject property, depicted by EWS-01 (0.273 ha), drains uncontrolled overland to the east side towards Bronson Ave., and the remaining 40%, depicted by EWS-02 (0.184 ha), drains uncontrolled overland to the west side of the site towards Cambridge St. S., refer to plan C701 included in **Appendix E** for pre-development drainage characteristics. There is currently an existing 375 mm dia. combined sewer within Bronson Ave, and a 250 mm dia. combined sewer within Cambridge St. S. right-of-way. Refer to **Appendix D** for pre-development and post-development watershed information.

### 7.2 Design Criteria

The stormwater management criteria for this development are based on the 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 Management Planning and Design Manual, 2003 (SWMP Manual).

#### 7.2.1 Water Quality

The subject property lies within the Ottawa River West sub-watershed and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA). It was determined that no further treatment is required for stormwater runoff from the proposed development. Correspondence with RVCA is included in **Appendix A**.

#### 7.2.2 Water Quantity

Based on pre-consultation with the City, correspondence included in **Appendix A**, the following stormwater management requirements for a combined sewer area were identified for the subject site:

- Meet an allowable release rate based on a Rational Method Coefficient of 0.40, employing the City of Ottawa IDF parameters for a 2-year storm with a calculated time of concentration equal to or greater than 10 minutes; and
- Attenuate all storms up to and including the City of Ottawa 100-year storm event on site.

To calculate the allowable storm release rate for the subject site, the proposed dry sanitary wastewater flow was deducted from the calculated pre-development 2-year release rate. The total allowable storm release rate was calculated to be **31.45 L/s** (38.97 L/s – 7.52 L/s). Refer to **Appendix D** for calculations.



### 7.3 Method of Analysis

The Modified Rational Method has been used to calculate the runoff rate from the site to quantify the detention storage required for quantity control of the development. Refer to **Appendix D** for storage calculations.

### 7.4 Proposed Stormwater Quantity Controls

The proposed stormwater management quantity control for this development will be accomplished using roof drains restricting the flow leaving the rooftop as well as proposed cisterns in the underground garage that will discharge at specified constant release rates. Storage required as a result of quantity control will be accomplished through a combination of rooftop storage and cisterns in the underground garage.

The subject site is proposed to be serviced via two 250 mm diameter storm sewer service laterals that will connect to the existing 375 mm combined sewer within Bronson Ave and existing 250 mm combined sewer within Cambridge St. S. The proposed servicing layout and connection points are shown on drawing C.401 in **Appendix E**, and detailed calculations can be found in **Appendix D**.

The existing site is delineated by catchments EWS-01, which currently drains uncontrolled towards the east of the property, and EWS-02 which drains to the west of the property.

The site has been analyzed and post-development watersheds have been allocated. To adhere to existing drainage characteristics, two outlets are proposed. Outlet 1 (in Phase 1) will be designed based on EWS-01 and Outlet 2 (in Phase 2) will be designed based on EWS-02. The allowable release rate in Phase 1 will be **17.70 L/s** and the allowable release rate in Phase 2 will be **13.75 L/s**.

#### 7.4.1 Phase 1 Outlet – Bronson Avenue

In order to achieve the allowable post-development stormwater release rate established in *Section 7.2.2*, above, Phase 1 of the proposed development will use rooftop storage as well as an internal cistern, to be designed by a mechanical engineer using the specified release rates determined in this analysis. The internal cistern and the roof drain outlet will discharge to the existing 375 mm diameter combined sewer within Bronson Avenue via a 250 mm diameter storm service lateral. Refer to C401 in **Appendix E** for servicing layout and connection points.

Table 6 below summarizes the Phase 1 post-development drainage areas. Calculations can be seen in **Appendix D**.

**Table 6: Phase 1 Drainage Areas**

Drainage Name	Area (ha)	Weighted Runoff Coefficient	100 Year Weighted Runoff Coefficient (25% increase)
WS-06 (ROOF)	0.009	0.90	1.0
WS-07 (ROOF)	0.016	0.90	1.0



WS-08 (ROOF)	0.017	0.90	1.00
WS-09 (ROOF)	0.011	0.90	1.00
WS-10 (ROOF)	0.011	0.90	1.00
WS-11 (ROOF)	0.008	0.90	1.00
WS-12 (ROOF)	0.018	0.90	1.00
WS-13 (ROOF)	0.006	0.90	1.00
WS-14 (ROOF)	0.011	0.90	1.00
WS-15 (ROOF)	0.011	0.90	1.00
WS-16 (ROOF)	0.008	0.90	1.00
WS-17 (CONTROLLED)	0.071	0.84	1.00
WS-18 (UNCONTROLLED)	0.016	0.78	1.00

The roof top of the 22-storey building in Phase 1 will include a total of **16** roof drains. Four (4) of the roof drains will not be controlled and will not provide any roof storage. The flows from these four (4) roofs drains will be carried to the cistern in Phase 1. The remaining twelve (12) roof drains will be controlled to a flow of **0.63L/s** and are to be Watts RD-100-A with a closed exposed weir opening. The total controlled flow rate from the rooftop in Phase 1 will be **6.93L/s**. See **Appendix D** for more information on the selected roof drains and flow restrictors. See drawing C.601 in **Appendix E** for roof drain locations and information.

The total available roof storage ( $m^3$ ) has been calculated using the following formula:

$$V = \left( \frac{D_{Sl} * A_{Eff}}{3} \right)$$

Where:

V = available (provided) rooftop storage ( $m^3$ )

$D_{Sl}$  = slope ponding depth (m)

$A_{Eff}$  = effective roof area ( $m^2$ )

Based on the equation above, it was calculated that **45.91 m<sup>3</sup>** of rooftop storage would be available in the 100-year event for phase 1. For additional details on the calculations for available area of rooftop storage, refer to **Appendix D**.

Table 7 below summarizes the release rates and storage volumes required to meet the Phase 1 weighted allowable release rate of **17.71 L/s** for 100-year flow rates. This release rate was calculated based on the area of EWS-01.



**TABLE 7: SUMMARY OF RELEASE RATES AND STORAGE VOLUMES FOR PHASE 1**

Catchment Area / Associated Roof Drain Number	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m3)	Total Available Storage (m3)
WS-06 (ROOF) / RD6	0.009	0.63	2.78	3.89
WS-07 (ROOF) / RD7	0.016	0.63	6.70	6.95
WS-08 (ROOF) / RD8 & RD9	0.017	1.26	5.39	6.86
WS-09 (ROOF) / RD10	0.011	0.63	3.94	4.94
WS-10 (ROOF) / RD11	0.011	0.63	3.94	4.98
WS-11 (ROOF) / RD12	0.008	0.63	2.71	3.04
WS-12 (ROOF) / RD13	0.018	0.63	8.11	8.41
WS-13 (ROOF) / RD16	0.006	0.63	1.58	2.73
WS-14 (ROOF) / RD17	0.011	0.63	4.05	4.89
WS-15 (ROOF) / RD18	0.011	0.63	4.19	5.04
WS-16 (ROOF) / RD19	0.008	0.63	2.53	3.38
WS-17 (CONTROLLED) Cistern	0.071	2.42	30.90	35.00
WS-18 (UNCONTROLLED)	0.016	7.72	0.00	0.00
<b>TOTAL</b>	<b>0.213</b>	<b>17.71</b>	<b>76.82</b>	<b>90.11</b>

It is calculated that a total of **76.82 m<sup>3</sup>** of storage will be required to attenuate flows to the allowable release rate of **17.71 L/s** for Phase 1. The project runoff exceeding the allowable release rate will be stored on-site via rooftop ponding at the building rooftop and an internal building cistern. Approximate **30.90 m<sup>3</sup>** of cistern storage will be required in Phase 1 to attenuate runoff to the specified allowable release rate. The cistern is required to discharge at **2.42 L/s** to ensure the allowable release rate is respected. The 100-year maximum ponding extents can be found on drawing “C601 – Stormwater Management Plan” of **Appendix E**.

#### 7.4.2 Phase 2 Outlet – Cambridge Street South

Phase 2 of proposed development will also use rooftop storage and an internal cistern, to be designed by a mechanical engineer using the specified release rates determined in this analysis. The internal cistern and the roof drain outlet will discharge to the existing 250 mm diameter combined sewer within Cambridge Street South via a 250 mm diameter storm service lateral. Refer to C401 in **Appendix E** for servicing layout and connection points.

Table 8 below summarizes Phase 2 post-development drainage areas. Calculations can be seen in **Appendix D**.





**Table 8: Phase 2 Drainage Areas**

Drainage Name	Area (ha)	Weighted Runoff Coefficient	100 Year Weighted Runoff Coefficient (25% increase)
WS-01 (ROOF)	0.014	0.90	1.00
WS-02 (ROOF)	0.019	0.90	1.00
WS-03 (ROOF)	0.014	0.90	1.00
WS-04 (ROOF)	0.016	0.90	1.00
WS-05 (ROOF)	0.016	0.90	1.00
WS-20 (CONTROLLED)	0.149	0.69	0.86
WS-19 (UNCONTROLLED)	0.015	0.69	0.86

The roof top of the 9-storey building in Phase 2 will include a total of seven (**7**) roof drains. Two (2) of the roof drains will not be controlled and will not provide any roof storage. The flows from these two (2) roofs drains will be carried to the cistern in Phase 2. The controlled roof drains are to be Watts RD-100-A. Four (4) of the controlled roof drains will have a fully exposed weir opening and be controlled to a flow of **0.63 L/s** and one (1) of the controlled roof drains will have a ¼ opened weir opening and will be controlled to a flow of **0.95L/s**. The total controlled flow rate from the rooftop in Phase 2 will be **3.47 L/s**. See **Appendix D** for more information on the selected roof drains and flow restrictors. See drawing C.601 in **Appendix E** for roof drain locations and information.

It was calculated that **32.03 m<sup>3</sup>** of rooftop storage is available in the 100-year event for phase 2. For additional details on the calculations for available area of rooftop storage, refer to **Appendix D**.

Table 9 below summarizes the release rates and storage volumes required to meet the phase 2 weighted allowable release rate of **13.75 L/s** for the 100-year flow rates. This release rate was calculated based on the area of EWS-02.

**Table 9: Summary of Release Rates and Storage Volumes for Phase 2**

Catchment Area	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m <sup>3</sup> )	Total Available Storage (m <sup>3</sup> )
WS-01 (ROOF) / RD1	0.014	0.63	5.39	6.08
WS-02 (ROOF) / RD2	0.019	0.63	8.62	8.90
WS-03 (ROOF) / RD3	0.014	0.63	5.56	6.10
WS-04 (ROOF) / RD4	0.016	0.95	5.90	6.55



WS-05 (ROOF) / RD5	0.016	0.63	6.56	7.25
WS-20 (CONTROLLED) CISTERN	0.149	3.69	59.30	60.00
WS-19 (UNCONTROLLED)	0.015	6.59	0.00	0.00
<b>TOTAL</b>	<b>0.244</b>	<b>13.75</b>	<b>91.34</b>	<b>94.88</b>

It is calculated that a total of **91.34 m<sup>3</sup>** of storage will be required to attenuate flows to the allowable release rate of **13.75 L/s** for Phase 2. The project runoff exceeding the allowable release rate will be stored on-site via rooftop ponding at the building rooftop and an internal building cistern. Approximately **60.00 m<sup>3</sup>** of cistern storage will be required in Phase 2 to attenuate runoff to the specified allowable release rate. The cistern is required to discharge at **3.69 L/s** to ensure the allowable release rate is respected. The 100-year maximum ponding depths can be found on drawing “C601 – Stormwater Management Plan” of **Appendix E**.

## 8 EROSION AND SEDIMENT CONTROL

During construction, erosion and sediment controls will be provided primarily via a sediment control fence to be erected along the perimeter of the site where runoff has the potential of leaving the site. Inlet sediment control devices are also to be provided in any catch basin and/or manholes in and around the site that may be impacted by the site construction. Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification OPSS 577. Refer to LRL Associates drawing C.101 for erosion and sediment control details.

## 9 CONCLUSION

This Stormwater Management and Servicing Report for the development proposed at 770-774 Bronson Avenue presents the rationale and details for the servicing requirements for the subject property.

In accordance with the report objectives, the servicing requirements for the development are summarized below:

### Water Service

- The maximum required fire flow was calculated at **23,000 L/min** using the FUS method.
- There are thirteen (13) existing fire hydrants available to service the proposed development. They will provide a combined fire flow of **49,208 L/min** to the site.



- The new development will be serviced with two 150 mm $\Phi$  water service connections to be connected to the existing 406 mm $\Phi$  watermain within Carling Avenue (for Phase 1) and the existing 203 mm $\Phi$  watermain within Cambridge Street South (for Phase 2).
- Boundary conditions received from the City of Ottawa indicate that sufficient pressure is available at Carling Ave to service the proposed site.

### Sanitary Service

- The total anticipated sanitary flow from the proposed development is **7.52 L/s**.
- Phase 1 of the proposed development will discharge **5.59 L/s** to the existing 375 mm dia. combined sewer within Bronson Avenue via a proposed 150 mm diameter sanitary service lateral.
- Phase 2 of the proposed development will discharge **1.93 L/s** to the existing 250 mm dia. combined sewer within Cambridge Street South via a proposed 150 mm diameter sanitary service lateral.

### Stormwater Management

- Stormwater quality control are not required as per consultation with RVCA.
- The storm water release rates from the proposed development will meet the calculated allowable release rate of **31.45 L/s**.
- Stormwater quantity control objectives will be met through on-site storm water ponding on the roof and internal building cisterns to be designed by a mechanical engineer.

## 10 REPORT CONDITIONS AND LIMITATIONS

The report conclusions are applicable only to this specific project described in the preceding pages. Any changes, modifications or additions will require a subsequent review by LRL Associates Ltd. to ensure the compatibility with the recommendations contained in this document. If you have any questions or comments, please contact the undersigned.

Prepared by:

**LRL Associates Ltd.**



Tamara Harb  
Civil EIT



Mohan Basnet, P. Eng.  
Civil Engineer



## **APPENDIX A**

### **Pre-consultation / Correspondence**



## DEVELOPMENT SERVICING STUDY CHECKLIST

Project #: 200436

Date: 2021-03-04

### 4.1 General Content

Executive Summary (for larger reports only).	N/A
Date and revision number of the report.	Report Cover Sheet
Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
Plan showing the site and location of all existing services.	Figure 1
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.	Section 1.0
Summary of Pre-consultation Meetings with City and other approval agencies.	Section 4.0 & Appendix 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 defensible design criteria.	Section 5.1, 6.1, 7.1
Statement of objectives and servicing criteria.	Section 1.0
Identification of existing and proposed infrastructure available in the immediate area.	Section 5.1, 6.1, 7.1
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).	Section 7.0
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.	C301



Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts. N/A

Proposed phasing of the development, if applicable. N/A

Reference to geotechnical studies and recommendations concerning servicing. C401

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

◦Metric scale

◦North arrow (including construction North)

◦Key plan

◦Name and contact information of applicant and property owner C401

◦Property limits including bearings and dimensions

◦Existing and proposed structures and parking areas

◦Easements, road widening and rights-of-way

◦Adjacent street names

## 4.2 Development Servicing Report: Water

Confirm consistency with Master Servicing Study, if available N/A

Availability of public infrastructure to service proposed development Section 5.1

Identification of system constraints Section 5.1

Identify boundary conditions Section 5.2

Confirmation of adequate domestic supply and pressure Section 5.2

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. Section 5.2

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.	Section 5.2
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	Section 5.2
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.	Section 5.2
Description of off -site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 5.2
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

#### **4.3 Development Servicing Report: Wastewater**

Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 6.2
Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A

Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 6.1
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)	N/A
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Section 6.2 Appendix C
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 6.2
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.	Section 6.1
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
Special considerations such as contamination, corrosive environment etc.	N/A

#### **4.4 Development Servicing Report: Stormwater Checklist**

Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 7.1
---	-------------

Analysis of available capacity in existing public infrastructure.	N/A
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	N/A
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.	Section 7.2.2
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 7.2.1
Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 7.4
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/A
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).	Section 7.4
Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 7.4 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.	Appendix D
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 Identification of municipal drains and related approval requirements.	N/A
Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 7.4
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	NA
Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 8.0
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: Checklist**



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 Checklist**

Clearly stated conclusions and recommendations

Section 9.0

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.

Noted

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

Noted

## Amr Salem

---

**From:** Rebecca Dam <rdam@figurr.ca>  
**Sent:** October 23, 2020 1:09 PM  
**To:** Amr Salem  
**Cc:** Tanya Chowieri; Roberto Campos; Melissa Du Plessis; Virginia Johnson; Maxime Longtin; Mohan Basnet  
**Subject:** RE: 200436- RE: 2025 Katasa- Civil Coordination  
**Attachments:** 2025 GFA Per Floor.pdf; 2025 Unit Breakdown.pdf; 2025\_East Elevation.png; 2025\_North Elevation.png; 2025\_South Elevation.png; 2025\_West Elevation.png

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Amr, please see below and attached our response to your questions.

Let me know if you need anything else.

Thanks,  
Rebecca

**Rebecca Dam** OAA M.Arch B.A.S ORSA  
Architect

**Figurr**  
architects collective  
[figurr.ca](http://figurr.ca)

**FIG. 1**  
190 Somerset St W #206  
Ottawa ON  
K2P 0J4  
T 613 695-6122 X 304  
M 613 618-3286

**FIG. 2**  
3550, Saint-Antoine O.  
Montréal QC  
H4C 1A9  
T 514 861-5122

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---

**From:** Amr Salem <asalem@lrl.ca>  
**Sent:** Tuesday, October 20, 2020 11:25 AM  
**To:** Rebecca Dam <rdam@figurr.ca>  
**Cc:** Tanya Chowieri <tanya@katasa.ca>; Roberto Campos <rcampos@figurr.ca>; Melissa Du Plessis <mduplessis@figurr.ca>; Virginia Johnson <vjohanson@lrl.ca>; Maxime Longtin <mlongtin@lrl.ca>; Mohan Basnet <mbasnet@lrl.ca>  
**Subject:** RE: 200436- RE: 2025 Katasa- Civil Coordination

Hey Rebecca,

Thanks for your prompt response.

A few points;

- So we can assume a max storage/ponding depth of 150mm can be provided on the majority of surface area of the 9<sup>th</sup> floor rooftop , tower rooftop and mech room rooftop over tower? — Yes
- I couldn't find elevations drawings. Please provide those ASAP once they're available. It's essential for our grading.— Attached are the elevations, note that the elevations are still a work in progress

As promised, the following info. is needed to estimate the fireflow demand. Please note the info below is needed to request boundary conditions from the City which is a lengthy process ( takes at least 2 weeks typically.)

- Can you please provide a breakdown of unit types? I only need them listed based on # of bedrooms. — See attached unit type chart
- Can you please confirm the total floor area (excluding U/G parking)? — See attached floor area chart. We will indicate this on our site plan as well.
- Can you confirm if sprinklers are proposed for the building? If yes, please specify if sprinkler system is **fully supervised** and **automatic**? — Yes- fully supervised by the fire alarm system and will be an automatic system
- Kindly provide the **ISO class** for the building as per ISO Guide sections 1, 2 and 3. I have included a brief summary of ISO Guide (review chapter 2 for construction types) as well as the section from the City's technical bulletin. Note that ISO refers only to fire-resistive for fire ratings not less than 1-hour. — Class 4

A. Determine the type of construction.

- Coefficient *C* in the FUS method is equivalent to coefficient *F* in the ISO method:

**Correspondence between FUS and ISO construction coefficients**

FUS type of construction	ISO class of construction	Coefficient <i>C</i>
Fire-resistive construction	Class 6 (fire resistive)	0.6
	Class 5 (modified fire resistive)	0.6
Non-combustible construction	Class 4 (masonry non-combustible)	0.8
	Class 3 (non-combustible)	0.8
Ordinary construction	Class 2 (joisted masonry)	1.0
Wood frame construction	Class 1 (frame)	1.5

However, the FUS definition of fire-resistive construction is more restrictive than those of ISO construction classes 5 and 6 (modified fire resistive and fire resistive). FUS requires structural members and floors in buildings of fire-resistive construction to have a fire-resistance rating of 3 hours or longer.

- With the exception of fire-resistive construction that is defined differently by FUS and ISO, practitioners can refer to the definitions of the ISO construction classes (and the supporting definitions of the types of materials and assemblies that make up the ISO construction classes) found in the current ISO guide [4] (see Annex i) to help select coefficient *C*.
- To identify the most appropriate type of construction for buildings of mixed construction, the rules included in the current ISO guide [4] can be followed (see Annex i). For a building to be assigned a given classification, the rules require  $\frac{2}{3}$  (67%) or more of the total wall area and  $\frac{2}{3}$  (67%) or more of the total floor and roof area of the building to be constructed according to the given construction class or a higher class.
- New residential developments (less than 4 storeys) are predominantly of wood frame construction ( $C = 1.5$ ) or ordinary construction ( $C = 1.0$ ) if exterior walls are of brick or masonry. Residential buildings with exterior walls of brick or masonry veneer and those with less than  $\frac{2}{3}$  (67%) of their exterior walls made of brick or masonry are considered wood frame construction ( $C = 1.5$ ).

Feel free to contact me with any questions.

Thanks,



**Amr Salem, EIT**

Civil Designer

**LRL Associates Ltd.**

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Ottawa, Ontario K1J 9G2

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## Amr Salem

---

**From:** Wu, John <John.Wu@ottawa.ca>  
**Sent:** October 27, 2020 1:06 PM  
**To:** Amr Salem; Mottalib, Abdul  
**Subject:** RE: 770-774 Bronson SWM Quantity Control Criteria

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi, Amr:

The storm water management criteria is to control 2, 5, 100 year's storm to the site using C0.4, 2 year's storm event release rate.

Thanks.

John

---

**From:** Amr Salem <asalem@lrl.ca>  
**Sent:** October 27, 2020 12:52 PM  
**To:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>  
**Subject:** RE: 770-774 Bronson SWM Quantity Control Criteria

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Hello Abdul, John,

Sorry for the confusion, my email now is [asalem@lrl.ca](mailto:asalem@lrl.ca). Please delete my previous e-mail from your contact list to avoid any confusion.

Regarding this file, please find attached the submission list provided on Dec 20,2019 which appoints John Wu as the infrastructure PM, hence my email. I also attached preconsult follow up correspondence.

Please let me know if someone else has taken this over since?

Thanks,

**Amr Salem, EIT**  
Civil Designer

## Amr Salem

---

**From:** Jamie Batchelor <jamie.batchelor@rvca.ca>  
**Sent:** March 3, 2021 3:45 PM  
**To:** Amr Salem  
**Cc:** Eric Lalande  
**Subject:** RE: (LRL#200436) - 770-774 Bronson Ave - SWM Quality Control Criteria

Hi Amr,

I can confirm that if the stormwater is being directed to combined sewers, no onsite water quality control measures are required save and except best management practices. We would encourage you to look at the opportunity to incorporate LID components into the stormwater management plan.

Jamie Batchelor, MCIP, RPP  
Planner, ext. 1191  
[jamie.batchelor@rvca.ca](mailto:jamie.batchelor@rvca.ca)



3889 Rideau Valley Drive  
PO Box 599, Manotick ON K4M 1A5  
T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | [www.rvca.ca](http://www.rvca.ca)

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---

**From:** Amr Salem <asalem@lrl.ca>  
**Sent:** Tuesday, March 2, 2021 5:11 PM  
**To:** Jamie Batchelor <jamie.batchelor@rvca.ca>  
**Subject:** RE: (LRL#200436) - 770-774 Bronson Ave - SWM Quality Control Criteria

Hey Jamie,

I just wanted to follow up on this, can you please confirm the below.



Thanks,

**Amr Salem**

Civil Designer

**LRL Associates Ltd.**

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---

**From:** Amr Salem  
**Sent:** October 27, 2020 2:32 PM  
**To:** [Jamie.batchelor@rvca.ca](mailto:Jamie.batchelor@rvca.ca)  
**Subject:** (LRL#200436) - 770-774 Bronson Ave - SWM Quality Control Criteria

Hello Jamie,

I wanted to consult with you regarding a residential mixed-use development, we are working on located on 770-774 Bronson Ave and 557 Cambridge Street.

Existing runoff from the subject properties drain into existing combined sewers in Carling Ave & Bronson Ave right-of-ways, see figure below;





Figure 1 Subject Properties

Can you please confirm that no quality controls will be required since the proposed development will discharge into a combined sewer?

Thank you,



**Amr Salem, EIT**

Civil Designer

**LRL Associates Ltd.**

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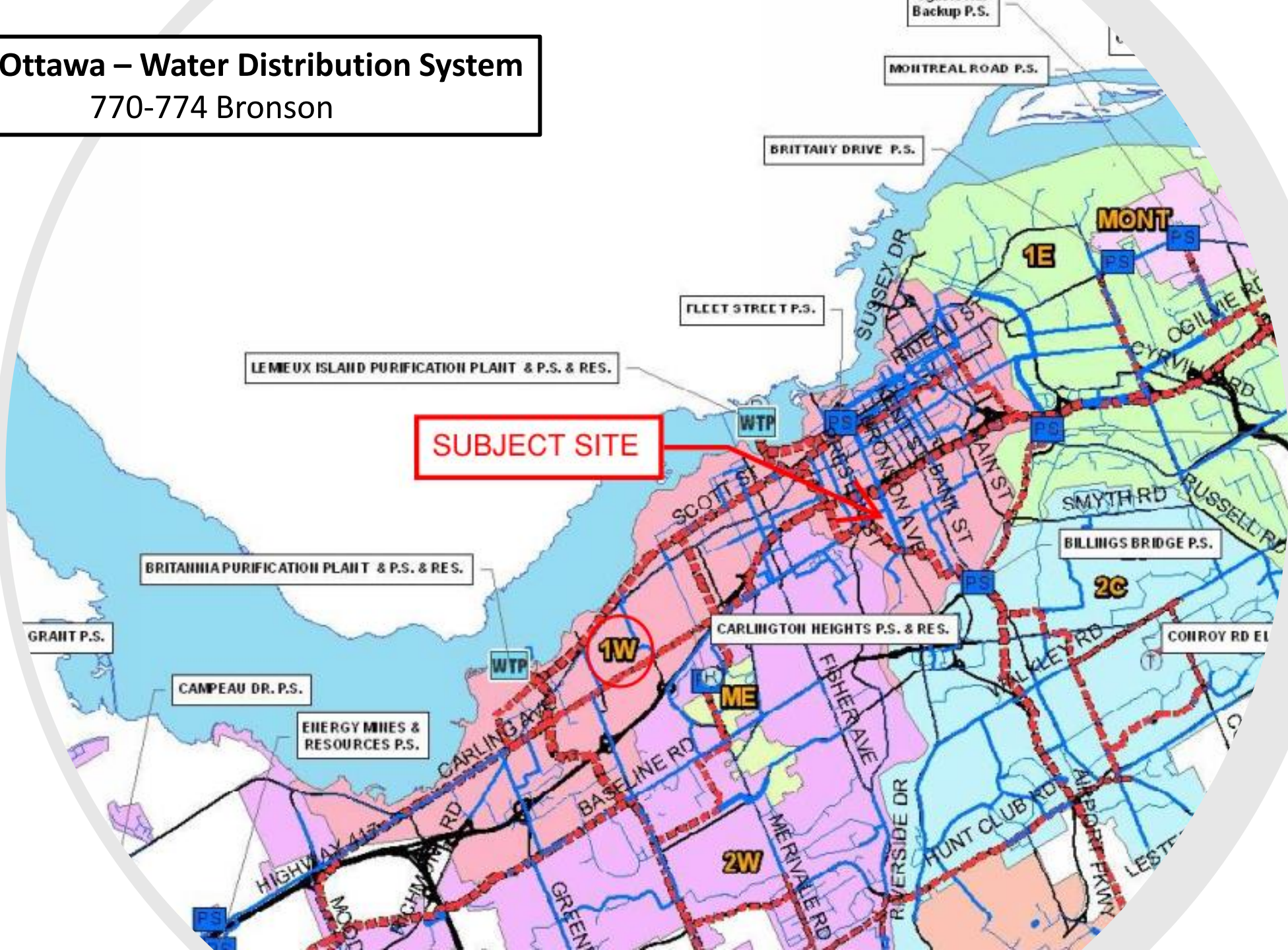
## **APPENDIX B**

### **Water Supply Calculations**



# City of Ottawa – Water Distribution System

770-774 Bronson

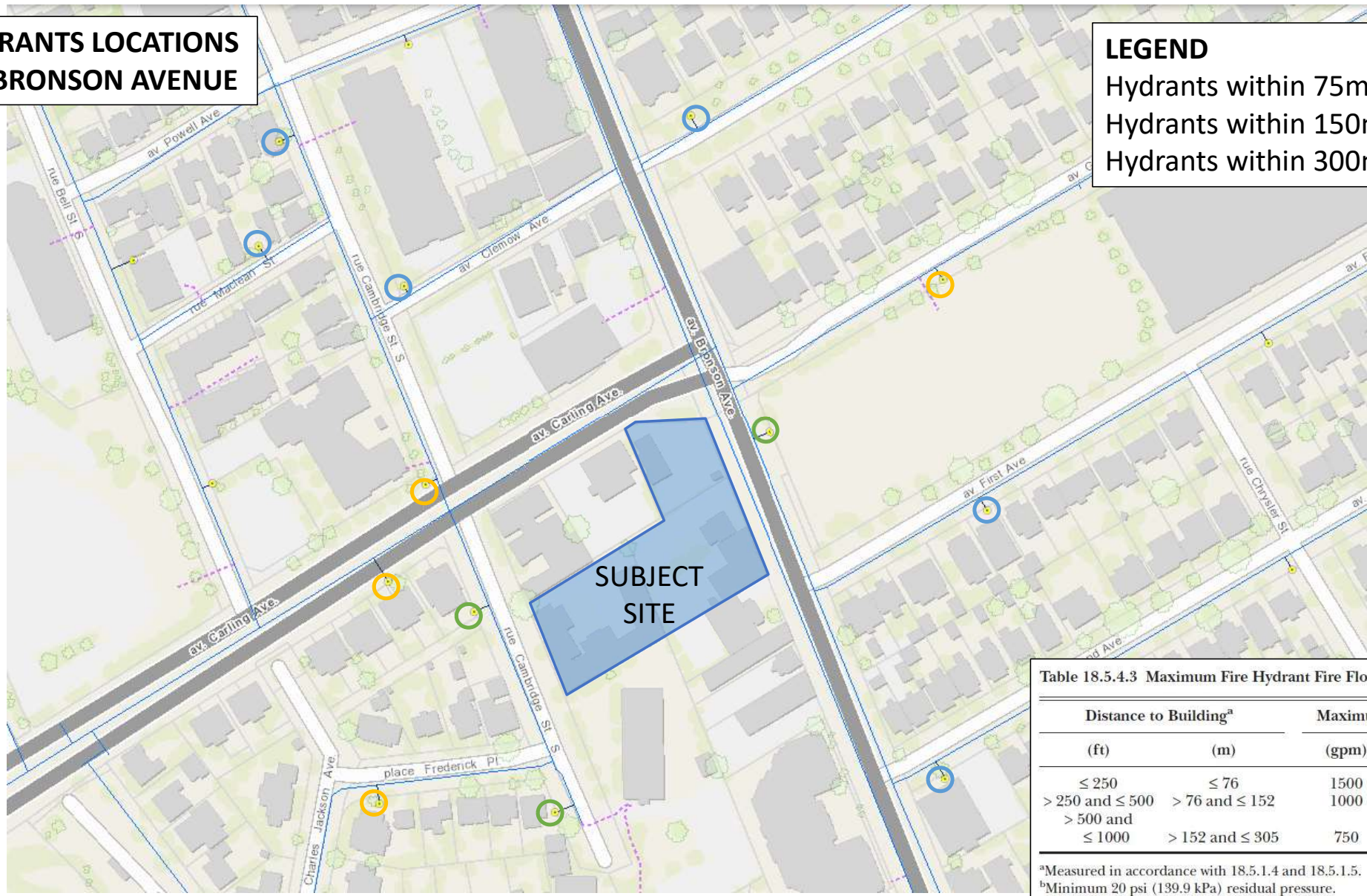




**FIRE HYDRANTS LOCATIONS  
770-774 BRONSON AVENUE**

**LEGEND**

- Hydrants within 75m ○
- Hydrants within 150m ○
- Hydrants within 300m ○



**Table 18.5.4.3 Maximum Fire Hydrant Fire Flow Capacity**

Distance to Building <sup>a</sup>		Maximum Capacity <sup>b</sup>	
(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

<sup>a</sup>Measured in accordance with 18.5.1.4 and 18.5.1.5.  
<sup>b</sup>Minimum 20 psi (139.9 kPa) residual pressure.



**Water Supply Calculations**  
 LRL File No. 200436  
 Date 2022-11-22  
 Prepared by Tamara Harb

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

Domestic Demand			
Unit Type	Persons Per Unit	Phase 1	Phase 1
		Number of Units	Population
Studio Apatment	1.4	0	0
1 Bedroom Apartment	1.4	78	109.2
2 Bedroom Apartment	2.1	39	81.9
Type of Housing	Persons Per Bed	Beds	Population
Boarding*	1	225	225.0
		<b>Total</b>	<b>416.1</b>

\*Based on a daily demand of 200L/day per person as identified by Appendix 4-A of the Sewer design guidelines.

Phase 1 Domestic Demand			
Average Water Consumption Rate	280	L/c/d	
<b>Average Day Demand</b>	<b>116,508</b>	<b>L/d</b>	<b>1.35</b> L/s
Maximum Day Factor	3.1		( Design Guidelines- Table 3-3 MOE)
<b>Maximum Daily Demand</b>	<b>365,353</b>	<b>L/d</b>	<b>4.23</b> L/s
Peak Hour Factor	4.7		( Design Guidelines- Table 3-3 MOE)
<b>Maximum Hour Demand</b>	<b>545,090</b>	<b>L/d</b>	<b>6.31</b> L/s

Institutional / Commercial / Industrial Demand			
Property Type	Unit Rate	Units (m <sup>2</sup> )	Demand (L/d)
Restaurant/Café**	125 L/seat/d	105	1411.3
Office	75 L/9.3m <sup>2</sup> /d	41	330.6
Amenities	2.8 L/m <sup>2</sup> /d	1097	3071.6

\*\*Estimated number of seats at 1 seat per 9.3 m<sup>2</sup>

<b>Average Day Demand</b>	<b>4,814</b>	<b>L/d</b>	<b>0.06</b>	<b>L/s</b>
Maximum Day Factor	1.5		( Design Guidelines-Water Distribution Table 4.2)	
<b>Maximum Daily Demand</b>	<b>7,220</b>	<b>L/d</b>	<b>0.08</b>	<b>L/s</b>
Peak Hour Factor	1.8		( Design Guidelines-Water Distribution Table 4.2)	
<b>Maximum Hour Demand</b>	<b>8,664</b>	<b>L/d</b>	<b>0.10</b>	<b>L/s</b>

PHASE 1 - TOTAL DEMAND				
<b>Average Day Demand</b>	<b>121,322</b>	<b>L/d</b>	<b>1.40</b>	<b>L/s</b>
<b>Maximum Daily Demand</b>	<b>372,574</b>	<b>L/d</b>	<b>4.31</b>	<b>L/s</b>
<b>Maximum Hour Demand</b>	<b>553,754</b>	<b>L/d</b>	<b>6.41</b>	<b>L/s</b>

**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:

$$\begin{aligned} \text{Minimum pipe diameter (d)} &= (4Q/\pi V)^{1/2} \\ &= 0.067 \quad \text{m} \\ &= 67 \quad \text{mm} \end{aligned}$$

$$\begin{aligned} \text{Proposed pipe diameter (d)} &= 150 \quad \text{mm} \\ &= 6 \quad \text{Inches} \end{aligned}$$



**Water Supply Calculations**  
 LRL File No. 200436  
 Date 2022-11-22  
 Prepared by Tamara Harb

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

Domestic Demand			
Unit Type	Persons Per Unit	Phase 1	Phase2
		Number of Units	Number of Units
Studio Apatment	1.4	3	4.2
1 Bedroom Apartment	1.4	66	92.4
2 Bedroom Apartment	2.1	21	44.1
		<b>Total</b>	<b>140.7</b>

\*Based on a daily demand of 200L/day per person as identified by Appendix 4-A of the Sewer design guidelines.

Phase 2 Domestic Demand			
Average Water Consumption Rate	280 L/c/d		
<b>Average Day Demand</b>	<b>39,396 L/d</b>	<b>0.46 L/s</b>	
Maximum Day Factor	5.0	( Design Guidelines- Table 3-3 MOE)	
<b>Maximum Daily Demand</b>	<b>195,647 L/d</b>	<b>2.26 L/s</b>	
Peak Hour Factor	7.4	( Design Guidelines- Table 3-3 MOE)	
<b>Maximum Hour Demand</b>	<b>293,164 L/d</b>	<b>3.39 L/s</b>	

**PHASE 2**

Institutional / Commercial / Industrial Demand			
Property Type	Unit Rate	Units (m <sup>2</sup> )	Demand (L/d)
Restaurant/Café**	125 L/seat/d	0	0.0
Office	75 L/9.3m <sup>2</sup> /d	20	161.3
Amenities	2.8 L/m <sup>2</sup> /d	457	1279.6

\*\*Estimated number of seats at 1 seat per 9.3 m<sup>2</sup>

<b>Average Day Demand</b>	<b>1,441 L/d</b>	<b>0.02 L/s</b>	
Maximum Day Factor	1.5	( Design Guidelines-Water Distribution Table 4.2)	
<b>Maximum Daily Demand</b>	<b>2,161 L/d</b>	<b>0.03 L/s</b>	
Peak Hour Factor	1.8	( Design Guidelines-Water Distribution Table 4.2)	
<b>Maximum Hour Demand</b>	<b>2,594 L/d</b>	<b>0.03 L/s</b>	

PHASE 2 - TOTAL DEMAND			
<b>Average Day Demand</b>	<b>40,837 L/d</b>	<b>0.47 L/s</b>	
<b>Maximum Daily Demand</b>	<b>197,808 L/d</b>	<b>2.29 L/s</b>	
<b>Maximum Hour Demand</b>	<b>295,758 L/d</b>	<b>3.42 L/s</b>	

**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) =  $(4Q/\pi V)^{1/2}$   
 = 0.049 m  
 = 49 mm

Proposed pipe diameter (d) = 150 mm  
 = 6 Inches



**Water Supply Calculations**  
 LRL File No. 200436  
 Date 2022-11-22  
 Prepared by Tamara Harb

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

Domestic Demand						
Unit Type	Persons Per Unit	Phase 1	Phase2	Phase 1	Phase 2	Combined Population
		Number of Units	Number of Units	Population	Population	
Studio Apatment	1.4	0	3	0	4.2	4.2
1 Bedroom Apartment	1.4	78	66	109.2	92.4	201.6
2 Bedroom Apartment	2.1	39	21	81.9	44.1	126
Type of Housing	Persons Per Bed	Beds	Beds	Population	Population	
Boarding*	1	225	0	225.0	0	225
			<b>Total</b>	<b>416.1</b>	<b>140.7</b>	<b>556.8</b>

\*Based on a daily demand of 200L/day per person as identified by Appendix 4-A of the Sewer design guidelines.

Combined Domestic Demand			
Average Water Consumption Rate	280 L/c/d		
<b>Average Day Demand</b>	<b>155,904 L/d</b>	<b>1.80</b>	<b>L/s</b>
Maximum Day Factor	2.8	( Design Guidelines- Table 3-3 MOE)	
<b>Maximum Daily Demand</b>	<b>432,094 L/d</b>	<b>5.00</b>	<b>L/s</b>
Peak Hour Factor	4.1	( Design Guidelines- Table 3-3 MOE)	
<b>Maximum Hour Demand</b>	<b>643,913 L/d</b>	<b>7.45</b>	<b>L/s</b>

**COMBINED**

Institutional / Commercial / Industrial Demand			
Property Type	Unit Rate	Units (m <sup>2</sup> )	Demand (L/d)
Restaurant/Café**	125 L/seat/d	105	1411.3
Office	75 L/9.3m <sup>2</sup> /d	61	491.9
Amenities	2.8 L/m <sup>2</sup> /d	1554	4351.2

\*\*Estimated number of seats at 1 seat per 9.3 m<sup>2</sup>

<b>Average Day Demand</b>	<b>6,254 L/d</b>	<b>0.07</b>	<b>L/s</b>
Maximum Day Factor	1.5	( Design Guidelines-Water Distribution Table 4.2)	
<b>Maximum Daily Demand</b>	<b>9,382 L/d</b>	<b>0.11</b>	<b>L/s</b>
Peak Hour Factor	1.8	( Design Guidelines-Water Distribution Table 4.2)	
<b>Maximum Hour Demand</b>	<b>11,258 L/d</b>	<b>0.13</b>	<b>L/s</b>

**COMBINED - TOTAL DEMAND**

<b>Average Day Demand</b>	<b>162,158 L/d</b>	<b>1.88</b>	<b>L/s</b>
<b>Maximum Daily Demand</b>	<b>441,475 L/d</b>	<b>5.11</b>	<b>L/s</b>
<b>Maximum Hour Demand</b>	<b>655,171 L/d</b>	<b>7.58</b>	<b>L/s</b>

**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:

$$\begin{aligned} \text{Minimum pipe diameter (d)} &= (4Q/\pi V)^{1/2} \\ &= 0.073 \text{ m} \\ &= 73 \text{ mm} \end{aligned}$$

$$\begin{aligned} \text{Proposed pipe diameter (d)} &= 150 \text{ mm} \\ &= 6 \text{ Inches} \end{aligned}$$



## Fire Flow Calculations

LRL File No. 200436  
 Date November 24, 2022  
 Method Fire Underwriters Survey (FUS)  
 Prepared by Tamara Harb

Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow	
<b>Structural Framing Material</b>									
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					
<b>Floor Space Area (A)</b>									
2			Total area			39,364	m <sup>2</sup>		
3	Obtain fire flow before reductions	Required fire flow	$Fire\ Flow = 220 \times C \times A^{0.5}$					L/min	34,919
<b>Reductions or surcharge due to factors affecting burning</b>									
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-25%	Limited combustible	-15%	L/min	29,681	
			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	14,841	
			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	10.1 to 20m	15%	L/min	23,003		
			East side	>30m	0%				
			South side	3.1 to 10m	20%				
			West side	3.1 to 10m	20%			55%	
<b>Net required fire flow</b>									
7	Obtain fire flow, duration, and volume					Minimum required fire flow rate (rounded to nearest 1000)	L/min	23,000	
						Minimum required fire flow rate	L/s	383.3	
						Required duration of fire flow	hr	5.25	

## Amr Salem

---

**From:** Wu, John <John.Wu@ottawa.ca>  
**Sent:** November 9, 2020 1:44 PM  
**To:** Amr Salem  
**Subject:** RE: (LRL-200436) 770-774 Bronson Mixed-Use Bldg - Boundary Condition Request  
**Attachments:** 770-774 Bronson Avenue November 2020.pdf

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

### Here is the result:

The following are boundary conditions, HGL, for hydraulic analysis at 770-774 Bronson (zone 1W). The boundary conditions are at the connections to the 406mm on Carling Avenue and 127mm on Bronson Avenue (see attached PDF for location).

Connection 1 - 406mm on Carling Avenue:

Minimum HGL = 106.6m

Maximum HGL = 114.7m

MaxDay + Fire Flow (350 L/s) = 107.9m

Connection 2 - 127mm on Bronson Avenue:

Minimum HGL = 105.9m

Maximum HGL = 114.7m

Available Fire Flow @ 20psi = 32 L/s

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.*

John

---

**From:** Amr Salem <asalem@lrl.ca>  
**Sent:** November 3, 2020 11:27 AM  
**To:** Wu, John <John.Wu@ottawa.ca>  
**Cc:** Mohan Basnet <mbasnet@lrl.ca>  
**Subject:** FW: (LRL-200436) 770-774 Bronson Mixed-Use Bldg - Boundary Condition Request



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Further to my e-mail below,

I wanted to highlight that I've been assuming an average water demand of 280 L/p/d.

The assumptions is based on discussion with various City reviewers and the revised wastewater design flow parameters as per ISTB-2018-01.

Can you confirm that this is acceptable?



Thank you,

**Amr Salem, EIT**

Civil Designer

**LRL Associates Ltd.**

5430 Canotek Road  
Ottawa, Ontario K1J 9G2

**T** (613) 842-3434 or (877) 632-5664 ext 248

**F** (613) 842-4338

**E** [asalem@lrl.ca](mailto:asalem@lrl.ca)

**W** [www.lrl.ca](http://www.lrl.ca)

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*Nous nous soucions profondément de votre opinion, nous vous invitons donc à nous faire savoir*

*si nous avons satisfait vos attentes en remplissant notre [sondage sur la satisfaction de la clientèle](#)*



---

**From:** Amr Salem

**Sent:** November 3, 2020 11:22 AM

**To:** Wu, John <[John.Wu@ottawa.ca](mailto:John.Wu@ottawa.ca)>

**Cc:** Mohan Basnet <[mbasnet@lrl.ca](mailto:mbasnet@lrl.ca)>

**Subject:** (LRL-200436) 770-774 Bronson Mixed-Use Bldg - Boundary Condition Request

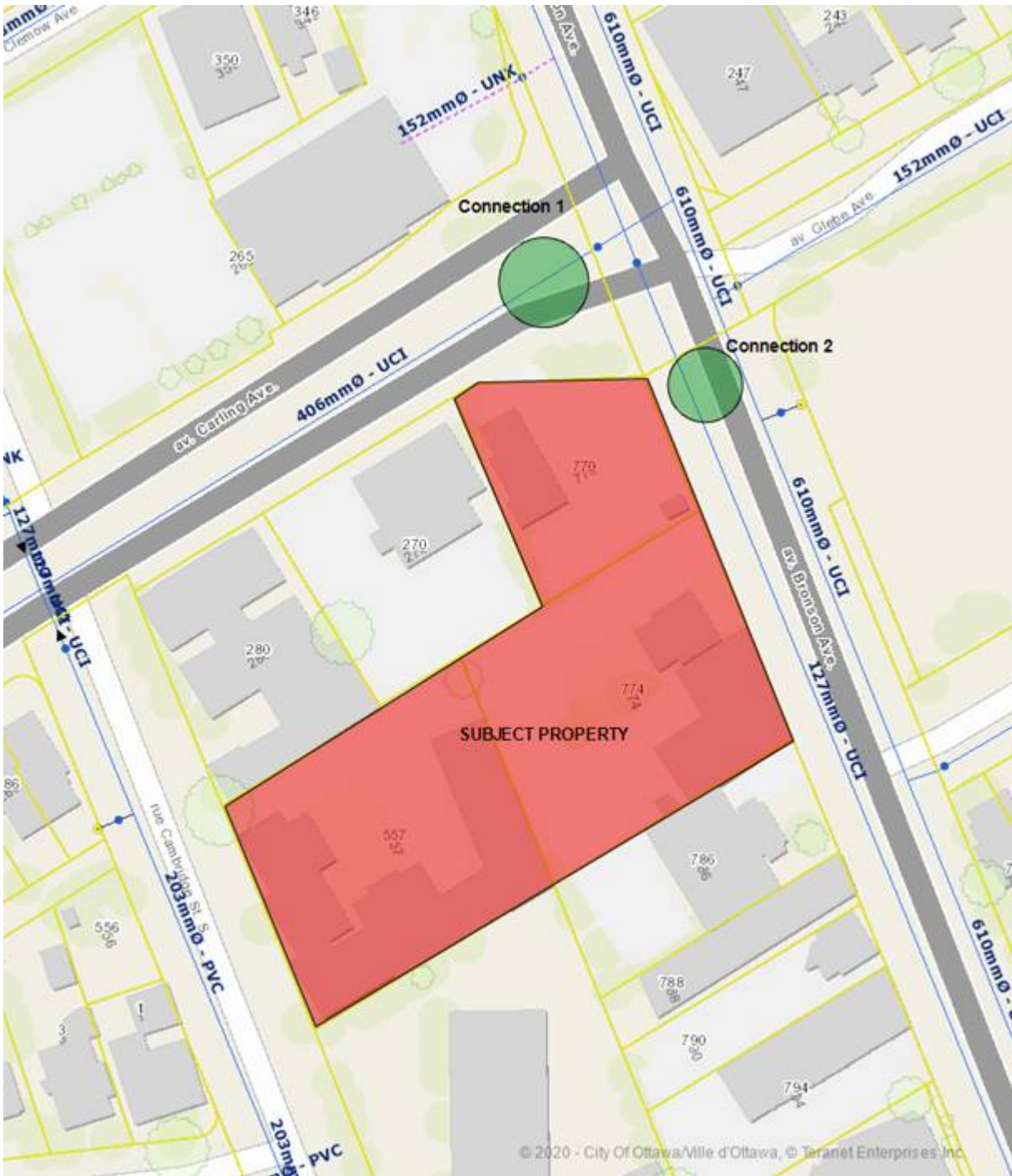
Good morning John,

We would like to kindly request boundary conditions for the proposed development at *770-774 Bronson* using the following proposed development demands:

- Location of Service / Street Number: **770-774 Bronson & 557 Cambridge**
- Type of development: **26-storey (tapering down to 9-storey) mixed-use residential building consisting of a total of 333 units, (80 of which are student housing dorm units with 1 to 4 beds).**

**Please see site plan attached for reference.**

- Proposed Connection Points:
  - One (1) connection the 406mm watermain along Carling Avenue, and
  - One (1) connection to the 127mm watermain along Bronson Avenue.



- Please provide pressures for the following water demand scenarios required for the proposed development:

	L/min	L/s
--	-------	-----

<b>Avg. Daily</b>	114.6	1.91
<b>Max Day + FUS</b>	283.8 + 21,000	4.73 + 350
<b>Peak Hour</b>	622.8	10.38

Please contact me if you have any questions.

Thank you,



**LRL**

ENGINEERING | INGÉNIERIE

**Amr Salem, EIT**

Civil Designer

**LRL Associates Ltd.**

5430 Canotek Road  
Ottawa, Ontario K1J 9G2

**T** (613) 842-3434 or (877) 632-5664 ext 248

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**E** [asalem@lrl.ca](mailto:asalem@lrl.ca)

**W** [www.lrl.ca](http://www.lrl.ca)

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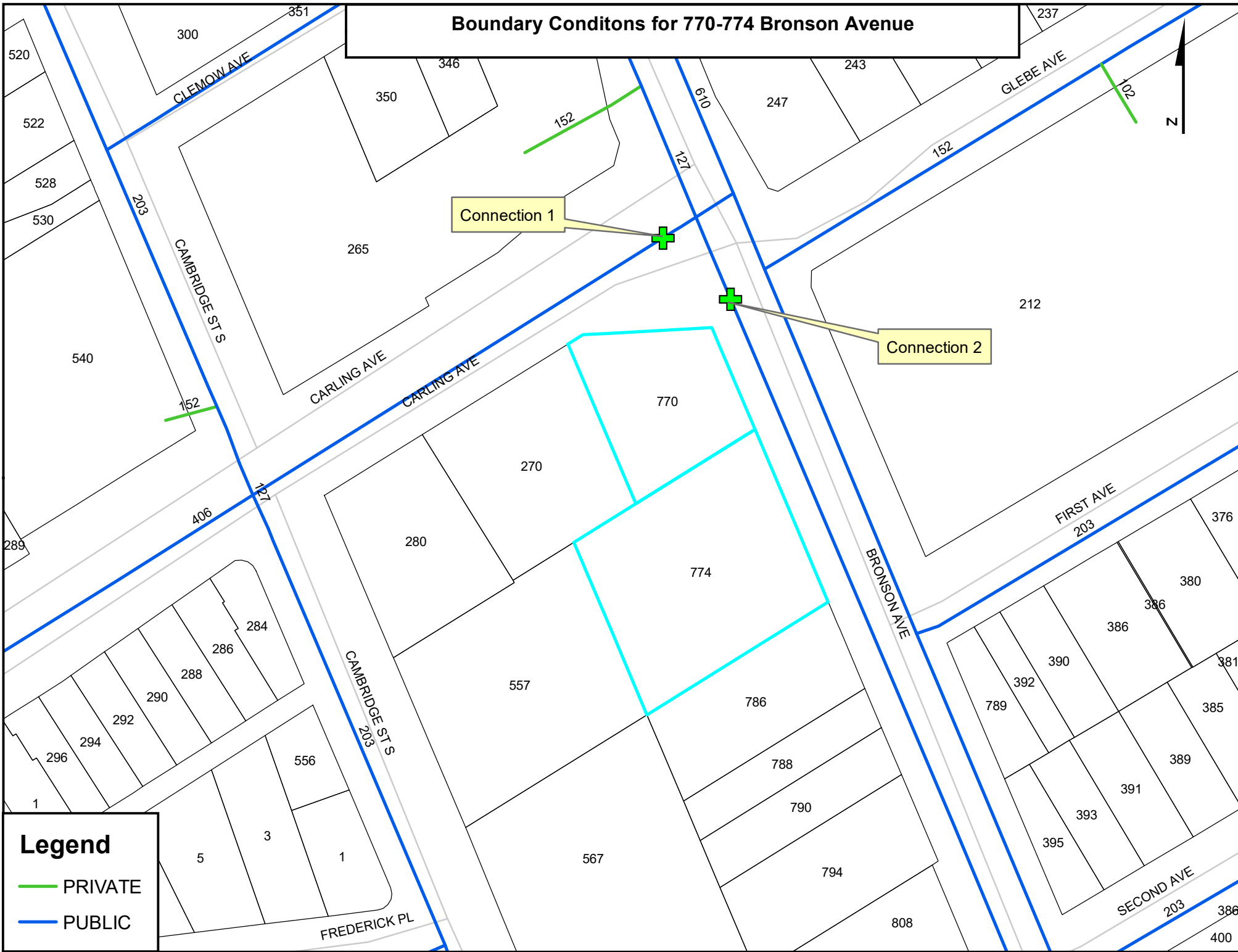
*Nous nous soucions profondément de votre opinion, nous vous invitons donc à nous faire savoir si nous avons satisfait vos attentes en remplissant notre [sondage sur la satisfaction de la clientèle](#)*



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# Boundary Conditions for 770-774 Bronson Avenue



**Legend**

- PRIVATE
- PUBLIC



## **APPENDIX C**

### **Wastewater Collection Calculations**





**LRL File No.** 200436  
**Project:** Multi-Storey Mixed-Use Building  
**Location:** 770-774 Bronson Avenue  
**Date:** November 22, 2022

**Sanitary Design Parameters**  
 Average Daily Flow = 280 L/p/day  
 Commercial & Institutional Flow = 50000 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 = 1.5

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	INFILTRATION			TOTAL FLOW (l/s)	PIPE					
STREET	FROM	TO	AREA (Ha)	POP.	CUMMULATIVE		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)	TOTAL FLOW (l/s)	LENGTH (m)	DIA. (mm)	SLOPE (%)	MATERIAL	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)
					AREA (Ha)	POP.																				
Outlet 1 - Bronson Ave	PROP. BLDG	EX. COMBINED SEWER	0.273	416.1	0.27	416.1	4.0	5.39	0.125	0.125	0.00	0.00	7.0	0.0	0.0	0.11	0.27	0.27	0.09	5.59	10.1	150	2.00%	PVC	21.54	1.22
Outlet 2 - Cambridge St	PROP. BLDG	EX. COMBINED SEWER	0.184	140.7	0.18	140.7	4.0	1.82	0.048	0.048	0.00	0.00	7.0	0.0	0.0	0.04	0.18	0.18	0.06	1.93	10.1	150	2.00%	PVC	21.54	1.22

NOTES	Existing inverts and slopes are estimated. They are to be confirmed on-site.															Designed: T.H.		PROJECT: Multi-Storey Mixed-Use Building									
																Checked: M.B.		LOCATION: 770-774 Bronson Avenue									
																Dwg. Reference: C.401		File Ref.: 200463			Date: 2022-11-22			Sheet No. 1 of 1			

## **APPENDIX D**

### **Stormwater Management Calculations Watts Roof Drain Specification**



LRL Associates Ltd.  
Storm Watershed Summary



**LRL File No.** 200436  
**Project:** Mixed-Use Bldg  
**Location:** 770-774 Bronson Ave  
**Date:** November 22, 2022  
**Designed:** Tamara Harb  
**Drawing Reference:** C701/C702

**Pre-Development Catchments**

WATERSHED	Total Area (m <sup>2</sup> )	Total Area (ha)	Combined C
EWS-01	2727.0	0.273	0.80
EWS-02	1836.0	0.184	0.80
<b>TOTAL</b>	<b>4563.0</b>	<b>0.456</b>	<b>0.80</b>

**Post-Development Catchments**

WATERSHED	PHASE 1			PHASE 2		
	C = 0.20	C = 0.70	C = 0.90	Total Area (m <sup>2</sup> )	Total Area (ha)	Combined C
WS-06 (ROOF)	0.00	0.00	85.05	85.05	0.009	0.90
WS-07 (ROOF)	0.00	0.00	160.37	160.37	0.016	0.90
WS-08 (ROOF)	0.00	0.00	166.66	166.66	0.017	0.90
WS-09 (ROOF)	0.00	0.00	108.82	108.82	0.011	0.90
WS-10 (ROOF)	0.00	0.00	108.69	108.69	0.011	0.90
WS-11 (ROOF)	0.00	0.00	83.69	83.69	0.008	0.90
WS-12 (ROOF)	0.00	0.00	184.95	184.95	0.018	0.90
WS-13 (ROOF)	0.00	0.00	58.28	58.28	0.006	0.90
WS-14 (ROOF)	0.00	0.00	110.90	110.90	0.011	0.90
WS-15 (ROOF)	0.00	0.00	113.60	113.60	0.011	0.90
WS-16 (ROOF)	0.00	0.00	79.62	79.62	0.008	0.90
WS-17 (CONTROLLED)	59.41	0.00	647.14	706.55	0.071	0.84
WS-18 (UNCONTROLLED)	26.25	0.00	132.34	158.59	0.016	0.78
<b>PHASE 1 TOTAL</b>	<b>85.66</b>	<b>0.00</b>	<b>2040.11</b>	<b>2125.77</b>	<b>0.213</b>	<b>0.87</b>
WS-01 (ROOF)	0.00	0.00	136.56	136.56	0.014	0.90
WS-02 (ROOF)	0.00	0.00	193.78	193.78	0.019	0.90
WS-03 (ROOF)	0.00	0.00	139.75	139.75	0.014	0.90
WS-04 (ROOF)	0.00	0.00	163.18	163.18	0.016	0.90
WS-05 (ROOF)	0.00	0.00	157.81	157.81	0.016	0.90
WS-19 (UNCONTROLLED)	47.15	0.00	107.47	154.62	0.015	0.69
WS-20 (CONTROLLED)	419.34	111.72	960.50	1491.56	0.149	0.69
<b>PHASE 2 TOTAL</b>	<b>466.5</b>	<b>111.7</b>	<b>1859.1</b>	<b>2437.3</b>	<b>0.244</b>	<b>0.76</b>
<b>PHASE 1 &amp; 2 TOTAL</b>	<b>552.15</b>	<b>111.72</b>	<b>3899.16</b>	<b>4563.03</b>	<b>0.456</b>	<b>0.81</b>





LRL File No. 200436  
 Project: Multi-Storey Mixed-Use BLDG  
 Location: 700-770 Bronson  
 Date: November 22, 2022  
 Designed: Tamara Harb  
 Drawing Ref.: C.601

Stormwater Management  
 Design Sheet

**PHASE 1 OUTLET - Bronson Avenue**

**Runoff Equation**

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

**Pre-development Stormwater Management**

$I_2 = 732.95 / (Td + 6.199)^{0.81}$

a = 732.951

b = 0.81

C = 6.199

C = 0.40  
 I = 76.8 mm/hr  
 T<sub>c</sub> = 10 min  
 Total Area = 0.273 ha

2-Yr Allowable Release Rate = 23.29 L/s  
 Proposed Sanitary Flow = 5.59 L/s

<-2-Yr Release Rate

<- Note that the proposed Dry Weather Flow was used as infiltration will be accounted for through storm calculations

Allotted Storm Allowable Release Rate = 17.70 L/s

<-Total Allowable Release Rate - Proposed Sanitary Flow

**Post-development Stormwater Management**

		Total Site Area =	0.2126	ha	ΣR=	ΣR <sub>245</sub>	ΣR <sub>100</sub>
Controlled	WS-06 (ROOF)	0.009	ha	R=	0.90	1.00	
	WS-07 (ROOF)	0.016	ha	R=	0.90	1.00	
	WS-08 (ROOF)	0.017	ha	R=	0.90	1.00	
	WS-09 (ROOF)	0.011	ha	R=	0.90	1.00	
	WS-10 (ROOF)	0.011	ha	R=	0.90	1.00	
	WS-11 (ROOF)	0.008	ha	R=	0.90	1.00	
	WS-12 (ROOF)	0.018	ha	R=	0.90	1.00	
	WS-13 (ROOF)	0.006	ha	R=	0.90	1.00	
	WS-14 (ROOF)	0.011	ha	R=	0.90	1.00	
	WS-15 (ROOF)	0.011	ha	R=	0.90	1.00	
	WS-16 (ROOF)	0.008	ha	R=	0.90	1.00	
	WS-17 (CONTROLLED)	0.071	ha	R=	0.84	1.00	
	Total Controlled =		0.197	ha	ΣR=	0.84	1.00
	Un-controlled	WS-18 (UNCONTROLLED)	0.016	ha	R=	0.78	0.98
		Total Un-Controlled =		0.016	ha	ΣR=	0.78

**Post-development Stormwater Management (Uncontrolled Catchment WS-18)**

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$

a = 1735.688

b = 0.820

C = 6.014

Time (min)	Intensity (mm/hr)	Uncontrolled Runoff (L/s)	Controlled Release Rate Constant (L/s)	Total Release Rate (L/s)
10	178.6	7.72	0.00	7.72

**Post-development Stormwater Management (WS-17 Controlled)**

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$

a = 1735.688

b = 0.820

C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	35.07	19.59	2.42	0.00	2.42
15	142.9	28.07	23.08	2.42	0.00	2.42
20	120.0	23.56	25.37	2.42	0.00	2.42
25	103.8	20.40	26.96	2.42	0.00	2.42
30	91.9	18.04	28.12	2.42	0.00	2.42
35	82.6	16.22	28.98	2.42	0.00	2.42
40	75.1	14.76	29.61	2.42	0.00	2.42
45	69.1	13.56	30.08	2.42	0.00	2.42
50	64.0	12.56	30.42	2.42	0.00	2.42
60	55.9	10.98	30.80	2.42	0.00	2.42
70	49.8	9.78	30.90	2.42	0.00	2.42
80	45.0	8.84	30.79	2.42	0.00	2.42
90	41.1	8.08	30.53	2.42	0.00	2.42
100	37.9	7.44	30.14	2.42	0.00	2.42
110	35.2	6.91	29.65	2.42	0.00	2.42
120	32.9	6.46	29.08	2.42	0.00	2.42

Total Storage Required =	30.90	m <sup>3</sup>
Available CISTERN Storage =	35.00	m <sup>3</sup>

refer to LRL Plan C.601



LRL File No. 200436  
 Project: Multi-Storey Mixed-Use BLDG  
 Location: 700-770 Bronson  
 Date: November 22, 2022  
 Designed: Tamara Harb  
 Drawing Ref.: C.601

Stormwater Management  
 Design Sheet

**PHASE 1 OUTLET - Bronson Avenue**

**Post-development Stormwater Management (WS-06 On Roof)**

100 Year Storm Event:

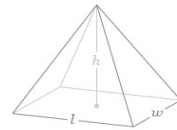
$$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$$

a = 1735.688

b = 0.820

C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	4.22	2.16	0.63	0.00	0.63
15	142.9	3.38	2.47	0.63	0.00	0.63
20	120.0	2.84	2.65	0.63	0.00	0.63
25	103.8	2.46	2.74	0.63	0.00	0.63
30	91.9	2.17	2.78	0.63	0.00	0.63
35	82.6	1.95	2.78	0.63	0.00	0.63
40	75.1	1.78	2.75	0.63	0.00	0.63
45	69.1	1.63	2.71	0.63	0.00	0.63
50	64.0	1.51	2.65	0.63	0.00	0.63
60	55.9	1.32	2.49	0.63	0.00	0.63
70	49.8	1.18	2.30	0.63	0.00	0.63
80	45.0	1.06	2.08	0.63	0.00	0.63
90	41.1	0.97	1.85	0.63	0.00	0.63
100	37.9	0.90	1.60	0.63	0.00	0.63
110	35.2	0.83	1.34	0.63	0.00	0.63
120	32.9	0.78	1.06	0.63	0.00	0.63



$$V = (l * w) * h / 3 = Ah / 3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 2.78 m<sup>3</sup>  
 Proposed Head = 150 mm  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 78 m<sup>2</sup>  
**Available Roof Storage = 3.89 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

\*An Emergency overflow scupper is provided above this height.

**Total Storage Required = 2.78 m<sup>3</sup>**  
**Available Roof Storage = 3.89 m<sup>3</sup>**

refer to LRL Plan C.601

**Post-development Stormwater Management (WS-07 On Roof)**

100 Year Storm Event:

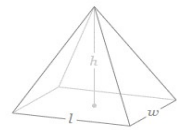
$$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$$

a = 1735.688

b = 0.820

C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	7.96	4.40	0.63	0.00	0.63
15	142.9	6.37	5.17	0.63	0.00	0.63
20	120.0	5.35	5.66	0.63	0.00	0.63
25	103.8	4.63	6.00	0.63	0.00	0.63
30	91.9	4.10	6.24	0.63	0.00	0.63
35	82.6	3.68	6.41	0.63	0.00	0.63
40	75.1	3.35	6.53	0.63	0.00	0.63
45	69.1	3.08	6.61	0.63	0.00	0.63
50	64.0	2.85	6.66	0.63	0.00	0.63
60	55.9	2.49	6.70	0.63	0.00	0.63
70	49.8	2.22	6.68	0.63	0.00	0.63
80	45.0	2.01	6.60	0.63	0.00	0.63
90	41.1	1.83	6.50	0.63	0.00	0.63
100	37.9	1.69	6.36	0.63	0.00	0.63
110	35.2	1.57	6.20	0.63	0.00	0.63
120	32.9	1.47	6.02	0.63	0.00	0.63



$$V = (l * w) * h / 3 = Ah / 3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 6.70 m<sup>3</sup>  
 Proposed Head = 150 mm  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 139 m<sup>2</sup>  
**Available Roof Storage = 6.95 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

\*An Emergency overflow scupper is provided above this height.

**Total Storage Required = 6.70 m<sup>3</sup>**  
**Available Roof Storage = 6.95 m<sup>3</sup>**

refer to LRL Plan C.601



LRL File No. 200436  
 Project: Multi-Storey Mixed-Use BLDG  
 Location: 700-770 Bronson  
 Date: November 22, 2022  
 Designed: Tamara Harb  
 Drawing Ref.: C.601

Stormwater Management  
 Design Sheet

**PHASE 1 OUTLET - Bronson Avenue**

**Post-development Stormwater Management (WS-08 On Roof)**

100 Year Storm Event:

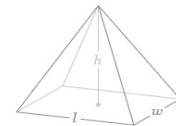
$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$

a = 1735.688

b = 0.820

C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	8.27	4.21	1.26	0.00	1.26
15	142.9	6.82	4.82	1.26	0.00	1.26
20	120.0	5.56	5.16	1.26	0.00	1.26
25	103.8	4.81	5.33	1.26	0.00	1.26
30	91.9	4.26	5.39	1.26	0.00	1.26
35	82.6	3.83	5.39	1.26	0.00	1.26
40	75.1	3.48	5.33	1.26	0.00	1.26
45	69.1	3.20	5.24	1.26	0.00	1.26
50	64.0	2.96	5.11	1.26	0.00	1.26
60	55.9	2.59	4.79	1.26	0.00	1.26
70	49.8	2.31	4.40	1.26	0.00	1.26
80	45.0	2.08	3.96	1.26	0.00	1.26
90	41.1	1.90	3.48	1.26	0.00	1.26
100	37.9	1.76	2.98	1.26	0.00	1.26
110	35.2	1.63	2.45	1.26	0.00	1.26
120	32.9	1.52	1.90	1.26	0.00	1.26



$V = (L*W)*h/3 = Ah/3$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 5.39 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 2  
 Total Flow from Roof Drain = 1.26 L/s  
 Available Roof Surface = 137 m<sup>2</sup>  
**Available Roof Storage = 6.86 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

Total Storage Required = 5.39 m<sup>3</sup>  
 Available Roof Storage = 6.86 m<sup>3</sup> refer to LRL Plan C.601

**Post-development Stormwater Management (WS-09 On Roof)**

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$

a = 1735.688

b = 0.820

C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	5.40	2.86	0.63	0.00	0.63
15	142.9	4.32	3.32	0.63	0.00	0.63
20	120.0	3.63	3.60	0.63	0.00	0.63
25	103.8	3.14	3.77	0.63	0.00	0.63
30	91.9	2.78	3.87	0.63	0.00	0.63
35	82.6	2.50	3.92	0.63	0.00	0.63
40	75.1	2.27	3.94	0.63	0.00	0.63
45	69.1	2.09	3.94	0.63	0.00	0.63
50	64.0	1.93	3.91	0.63	0.00	0.63
60	55.9	1.69	3.82	0.63	0.00	0.63
70	49.8	1.51	3.68	0.63	0.00	0.63
80	45.0	1.36	3.51	0.63	0.00	0.63
90	41.1	1.24	3.31	0.63	0.00	0.63
100	37.9	1.15	3.10	0.63	0.00	0.63
110	35.2	1.06	2.87	0.63	0.00	0.63
120	32.9	1.00	2.63	0.63	0.00	0.63



$V = (L*W)*h/3 = Ah/3$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 3.94 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 99 m<sup>2</sup>  
**Available Roof Storage = 4.94 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

Total Storage Required = 3.94 m<sup>3</sup>  
 Available Roof Storage = 4.94 m<sup>3</sup> refer to LRL Plan C.601

**Post-development Stormwater Management (WS-10 On Roof)**

100 Year Storm Event:



LRL File No. 200436  
 Project: Multi-Storey Mixed-Use BLDG  
 Location: 700-770 Bronson  
 Date: November 22, 2022  
 Designed: Tamara Harb  
 Drawing Ref.: C.601

Stormwater Management  
 Design Sheet

**PHASE 1 OUTLET - Bronson Avenue**

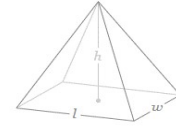
$$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$$

$$a = 1735.688$$

$$b = 0.820$$

$$C = 6.014$$

Time (min)	Intensity (mm/hr)	Storage Required			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )	Controlled Release Rate Constant (L/s)		
10	178.6	5.40	2.86	0.63	0.00	0.63
15	142.9	4.32	3.32	0.63	0.00	0.63
20	120.0	3.62	3.59	0.63	0.00	0.63
25	103.8	3.14	3.76	0.63	0.00	0.63
30	91.9	2.78	3.86	0.63	0.00	0.63
35	82.6	2.50	3.92	0.63	0.00	0.63
40	75.1	2.27	3.94	0.63	0.00	0.63
45	69.1	2.09	3.93	0.63	0.00	0.63
50	64.0	1.93	3.91	0.63	0.00	0.63
60	55.9	1.69	3.81	0.63	0.00	0.63
70	49.8	1.50	3.67	0.63	0.00	0.63
80	45.0	1.36	3.50	0.63	0.00	0.63
90	41.1	1.24	3.31	0.63	0.00	0.63
100	37.9	1.15	3.09	0.63	0.00	0.63
110	35.2	1.06	2.86	0.63	0.00	0.63
120	32.9	0.99	2.62	0.63	0.00	0.63



$$V = (l*w)*h/3 = Ah/3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 3.94 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 100 m<sup>2</sup>  
**Available Roof Storage = 4.98 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

**Total Storage Required = 3.94 m<sup>3</sup>**  
**Available Roof Storage = 4.98 m<sup>3</sup>** refer to LRL Plan C.601

**Post-development Stormwater Management (WS-11 On Roof)**

100 Year Storm Event:

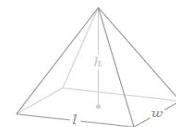
$$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$$

$$a = 1735.688$$

$$b = 0.820$$

$$C = 6.014$$

Time (min)	Intensity (mm/hr)	Storage Required			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )	Controlled Release Rate Constant (L/s)		
10	178.6	4.15	2.11	0.63	0.00	0.63
15	142.9	3.32	2.43	0.63	0.00	0.63
20	120.0	2.79	2.59	0.63	0.00	0.63
25	103.8	2.42	2.68	0.63	0.00	0.63
30	91.9	2.14	2.71	0.63	0.00	0.63
35	82.6	1.92	2.71	0.63	0.00	0.63
40	75.1	1.75	2.68	0.63	0.00	0.63
45	69.1	1.61	2.64	0.63	0.00	0.63
50	64.0	1.49	2.57	0.63	0.00	0.63
60	55.9	1.30	2.41	0.63	0.00	0.63
70	49.8	1.16	2.22	0.63	0.00	0.63
80	45.0	1.05	2.00	0.63	0.00	0.63
90	41.1	0.96	1.76	0.63	0.00	0.63
100	37.9	0.88	1.51	0.63	0.00	0.63
110	35.2	0.82	1.25	0.63	0.00	0.63
120	32.9	0.77	0.97	0.63	0.00	0.63



$$V = (l*w)*h/3 = Ah/3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 2.71 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 61 m<sup>2</sup>  
**Available Roof Storage = 3.04 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

**Total Storage Required = 2.71 m<sup>3</sup>**  
**Available Roof Storage = 3.04 m<sup>3</sup>** refer to LRL Plan C.601

**Post-development Stormwater Management (WS-12 On Roof)**

100 Year Storm Event:

$$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$$

$$a = 1735.688$$

$$b = 0.820$$

$$C = 6.014$$

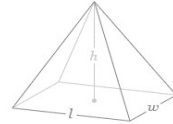


LRL File No. 200436  
 Project: Multi-Storey Mixed-Use BLDG  
 Location: 700-770 Bronson  
 Date: November 22, 2022  
 Designed: Tamara Harb  
 Drawing Ref.: C.601

Stormwater Management  
 Design Sheet

**PHASE 1 OUTLET - Bronson Avenue**

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	9.18	5.13	0.63	0.00	0.63
15	142.9	7.35	6.05	0.63	0.00	0.63
20	120.0	6.17	6.64	0.63	0.00	0.63
25	103.8	5.34	7.06	0.63	0.00	0.63
30	91.9	4.72	7.37	0.63	0.00	0.63
35	82.6	4.25	7.59	0.63	0.00	0.63
40	75.1	3.86	7.76	0.63	0.00	0.63
45	69.1	3.55	7.88	0.63	0.00	0.63
50	64.0	3.29	7.97	0.63	0.00	0.63
60	55.9	2.87	8.08	0.63	0.00	0.63
70	49.8	2.56	8.11	0.63	0.00	0.63
80	45.0	2.31	8.08	0.63	0.00	0.63
90	41.1	2.11	8.01	0.63	0.00	0.63
100	37.9	1.95	7.91	0.63	0.00	0.63
110	35.2	1.81	7.79	0.63	0.00	0.63
120	32.9	1.69	7.64	0.63	0.00	0.63



$$V = (l*w)*h/3 = Ah/3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 8.11 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 168 m<sup>2</sup>  
**Available Roof Storage = 8.41 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

\*An Emergency overflow scupper is provided above this height.

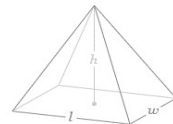
**Total Storage Required = 8.11 m<sup>3</sup>**  
**Available Roof Storage = 8.41 m<sup>3</sup>** refer to LRL Plan C.601

**Post-development Stormwater Management (WS-13 On Roof)**

100 Year Storm Event:

$$I_{100} = 1735.688 / (Td + 6.014)^{0.820} \quad a = 1735.688 \quad b = 0.820 \quad C = 6.014$$

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	2.89	1.36	0.63	0.00	0.63
15	142.9	2.32	1.52	0.63	0.00	0.63
20	120.0	1.94	1.58	0.63	0.00	0.63
25	103.8	1.68	1.58	0.63	0.00	0.63
30	91.9	1.49	1.55	0.63	0.00	0.63
35	82.6	1.34	1.49	0.63	0.00	0.63
40	75.1	1.22	1.41	0.63	0.00	0.63
45	69.1	1.12	1.32	0.63	0.00	0.63
50	64.0	1.04	1.22	0.63	0.00	0.63
60	55.9	0.91	0.99	0.63	0.00	0.63
70	49.8	0.81	0.74	0.63	0.00	0.63
80	45.0	0.73	0.47	0.63	0.00	0.63
90	41.1	0.67	0.19	0.63	0.00	0.63
100	37.9	0.61	0.00	0.63	0.00	0.63
110	35.2	0.57	0.00	0.63	0.00	0.63
120	32.9	0.53	0.00	0.63	0.00	0.63



$$V = (l*w)*h/3 = Ah/3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 1.58 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 55 m<sup>2</sup>  
**Available Roof Storage = 2.73 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

\*An Emergency overflow scupper is provided above this height.

**Total Storage Required = 1.58 m<sup>3</sup>**  
**Available Roof Storage = 2.73 m<sup>3</sup>** refer to LRL Plan C.601

**Post-development Stormwater Management (WS-14 On Roof)**

100 Year Storm Event:

$$I_{100} = 1735.688 / (Td + 6.014)^{0.820} \quad a = 1735.688 \quad b = 0.820 \quad C = 6.014$$

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	5.51	2.93	0.63	0.00	0.63
15	142.9	4.41	3.40	0.63	0.00	0.63

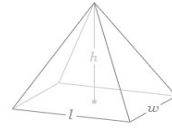


LRL File No. 200436  
 Project: Multi-Storey Mixed-Use BLDG  
 Location: 700-770 Bronson  
 Date: November 22, 2022  
 Designed: Tamara Harb  
 Drawing Ref.: C.601

Stormwater Management  
 Design Sheet

**PHASE 1 OUTLET - Bronson Avenue**

20	120.0	3.70	3.68	0.63	0.00	0.63
25	103.8	3.20	3.86	0.63	0.00	0.63
30	91.9	2.83	3.96	0.63	0.00	0.63
35	82.6	2.55	4.02	0.63	0.00	0.63
40	75.1	2.32	4.05	0.63	0.00	0.63
45	69.1	2.13	4.05	0.63	0.00	0.63
50	64.0	1.97	4.03	0.63	0.00	0.63
60	55.9	1.72	3.94	0.63	0.00	0.63
70	49.8	1.54	3.80	0.63	0.00	0.63
80	45.0	1.39	3.63	0.63	0.00	0.63
90	41.1	1.27	3.44	0.63	0.00	0.63
100	37.9	1.17	3.23	0.63	0.00	0.63
110	35.2	1.09	3.00	0.63	0.00	0.63
120	32.9	1.01	2.77	0.63	0.00	0.63



$$V = (1/3) * w * h^3 = Ah/3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 4.05 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 98 m<sup>2</sup>  
**Available Roof Storage = 4.89 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

Total Storage Required = 4.05 m<sup>3</sup>  
 Available Roof Storage = 4.89 m<sup>3</sup> refer to LRL Plan C.601

**Post-development Stormwater Management (WS-15 On Roof)**

100 Year Storm Event:

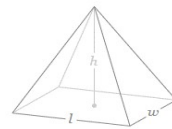
$$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$$

a = 1735.688

b = 0.820

C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	5.64	3.01	0.63	0.00	0.63
15	142.9	4.51	3.49	0.63	0.00	0.63
20	120.0	3.79	3.79	0.63	0.00	0.63
25	103.8	3.28	3.97	0.63	0.00	0.63
30	91.9	2.90	4.09	0.63	0.00	0.63
35	82.6	2.61	4.15	0.63	0.00	0.63
40	75.1	2.37	4.18	0.63	0.00	0.63
45	69.1	2.18	4.19	0.63	0.00	0.63
50	64.0	2.02	4.17	0.63	0.00	0.63
60	55.9	1.77	4.09	0.63	0.00	0.63
70	49.8	1.57	3.96	0.63	0.00	0.63
80	45.0	1.42	3.80	0.63	0.00	0.63
90	41.1	1.30	3.61	0.63	0.00	0.63
100	37.9	1.20	3.40	0.63	0.00	0.63
110	35.2	1.11	3.18	0.63	0.00	0.63
120	32.9	1.04	2.94	0.63	0.00	0.63



$$V = (1/3) * w * h^3 = Ah/3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 4.19 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 101 m<sup>2</sup>  
**Available Roof Storage = 5.04 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

Total Storage Required = 4.19 m<sup>3</sup>  
 Available Roof Storage = 5.04 m<sup>3</sup> refer to LRL Plan C.601

**Post-development Stormwater Management (WS-16 On Roof)**

100 Year Storm Event:

$$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$$

a = 1735.688

b = 0.820

C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	3.95	1.99	0.63	0.00	0.63
15	142.9	3.16	2.28	0.63	0.00	0.63
20	120.0	2.66	2.43	0.63	0.00	0.63
25	103.8	2.30	2.50	0.63	0.00	0.63
30	91.9	2.03	2.53	0.63	0.00	0.63

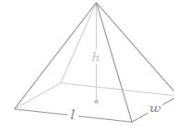


**LRL File No.** 200436  
**Project:** Multi-Storey Mixed-Use BLDG  
**Location:** 700-770 Bronson  
**Date:** November 22, 2022  
**Designed:** Tamara Harb  
**Drawing Ref.:** C.601

Stormwater Management  
 Design Sheet

**PHASE 1 OUTLET - Bronson Avenue**

35	82.6	1.83	2.52	0.63	0.00	0.63
40	75.1	1.66	2.48	0.63	0.00	0.63
45	69.1	1.53	2.43	0.63	0.00	0.63
50	64.0	1.42	2.36	0.63	0.00	0.63
60	55.9	1.24	2.19	0.63	0.00	0.63
70	49.8	1.10	1.98	0.63	0.00	0.63
80	45.0	1.00	1.76	0.63	0.00	0.63
90	41.1	0.91	1.51	0.63	0.00	0.63
100	37.9	0.84	1.25	0.63	0.00	0.63
110	35.2	0.78	0.98	0.63	0.00	0.63
120	32.9	0.73	0.71	0.63	0.00	0.63



$$V = (l * w) * h / 3 = Ah / 3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) =	2.53	m <sup>3</sup>
Watts Roof Drain Discharge =	0.0042	L/s/mm
Proposed Head =	150	mm
Control Flow/Drain =	0.63	L/s
Number of Roof Drains =	1	
Total Flow from Roof Drain =	0.63	L/s
Available Roof Surface =	68	m <sup>2</sup>
<b>Available Roof Storage =</b>	<b>3.38</b>	<b>m<sup>3</sup></b>

\*An Emergency overflow scupper is provided above this height.

Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

<b>Total Storage Required =</b>	<b>2.53</b>	<b>m<sup>3</sup></b>
<b>Available Roof Storage =</b>	<b>3.38</b>	<b>m<sup>3</sup></b>

refer to LRL Plan C.601



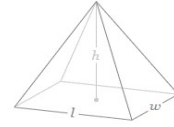
**LRL File No.** 200436  
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**PHASE 1 OUTLET - Bronson Avenue**

Summary of Release Rates and Storage Volumes For PHASE 1

Catchment Area / Associated Roof Drain Number	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m3)	Total Available Storage (m3)
WS-06 (ROOF) / RD6	0.009	0.63	2.78	3.89
WS-07 (ROOF) / RD7	0.016	0.63	6.70	6.95
WS-08 (ROOF) / RD8 & RD9	0.017	1.26	5.39	6.86
WS-09 (ROOF) / RD10	0.011	0.63	3.94	4.94
WS-10 (ROOF) / RD11	0.011	0.63	3.94	4.98
WS-11 (ROOF) / RD12	0.008	0.63	2.71	3.04
WS-12 (ROOF) / RD13	0.018	0.63	8.11	8.41
WS-13 (ROOF) / RD16	0.006	0.63	1.58	2.73
WS-14 (ROOF) / RD17	0.011	0.63	4.05	4.89
WS-15 (ROOF) / RD18	0.011	0.63	4.19	5.04
WS-16 (ROOF) / RD19	0.008	0.63	2.53	3.38
WS-17 (CONTROLLED) Cistern	0.071	2.42	30.90	35.00
WS-18 (UNCONTROLLED)	0.016	7.72	0.00	0.00
<b>TOTAL</b>	<b>0.213</b>	<b>17.71</b>	<b>76.82</b>	<b>90.11</b>







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Stormwater Management  
 Design Sheet

**PHASE 2 OUTLET - Cambridge Street S**

**Runoff Equation**

Q = 2.78CIA (L/s)  
 C = Runoff coefficient  
 I = Rainfall intensity (mm/hr)  
 A = Area (ha)  
 T<sub>c</sub> = Time of concentration (min)  
 $Q = A / (T_d + C)^B$

**Pre-development Stormwater Management**

$I_p = 732.95 / (T_d + 6.199)^{0.871}$       a = 732.95      b = 0.81      C = 6.199

C = 0.40  
 I = 76.8 mm/hr  
 T<sub>c</sub> = 10 min  
 Total Area = 0.184 ha

2-Yr Allowable Release Rate = 15.68 L/s  
 Proposed Sanitary Flow = 1.93 L/s

<-2-Yr Release Rate  
 <- Note that the proposed Dry Weather Flow was used as infiltration will be accounted for through storm calculations

Storm Allowable Release Rate = 13.75 L/s  
 <-Total Combined Release Rate - Proposed Sanitary Flow

**Post-development Stormwater Management**

				ΣR=	ΣR <sub>25.5</sub>	ΣR <sub>100</sub>
Controlled	Total Site Area =	0.2437	ha	ΣR=	0.76	0.95
	WS-01 (ROOF)	0.014	ha	R=	0.90	1.00
	WS-02 (ROOF)	0.019	ha	R=	0.90	1.00
	WS-03 (ROOF)	0.014	ha	R=	0.90	1.00
	WS-04 (ROOF)	0.016	ha	R=	0.90	1.00
	WS-05 (ROOF)	0.016	ha	R=	0.90	1.00
	WS-20 (CONTROLLED)	0.149	ha	R=	0.69	0.86
	Total Controlled =	0.228	ha	ΣR=	0.76	0.95
Un-controlled	WS-19 (UNCONTROLLED)	0.015	ha	R=	0.69	0.86
	Total Un-Controlled =	0.015	ha	ΣR=	0.69	0.86

**Post-development Stormwater Management (Uncontrolled Catchment WS-04)**

100 Year Storm Event:

$I_{100} = 1735.688 / (T_d + 6.014)^{0.820}$       a = 1735.688      b = 0.820      C = 6.014

Time (min)	Intensity (mm/hr)	Uncontrolled Runoff (L/s)	Controlled Release Rate Constant (L/s)	Total Release Rate (L/s)
10	178.6	6.59	0.00	6.59

**Post-development Stormwater Management (WS-01)**

100 Year Storm Event:

$I_{100} = 1735.688 / (T_d + 6.014)^{0.820}$       a = 1735.688      b = 0.820      C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	63.69	36.00	3.69	0.00	3.69
15	142.9	50.97	42.55	3.69	0.00	3.69
20	120.0	42.79	46.91	3.69	0.00	3.69
25	103.8	37.04	50.02	3.69	0.00	3.69
30	91.9	32.77	52.34	3.69	0.00	3.69
35	82.6	29.46	54.10	3.69	0.00	3.69
40	75.1	26.81	55.47	3.69	0.00	3.69
45	69.1	24.63	56.53	3.69	0.00	3.69
50	64.0	22.81	57.36	3.69	0.00	3.69
60	55.9	19.94	58.48	3.69	0.00	3.69
70	49.8	17.76	59.08	3.69	0.00	3.69
80	45.0	16.05	59.30	3.69	0.00	3.69
90	41.1	14.66	59.24	3.69	0.00	3.69
100	37.9	13.52	58.96	3.69	0.00	3.69
110	35.2	12.56	58.49	3.69	0.00	3.69
120	32.9	11.73	57.89	3.69	0.00	3.69

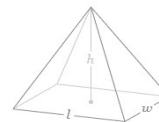
Total Storage Required = 59.30 m<sup>3</sup>  
 Available CISTERN Storage = 60.00 m<sup>3</sup>      refer to LRL Plan C.601

**Post-development Stormwater Management (WS-01 On Roof)**

100 Year Storm Event:

$I_{100} = 1735.688 / (T_d + 6.014)^{0.820}$       a = 1735.688      b = 0.820      C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required		Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )			
10	178.6	6.78	3.69	0.63	0.00	0.63
15	142.9	5.42	4.32	0.63	0.00	0.63
20	120.0	4.55	4.71	0.63	0.00	0.63
25	103.8	3.94	4.97	0.63	0.00	0.63
30	91.9	3.49	5.14	0.63	0.00	0.63
35	82.6	3.13	5.26	0.63	0.00	0.63
40	75.1	2.85	5.33	0.63	0.00	0.63
45	69.1	2.62	5.38	0.63	0.00	0.63
50	64.0	2.43	5.39	0.63	0.00	0.63
60	55.9	2.12	5.37	0.63	0.00	0.63
70	49.8	1.89	5.29	0.63	0.00	0.63
80	45.0	1.71	5.17	0.63	0.00	0.63
90	41.1	1.56	5.03	0.63	0.00	0.63
100	37.9	1.44	4.85	0.63	0.00	0.63
110	35.2	1.34	4.66	0.63	0.00	0.63
120	32.9	1.25	4.46	0.63	0.00	0.63





LRL File No. 200436  
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 Location: 700-770 Bronson  
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 Drawing Ref.: C.601

Stormwater Management  
 Design Sheet

**PHASE 2 OUTLET - Cambridge Street S**

$$V = (l*w)*h/3 = Ah/3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) =	5.39	m <sup>3</sup>	
Watts Roof Drain Discharge =	0.0042	L/s/mm	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	0.63	L/s	
Number of Roof Drains =	1		
Total Flow from Roof Drain =	0.63	L/s	
Available Roof Surface =	122	m <sup>2</sup>	
Effective Roof Surface =	122	m <sup>2</sup>	100 (% of total roof surface)
<b>Available Roof Storage =</b>	<b>6.08</b>	<b>m<sup>3</sup></b>	

Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

<b>Total Storage Required =</b>	<b>5.39</b>	<b>m<sup>3</sup></b>
<b>Available Roof Storage =</b>	<b>6.08</b>	<b>m<sup>3</sup></b>

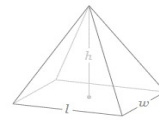
refer to LRL Plan C.601

**Post-development Stormwater Management (WS-02 On Roof)**

100 Year Storm Event:

$I_{100} = 1735.688 / (T_d + 6.014)^{0.820}$        $a = 1735.688$        $b = 0.820$        $C = 6.014$

Time (min)	Intensity (mm/hr)	Storage Required			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )	Controlled Release Rate Constant (L/s)		
10	178.6	9.62	5.39	0.63	0.00	0.63
15	142.9	7.70	6.36	0.63	0.00	0.63
20	120.0	6.46	7.00	0.63	0.00	0.63
25	103.8	5.59	7.45	0.63	0.00	0.63
30	91.9	4.95	7.77	0.63	0.00	0.63
35	82.6	4.45	8.02	0.63	0.00	0.63
40	75.1	4.05	8.20	0.63	0.00	0.63
45	69.1	3.72	8.34	0.63	0.00	0.63
50	64.0	3.45	8.45	0.63	0.00	0.63
60	55.9	3.01	8.57	0.63	0.00	0.63
70	49.8	2.68	8.62	0.63	0.00	0.63
80	45.0	2.42	8.61	0.63	0.00	0.63
90	41.1	2.21	8.56	0.63	0.00	0.63
100	37.9	2.04	8.47	0.63	0.00	0.63
110	35.2	1.90	8.36	0.63	0.00	0.63
120	32.9	1.77	8.22	0.63	0.00	0.63



$$V = (l*w)*h/3 = Ah/3$$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) =	8.62	m <sup>3</sup>	
Watts Roof Drain Discharge =	0.0042	L/s/mm	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	0.63	L/s	
Number of Roof Drains =	1		
Total Flow from Roof Drain =	0.63	L/s	
Available Roof Surface =	178	m <sup>2</sup>	
Effective Roof Surface =	178	m <sup>2</sup>	100 (% of total roof surface)
<b>Available Roof Storage =</b>	<b>8.90</b>	<b>m<sup>3</sup></b>	

Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

<b>Total Storage Required =</b>	<b>8.62</b>	<b>m<sup>3</sup></b>
<b>Available Roof Storage =</b>	<b>8.90</b>	<b>m<sup>3</sup></b>

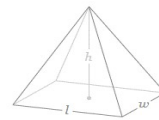
refer to LRL Plan C.601

**Post-development Stormwater Management (WS-03 On Roof)**

100 Year Storm Event:

$I_{100} = 1735.688 / (T_d + 6.014)^{0.820}$        $a = 1735.688$        $b = 0.820$        $C = 6.014$

Time (min)	Intensity (mm/hr)	Storage Required			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )	Controlled Release Rate Constant (L/s)		
10	178.6	6.94	3.78	0.63	0.00	0.63
15	142.9	5.55	4.43	0.63	0.00	0.63
20	120.0	4.66	4.84	0.63	0.00	0.63
25	103.8	4.03	5.11	0.63	0.00	0.63
30	91.9	3.57	5.29	0.63	0.00	0.63
35	82.6	3.21	5.41	0.63	0.00	0.63
40	75.1	2.92	5.49	0.63	0.00	0.63
45	69.1	2.68	5.54	0.63	0.00	0.63
50	64.0	2.48	5.56	0.63	0.00	0.63
60	55.9	2.17	5.55	0.63	0.00	0.63
70	49.8	1.93	5.48	0.63	0.00	0.63
80	45.0	1.75	5.37	0.63	0.00	0.63
90	41.1	1.60	5.22	0.63	0.00	0.63
100	37.9	1.47	5.06	0.63	0.00	0.63
110	35.2	1.37	4.87	0.63	0.00	0.63
120	32.9	1.28	4.67	0.63	0.00	0.63



$$V = (l*w)*h/3 = Ah/3$$



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 Drawing Ref.: C.601

Stormwater Management  
 Design Sheet

**PHASE 2 OUTLET - Cambridge Street S**

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 5.56 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s  
 Available Roof Surface = 122 m<sup>2</sup>  
 Effective Roof Surface = 122 m<sup>2</sup> 100 (% of total roof surface)  
**Available Roof Storage = 6.10 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

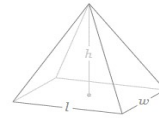
**Total Storage Required = 5.56 m<sup>3</sup>**  
**Available Roof Storage = 6.10 m<sup>3</sup>** refer to LRL Plan C.601

**Post-development Stormwater Management (WS-04 On Roof)**

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.829}$  a = 1735.688 b = 0.820 c = 6.014

Time (min)	Intensity (mm/hr)	Storage Required			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )	Controlled Release Rate Constant (L/s)		
10	178.6	8.10	4.29	0.95	0.00	0.95
15	142.9	6.48	4.98	0.95	0.00	0.95
20	120.0	5.44	5.39	0.95	0.00	0.95
25	103.8	4.71	5.64	0.95	0.00	0.95
30	91.9	4.17	5.79	0.95	0.00	0.95
35	82.6	3.75	5.87	0.95	0.00	0.95
40	75.1	3.41	5.90	0.95	0.00	0.95
45	69.1	3.13	5.89	0.95	0.00	0.95
50	64.0	2.90	5.85	0.95	0.00	0.95
60	55.9	2.54	5.71	0.95	0.00	0.95
70	49.8	2.26	5.50	0.95	0.00	0.95
80	45.0	2.04	5.24	0.95	0.00	0.95
90	41.1	1.86	4.94	0.95	0.00	0.95
100	37.9	1.72	4.62	0.95	0.00	0.95
110	35.2	1.60	4.27	0.95	0.00	0.95
120	32.9	1.49	3.90	0.95	0.00	0.95



$V = (l*w)*h/3 = Ah/3$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 5.90 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0063 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.95 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.95 L/s  
 Available Roof Surface = 131 m<sup>2</sup>  
 Effective Roof Surface = 131 m<sup>2</sup> 100 (% of total roof surface)  
**Available Roof Storage = 6.55 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = 1/4 open)

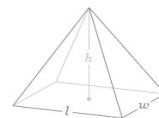
**Total Storage Required = 5.90 m<sup>3</sup>**  
**Available Roof Storage = 6.55 m<sup>3</sup>** refer to LRL Plan C.601

**Post-development Stormwater Management (WS-05 On Roof)**

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.829}$  a = 1735.688 b = 0.820 c = 6.014

Time (min)	Intensity (mm/hr)	Storage Required			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m <sup>3</sup> )	Controlled Release Rate Constant (L/s)		
10	178.6	7.83	4.32	0.63	0.00	0.63
15	142.9	6.27	5.08	0.63	0.00	0.63
20	120.0	5.26	5.56	0.63	0.00	0.63
25	103.8	4.56	5.89	0.63	0.00	0.63
30	91.9	4.03	6.12	0.63	0.00	0.63
35	82.6	3.62	6.28	0.63	0.00	0.63
40	75.1	3.30	6.40	0.63	0.00	0.63
45	69.1	3.03	6.48	0.63	0.00	0.63
50	64.0	2.81	6.53	0.63	0.00	0.63
60	55.9	2.45	6.56	0.63	0.00	0.63
70	49.8	2.18	6.53	0.63	0.00	0.63
80	45.0	1.97	6.45	0.63	0.00	0.63
90	41.1	1.80	6.34	0.63	0.00	0.63
100	37.9	1.66	6.20	0.63	0.00	0.63
110	35.2	1.54	6.03	0.63	0.00	0.63
120	32.9	1.44	5.85	0.63	0.00	0.63



$V = (l*w)*h/3 = Ah/3$

**Summary of Roof Storage**

Maximum Required Roof Storage (100 Year) = 6.56 m<sup>3</sup>  
 Watts Roof Drain Discharge = 0.0042 L/s/mm  
 Proposed Head = 150 mm \*An Emergency overflow scupper is provided above this height.  
 Control Flow/Drain = 0.63 L/s  
 Number of Roof Drains = 1  
 Total Flow from Roof Drain = 0.63 L/s



**LRL File No.** 200436  
**Project:** Multi-Storey Mixed-Use BLDG  
**Location:** 700-770 Bronson  
**Date:** November 22, 2022  
**Designed:** Tamara Harb  
**Drawing Ref.:** C.601

**Stormwater Management  
 Design Sheet**

**PHASE 2 OUTLET - Cambridge Street S**

Available Roof Surface = 145 m<sup>2</sup>  
 Effective Roof Surface = 145 m<sup>2</sup> 100 (% of total roof surface)  
**Available Roof Storage = 7.25 m<sup>3</sup>**  
 Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (Watts RD-100-A-ADJ Weir Opening = Closed)

**Total Storage Required = 6.56 m<sup>3</sup>**  
**Available Roof Storage = 7.25 m<sup>3</sup>**

refer to LRL Plan C.601

Summary of Release Rates and Storage Volumes For PHASE 2

Catchment Area / Associated Roof Drain Number	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m3)	Total Available Storage (m3)
WS-01 (ROOF) / RD1	0.014	0.63	5.39	6.08
WS-02 (ROOF) / RD2	0.019	0.63	8.62	8.90
WS-03 (ROOF) / RD3	0.014	0.63	5.56	6.10
WS-04 (ROOF) / RD4	0.016	0.95	5.90	6.55
WS-05 (ROOF) / RDS	0.016	0.63	6.56	7.25
WS-20 (CONTROLLED) Cistern	0.149	3.69	59.30	60.00
WS-19 (UNCONTROLLED)	0.015	6.59	0.00	0.00
<b>TOTAL</b>	<b>0.244</b>	<b>13.75</b>	<b>91.34</b>	<b>94.88</b>

LRL Associates Ltd.  
Storm Design Sheet



**LRL File No.** 200436  
**Project:** Mixed-Use Bldg  
**Location:** 770-774 Bronson Ave  
**Date:** November 22, 2022  
**Designed:** Tamara Harb  
**Drawing Reference:** C.401

**Storm Design Parameters**

Rational Method  $Q = 2.78CIA$

Q = Peak flow in litres per second (L/s)  
 A = Drainage area in hectares (ha)  
 C = Runoff coefficient  
 I = Rainfall intensity (mm/hr)

Runoff Coefficient (C)  
 Grass 0.20  
 Gravel 0.80  
 Asphalt / rooftop 0.90

Ottawa Macdonald-Cartier International Airport IDF curve  
 equation (2 year event, intensity in mm/hr)  
 $I_2 = 732.95 / (Td + 6.199)^{0.81}$   
 Min. velocity = 0.80 m/s  
 Manning's "n" = 0.013

LOCATION			AREA (ha)			FLOW						STORM SEWER							
WATERSHED / STREET	From	To	C = 0.20	C = 0.80	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (L/s)	Controlled Flow Q (L/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q <sub>FULL</sub> )
PHASE 1	BLDG	PROP MH1	0.006	0.000	0.191	0.481	0.48	10.00	76.8	36.91	9.99	250	PVC	2.00%	10.0	84.1	1.71	0.10	0.12
PHASE 2	BLDG	EX. STM	0.042	0.011	0.175	0.486	0.49	10.00	76.8	37.36	7.17	250	PVC	2.00%	10.1	84.1	1.71	0.10	0.09

### ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

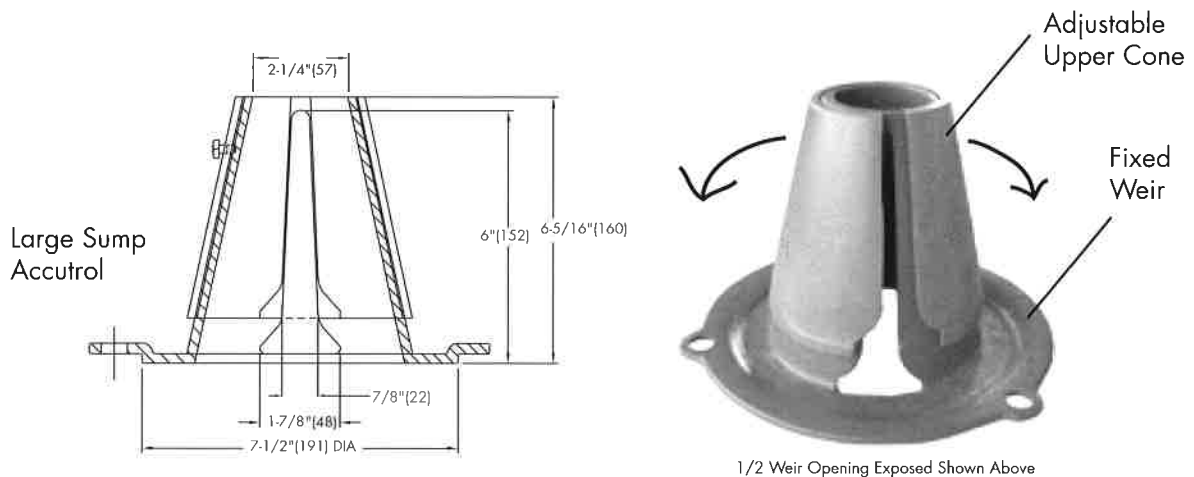
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.

Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

**EXAMPLE:**

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2" of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3" of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:  
 [ 5 gpm(per inch of head) x 2 inches of head ] + 2-1/2 gpm(for the third inch of head) = 12-1/2 gpm.


**TABLE 1. Adjustable Accutrol Flow Rate Settings**

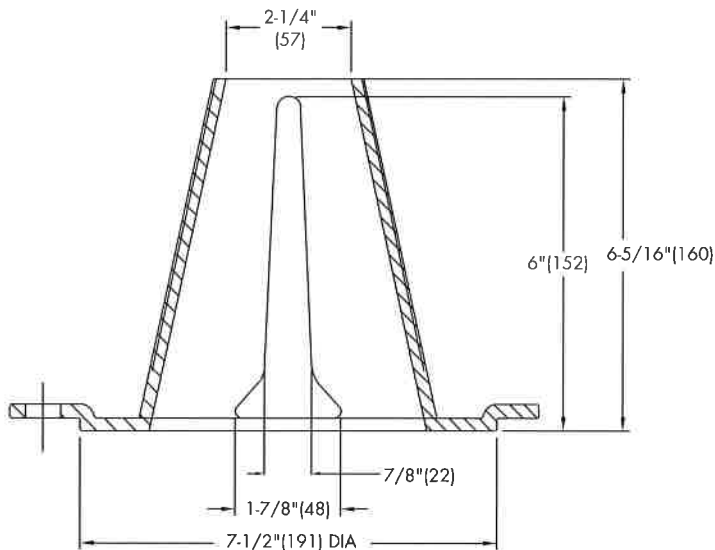
Weir Opening Exposed	Head of Water					
	1"	2"	3"	4"	5"	6"
	<b>Flow Rate (gallons per minute)</b>					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	10	10	10	10	10

Job Name \_\_\_\_\_ Model No. \_\_\_\_\_  
 Job Location \_\_\_\_\_ Contractor \_\_\_\_\_  
 Engineer \_\_\_\_\_ Representative \_\_\_\_\_

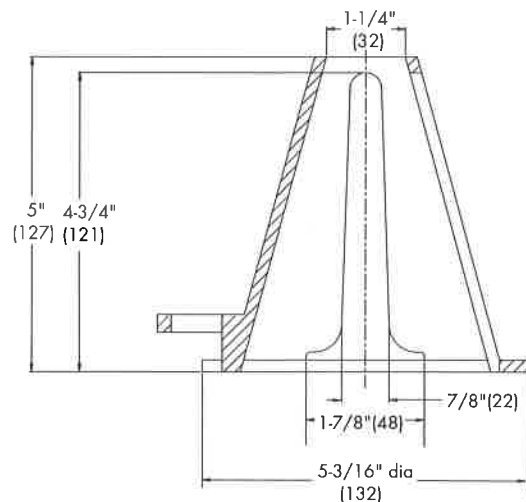
### ACCUTROL WEIR FLOW CONTROL

**SPECIFICATION:** Watts Drainage Products epoxy coated cast iron Accutrol Weir is designed with parabolic openings which limit the flow of rain water off a roof. Each weir slot controls flow to 5 gpm per inch of head to a maximum of 30 gpm at 6" head (for large sump), 25 gpm at 5" head (for small sump). The Accutrol Weir is secured to the flashing clamp of the roof drain. The Accutrol Weir is available with 1 to 4 slots for the large sump drain and up to 3 slots for the small sump drain.

**For Large Sump Roof Drains Specify the "-A" option and number of slots required. (ie. "RD-100-A2" for two slot weir)**  
**For Small Sump Roof Drains Specify the "-A" option and number of slots required. (ie. "RD-200-A1" for one slot weir)**



**LARGE SUMP ACCUTROL WEIR**



**SMALL SUMP ACCUTROL WEIR**

Job Name \_\_\_\_\_ Model No. \_\_\_\_\_

Job Location \_\_\_\_\_ Contractor \_\_\_\_\_

Engineer \_\_\_\_\_ Representative \_\_\_\_\_



Specification Drainage Products

WATTS Drainage reserves the right to modify or change product design or construction without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your WATTS Drainage representative for any clarification. Dimensions are subject to manufacturing tolerances.



CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattscanada.ca



## **APPENDIX E**

### **Civil Engineering Drawings**





**EROSION AND SEDIMENT CONTROL MEASURES:**

"CONTRACTOR IS RESPONSIBLE FOR ALL INSTALLATION, MONITORING, REPAIR AND REMOVAL OF ALL EROSION AND SEDIMENT CONTROL FEATURES"

**1 PRIOR TO START OF CONSTRUCTION:**

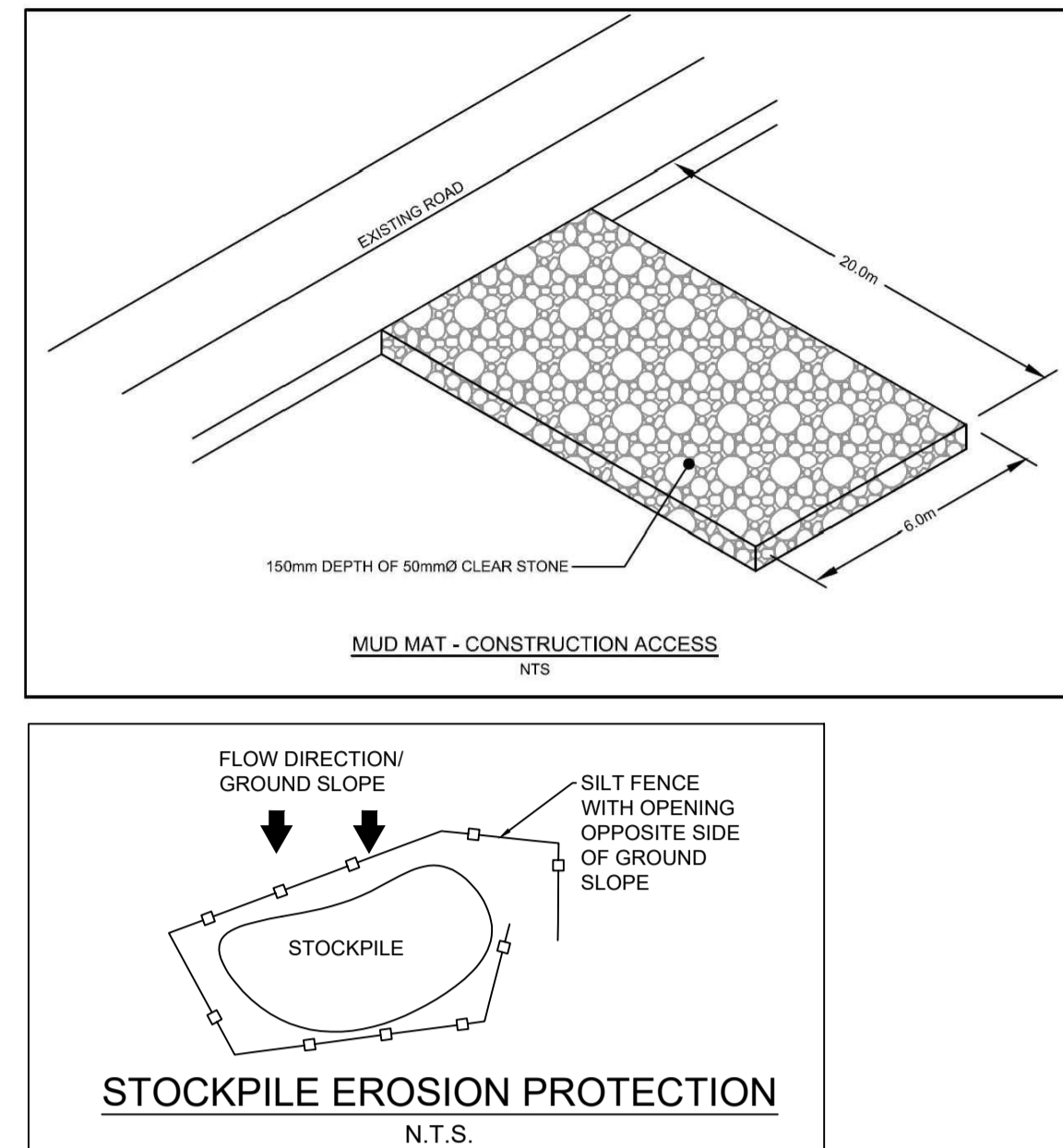
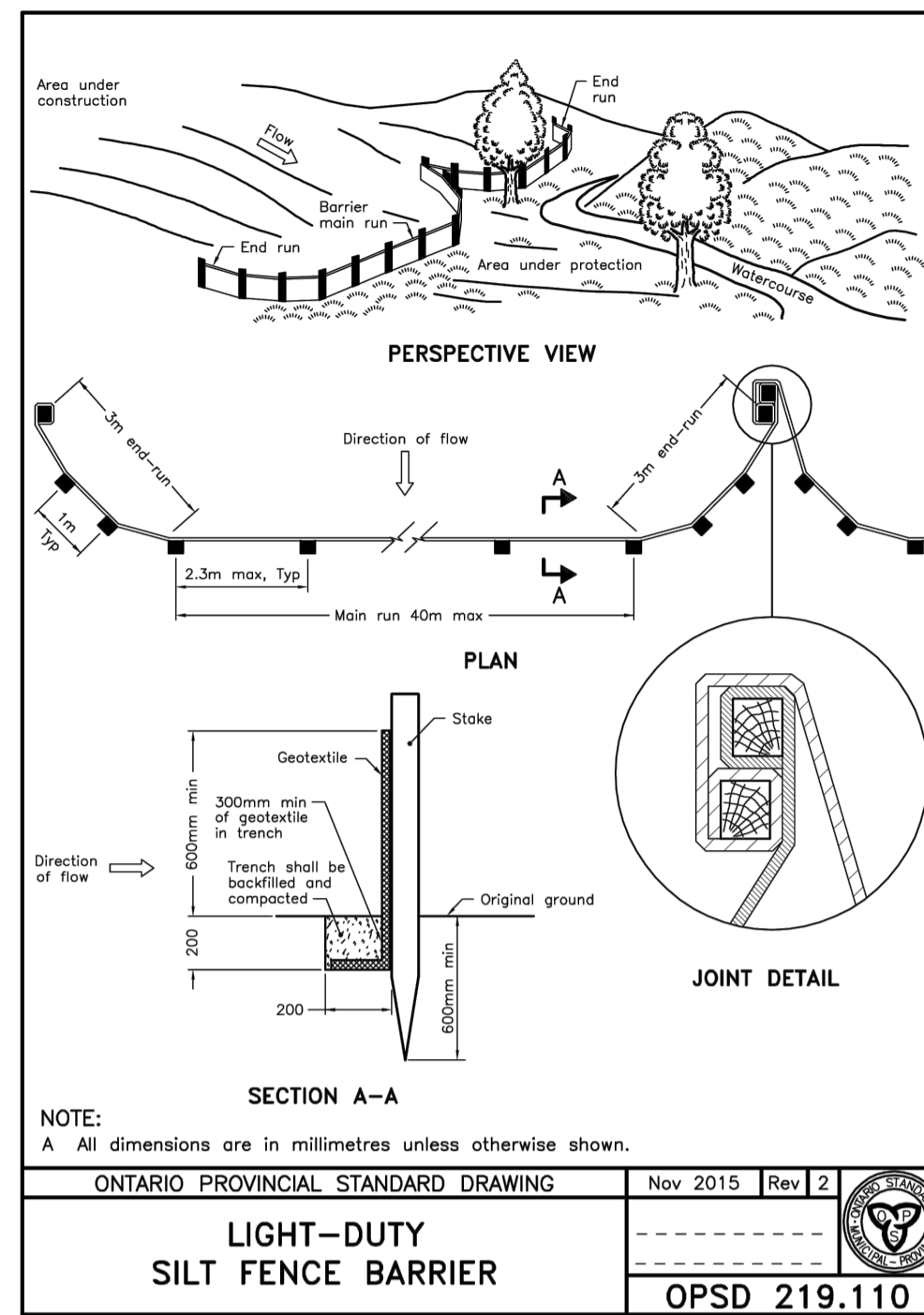
- PRIOR TO THE REMOVAL OF ANY VEGETATIVE COVER, MOVING OF SOIL AND CONSTRUCTION:
- INSTALL SILT FENCE IMMEDIATELY DOWNSTREAM FROM AREAS TO BE DISTURBED (SEE PLAN FOR LOCATION).
- INSTALL GEOSOCK INSERTS WITH AN OVERFLOW IN ALL THE DOWNSTREAM CATCHBASINS AND MANHOLES
- INSTALL SILT SACK FILTERS IN ALL CONCRETE CATCH BASINS STRUCTURES
- INSPECT MEASURES IMMEDIATELY AFTER INSTALLATION.

**2 DURING CONSTRUCTION:**

- WORK TO BE DONE IN THE VICINITY OF MAJOR WATERWAYS TO BE CARRIED OUT FROM JULY TO SEPTEMBER ONLY.
- MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE.
- PROTECT DISTURBED AREAS FROM RUNOFF
- PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILITATED WITHIN 30 DAYS
- INSPECT SILT FENCES, FILTER CLOTHS AND CATCH BASIN SUMPS WEEKLY AND AFTER EVERY MAJOR STORM EVENT.
- CLEAN AND REPAIR WHEN NECESSARY.
- CONSTRUCT SWALES AS PER DETAIL.
- PLAN TO BE REVIEWED AND REVISED AS REQUIRED DURING CONSTRUCTION
- EROSION CONTROL FENCING TO BE ALSO INSTALLED AROUND THE BASE OF ALL STOCKPILES.
- DO NOT LOCATE TOPSOIL PILES AND EXCAVATION MATERIAL CLOSER THAN 2.5m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE THE PILE IS REMOVED. ALL TOPSOIL PILES ARE TO BE SEEDED IF THEY ARE TO REMAIN ON SITE LONG ENOUGH FOR SEEDS TO GROW (LONGER THAN 90 DAYS)
- CONTROL WIND-BLOWN DUST OFF SITE TO ACCEPTABLE LEVELS BY SEEDING TOPSOIL PILES AND OTHER AREAS TEMPORARILY (PROVIDE WATERING AS REQUIRED).
- ALL EROSION CONTROL STRUCTURE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
- NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THIS CONSULTING ENGINEER AND THE CITY DEPARTMENT OF PUBLIC WORKS.
- CONTRACTOR RESPONSIBLE FOR CITY ROADWAY AND SIDEWALK TO BE CLEANED OF ALL SEDIMENT FROM VEHICULAR TRACKING ETC. AT THE END OF EACH WORK DAY.
- PROVIDE GRAVEL ENTRANCE WHEREVER EQUIPMENT LEAVES THE SITE TO PREVENT MUD TRACKING ONTO PAVED SURFACES. GRAVEL BED SHALL BE A MINIMUM OF 15m LONG, 4M WIDE AND 0.3m DEEP AND SHALL CONSIST OF COARSE (50mm CRUSHED-RUN LIMESTONE) MATERIAL. MAINTAIN GRAVEL ENTRANCE IN CLEAN CONDITION.
- DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPPED.
- ANY MUD/MATERIAL TRACKED ONTO THE ROAD SHALL BE REMOVED IMMEDIATELY BY HAND OR RUBBER TIRE LOADER.
- TAKE ALL NECESSARY STEPS TO PREVENT BUILDING MATERIAL, CONSTRUCTION DEBRIS OR WASTE BEING SPILLED OR TRACKED ONTO ADJUTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.

**3 AFTER CONSTRUCTION:**

- PROVIDE PERMANENT COVER CONSISTING OF TOPSOIL AND SEED TO DISTURBED AREAS.
- REMOVE STRAW BALE FLOW CHECK DAMS, SILT FENCES AND FILTER CLOTHS ON CATCH BASINS AND MANHOLE COVERS
- AFTER DISTURBED AREAS HAVE BEEN REHABILITATED AND STABILIZED.
- INSPECT AND CLEAN CATCH BASIN SUMPS AND STORM SEWERS.



**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
- PROPOSED ELEVATION
- PROPOSED HIGH POINT ELEVATION
- PROPOSED DEPRESSED CURB
- PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- PROPOSED TOP OF CURB ELEVATION
- PROPOSED EXPOSED BOTTOM OF RETAINING WALL
- PROPOSED TOP OF RETAINING WALL
- MATCH INTO EXISTING ELEVATION
- EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED 100mmØ PERFORATED SUBDRAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED AREA DRAIN
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- 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 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, CAD FILES OR OTHER ELECTRONIC MEDIA AND COPIES 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 ILLUSTRATE 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 A CONCLUSIVE ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHARGES 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 LRI ASSOCIATES LTD. (LRI) WITHOUT OBTAINING LRI'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 LRI AND TO RELEASE LRI 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 LRI 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 LRI'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRI, AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRI AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

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 WRITING 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.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES, AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

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

SCALE: 1:250

02 REISSUED FOR CITY APPROVAL T.H. 15 DEC 2022

01 ISSUED FOR MUNICIPAL APPROVAL A.S. 04 MAR 2021

No.	REVISIONS	BY	DATE
02	REISSUED FOR CITY APPROVAL	T.H.	15 DEC 2022
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	04 MAR 2021

NOT AUTHENTIC UNLESS SIGNED AND DATED

**LRI**  
ENGINEERING | INGENIERIE  
5430 Canotek Road | Ottawa, ON, K1J 9G2  
www.lri.ca | (613) 842-3434

CLIENT: **KATASA GROUP**  
69 Rue Jean-Proulx unit #301  
Gatineau, QC, J8V 1W2

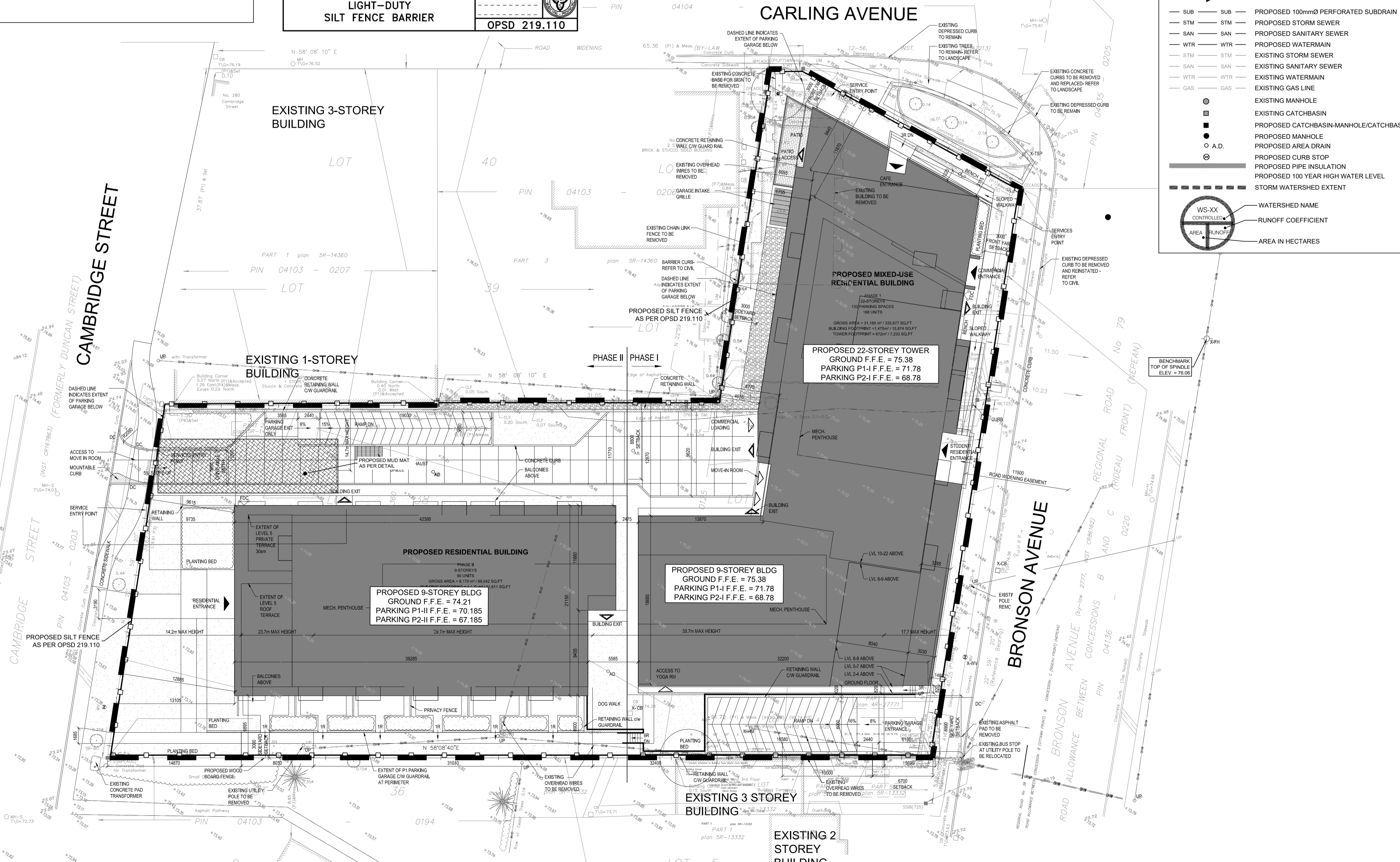
DESIGNED BY: T.H. DRAWN BY: T.H. APPROVED BY: M.B.

PROJECT: **770-774 BRONSON AVENUE**

DRAWING TITLE: **EROSION AND SEDIMENT CONTROL PLAN**

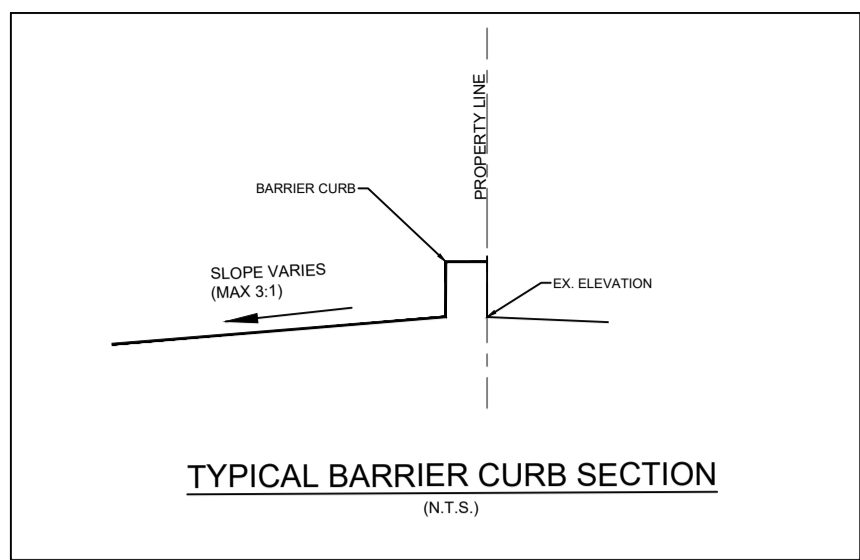
PROJECT NO: 200436  
DATE: DECEMBER 2022

**C101**





- GENERAL GRADING NOTES**
1. ANY MODIFICATIONS IN ELEVATION BETWEEN THE SURVEY AND CONSTRUCTION THAT WILL AFFECT THE PROJECT ARE TO BE COMMUNICATED WITH THE ENGINEER PRIOR TO START OF CONSTRUCTION.
  2. PRIOR TO START OF ANY WORK ON SITE, THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY EXISTING GRADES AND ENSURE OVERLAND DRAINAGE IS FEASIBLE WITH ACTUAL SITE CONDITIONS.
  3. ANY DISCREPANCIES ARE TO BE COMMUNICATED WITH THE ENGINEER PRIOR TO CONSTRUCTION.
  4. NO EXCESS DRAINAGE, EITHER DURING OR AFTER CONSTRUCTION, WILL BE DIRECTED TOWARDS NEIGHBOURING PROPERTIES.
  5. NO ALTERATION OF EXISTING GRADES AND DRAINAGE PATTERNS ON PROPERTY BOUNDARIES.
  6. ENSURE POSITIVE DRAINAGE AWAY FROM FOUNDATION.
  7. CONTRACTOR IS RESPONSIBLE TO KEEP THE ROADS FREE AND CLEAN FROM MUD OR DEBRIS.



**LEGEND:**

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.11.0
- 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
- PROPOSED ELEVATION
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- PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- PROPOSED TOP OF CURB ELEVATION
- PROPOSED EXPOSED BOTTOM OF RETAINING WALL
- PROPOSED TOP OF RETAINING WALL
- MATCH INTO EXISTING ELEVATION
- EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED 100mmØ PERFORATED SUBDRAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED AREA DRAIN
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- 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 THE WORK 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, CAD FILES OR OTHER ELECTRONIC MEDIA AND COPIES THEREOF 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 ILLUSTRATE 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 CHARGES 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 LRI ASSOCIATES LTD. (LRI) WITHOUT OBTAINING LRI'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 LRI AND TO RELEASE LRI 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 LRI FROM ANY DAMAGES, LIABILITIES OR COSTS, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

THE ENGINEER 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 LRI'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRI AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRI AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

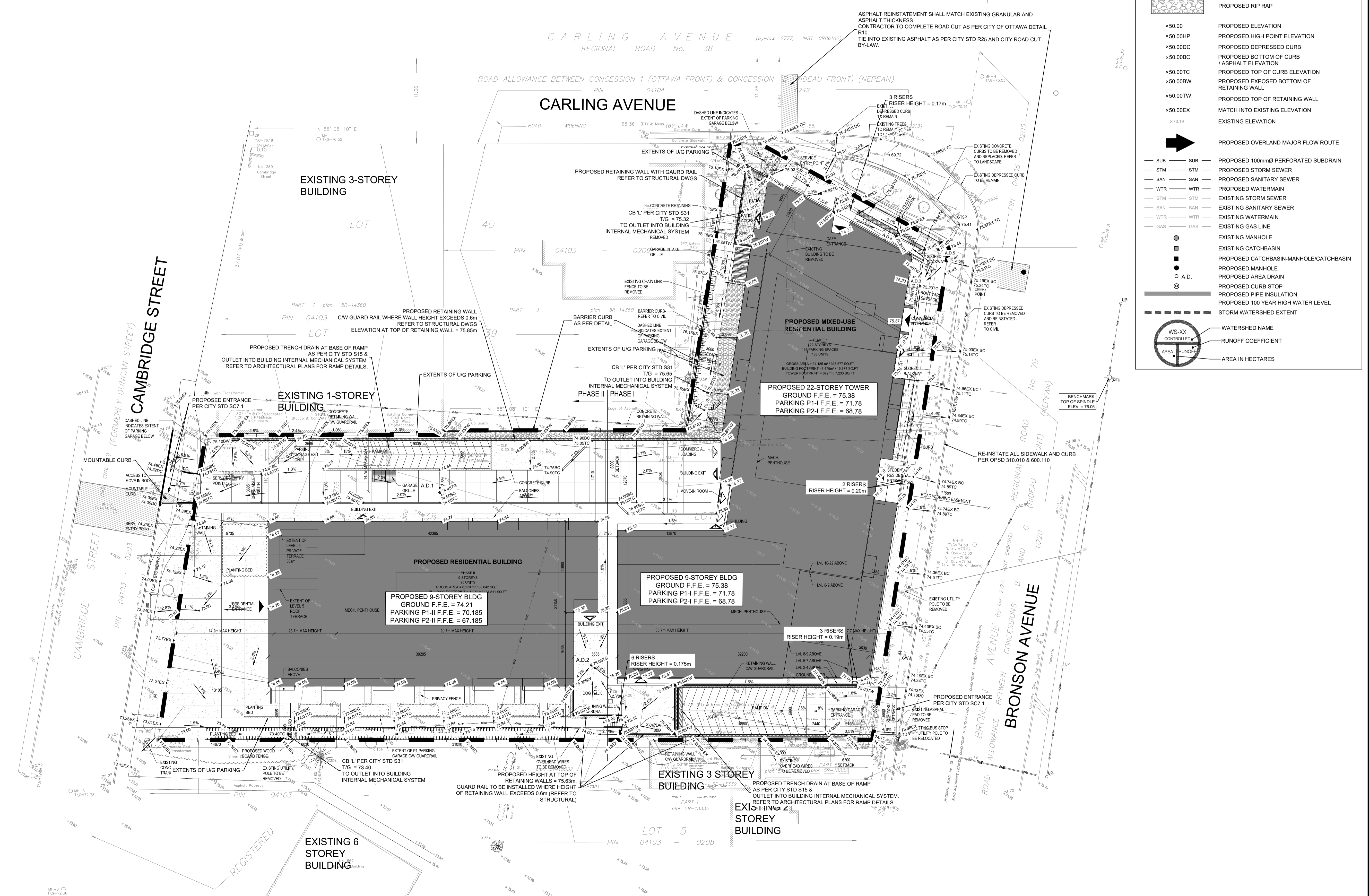
**GENERAL NOTES:**

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.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES, AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

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



SCALE: 1:250

No.	REVISIONS	BY	DATE
02	REISSUED FOR CITY APPROVAL	T.H.	15 DEC 2022
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	04 MAR 2021

**LRI**  
ENGINEERING | INGENIERIE

5430 Canotek Road | Ottawa, ON, K1J 9G2  
www.lri.ca | (613) 842-3434

**CLIENT**  
KATASA GROUP  
69 Rue Jean-Proulx unit #301  
Gatineau, QC, J8V 1W2

**DESIGNED BY:** T.H. **DRAWN BY:** T.H. **APPROVED BY:** M.B.

**PROJECT**  
770-774 BRONSON AVENUE

**DRAWING TITLE**  
GRADING AND DRAINAGE PLAN

**PROFESSIONAL ENGINEER**  
M. BASNET  
100501996  
2022/12/19  
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

**PROJECT NO.**  
200436

**DATE**  
DECEMBER 2022

**C301**



NOTES: GENERAL

- 1. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
2. ELEVATION ARE GEOMETRIC AND UTILIZE METRIC UNITS.
3. JOB BENCH MARK - CONFIRM WITH LRL PRIOR TO UTILIZATION.
4. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE, CATCH BASIN OUTLETS AND/OR STORM DETENTION AREAS ARE PROVIDED.
5. STRIP AND REMOVE ALL TOPSOIL FROM IMPROVED AREAS.
6. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
7. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW CUT TO FORM A CLEAN STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT. PAVEMENT REINSTATEMENT SHALL BE WITH STEP JOINTS OF 500mm WIDTH MINIMUM.
8. CURBS TO BE BARRIER, CONSTRUCTED AS PER OPSD 600.110.
9. ALL MATERIAL SUPPLY AND PLACED FOR PARKING LOT AND ACCESS ROAD CONSTRUCTION SHALL BE TO OPSD STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED. CONSTRUCTION TO OPSD 206, 310 & 314. MATERIALS TO OPSD 1001, 1003 & 1010.
10. ADJUSTING PROPERTY GRADE TO BE MATCHED.
11. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE MUNICIPAL AUTHORITIES PRIOR TO COMMENCING CONSTRUCTION.
12. MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING THE EXECUTION OF ALL WORKS.
13. FILTER FABRIC TO BE INSTALLED AND MAINTAINED BETWEEN THE FRAME AND COVER OF ALL CATCHBASINS, CATCHBASIN MANHOLES AND MANHOLES DURING THE CONSTRUCTION PERIOD TO MINIMIZE SEDIMENTS ENTERING THE STORM SEWER SYSTEM. ALL GRASSED AREAS MUST BE COMPLETED PRIOR TO THE REMOVAL OF THE FILTER FABRIC IN THE DRAINAGE STRUCTURES.
14. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE DIRECTED FROM THE ENGINEER. EXCAVATE AND REMOVE ALL ORGANIC MATERIAL AND DEBRIS, IF ANY, LOCATED WITHIN THE PROPOSED BUILDING, PARKING AND ROADWAY LOCATIONS. THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE CONTRACTOR FROM THE REQUIREMENTS TO OBTAIN THE VARIOUS PERMITS/APPROVALS REQUIRED TO COMPLETE A CONSTRUCTION PROJECT, SUCH AS BUT NOT LIMITED TO, ROAD CUT PERMITS, SEWER PERMITS, WATER PERMIT, ETC.
15. AT PROPOSED UTILITY CONNECTION POINTS AND CROSSINGS (I.E. STORM SEWER, SANITARY SEWER, WATER, ETC.) THE CONTRACTOR SHALL DETERMINE THE PRECISE LOCATION AND DEPTH OF EXISTING UTILITIES AND REPORT ANY DISCREPANCIES OR CONFLICTS TO THE ENGINEER BEFORE COMMENCING WORK.
16. ALL SIDEWALK CONSTRUCTION TO BE AS PER OPSD 310.010 & OPSD 310.050.
17. EXISTING BUILDINGS REQUIRE A CCTV INSPECTION AND REPORT TO ENSURE EXISTING SERVICES TO BE RE-USED ARE IN GOOD WORKING ORDER AND MEET CURRENT MINIMUM SIZE REQUIREMENTS.
18. ALL MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH CURRENT CITY OF OTTAWA (COA) STANDARDS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS (OPSS & OPSD), SEWER AND WATERMAIN MATERIAL TYPES AND DISINFECTION.
19. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH CURRENT CITY OF OTTAWA (COA) STANDARDS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS (OPSS & OPSD), ROADS AND PUBLIC WORKS.

NOTES: SEWERS

- 1. SEWER BEDDING AS PER PIPE TRENCH DETAIL WITH GRANULAR 'A' BEDDING COMPACTED TO 95% OF ITS PMDD.
2. ALL WORK SHALL BE PERFORMED, AS APPLICABLE IN ACCORDANCE WITH OPSD 407 AND 410.
3. CONTRACTOR TO CONFIRM ELEVATION OF EXISTING SEWERS AT PROPOSED CONNECTION POINTS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE COMMENCING ANY WORK.
4. ALL SEWERS WITH LESS THAN 2.0m OF COVER ARE SUBJECT TO INSULATION DETAIL.
5. INSULATE ALL STORM PIPES WITH LESS THAN 1.5M COVER AND ALL SANITARY PIPES WITH LESS THAN 2.1M COVER WITH APPROPRIATE DEPTH OF THERMAL INSULATION AS PER CITY OF OTTAWA SEWER DESIGN GUIDELINES SECTION 5.7.1.3 & 5.10 AS WELL AS REFER TO COO STD. DWG. W21-23.
6. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTION SEWER PIPES TO MANHOLES. SANITARY RUBBER GASKET TYPE JOINTS TO CONFORM TO CSA.
7. QUALITY CONTROL FIELD TESTS, LEAKAGE & DYE TESTS FOR SEWERS TO BE COMPLETED IN ACCORDANCE TO OTTAWA SEWER DESIGN GUIDELINES SECTION 6.1.14 & 6.1.15.

SANITARY

- 8. ALL SANITARY GRAVITY SEWER SHALL BE PVC SDR 35, IPEX 'RING-TITE' (OR APPROVED EQUIVALENT) PER CSA STANDARD B182.2 OR LATEST AMENDMENT, UNLESS SPECIFIED OTHERWISE.
9. EXISTING MAINTENANCE STRUCTURES TO BE RE-BENCHED WHERE A NEW CONNECTION IS MADE.
10. SANITARY GRAVITY SEWER TRENCH AND BEDDING SHALL BE PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B' BEDDING, UNLESS SPECIFIED OTHERWISE.
11. SANITARY MAINTENANCE STRUCTURE FRAME AND COVERS SHALL BE PER CITY OF OTTAWA STD. S24 AND S25.
12. SANITARY MAINTENANCE STRUCTURES SHALL BE BENCHED PER OPSD 701.021.

STORM

- 13. STORM GRAVITY SEWER TRENCH AND BEDDING SHALL BE PER CITY OF OTTAWA STD. S9 AND S7, CLASS 'B' BEDDING, UNLESS SPECIFIED OTHERWISE. BEDDING AND COVER MATERIAL TO BE SPECIFIED BY GEOTECHNICAL ENGINEER.
14. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
15. CATCH BASIN SHALL BE IN ACCORDANCE WITH OPSD 705.010.
16. CATCH BASIN LEADS SHALL BE 200mm DIA. AT 1.0% SLOPE (MIN) UNLESS SPECIFIED OTHERWISE.
17. ALL CATCH BASINS SHALL HAVE 600mm SUMPS, UNLESS SPECIFIED OTHERWISE.
18. ALL CATCH BASIN LEAD INVERTS TO BE 1.5m BELOW FINISHED GRADE UNLESS SPECIFIED OTHERWISE.
19. STORM MAINTENANCE STRUCTURE FRAME AND COVERS SHALL BE PER CITY OF OTTAWA STD 25 AND S24.1, UNLESS SPECIFIED OTHERWISE.
20. CATCHBASIN FRAME AND COVER SHALL BE PER OPSD 400.010 UNLESS OTHERWISE NOTED.

NOTES: WATERMAIN

- 1. PROPOSED WATER SERVICE TO BE 2.4m BELOW GRADE, WHERE LESS THAN 2.4M COVER, THERMAL INSULATION IS TO BE PROVIDED AS PER COO STD. DWGS. W 21 (DITCHED AREAS), W22 (SHALLOW TRENCHES), W22 (AT OPEN STRUCTURES) AND CITY OF OTTAWA DESIGN GUIDELINES (COOG)-WATER DISTRIBUTION (WD) SECTION 4.3.13.
2. ALL PVC WATERMANS SHALL BE AWWA C-900 CLASS 150, SDR 18 OR APPROVED EQUIVALENT.
3. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH OPSD 802.010/802.010 AND CITY OF OTTAWA STANDARD W17, UNLESS SPECIFIED OTHERWISE. BEDDING AND COVER MATERIAL TO BE SPECIFIED BY GEOTECHNICAL ENGINEER.
4. FIRE HYDRANT INSTALLATION AS PER CITY STD W19, ALL BOTTOM OF HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 0.10m ABOVE PROPOSED FINISHED GRADE AT HYDRANT; FIRE HYDRANT LOCATION AS PER STD DWG W19 UNLESS OTHERWISE NOTED.
5. BUILDING SERVICE TO BE CAPPED OFF 1.0m OFF THE FACE OF BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12m BACK FROM STUB.
6. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 500mm BLOW OFF UNLESS OTHERWISE NOTED.
7. METALLIC WARNING TAPE SHALL BE USED OVER ALL WATERMANS.
8. INSTALL AND TEST TRACER WIRE FOR ALL PROPOSED WATERMAIN IN ACCORDANCE WITH THE COOG-WO AS SPECIFIED IN SECTION 4.3.12 AND COO STD. DWG. W38.
9. WATER SHUTOFF VALVE AND VALVE BOX TO BE WITHIN THE ROW AND LOCATED A MINIMUM DISTANCE OF 1.0 M FROM THE BUILDING FOUNDATION (IF APPLICABLE). TYPICAL PRIVATE SERVICES AS PER COO STD. DWG. W50 (2 100MM SERVICE CONNECTION), VALVE BOX ASSEMBLY AS PER COO STD. DWG. W24.
10. ALL CONNECTIONS, RESTRAINT RODS AND VALVE BOLTS TO BE STAINLESS STEEL AS PER COOG - WATER DISTRIBUTION SECTION 4.3.11 AND COO STD DWGS.
11. VALVES TO BE OPERATED BY CITY OF OTTAWA STAFF ONLY.
12. NO CONNECTION TO EXISTING WATER NETWORK SHALL BE COMPLETED UNTIL A WATER PERMIT IS OBTAINED FROM THE CITY OF OTTAWA (COO). COA FORCES TO COMPLETE WATERMAIN CONNECTIONS, EXCAVATION, BACKFILLING AND REINSTATEMENT TO BE COMPLETED BY CONTRACTOR.
13. CATHODIC PROTECTION AS PER OPSD 1109.010, COAGD - WATER DISTRIBUTION SECTION 4.8 AND COO STD. DWGS. W39 (DI), W40 (PVC) AND/OR W41-W43 & 48 AS APPLICABLE.
14. PRESSURE TESTING AS PER AWWA C605-06 & COAGD - WATER DISTRIBUTION SECTION 4.6.13.
15. CHLORINATION AS PER AWA C-651-06, COAGD - WATER DISTRIBUTION SECTION 4.6.13 & COO STD. DWG. W46.

LEGEND:

Legend table listing symbols for existing property line, proposed curb, proposed depressed curb, proposed silt fence, proposed fence, proposed door entrance, proposed grass area, proposed concrete features, proposed heavy duty asphalt, proposed light duty asphalt, proposed rip rap, proposed elevation, proposed high point elevation, proposed depressed curb, proposed bottom of curb, proposed top of curb, proposed exposed bottom of retaining wall, proposed top of retaining wall, match into existing elevation, existing elevation, proposed overlaid major flow route, proposed 100mm perforated subdrain, proposed storm sewer, proposed sanitary sewer, proposed watermain, existing storm sewer, existing sanitary sewer, existing watermain, existing gas line, existing manhole, existing catchbasin, proposed catchbasin, proposed manhole, proposed area drain, proposed curb stop, proposed pipe insulation, proposed 100 year high water level, storm water shed extent, watershed name, runoff coefficient, area in hectares.

GENERAL INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE THE WORK AND INTENT OF THE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE MUNICIPAL AUTHORITIES PRIOR TO COMMENCING CONSTRUCTION.

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

Table with 4 columns: No., REVISIONS, BY, DATE. Includes entries for city approval and municipal approval.

Table with 4 columns: No., REVISIONS, BY, DATE. Includes entries for reissued for city approval and issued for municipal approval.



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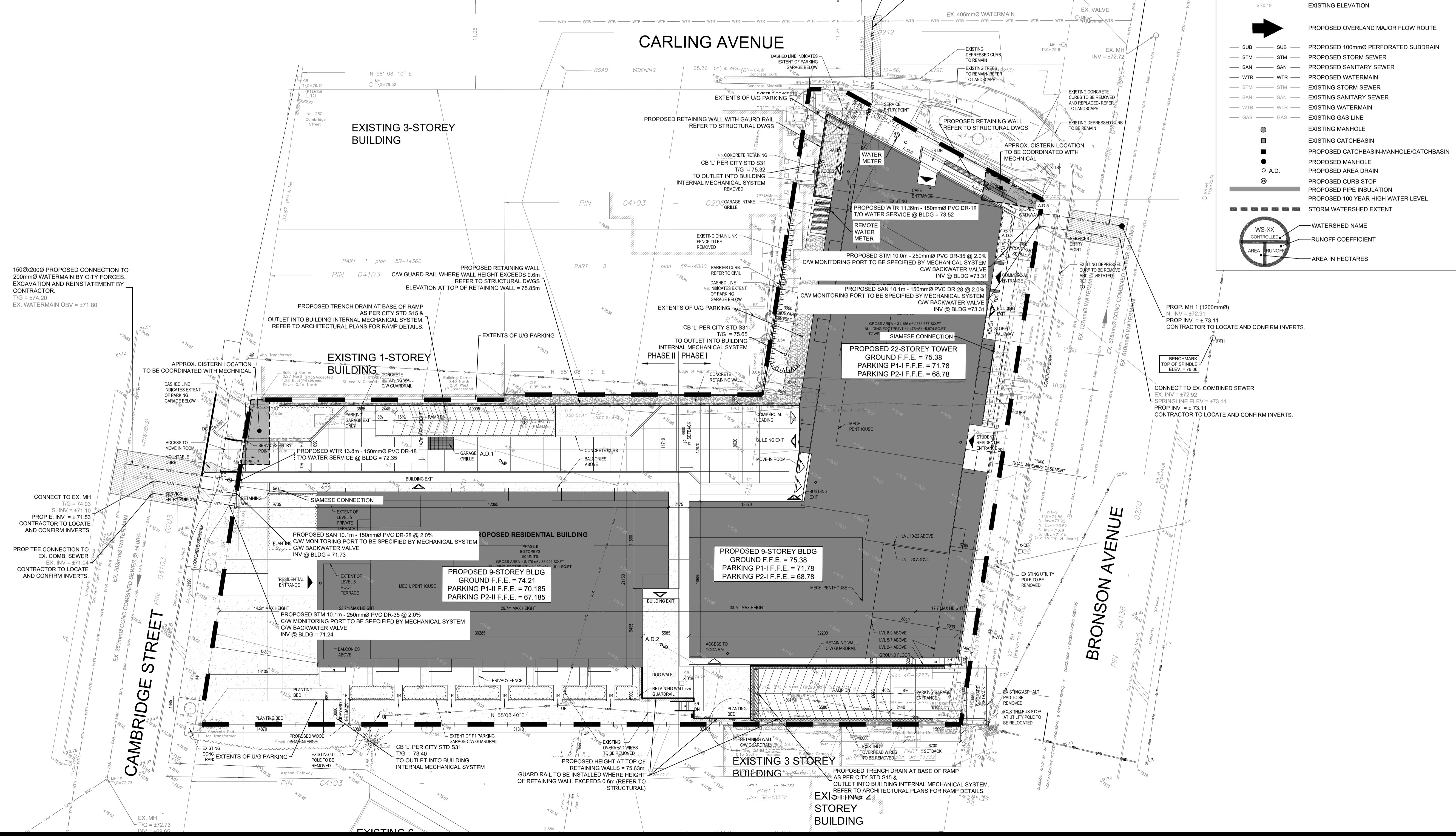
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www.lrl.ca | (613) 842-3434

CLIENT: KATASA GROUP
69 Rue Jean-Proulx unit #301
Gatineau, QC, J8V 1W2

DESIGNED BY: T.H. DRAWN BY: T.H. APPROVED BY: M.B.
PROJECT: 770-774 BRONSON AVENUE

DRAWING TITLE: SERVICING PLAN

PROJECT NO: 200436 DATE: DECEMBER 2022





Summary of Release Rates and Storage Volumes For PHASE 1				
Catchment Area / Associated Roof Drain Number	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m3)	Total Available Storage (m3)
WS-06 (ROOF) / RD6	0.009	0.63	2.78	3.89
WS-07 (ROOF) / RD7	0.016	0.63	6.70	6.95
WS-08 (ROOF) / RD8 & RD9	0.017	1.26	5.39	6.86
WS-09 (ROOF) / RD10	0.011	0.63	3.94	4.94
WS-10 (ROOF) / RD11	0.011	0.63	3.94	4.98
WS-11 (ROOF) / RD12	0.008	0.63	2.71	3.04
WS-12 (ROOF) / RD13	0.018	0.63	8.11	8.41
WS-13 (ROOF) / RD16	0.006	0.63	1.58	2.73
WS-14 (ROOF) / RD17	0.011	0.63	4.05	4.89
WS-15 (ROOF) / RD18	0.011	0.63	4.19	5.04
WS-16 (ROOF) / RD19	0.008	0.63	2.53	3.38
WS-17 (CONTROLLED) Cistern	0.071	2.42	30.90	35.00
WS-18 (UNCONTROLLED)	0.016	7.72	0.00	0.00
<b>TOTAL</b>	<b>0.213</b>	<b>17.71</b>	<b>76.82</b>	<b>90.11</b>

Summary of Release Rates and Storage Volumes For PHASE 2				
Catchment Area / Associated Roof Drain Number	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m3)	Total Available Storage (m3)
WS-01 (ROOF) / RD1	0.014	0.63	5.39	6.08
WS-02 (ROOF) / RD2	0.019	0.63	8.62	8.90
WS-03 (ROOF) / RD3	0.014	0.63	5.56	6.10
WS-04 (ROOF) / RD4	0.016	0.95	5.90	6.55
WS-05 (ROOF) / RD5	0.016	0.63	6.56	7.25
WS-20 (CONTROLLED) Cistern	0.149	3.69	59.30	60.00
WS-19 (UNCONTROLLED)	0.015	6.59	0.00	0.00
<b>TOTAL</b>	<b>0.244</b>	<b>13.75</b>	<b>91.34</b>	<b>94.88</b>

**LEGEND:**

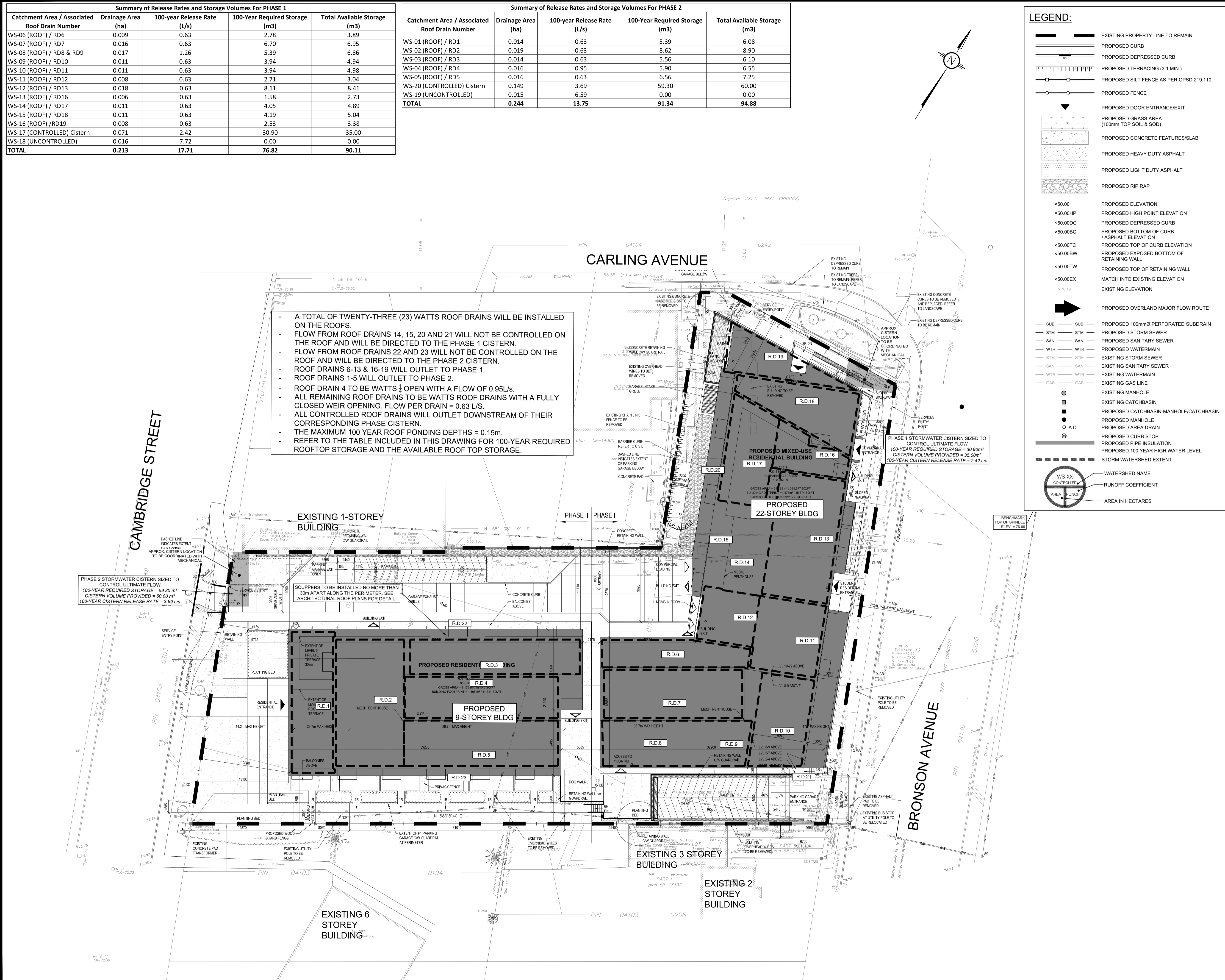
- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED FENCE
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- PROPOSED ELEVATION
- PROPOSED HIGH POINT ELEVATION
- PROPOSED DEPRESSED CURB
- PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- PROPOSED TOP OF CURB ELEVATION
- PROPOSED EXPOSED BOTTOM OF RETAINING WALL
- PROPOSED TOP OF RETAINING WALL
- MATCH INTO EXISTING ELEVATION
- EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED 100mm PERFORATED SUBDRAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING STORM SEWER
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- WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES

A TOTAL OF TWENTY-THREE (23) WATTS ROOF DRAINS WILL BE INSTALLED ON THE ROOFS.

- FLOW FROM ROOF DRAINS 14, 15, 20 AND 21 WILL NOT BE CONTROLLED ON THE ROOF AND WILL BE DIRECTED TO THE PHASE 1 CISTERN.
- FLOW FROM ROOF DRAINS 22 AND 23 WILL NOT BE CONTROLLED ON THE ROOF AND WILL BE DIRECTED TO THE PHASE 2 CISTERN.
- ROOF DRAINS 6-13 & 16-19 WILL OUTLET TO PHASE 1.
- ROOF DRAINS 1-5 WILL OUTLET TO PHASE 2.
- ROOF DRAIN 4 TO BE WATTS 1/2 OPEN WITH A FLOW OF 0.95L/s.
- ALL REMAINING ROOF DRAINS TO BE WATTS ROOF DRAINS WITH A FULLY CLOSED WEIR OPENING. FLOW PER DRAIN = 0.63 L/S.
- ALL CONTROLLED ROOF DRAINS WILL OUTLET DOWNSTREAM OF THEIR CORRESPONDING PHASE CISTERN.
- THE MAXIMUM 100 YEAR ROOF PONDING DEPTHS = 0.15m.
- REFER TO THE TABLE INCLUDED IN THIS DRAWING FOR 100-YEAR REQUIRED ROOFTOP STORAGE AND THE AVAILABLE ROOF TOP STORAGE.

PHASE 2 STORMWATER CISTERN SIZED TO CONTROL ULTIMATE FLOW  
 100-YEAR REQUIRED STORAGE = 30.90m<sup>3</sup>  
 CISTERN VOLUME PROVIDED = 60.00m<sup>3</sup>  
 100-YEAR CISTERN RELEASE RATE = 3.69 L/s

SCUPPERS TO BE INSTALLED NO MORE THAN 30m APART ALONG THE PERIMETER. SEE ARCHITECTURAL ROOF PLANS FOR DETAIL.



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Scale: 1:250

02 REISSUED FOR CITY APPROVAL T.H. 15 DEC 2022

01 ISSUED FOR MUNICIPAL APPROVAL A.S. 04 MAR 2021

Professional Engineer: M. BASNET, 100501996, 2022/12/19, PROVINCE OF ONTARIO

CLIENT: KATASA GROUP, 69 Rue Jean-Proulx unit #301, Gatineau, QC, J8V 1W2

DESIGNED BY: T.H. DRAWN BY: T.H. APPROVED BY: M.B.

PROJECT: 770-774 BRONSON AVENUE

DRAWING TITLE: STORMWATER MANAGEMENT PLAN

PROJECT NO: 200436 DATE: DECEMBER 2022

C601



**LEGEND:**

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSION CURB
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- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED FENCE
- PROPOSED DOOR ENTRANCE/EXIT
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- PROPOSED DEPRESSION CURB
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- PROPOSED TOP OF CURB ELEVATION
- PROPOSED EXPOSED BOTTOM OF RETAINING WALL
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- PROPOSED STORM SEWER
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- PROPOSED WATERMAIN
- EXISTING STORM SEWER
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- EXISTING GAS LINE
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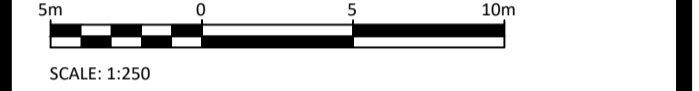
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02	REISSUED FOR CITY APPROVAL	T.H.	15 DEC 2022
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	04 MAR 2021
No.	REVISIONS	BY	DATE



NOT AUTHENTIC UNLESS SIGNED AND DATED

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

CLIENT	KATASA GROUP 69 Rue Jean-Proulx unit #301 Gatineau, QC, J8V 1W2		
DESIGNED BY:	T.H.	DRAWN BY:	T.H.
		APPROVED BY:	M.B.

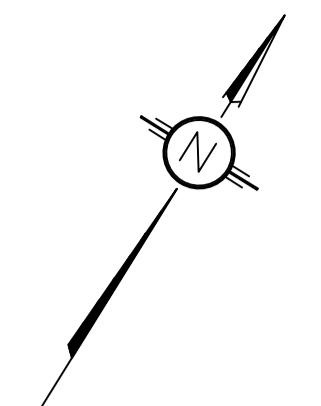
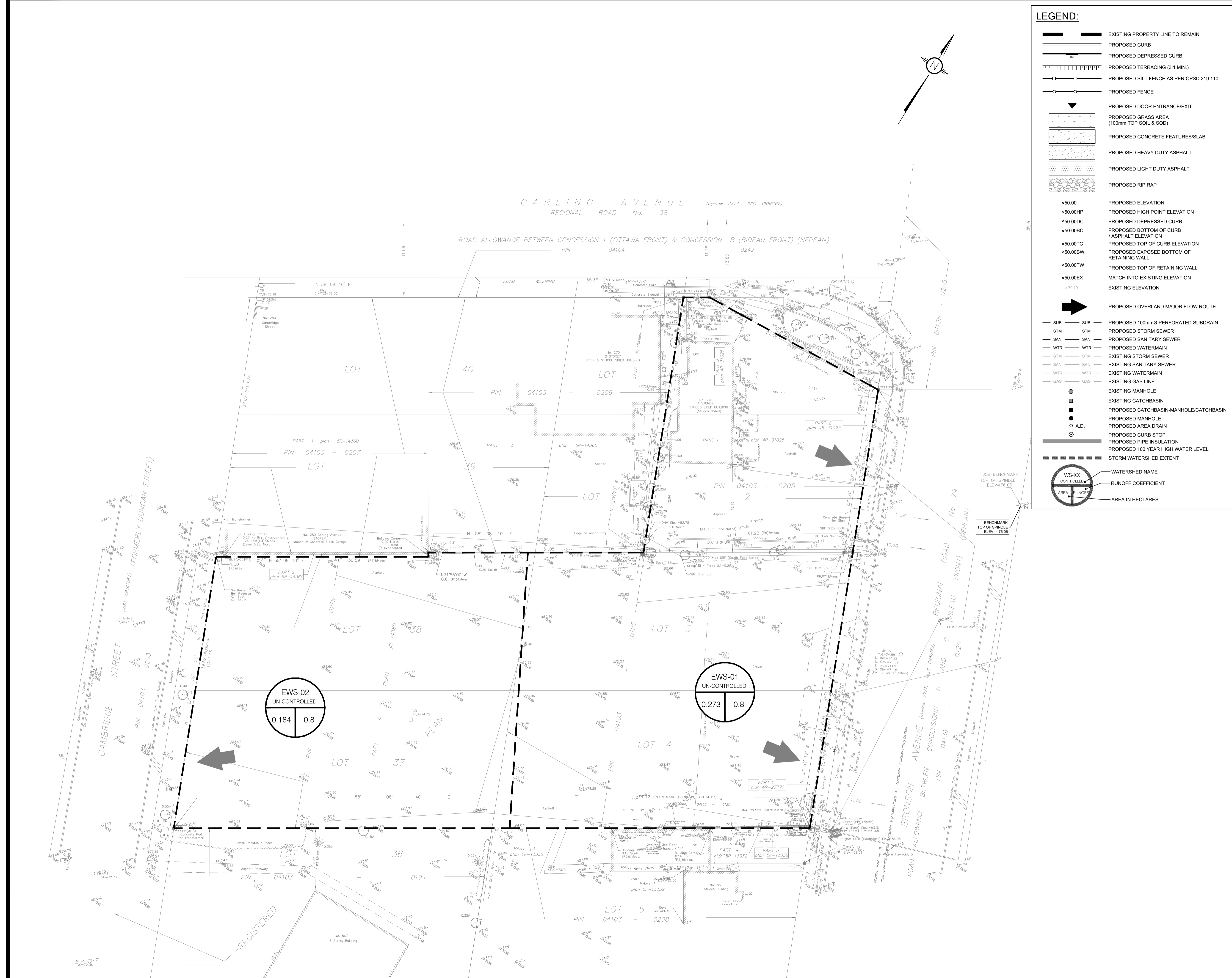
PROJECT  
**770-774 BRONSON AVENUE**

DRAWING TITLE  
**PRE-DEVELOPMENT WATERSHED PLAN**

PROJECT NO.  
**200436**

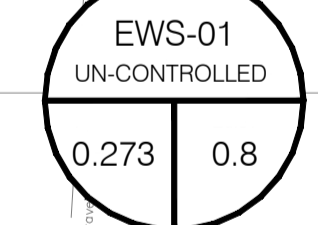
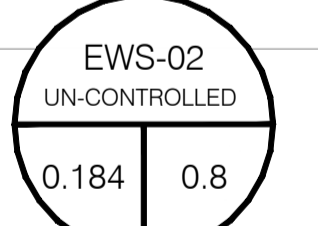
DATE  
**DECEMBER 2022**

**C701**



CARLING AVENUE (by-law 2777, INST CR66162)  
REGIONAL ROAD No. 38

ROAD ALLOWANCE BETWEEN CONCESSION 1 (OTTAWA FRONT) & CONCESSION B (RIDEAU FRONT) (NEPEAN)





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SCALE: 1:250

5m 0 5 10m

No.	REVISIONS	BY	DATE
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www.lri.ca | (613) 842-3434

CLIENT: **KATASA GROUP**  
69 Rue Jean-Proulx unit #301  
Gatineau, QC, J8V 1W2

DESIGNED BY: T.H. DRAWN BY: T.H. APPROVED BY: M.B.

PROJECT: **770-774 BRONSON AVENUE**

DRAWING TITLE: **POST-DEVELOPMENT WATERSHED PLAN**

PROJECT NO: 200436  
DATE: DECEMBER 2022

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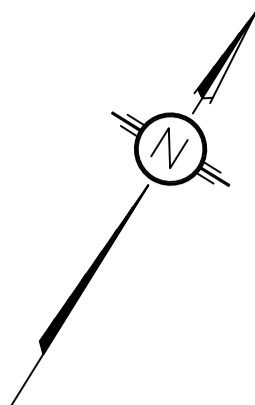
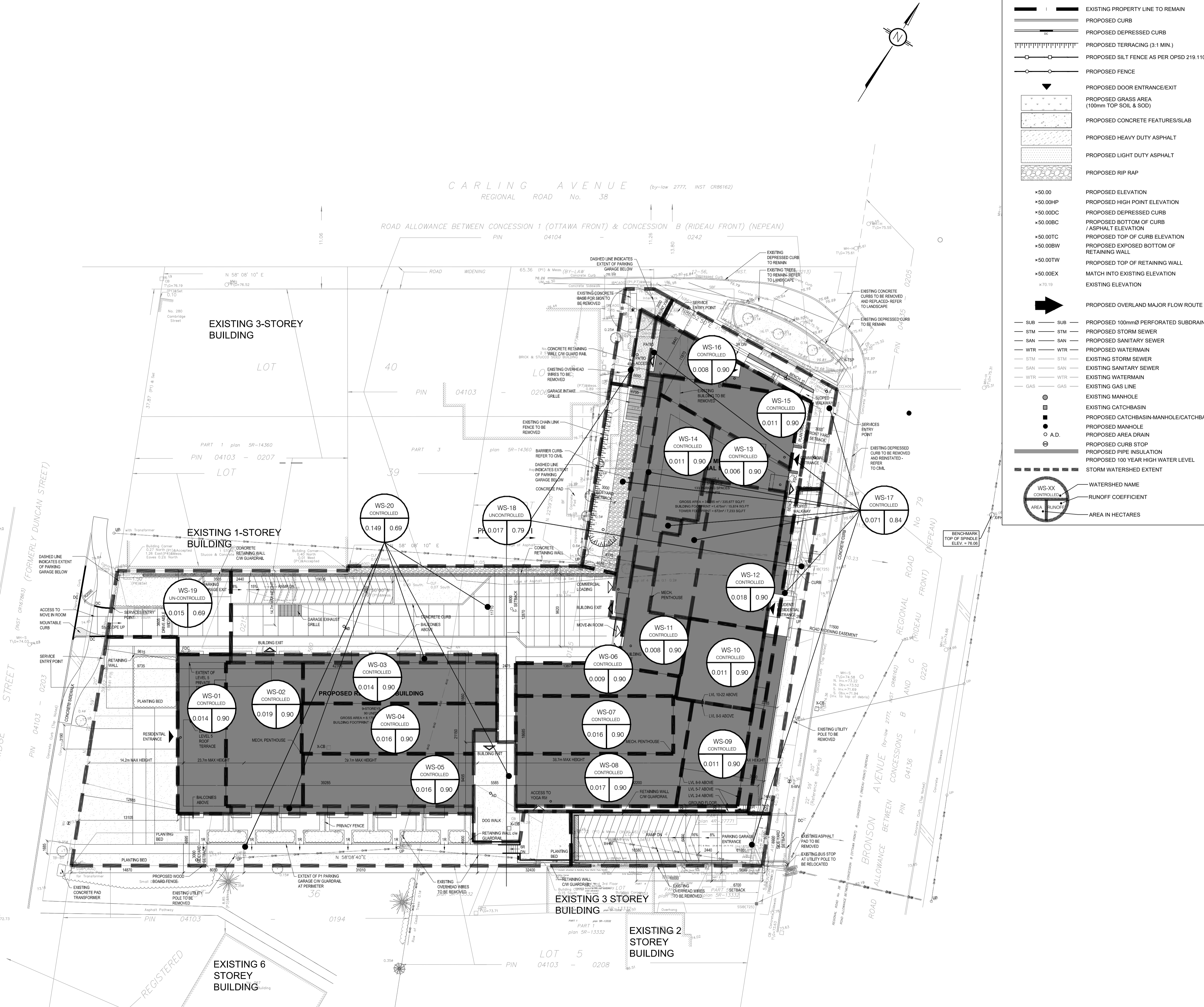
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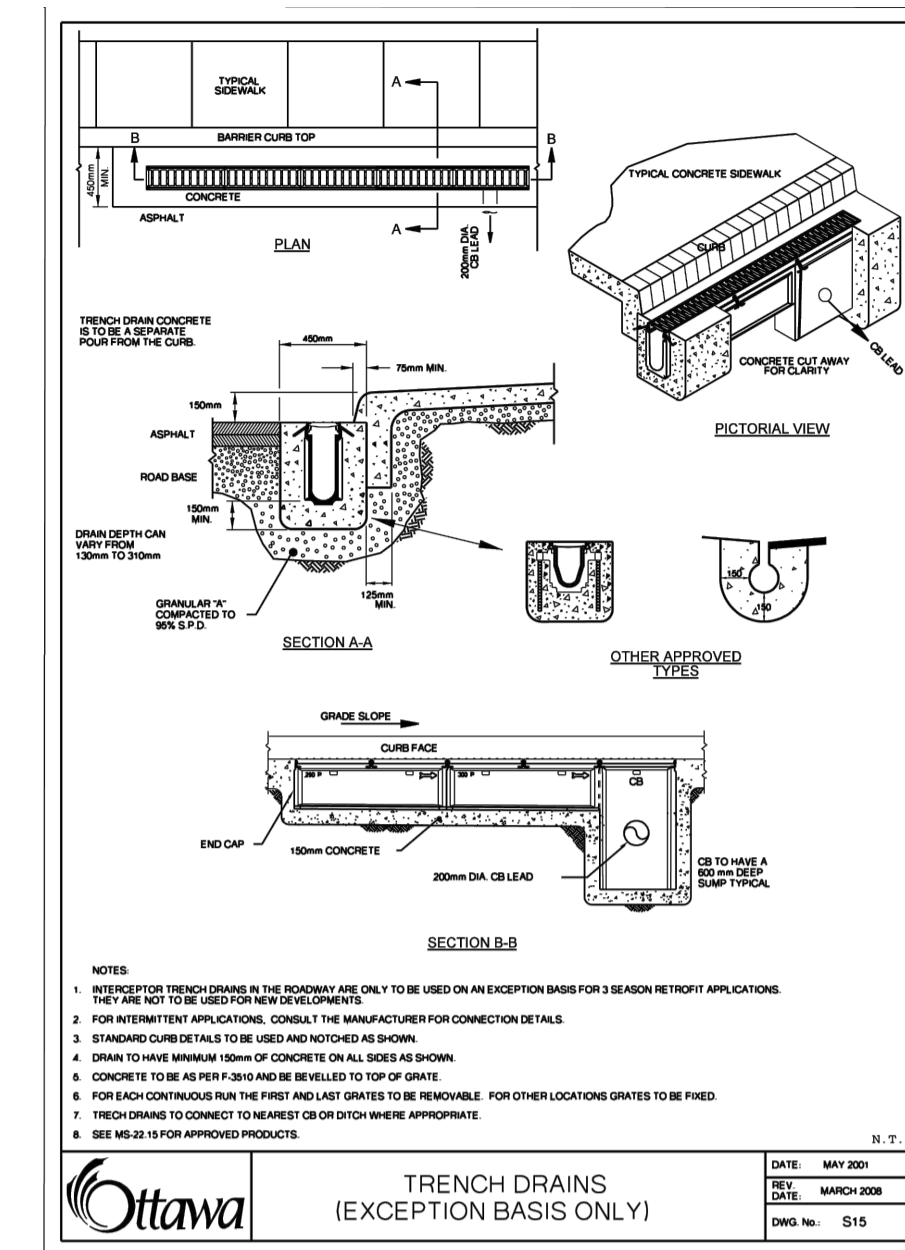
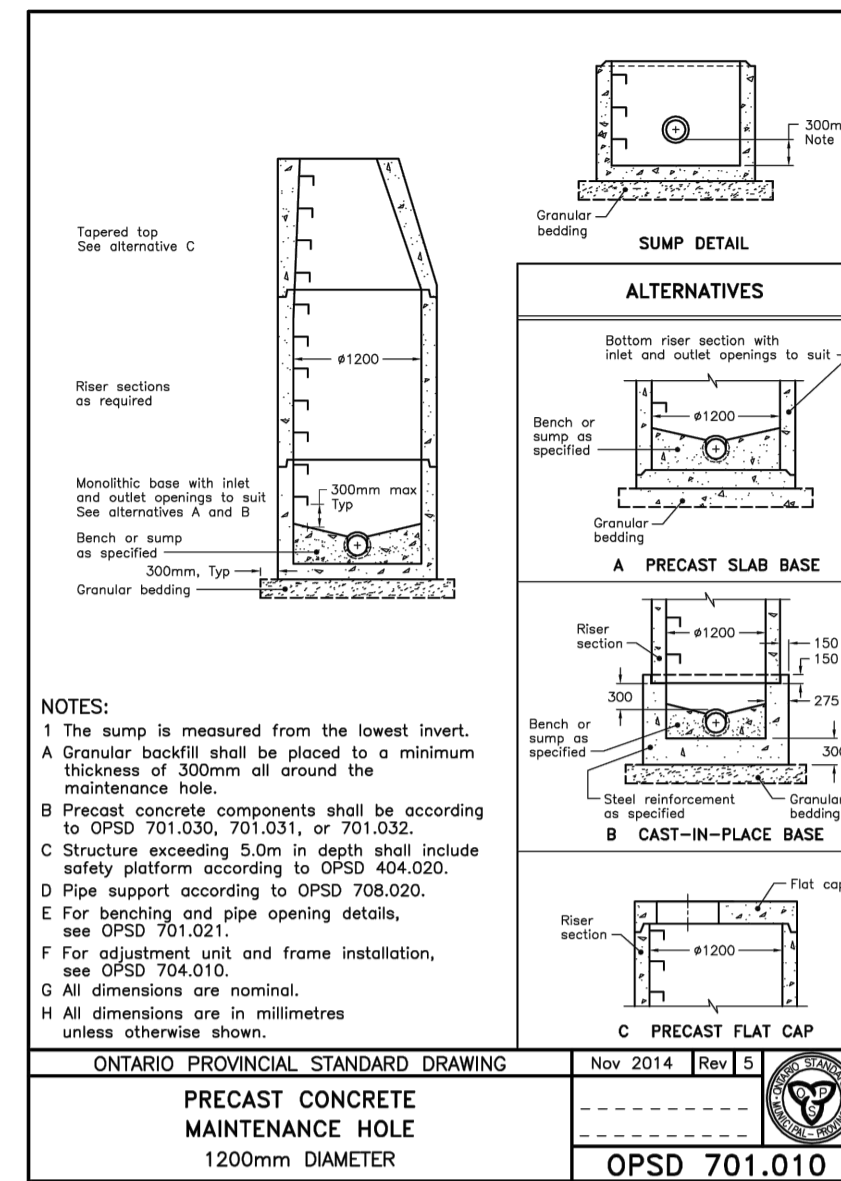
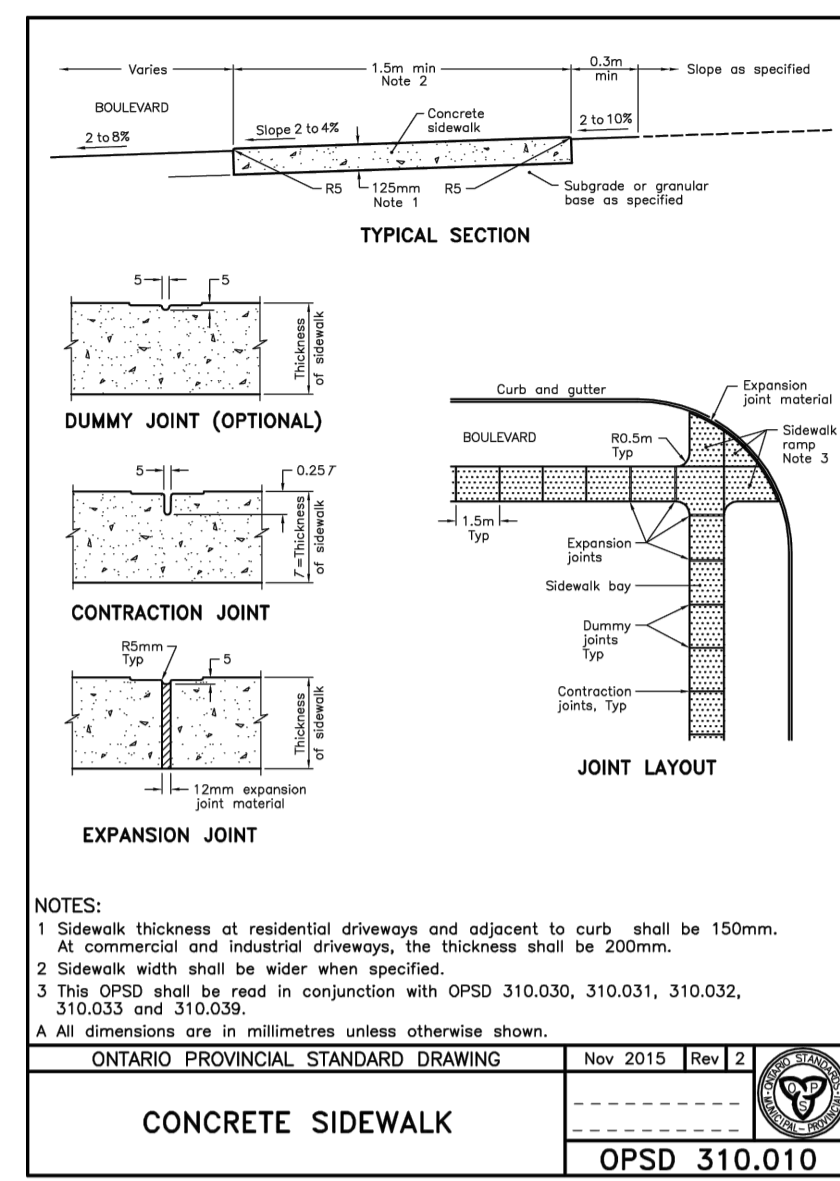
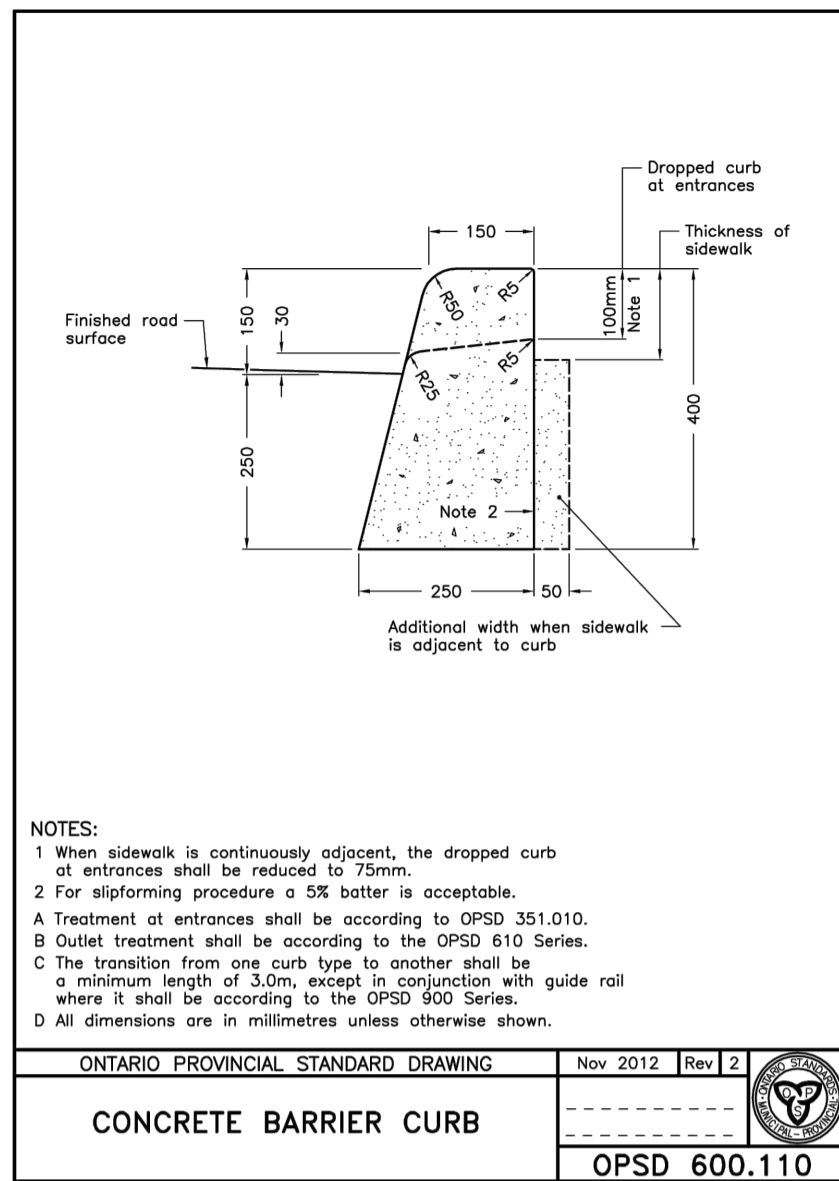
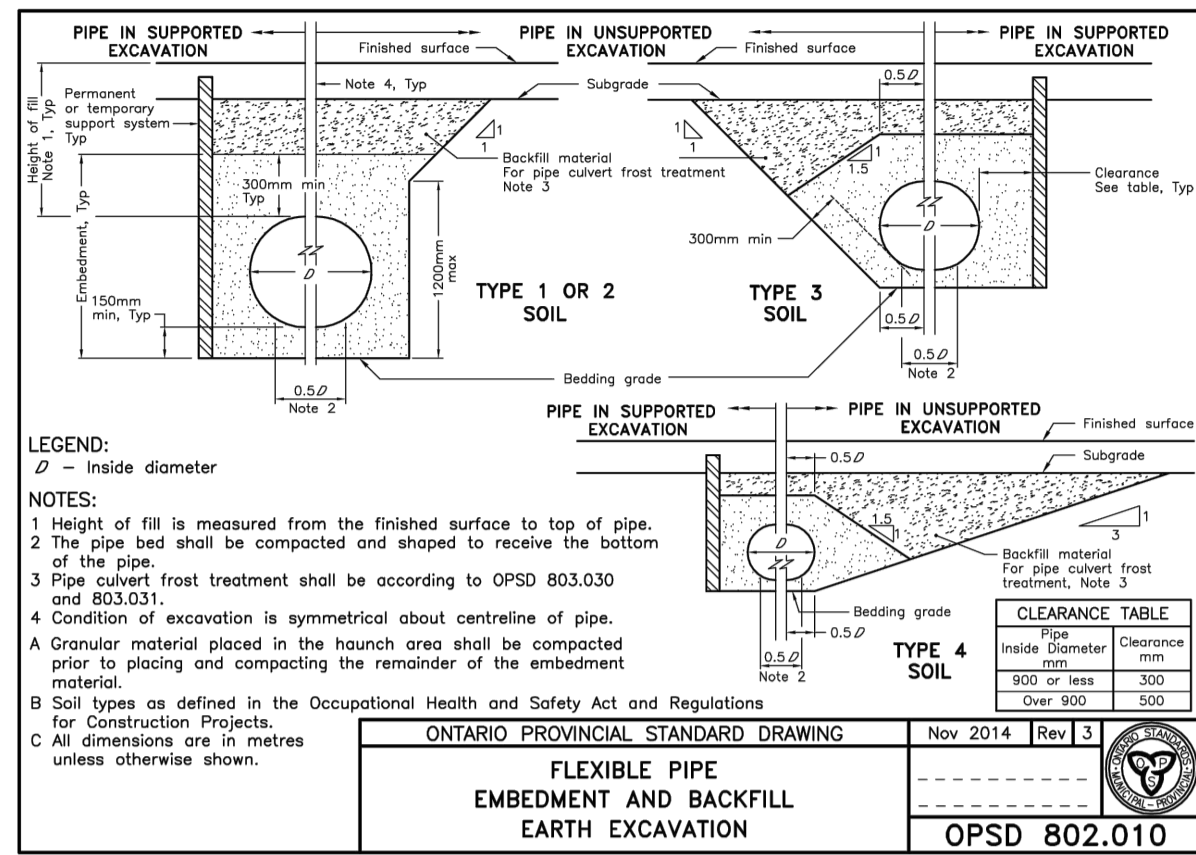
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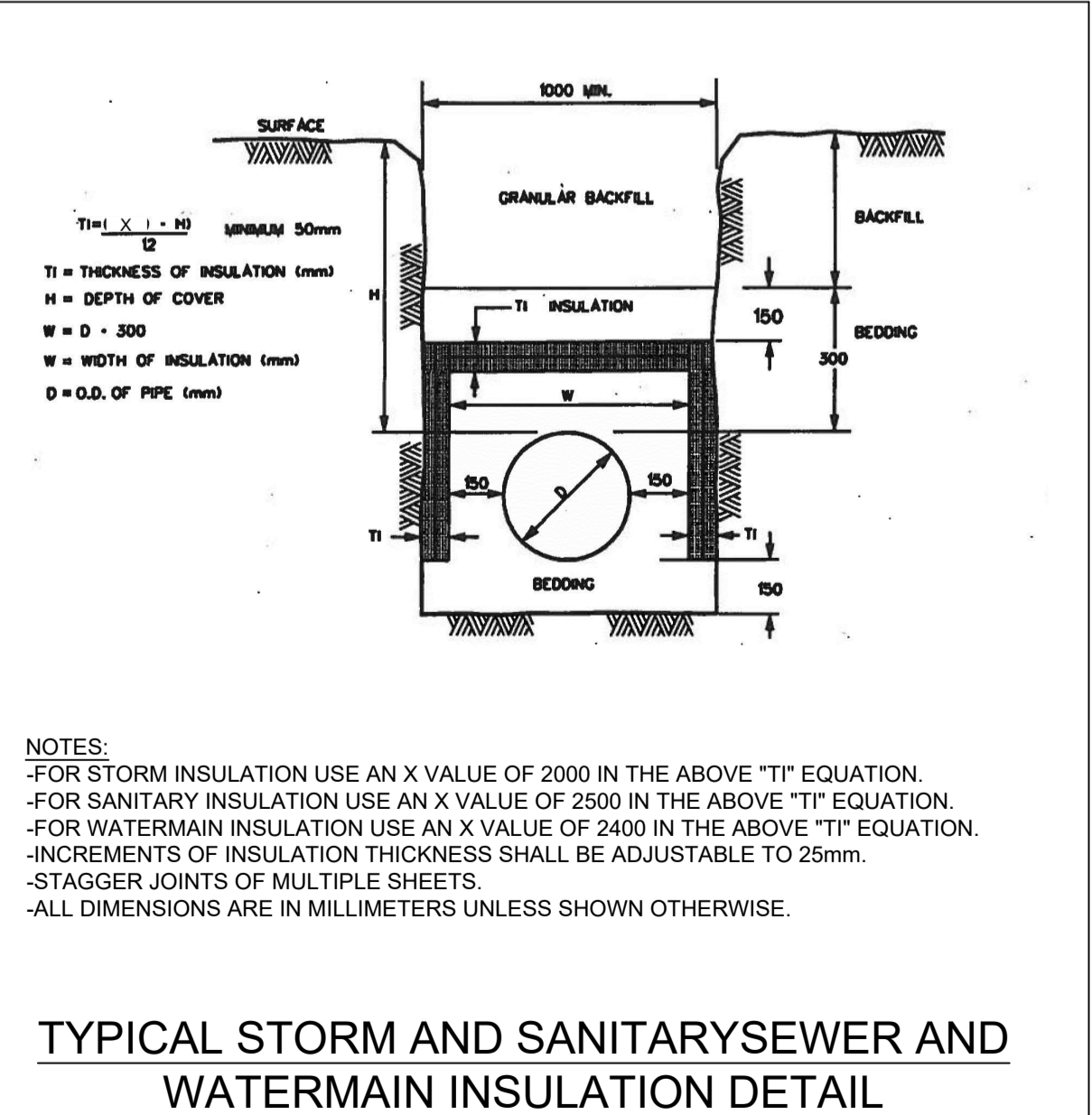
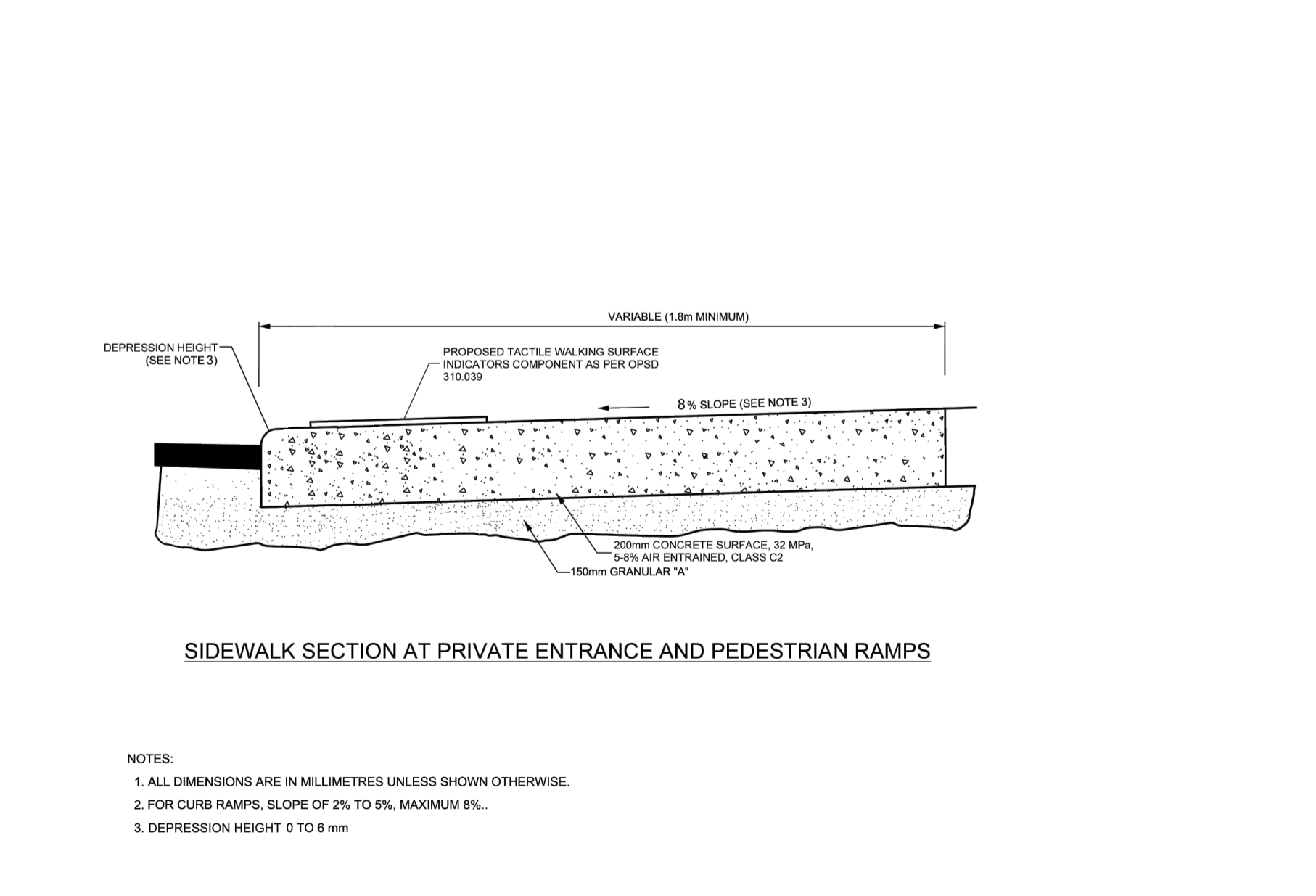
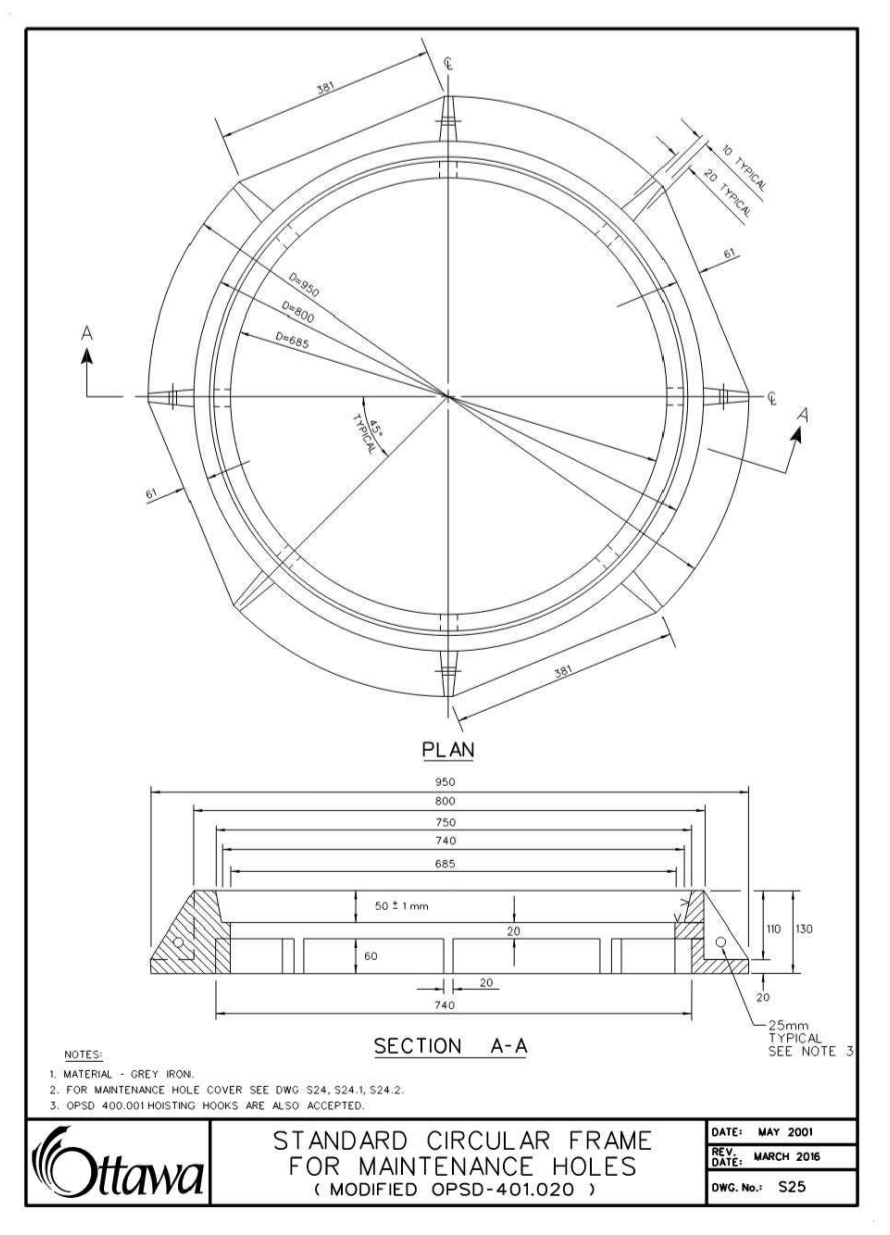
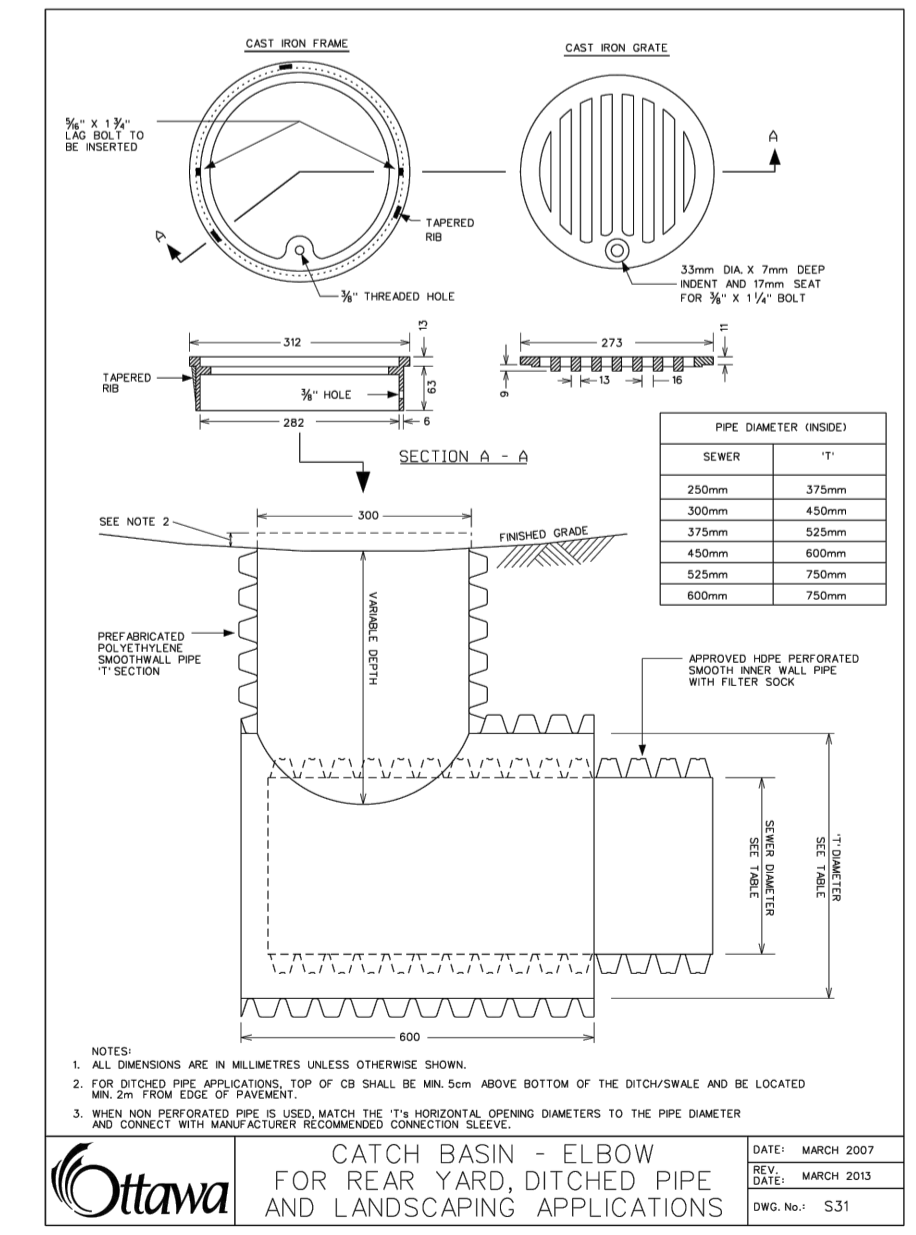
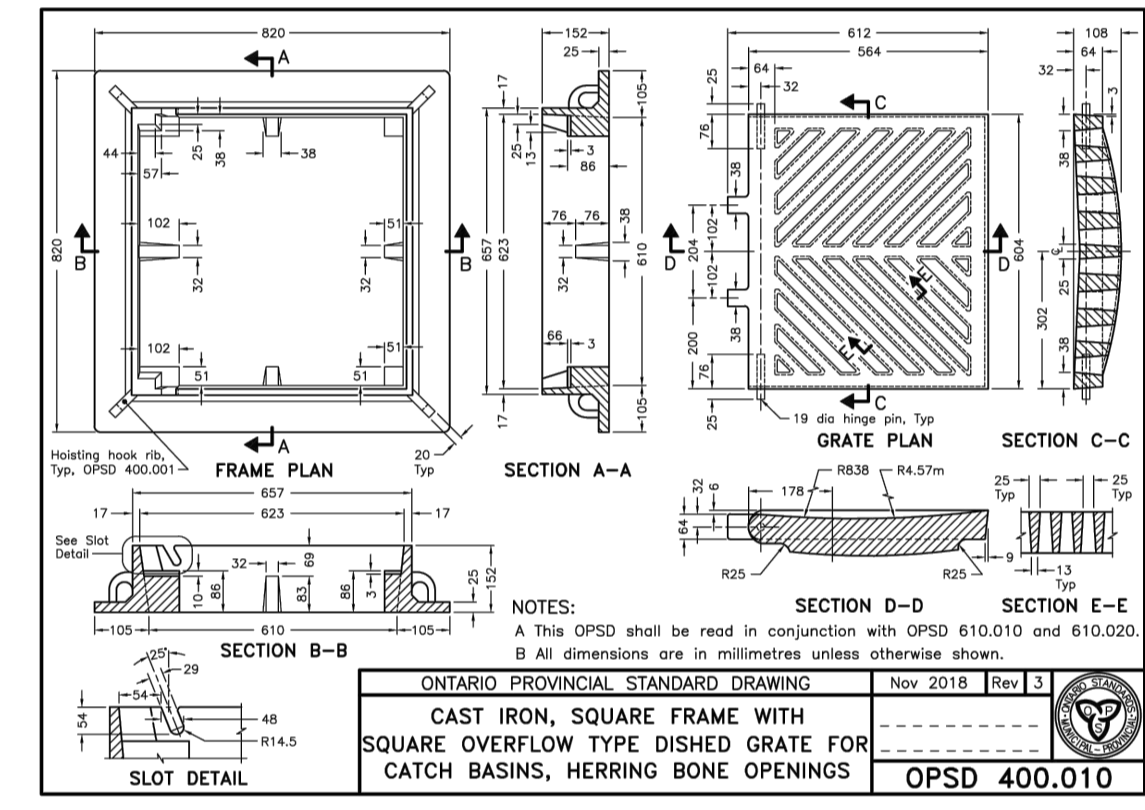
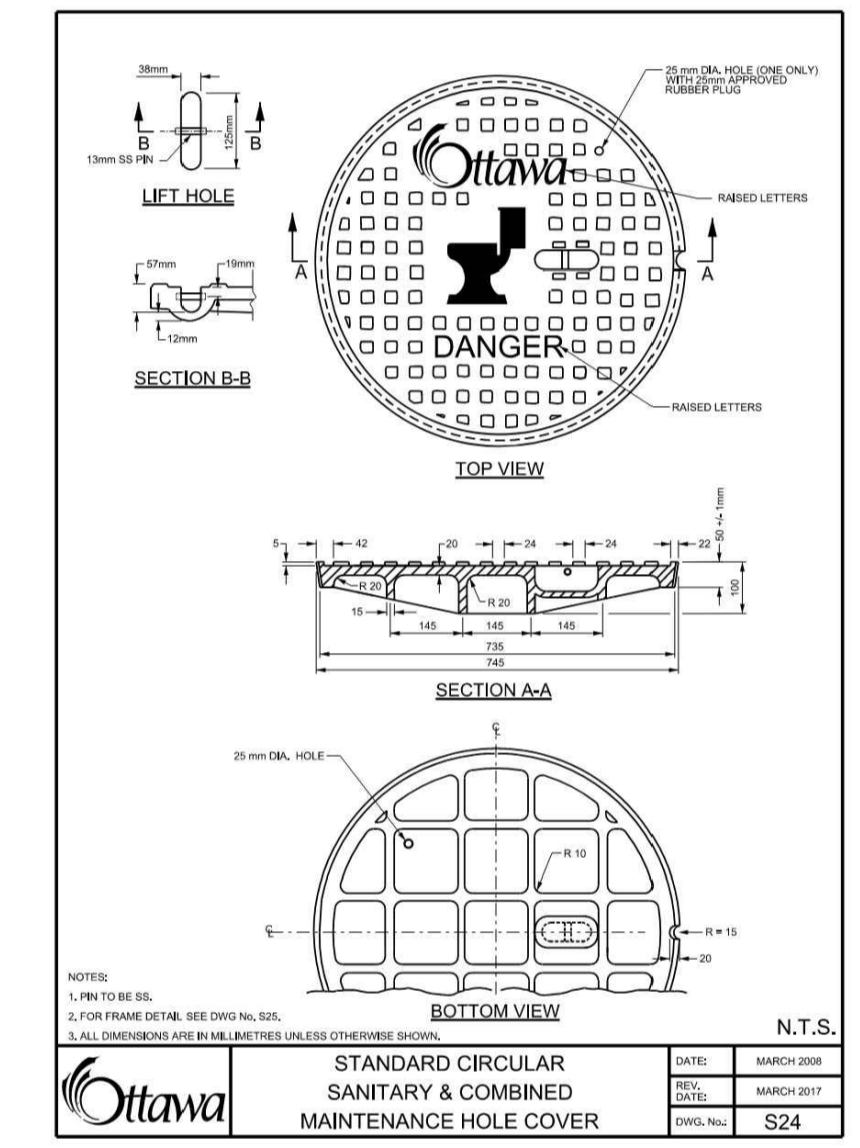
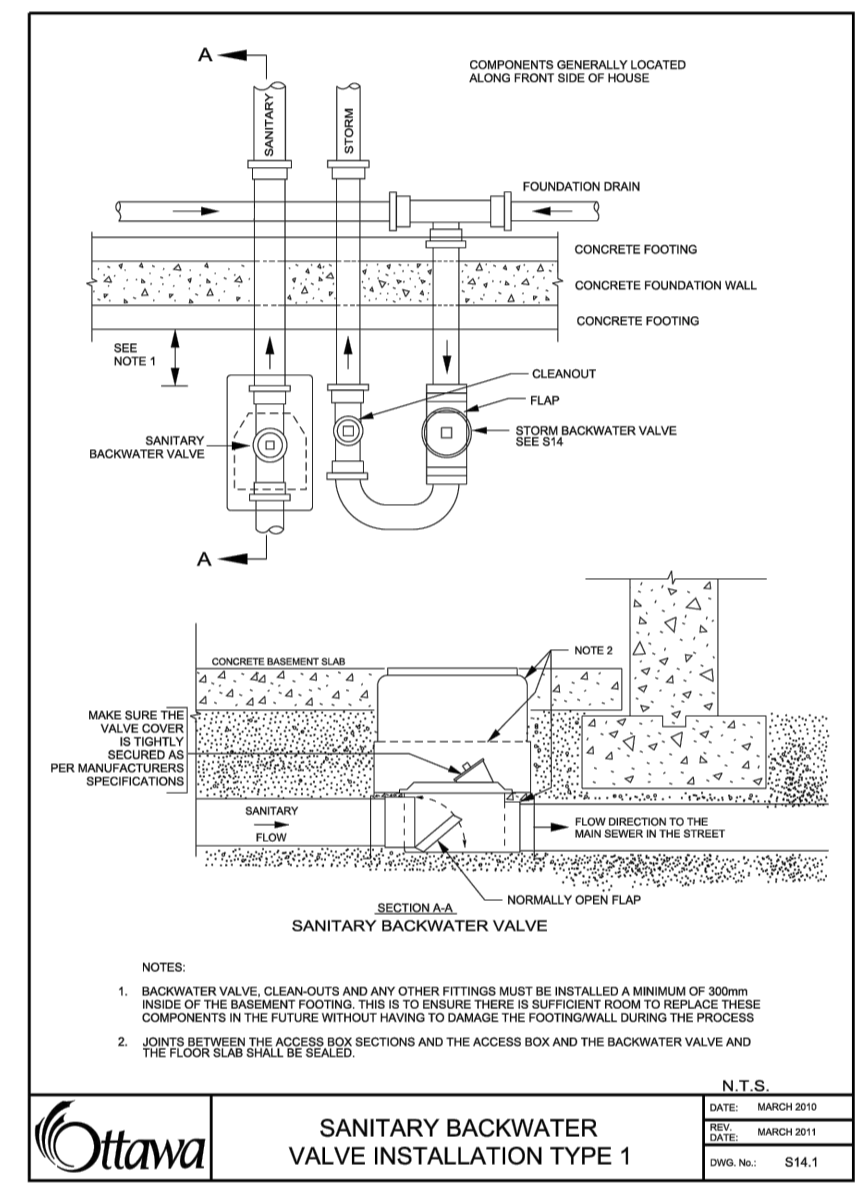
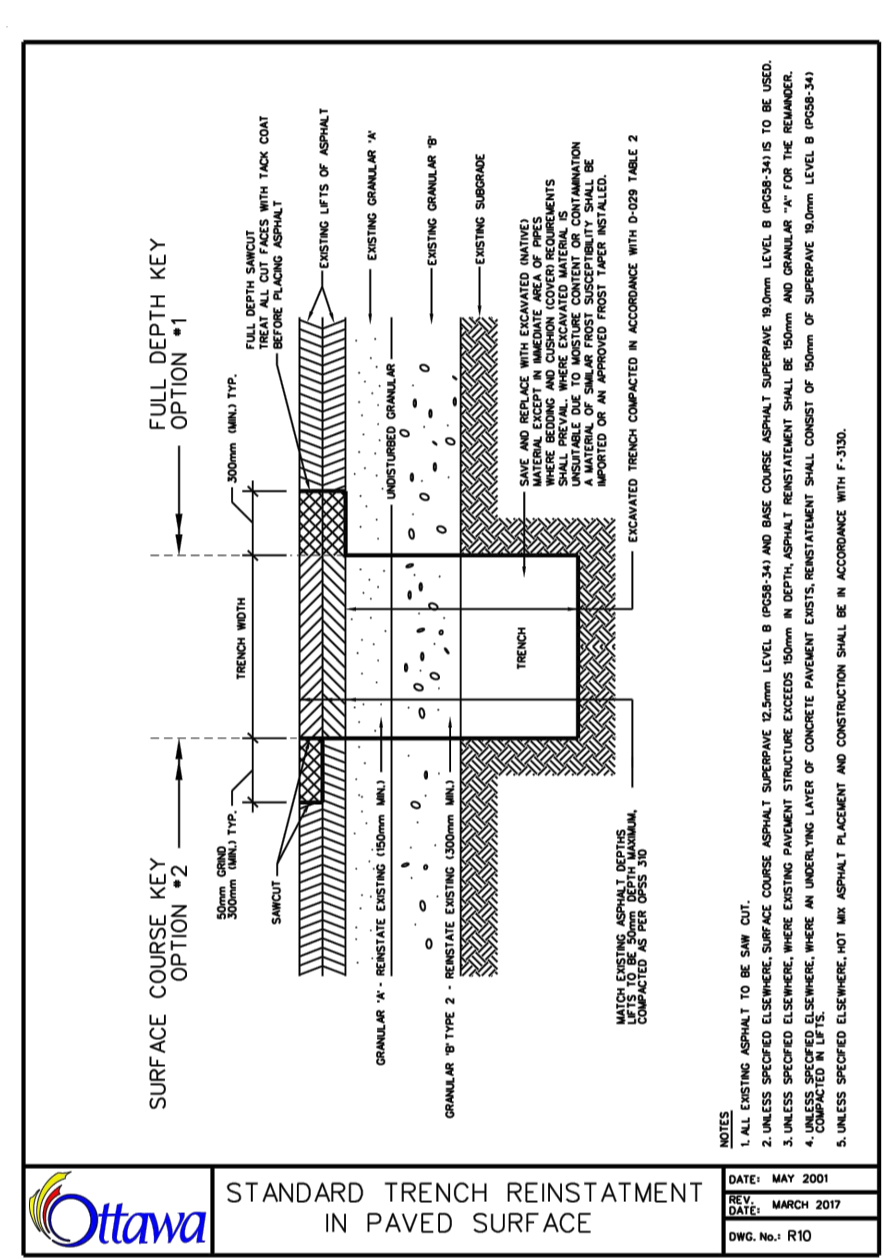
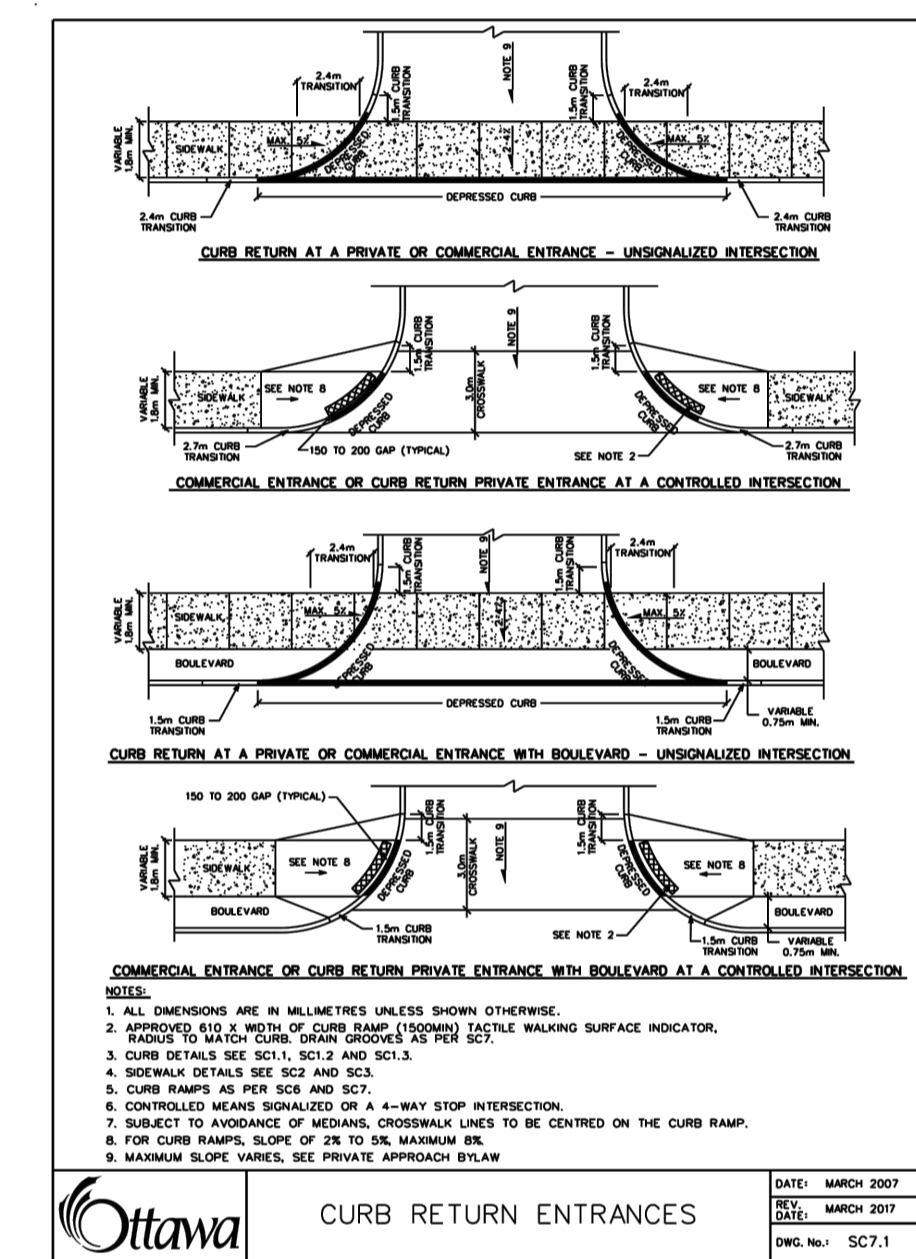
**GENERAL NOTES:**

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.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES, AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

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



**REVISIONS**

02	REISSUED FOR CITY APPROVAL	T.H.	15 DEC 2022
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	04 MAR 2021

**PROFESSIONAL ENGINEER**  
M. BASNET  
100501996  
2022/12/15  
PROVINCE OF ONTARIO

**CLIENT:** KATASA GROUP  
69 Rue Jean-Proulx Unit #301  
Gatineau, QC, J8V 1W2

**DESIGNED BY:** T.H. **DRAWN BY:** T.H. **APPROVED BY:** M.B.

**PROJECT:** 770-774 BRONSON AVENUE

**DRAWING TITLE:** CONSTRUCTION DETAIL PLAN

**PROJECT NO.:** 200436  
**DATE:** DECEMBER 2022

**C901**



## **DRAWINGS/FIGURES**

**Proposed Site Plan  
Legal Survey  
As-builts**



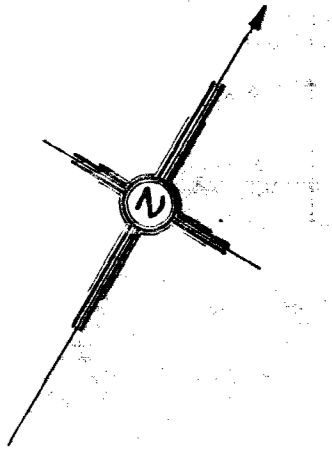
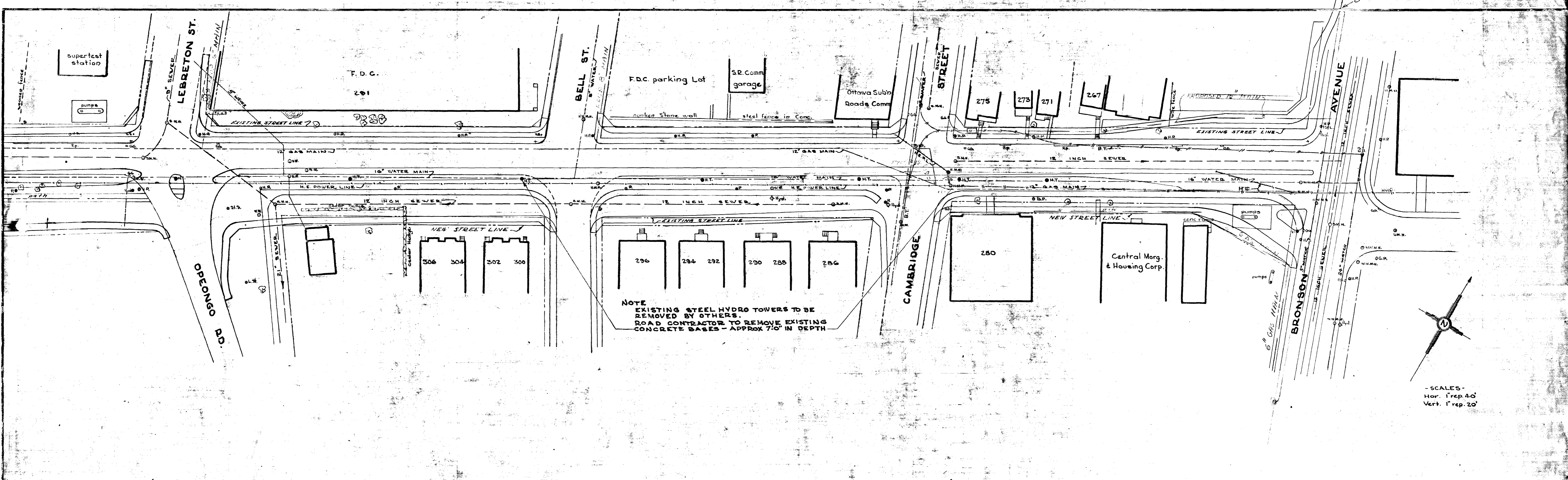




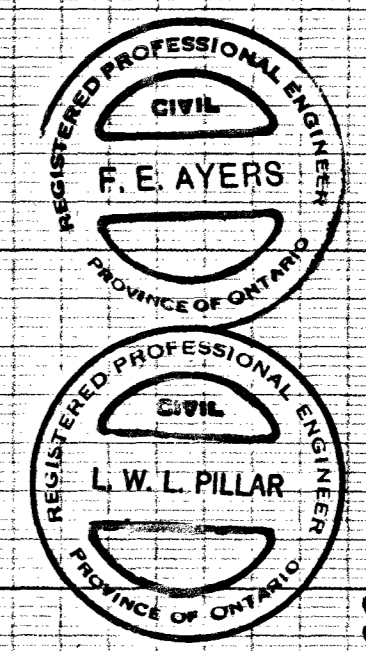
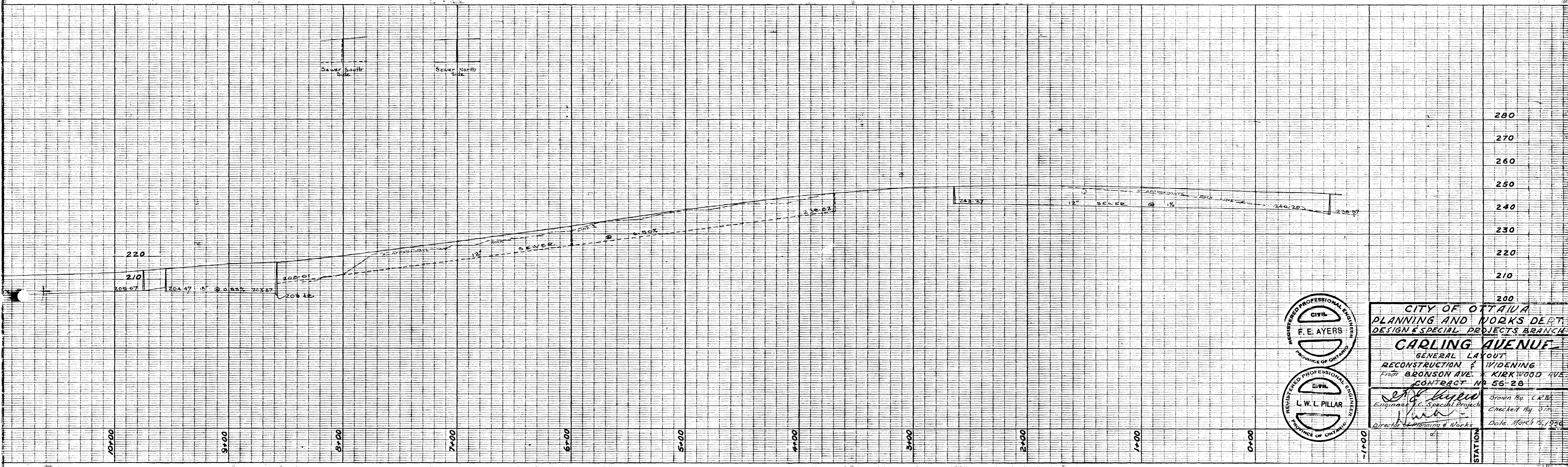








SCALES -  
 Hor. 1" rep. 40'  
 Vert. 1" rep. 20'



CITY OF OTTAWA  
 PLANNING AND WORKS DEPT.  
 DESIGN & SPECIAL PROJECTS BRANCH  
**CARLING AVENUE**  
 GENERAL LAYOUT  
 RECONSTRUCTION & WIDENING  
 From BRONSON AVE. to KIRKWOOD AVE.  
 CONTRACT NO. 56-23

Drawn By: C.K.M.  
 Checked By: S.M.  
 Date: March 15, 1956