



Functional Servicing Report Victoria Village Rezoning

P/N 22-3554 | October 28, 2022

Victoria Village
c/o Salter Pilon Architecture Inc.
74 Ross Street
Barrie, ON L4N 1G3

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& Associates Inc.

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Appendices

Appendix A	Appendix B
Jain SWM Report 2001 City of Barrie Storm Drawings for Toronto Street and Ross Street Ross Street As-Constructed Drawings	Stormwater Calculations

Drawings

3554-SWM1 Pre-Development Drainage Catchments

3554-SWM2 Proposed Drainage Catchments

3554-SS Site Servicing Concept

**Functional Servicing Report
Victoria Village Rezoning
74 Ross Street, City of Barrie**

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October 28, 2022

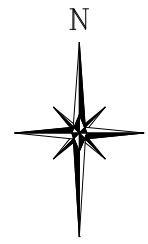
1.0 Introduction

Victoria Village is a not-for-profit organization in the City of Barrie that opened in 2003, providing 128 long-term care beds, 57 Life Lease suites, 16 senior residential suites, and approximately 16,400 square feet of commercial space including a sports medicine clinic, a café, a pharmacy, a law office, an accounting office, and community services groups.

The Victoria Village property is located at 74 Ross Street in the City of Barrie, and is bounded by Ross Street to the south and west, Wellington Street West to the north, and Toronto Street to the east. The property is irregularly shaped, with an area of approximately 1.65 ha (4.08 acres). Victoria Village also owns the properties at 54 Ross Street and 150 Toronto Street, which have areas of 0.10 ha (0.25 acres) and 0.46 ha (1.14 acres), respectively. The combined area of the properties, hereinafter referred to as the “subject lands”, is 2.21 ha (5.46 acres).

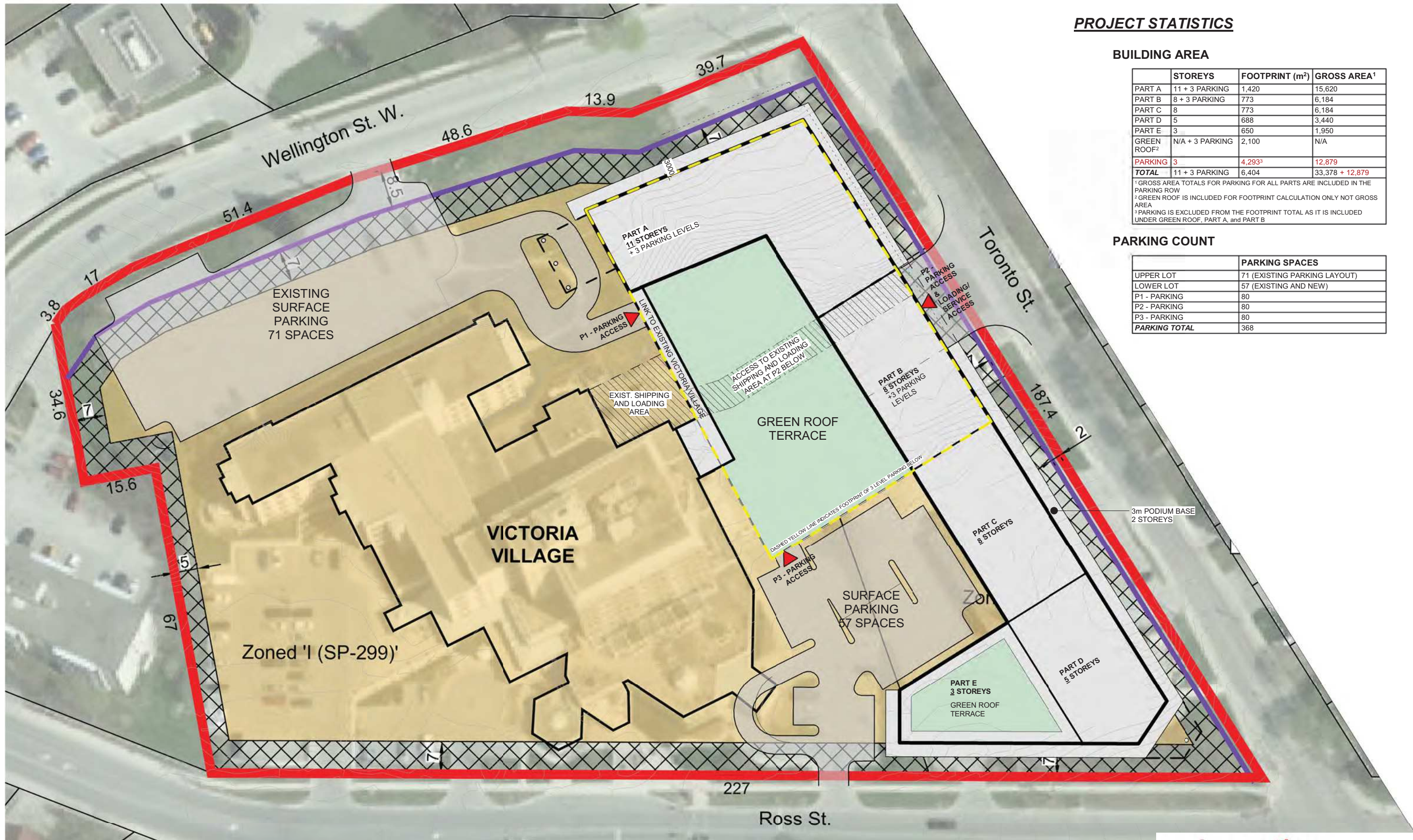
As the demand for long-term care beds in the City of Barrie has grown, Victoria Village has been approved by the Province of Ontario to construct an additional 128 long-term care beds in the City of Barrie, which forms an early component of the Victoria Village masterplan. In order to receive grants from the Province of Ontario to construct additional long-term care beds beyond those already approved, Victoria Village is required to undertake re-zoning of the currently vacant lands at 54 Ross Street and 150 Toronto Street to align with the current zoning for 74 Ross Street.

Skelton, Brumwell & Associates Inc. (SBA) has been retained to provide consulting engineering services in support of the proposed zoning bylaw amendments. In support of the zoning bylaw amendment applications, a preliminary Functional Servicing Report for the entirety of the Victoria Village properties has been completed, as summarized herein.



VICTORIA VILLAGE REDEVELOPMENT	
FIGURE 1 SITE LOCATION PLAN	
N.T.S.	
P/N 3554	OCT 2022
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PROJECT STATISTICS

BUILDING AREA

	STOREYS	FOOTPRINT (m ²)	GROSS AREA ¹
PART A	11 + 3 PARKING	1,420	15,620
PART B	8 + 3 PARKING	773	6,184
PART C	8	773	6,184
PART D	5	688	3,440
PART E	3	650	1,950
GREEN ROOF ²	N/A + 3 PARKING	2,100	N/A
PARKING	3	4,293³	12,879
TOTAL	11 + 3 PARKING	6,404	33,378 + 12,879

¹ GROSS AREA TOTALS FOR PARKING FOR ALL PARTS ARE INCLUDED IN THE PARKING ROW
² GREEN ROOF IS INCLUDED FOR FOOTPRINT CALCULATION ONLY NOT GROSS AREA
³ PARKING IS EXCLUDED FROM THE FOOTPRINT TOTAL AS IT IS INCLUDED UNDER GREEN ROOF, PART A, and PART B

PARKING COUNT

	PARKING SPACES
UPPER LOT	71 (EXISTING PARKING LAYOUT)
LOWER LOT	57 (EXISTING AND NEW)
P1 - PARKING	80
P2 - PARKING	80
P3 - PARKING	80
PARKING TOTAL	368

2.0 Existing Site Conditions

As noted previously, the property at 74 Ross Street is occupied by the current Victoria Village buildings, while the properties at 54 Ross Street and 150 Toronto Street are currently vacant. Topographic information for the site was reviewed based on County of Simcoe Geographic Information System (GIS) mapping, which shows total relief on the site to be in order of 12 m, generally falling from the north/northwest to southeast towards the intersection of Ross Street and Toronto Street.

The site has multiple access points, including four (4) driveways off of Ross Street, and three (3) driveways off of Toronto Street. Ross Street has a multi-lane cross section, including two (2) driving lanes (one in each direction), on street parking near the Ross Street/Toronto Street intersection, a bus layby near the main entrance to Victoria Village, and left turn lanes onto Toronto Street, Parkside Drive, and Wellington Street West. There are sidewalks present on both sides of Ross Street, and the City of Barrie Official Plan classifies Ross Street as a Major Collector Road.

Toronto Street has a two (2) lane cross section, with no on street parking or dedicated turning lanes, and sidewalks on both sides of the road. It is classified as a Minor Collector Road in the City of Barrie Official Plan.

Wellington Street West adjacent to the Victoria Village property has a three (3) lane cross section, including two (2) driving lanes (one in each direction), and a left turn lane onto Toronto Street. It is classified as an Arterial Road in the City of Barrie Official Plan.

2.1 Existing Building

As noted previously, the existing Victoria Village building includes 128 long-term care beds, 57 Life Lease suites, 16 senior residential suites, and approximately 16,400 square feet of commercial space. Staff from Salter Pilon Architecture provided a set of drawings dated September 2001 noted to be “Key Plans” for the proposed Victoria Village development

The drawings note thirty-three (33) one bedroom and nineteen (19) two-bedroom units, for a total of fifty-two (52) units. The additional five (5) Life Lease suites and the 16 senior residential suites are not shown on the plans, therefore the makeup of those units is unknown.

2.2 Previous Buildings - Removed

Review historical photography for the site shows that as of the development of the current Victoria Village several existing buildings remained inside of the general footprint of the conceptual building plan. This includes the Stewart Building, two residential buildings and a

Church. These buildings have since been demolished and removed from site. The buildings note are illustrate on drawing 3554-SWM1 which is include with this report.

3.0 Municipal Records

Staff from the City of Barrie provided a number of record drawings and service records for the subject property, including:

- 1993–506–002 – Wellington Street West Road Reconstruction, at Toronto Street, STA 0+220 to 0+420
- 1993–506–003 – Wellington Street West Road Reconstruction, Toronto Street to Eccles Street, STA 0+420 to 0+760
- 2010–025–004 – Toronto Street Reconstruction, Stormwater Drainage Area Plan
- 2010–025–013 – Toronto Street Reconstruction, Construction Plan and Profile, Toronto Street (STA 0+340 to STA 0+450)
- 2010–025–014 – Toronto Street Reconstruction, Construction Plan and Profile, Ross Street (STA 49+963 to STA 50+060)
- 2012–060–002 – Ross Street Reconstruction, Storm Drainage Plan
- 2012–060–004 – Ross Street Reconstruction (Wellington Street to Toronto Street), Wellington Street to Parkside Drive, STA 0+023 to 0+090
- 2012–060–005 – Ross Street Reconstruction (Wellington Street to Toronto Street), Parkside Drive to Toronto Street, STA 0+090 to 0+220
- 2012–060–006 – Ross Street Reconstruction (Wellington Street to Toronto Street), Parkside Drive to Toronto Street, STA 0+220 to 0+340
- 2012–060–007 – Ross Street Reconstruction (Wellington Street to Toronto Street), Wellington Street Crossing, STA 0+002 to 0+050
- 2012–060–008 – Ross Street Reconstruction (Wellington Street to Toronto Street), Parkside Drive Crossing, STA 0+006 to 0+050
- Water & Sanitary Services Records for 76 & 78 Ross Street.

The record drawings and service records are discussed further throughout the report when reviewing existing infrastructure in the vicinity of the proposed development.

4.0 Sanitary Sewage System

4.1 Existing Conditions

Based on review of the drawings provided by the City of Barrie, there is an existing 250 mm diameter sanitary sewer along Ross Street, directly in front of the existing Victoria Village building, conveying flow from west to east. The material is unknown; however, the drawings note that the pipe was installed as part of the Ross Street Reconstruction in 2012, therefore it is assumed the pipe is PVC. The pipe slopes from 2.8% in front of Victoria Village, and flattens to 2.6% as it approaches the intersection of Ross Street and Toronto Street. From there, it connects to a sanitary manhole (MHSAL8271) and the pipe size then increases to 300 mm diameter. The slope of the 300 mm diameter pipe is unknown; however, the profile view shows the pipe to be steeper than 2.6%.

The drawings also show that there is a 300 mm diameter sanitary sewer along Toronto Street, conveying flow from north to south. The slope is not indicated on the plans; however, the profile view shown on the drawings indicates that the pipe slope is at least 6.0%.

Along Wellington Street West, there is a 250 mm diameter sanitary sewer at 1.0% running from west to east towards Toronto Street.

The 300 mm diameter sewers along Ross Street and Toronto Street converge at manhole MHSALO8272 at the intersection of Ross Street and Toronto Street, and from there flows are conveyed via a 300 mm diameter sanitary sewer flowing south along Toronto Street at a slope of 1.5%.

4.2 Sanitary Sewage Design Flow

At this time there is currently no Site Plan for the proposed Victoria Village expansion; however, Innovative Planning Solutions (IPS) has developed a concept plan to be utilized as part of the re-zoning application(s). Based on review of the concept plan, it is understood that the expansion may consist of new building(s) with up to five (5) parts of varying height, with a total footprint of approximately 6,400 m² (0.64 ha). The potential developable area of the site is in the order of 12,223 m² (1.22 ha). The gross building area of the concept plan is approximately 33,380 m² (3.34 ha).

As noted previously, the existing Victoria Village site includes 33 one bedroom and 19 two – bedroom units. The makeup of the remaining twenty–one (21) units (5 Life Lease suites and 16 senior suites) is unknown; for the purposes of this analysis, the Life Lease suites are assumed to be two–bedroom units and the senior suites are assumed to be one–bedroom units.

The City of Barrie Design Sanitary Sewage Collection System Policies and Design Guidelines (2017) recommend that for institutional uses where historical data is not available, the common commercial sewage rates recommended in the Ministry of the Environment (MOE) Design Guidelines for Sewage Works can be utilized. The MOE guidelines do provide a flow rate of 900-1,800 L/day/bed for hospitals, which may be an appropriate value to utilize for preliminary determination of sewage flows for the site.

Given that the existing building has 128 long-term care beds, and preliminary approval has been provided for 128 long-term care beds, and utilizing a conservative estimate of 1,800 L/day/bed, the average daily flow for the existing and proposed Victoria Village is calculated as:

$$Q_{avg} = 1,800 \text{ L/day/bed} \times 256 \text{ beds} = 460,700 \text{ L/day} = 5.33 \text{ L/s}$$

The suites within the existing building include an assumed forty-nine (49) one-bedroom units, and twenty-four (24) two-bedroom units. For the purpose of this analysis, the residential portion of the building would be equivalent to a “high density apartment dwelling” as defined in the City of Barrie Sanitary Sewage Collection System Policies and Design Guidelines, which have a design population of 1.67 persons per unit. Assuming an average daily domestic flow of 225 L/day/person, the average daily flow for the suites in the existing Victoria Village building is calculated as:

$$Q_{avg} = 1.67 \text{ ppu} \times 73 \text{ units} \times 225 \text{ L/day/person} = 27,430 \text{ L/day} = 0.29 \text{ L/s}$$

The existing building includes approximately 16,400 square feet (1,524 m²) of commercial space of varying uses. For the purpose of this analysis, the MOE Design Guideline value for “shopping centre” was utilized to determine the overall flow for the commercial portion, which may be appropriate given the varying uses of the space. Given the commercial area, and utilizing a conservative estimate of 5.0 L/d/m², the average daily flow for the commercial area of the existing Victoria Village building is calculated as:

$$Q_{avg} = 5 \text{ L/day/m}^2 \times 1,524 \text{ m}^2 = 7,620 \text{ L/day} = 0.09 \text{ L/s}$$

The peak sewage flow is calculated using a peak factor of 2.0, which is permissible where more specific information is not known. Utilizing this flow, as well as an infiltration allowance of 0.1 L/s/ha, the peak sewage flow is:

$$Q_p = ((5.33 \text{ L/s} + 0.29 \text{ L/s} + 0.09 \text{ L/s}) \times 2.0) + (0.1 \text{ L/s/ha} \times 1.22 \text{ ha})$$

$$Q_p = 11.42 \text{ L/s} + 0.12 \text{ L/s} = 11.54 \text{ L/s}$$

As noted previously, the calculated flows are conservative given the lack of information available at this time. It is anticipated that Victoria Village and/or the City of Barrie would have access to sanitary flow records for the property that could be utilized to better estimate the anticipated flows from the proposed expansion.

4.3 Sanitary Sewer Requirements

The City of Barrie Sanitary Sewage Collection System Policies and Design Guidelines note that the minimum pipe diameter for sanitary services for institutional uses shall have a diameter no less than 150 mm, and a slope of between 2%–8%. The site sanitary sewer is also required to provide sewage velocities of 0.6 m/s–3.0 m/s.

Based on a peak flow of 11.54 L/s, a 150 mm diameter sanitary service requires a pipe slope of at least 2.2%, which provides a full flow and actual velocity of 1.28 m/s. As such, a pipe of this diameter and slope is sufficient based on the preliminary peak flow calculation. It is noted that the existing Victoria Village building utilizes a 250 mm diameter service at unknown slope. A service of this size at a minimum 2% slope would also be sufficient for the proposed expansion.

It may also be feasible to connect the proposed Victoria Village expansion into the existing 250 mm diameter sanitary service; however, that option would require further review with Victoria Village and/or City of Barrie staff to determine if there is any more detailed flow records for the existing site available in order to confirm if there is sufficient reserve capacity in that service.

A third option would be to utilize the sanitary connection for the former church. This connection is close to the intersection of Toronto and Ross Streets at the south west corner of the site. This would require the addition of a sanitary MH at the property line, consistent with normal municipal requirements. This third option is conceptually illustrated on drawing 3554-SS.

Based on area grades, it is assumed that the proposed sanitary service would likely tie into the existing sanitary main along Ross Street. Given the location of the mains, it is assumed the connection would be to the 300 mm diameter main with slope of at least 2.6%.

The sanitary flow within that existing main would have to be confirmed by City of Barrie staff through the detailed design stage of the project; however, a main of that size would have a full flow capacity of 155.93 L/s, therefore it is assumed that there would be sufficient capacity within that main to accommodate the potential flow generated by the Victoria Village expansion, which would represent about 7.4% of the total pipe capacity.

5.0 Water Supply and Distribution

5.1 Existing Conditions

Based on review of the drawings provided by the City of Barrie, there is an existing 200 mm diameter PVC watermain along the north side of Ross Street. There is also a 400 mm diameter PVC watermain along the south side of Ross Street. Toronto Street is serviced via a 150 mm diameter PVC watermain, while Wellington Street West is serviced via a 300 mm diameter PVC watermain.

The Victoria Village building is serviced via a 150 mm diameter domestic water service connected to the 200 mm diameter watermain on Ross Street, as well as via a 150 mm diameter domestic water service and 200 mm diameter fire service, each connected to the 300 mm diameter watermain on Wellington Street West.

The watermains on Ross Street and Toronto Street are part of the City of Barrie Zone 1 pressure zone, while the watermain at Wellington Street West is part of the City of Barrie Zone 2 North pressure zone.

5.2 Water Flow and Pressure

Detailed information with respect to available water pressure in the area is unknown at this time, and would require a hydrant pressure test be undertaken. It is assumed that there is ample pressure in the area to meet the needs of the existing Victoria Village building.

It should also be noted that the pressure in the Wellington Street West watermain will be higher than the pressure in the Ross Street/Toronto Street watermains. The Wellington Street West watermain is at the lower reach of the higher-pressure Zone 2N, while the Ross Street/Toronto Street watermains are at the higher end of the lower pressure Zone 1.

Future hydrant testing cannot be undertaken until at least Spring 2023 to confirm available pressures in the area.

The use of booster pumps would likely be required as well in order to reach the upper floors of the proposed development; however, that determination and sizing would be required to be undertaken by a mechanical consultant as part of future detailed design works.

5.3 Water Demand

The preliminary water demand calculation for the Victoria Village site is calculated based on the existing and proposed use of the property. As such, average daily water demand is assumed to be equal to the average daily sewage demand, or 5.71 L/s.

The City of Barrie Water Transmission and Distribution Policies and Design Guidelines (2022) specify that all water systems are required to have preferred operating pressures of 50–70 PSI under maximum daily flow conditions, and a fire flow pressure of at least 20 PSI during the maximum day plus fire flow condition. Watermains are to be sized to meet the greater of the maximum daily demand plus fire flow condition, or, the peak hourly demand.

Appropriate peak factors for the proposed development would be determined as part of the detailed design of the site; however, for preliminary purposes, a maximum daily demand factor of 2.0 is assumed. In addition, the City of Barrie guidelines require a minimum fire flow for institutional uses of 200 L/s. As such, it is assumed that the maximum daily demand plus fire flow condition would govern, which therefore would require the area watermains to be able to accommodate:

$$Q = (5.71 \text{ L/s} \times 2.0) + 200 \text{ L/s} = 211.42 \text{ L/s}$$

5.4 Fire Demand

The City of Barrie Water Transmission and Distribution Policies and Design Guidelines specify that the applicant is required to provide their own calculations specifying the minimum required fire flow, and the fire flow demand is to be calculated according to the latest published requirements of the Water Supply for Public Fire Protection; Fire Underwriters Survey (FUS 1999). As noted previously, they also require the available fire flow be at least 20 PSI.

The fire flow at 20 PSI is calculated as follows:

$$Q_R = Q_F \times (h_r/h_f)^{0.54}$$

where Q_R is the flow at 20 PSI
 Q_F is the flow at test
 h_r is the available pressure drop
 h_f is the pressure drop at test

The required fire fighting flow for the buildings can be calculated utilizing the Water Supply for Public Fire Protection 1999, prepared by the Fire Underwriters Survey (FUS), we have estimated the required fire fighting flow for the building to be:

$$F = 220 \times C \times A^{0.5}$$

where F is the required fire flow in litres per minute
C is the coefficient related to the type of construction
A is the total floor area in m²

These calculations would be undertaken as part of future detailed design to confirm the required and available fire flows for the proposed development. It is assumed that the building would be of non-combustible construction with sprinklers, which would permit reductions in the required fire fighting flow.

5.5 Water Servicing

The sizing of required water services for the proposed buildings is unknown at this time, and would be confirmed as part of detailed design works; however, given that the existing Victoria Village building is serviced by 150 mm diameter domestic water services and a 200 mm diameter fire service, it is likely that future buildings would require services of similar size.

Though the exact water pressure in area watermains is not known at this time, it can be assumed that the pressure in the watermain along Wellington Street West would be higher than the pressure at Ross Street or Toronto Street. As such, it would be most practical to provide water service for the proposed expansion via a new water service fed from the Wellington Street West watermain. This is illustrated conceptually on drawing 3554-SS included with this report.

Given the anticipated height of the proposed buildings, booster pumps may be required to provide the required operating pressure to the upper floors. The need for (and design of) booster pumps will need to be confirmed by the project mechanical consultant as part of future detailed design works.

6.0 Stormwater Management

The expansion of use on the Victoria Village site with require stormwater management to address the following key criteria

- 1) Maintain post-development peak flows at or below existing condition magnitudes
- 2) Provide Level 1 stormwater quality control (80% TSS removal)
- 3) Minimize changes in water balance (reduction in infiltration), with potential financial compensation paid to the Lake Simcoe Region Conservation Authority (LSRCA) for increases
- 4) Capture and either infiltrate or filter the runoff from a 25mm rainfall event.
- 5) Reduce phosphorus discharge from the site by a minimum target of 80%
- 6) Reduce phosphorus export to from the project site to zero with potential financial compensation paid to the LSRCA for loader greater than zero.

6.1 Existing Drainage Conditions

The existing drainage condition considered for the site is based on the stormwater management plan developed by Jain & Associates in 2001. This includes peak flow controls for the north parking lot which drains to Wellington Street. The balance of the site including the current Victoria Village complex and the eastern area proposed for re-development drain to Ross Street. According to the Jain report, the site is drained by an existing storm sewer system, with three drainage outlets, one at Wellington Street and two at Ross Street. The Jain report did not include the drainage outlet for the church site at Ross Street as it was outside of the scope of the Victoria Village project at that time, however City records show it is existing and was accounted for in the design for the reconstruction of Ross Street (2012).

Each of the noted drainage outlets were provided with stormwater quality controls in the form of Stormceptor oil/grit separators. These are sized for what was then called Type 2 habitat by Stormceptor Canada. This would be below the current Level 1 standard for all new developments in Ontario.

The north parking area draining to Wellington Street was noted to be flow controlled such that the peak flow for the 1 in 100-year storm event was managed to the 1 in 2-year pre-development flow rate of 0.029 cms.

Due to the revisions in site drainage patterns as a result of the development of the current building complex, no peak flow controls for the areas draining to Ross Street were required. This drainage condition was reflective of the former Stewart Building (near Wellington Street), two former residential buildings (at Toronto Street) and the former church (at Toronto and Ross Street) being in place at that time.

For the purpose of this study, the existing condition is considered to be the site as per the 2001 stormwater design, complete with the now demolished buildings at the north and east side of the site. This is consistent with drainage drawings provided by the City of Barrie for reconstruction of both Toronto Street (2010) and Ross Street (2012). These drawings are included in Appendix A.

6.1.1 Existing Drainage Catchments

Consistent with the Jain report, the pre-development site has been divided into three drainage catchments

Catchment 101 is 0.997 Ha in size and contains the existing Victoria Village complex which drains to Ross Street. There are no changes proposed to this catchment so it is being ignored for the purpose of this study.

Catchment 102 is 0.265 Ha in size. This catchment consists of the north parking area and has flow controls as noted in the Jain report. At this point there are no proposed changes to this catchment area, so it also is being ignored for the purpose of this study.

Catchment 103 is 1.46 Ha in size and contains the eastern portion of the site draining to Ross Street. This catchment is where the proposed re-development construction will take place and as such is the primary focus of stormwater management for this study.

The pre-development drainage condition is illustrated on drawing 3554-SWM1. The SWM report by Jain & Associates is included in Appendix A.

6.1.2 Pre-Development Condition Peak Flows

Pre-Development condition peak flows were calculated for Catchment 103 with land coverage consistent with all previous buildings and associated parking areas being in place as per the 2001 Jain report, resulting in a calculated imperviousness of 72.6%. Composite C factors were calculated based on the land use coverage. Time to peak was assumed to be the minimum 10min consistent with a site serviced by storm sewers. Peak flows for the pre-development condition were calculated with the Rational Method, using IDF data that was current for 2001.

Table 1 Pre-Development Peak Flows

Storm Return Period	2 year	5 year	10 year	25 year	50 year	100 year
C factor	0.76	0.76	0.76	0.80	0.81	0.81
Q cms	0.218	0.287	0.334	0.415	0.464	0.512

Calculations for the pre-development condition peak flow are included in Appendix B.

6.2 Post-Development Drainage

For analysis of post-development drainage, the conceptual site plan by Salter Pilon was reviewed and analyzed in a board sense, focusing on the eastern side of the site. Based on this review, it appears feasible to maintain the current overall drainage patterns with the eastern portion of the site continuing to outlet on Ross Street.

Consistent with the current condition, the proposed development will be drained by storm sewers connected to the existing municipal system at Ross Street near Toronto Street. Most of the existing storm sewer system on site is anticipated to be required to be removed and replaced to avoid conflicts with the proposed building foot print. Some storm sewers currently draining from the north side of the existing Victoria Village will have to be routed under the newly proposed building areas to maintain existing drainage patterns. This will have to be addressed at the detailed design stage for the site development.

6.2.1 Post-Development Drainage Conditions

The post-development condition was analyzed based on the conceptual site plan developed by Salter Pilon. The proposed development is entirely contained in the pre-development Catchment area 103 which is then labeled 203 for the proposed condition. Again, the drainage condition was analyzed using the rational method. The proposed condition imperviousness for catchment 203 is actually less than the pre-development, at 70.4%. However, the post-development analysis utilizes the current City of Barrie IDF data which has been increased by 15% to account for Climate Change. As a result, even though the drainage area stays the same, and the imperviousness of the catchment is lowered, peak flows are somewhat higher than the pre-development condition. These flows are summarized in Table 2 below

Table 2 Post-Development Peak Flows

Storm Return Period	2 year	5 year	10 year	25 year	50 year	100 year
C factor	0.74	0.74	0.74	0.79	0.79	0.80
Q cms	0.251	0.330	0.382	0.472	0.529	0.583

Given that the proposed condition peak flows are greater than pre-development, peak flow controls will be required.

Calculations for the post-development condition are included in Appendix B. The proposed condition site is illustrated on drawing 3554-SWM2.

6.2.2 Post-Development Stormwater Quantity Control

As stated in the preceding section, controls will be required to maintain the post-development peak flows at pre-development magnitudes.

Storage volumes required to achieve this have been estimated using the MTO Method, for the 2, 5, 10, 25, 50 and 100 year storm return periods. IDF inputs for the proposed condition rainfall are as per current City of Barrie standards, while limiting flows are as calculated with previous IDF information.

At this conceptual stage, there are two drainage scenarios considered in the high-level analysis completed

Scenario 1 – site flows up to the 5 year event are controlled to match the pre-development 5 year flow rate and routed to site storm sewers and then to sewers on Ross Street. Runoff from larger storm events is allowed to drainage via sheet flow overland to the Ross Street major system.

For scenario 1, the required storage volumes are summarized in Table 3

Table 3 Detention Storage Volumes

Storm Return Period	2 year	5 year	10 year	25 year	50 year	100 year
Volume (cu.m.)	38.7	43.4	55.5	69.6	90.2	84.6

The maximum estimate storage volume for Scenario 1 is 90.2 cu.m. for the 1 in 50-year storm. For this high-level analysis, we would expect the volume estimates are no the low side and would instead estimate a maximum storage volume of 100-110 cu.m. be actually required, and resulting peak flows being slightly less than pre-development.

Scenario 2 – site flows up to the 1 in 100-year storm event are controlled to the 5-year predevelopment peak, allowing all of the site flows to be conveyed by the downstream storm sewer system on Ross Street.

In this scenario, the maximum storage volume for the 1 in 100-year event would increase to 184.3 cu.m.

6.2.3 Proposed Low Impact Development

Low Impact development features for the site will be focused on infiltrating storm runoff (if possible) or filtering it and reducing the amount of phosphorus being discouraged from the portion of the property proposed for development.

Anticipated mechanisms for achieving these aims include

- Bioswales/Rain Gardens – these provide filtration of storm runoff and phosphorus reduction. Where soils and groundwater allow, these can also provide for infiltration.
- Infiltration Galleries – when fed from clean runoff sources such as building roofs, these features infiltrate runoff from minor storm events, reducing runoff volume and thereby also reducing the amount of phosphorus that is carried off site.
- Filters – these hydrodynamic devices are suitable for collection and treatment of runoff from all areas on development site and when appropriately sized, provide for phosphorus reduction up to 77.5% as well as trapping oils and sediment (up to 89% TSS removal)

It is expected that combination of measures will be required to achieve targets for volume control (infiltration or filtration) and phosphorus reduction. These will be assessed and designed during design development at the site plan approval stage.

6.2.4 Post–Development Water Balance Analysis

No water balance analysis has been completed at this time. However, given that the site concept reduces imperviousness from 72.6% to 70.4% it appears reasonable to assume that there will be a net benefit for water balance overall.

As part of the Low Impact Development requirements for the project, particularly volume control and phosphorus mitigation, it is likely that infiltration mechanisms will be investigated. Given that this site is institutional, only runoff from clean sources such as the building roof will be allowed.

Assuming that the entire building roof is drained to an infiltration practice, the total volume required as generated from a 25mm rainfall event would be in the order of 25mm x 6300 sq.m. (conceptual roof area total) = 157.5 cu.m. Potential locations for infiltration practices include the landscaped area at the north side of the proposed building, under the proposed surface parking area at the south or under the existing north parking lot. Given that the infiltration practices would be fed primarily from roofs provides for flexibility with pipe routing to any of these areas.

Detailed soil analysis would have to be completed to verify groundwater depth the infiltration capacity of soils in site in order determine if infiltration is feasible. Further, the site will have to be checked to confirm there are no existing contaminants that could impact the groundwater below the site. This will all be reviewed at the design development stage.

6.3 Storm Sewer Sizing

Storm sewers for the site will be sized as part of detailed design development at the site plan application stage. It is anticipated that these will be sized for the peak flow from either the 1 in 5 year or the 1 in 100-year event, depending on the location and configuration of site peak flow controls.

6.4 Detention Storage Design

The configuration of detention storage on the site will be developed at the detailed design stage for the site plan approval application. The primary options for detention storage on this site are roof top or underground. Potentially a combination of the two would be utilized in order to peak flow targets are achieved.

If roof top storage is utilized, the proposed green roof terrace in the middle of the building complex could be a suitable location. This area is approximately 1940 sq.m. in size so the maximum calculated storage volume would be achieved with a storage depth of 0.095m (95mm).

If underground storage were utilized, the south parking lot would be the candidate location for a storage structure. Here there would be an available space of about 1000 sq.m. for storage. Assuming a system that provides about 95% volume efficiency is used, the maximum storage depth required would be about 0.19m (190mm) which is likely to be able to be accommodated.

Other options for detention storage can be investigated during design development. This may include underground storage around the south, east and north perimeter under landscaped areas. This may prove to be beneficial rather than letting these areas drain completely uncontrolled and increasing the required sizing of roof top and under parking storage.

6.5 Stormwater Quality Control

The current Victoria Village Complex is serviced by three oil/grit separators. The former church site has no stormwater quality controls. It is proposed to leave the existing separators in place that drain to Wellington Street and the west side of the site to Ross Street as there is currently not change of use proposed for the contributing drainage areas.

The third oil/grit separator at the east side of the current complex is anticipated to be removed and replaced with a larger treatment unit sized for Level 1 control for the expanded building. It is anticipated that the replacement unit will be a filter such as an Imbrium Jellyfish that reduces phosphorus as well as trapping sediments and hydrocarbons.

Given the conceptual site layout, this it is considered that this is the most feasible means of providing stormwater quality control for the limited surface parking areas shown in the concept plan. Routing runoff through a filter such as a Jellyfish can also be accomplished downstream of peak flow control volumes, either roof top or underground, which will minimize the size of the unit required to achieve treatment targets.

6.5.1 Heavy Metals, Oils, Grease, Total Suspended Solids

These contaminants are most commonly generated in vehicle access and parking areas. The concept plan for the site has relatively little surface driveways and parking, instead providing multiple floors of parking under the units on site. In addition to achieving the required parking requirements in the space provided on site, it greatly reduces surface area and thus volume of runoff that would discharge hydrocarbons and suspended solids.

By routing surface parking and driveway areas through a treatment device such as an oil/grit separator or filter like the Jellyfish noted previously, these contaminants can be effectively captured, allowing for clean runoff to be discharge from the property.

6.5.2 Phosphorous Control

As noted in Section 6.2.3, there are several mechanisms to be considered to target phosphorus reduction with the aim of meeting the LSRCA required minimum of 80% reduction. The effectiveness of each method will be evaluated using modelling software such as the Low Impact Development Treatment Train Tool (LID TTT) provided by the LSRCA. While challenging to apply to individual site plans due to limitations in the graphical user interface, this tool can effectively model various LID practices and estimate the overall loading and reduction in phosphorus that is achieved. This tool is particularly useful in that it allows evaluation of the overall effectiveness of various practices being applied together, either in parallel or in series.

The most effective method for phosphorus reduction is infiltration of site runoff. At this stage, we cannot determine if infiltration can be utilized on the project site. Once this is determined as part of the detailed design development stage, methods for phosphorus reduction can be decided on. The LID TTT model will be used as part of the design process.

6.6 Connection to Existing Infrastructure

As noted in Section 6.1, there are multiple storm connections from the site to Ross Street currently. The west most connection drains the existing Victoria Village Complex. A second 200mm diameter connection on the east side of the building drains the current site parking lot and areas at the north of the complex, south of the north parking lot. A third 300mm diameter storm connection drained the former parking lot of the church.

Typically, the City of Barrie allows only one storm service connection per property, however two currently exist for the Victoria Village complex. It would be anticipated that the new development would make use of the existing east side connection, provided that it has sufficient capacity to drain the site. The 200mm size of the specified by Jain & Associates is below the standard minimum. Further, when the City of Barrie re-constructed Ross Street, a 300mm pipe was extended to connect to this pipe at the property line (as per as-constructed

records) with a slope of 1.6% which provides a capacity of 0.122 cms. The 300mm diameter connection from the church parking lot is at 1.0% providing a capacity of 0.110 cms. Thus, the combined existing capacity of the two storm services currently connected in the vicinity of the redevelopment is 0.232 cms, below the estimated pre-development peak flow of 0.287.

This means that a new storm sewer connection to Ross Street will be required, with at least a capacity of 0.287 cms. This would mean at least a 450mm pipe with a slope of 1.1% (smaller pipes with greater slope could also be employed). The east most connection would be to manhole DDPS01832 which is drained by a 600mm storm sewer as compared to the middle connection (200mm) to the next upstream manhole drained by a 525mm sewer. Thus, of these two connections, the east most connection would be the preferred to be replaced.

Further downstream, at the intersection of Toronto and Ross Streets, the storm sewer is 1050mm diameter and would be sized for the entire Victoria Village site. The storm sewer in this location is on the north side of Ross Street and if used, would not require a new service to be constructed across the roadway. This option may prove to be the preferred as the leaves no question about downstream sewer capacity at the connection point.

A further option would be to reduce peak flows to match the capacity of one of the existing outlets from the site by increasing stormwater detention.

All of these connection options will be investigated at the design development stage to confirm the best option for the site with the least impact on municipal infrastructure. Regardless of the connection point selected, a new manhole will be required at the property line to meet current municipal requirements.

6.7 Erosion and Sediment Control During Construction

To ensure stormwater quality control during construction, it is imperative that effective erosion and sediment controls be placed throughout the entire area prior to construction activities. The construction phase of the site development provides a risk of soil erosion and migration of soil off-site. In order to mitigate this risk, the following practices shall be employed:

- All construction traffic to be routed over a mud mat at the construction entrance. The exact location of the mat or mats will need to be determined by the contractor in order to best provide access. Mud mats are to be in place prior to any disturbance of the site for construction.
- The site is to be ringed with sediment control fence. Installation of sediment control fence shall be constructed to current LSRCA and/or City of Barrie standards.

- All drainage structures when installed are to be protected with silt–sack erosion control devices to prevent structures and sewers being filled with sediment and/or this being conveyed off site.
- The contractor is to maintain a quantity of sediment control materials on the site during construction so as to be able to rapidly address failures of the measures put in place.

7.0 Utilities

7.1 Electrical & Gas

The site is currently serviced by underground electrical service, as well as by natural gas. Staff from Alectra Utilities and Enbridge, respectively, have not been contacted as of the date of this report. They will need to be circulated as part of any future Site Plan Application(s) for the development site, as they will need to review their respective capacities and confirm any necessary improvements that may be required to local utility infrastructure.

7.2 Bell Canada and Rogers Communications

Telephone and internet service in the area is currently available from both Bell Canada (Bell) and Rogers Communications Inc. (Rogers). Staff from Bell and Rogers will need to be circulated during the detailed design of the project in order to coordinate the design and installation of communication services to the proposed development.

8.0 Conclusions and Recommendations

Based on the preceding analysis, it is our opinion that the proposed Victoria Village expansion can be constructed on the existing property utilizing existing municipal services. Detailed design of the building(s) will be required before further analysis of required sanitary and water services and mains can be completed. City of Barrie staff will also be required to review and/or confirm the current available capacity within the existing water and sanitary main networks in order to determine if they have sufficient capacity to accommodate the proposed development.

Stormwater management controls for the site to meet requirements for peak flow and quality control, water balance, volume control and phosphorus reduction will be developed on site as part of the site design as part of the application for site plan approval.

Circulation to the various utilities in the area will need to be undertaken as part of the detailed design of the site, which can commence following adoption of the proposed Zoning Bylaw Amendments.

9.0 Disclaimer of Responsibilities to Third Parties

This report was prepared by Skelton, Brumwell & Associates Inc. for the account of Victoria Village.

The material in it reflects Skelton, Brumwell & Associates Inc.'s best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Skelton, Brumwell & Associates Inc. accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions based on this report.

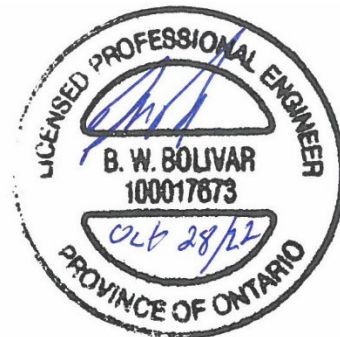
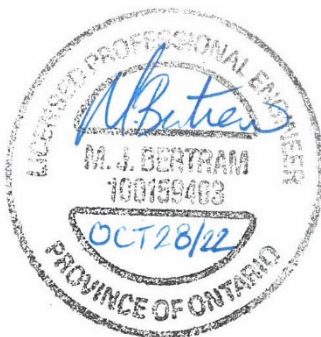
All of which is respectfully submitted,
SKELTON, BRUMWELL & ASSOCIATES INC.

Per:

Matt Bertram, P. Eng.
Partner, Senior Project Engineer

Per:

Bryan W. Bolivar, P. Eng.
Vice President



Appendix A

Jain SWM Report 2001
City of Barrie Storm Drawings for Toronto Street and Ross Street
Ross Street As-Constructed Drawings

**REPORT
OF
STORM WATER RUN-OFF
FROM
VICTORIA VILLAGE
BARRIE, ONTARIO**



**Prepared by:
Jain & Associates Ltd.**

June 26, 2001

1. BACKGROUND

Victoria Village Inc. is proposing to convert the formerly known Victoria Hospital Building into Long Term Care Facilities for Seniors. The site is located at 76 Ross Street in Barrie, surrounded around Wellington Street, Ross Street and Toronto Street.

2. SCOPE OF REPORT

The purpose of this report is to address the storm water run-off from the post development conditions of the site.

3. EXISTING CONDITIONS

The building is existing and has four (4) Parking Lots with paved surfaces. Two (2) Parking Lots are accessible from Ross Street and the other two (2), smaller in size, from Wellington Street.

The users of the Hospital Building utilized the two (2) Parking Lots from Ross Street. Wellington Street has two (2) Parking Lots. One (1) was used by the Maintenance Staff while the other Parking Lot was used by the Residents of Stewart Building. The Parking Lot used by the Residents of Stewart Building will remain as is and no alterations are proposed.

The existing Service Building and Laidlaw Building 17979 square meter located along Wellington Street will be demolished and a new Parking Lot as indicated on Drawing P-7 of about 2452 square metre would be built in its place.

The storm sewer from these demolished buildings is discharging to Ross Street's Storm Sewer System. Due to the new two (2) storey Parking P1 and P2 the existing storm sewer serving the demolished buildings has to be removed and a new storm connection has to be provided from Wellington Street to new Parking Lot P7.

The site has five (5) storm sewer outlets to Ross Street's storm sewer system. Three (3) storm sewer systems located in most easterly direction will be reused. The two (2) storm sewers in most westerly direction will be abandoned and capped at street line.

The existing drawings were obtained from the Owner to establish present storm sewer system. The information was not in reliable condition. Whatever information was available has been transferred to Drawing M-101.

4. PROPOSED CONDITIONS

It is proposed to renovate the present facilities into Long-Term Care Facilities for Seniors. Most of the renovations will be done to the internal layout. A minor portion of 322 square meters will be added to the building structure.

It is also intended to provide additional parking for the users. The Parking Lot along Ross Street will be converted into a new two (2) storey parking structure as indicated P1 and P2. The storm water from this building will be pumped to the existing storm line available at site.

It is proposed to provide a new storm outlet to Wellington Street for the new Parking lot P7. The outlet will be controlled through a 100 mm orifice to retain the water from a 100-years past to a 2-year present develop condition.

5. STORM DISCHARGE

The storm discharge from the proposed alterations to Ross Street will be less than the present conditions, because the Laidlaw Building and Service Building are no longer discharging to Ross Street's Storm Sewer System.

A new connection is proposed to Wellington Street but it is proposed to retain the water to 2 years present develop condition to 100 years past develop condition. All required retention would be over the Parking Lot, to a maximum height of 300 mm.

In addition to this, two (2) new oil interceptors are also proposed. They will provide a better quality of storm discharge than the present existing system. Storage available in oil interceptor is ignored in the calculations.

6. CONCLUSION

The proposed development should not have any impact on the Storm Sewer System, as the quantity to Ross Street's Sewer System will be less.

Very minor increase in storm water run-off to Wellington Street's Storm Sewer System. The oil interceptor can provide additional storage also.

A significant increase in quality of storm discharge is proposed. Our opinion is that the proposed development should not have any significant impact.

VICTORIA VILLAGE

Flow from site - 100 years storm.

Year	A	B
2	20.8	-0.683
5	27.9	-0.674
10	32.7	-0.67
25	38.6	-0.667
50	43	-0.665
100	47.4	-0.663

COPY COLUMNS A,B, FROM ABOVE
FOR THE REQUIRED STORM INTO THE
ROW BELOW:

47.4 -0.663

T.C. (min): 10

C (PRE DEVELOPMENT): 0.65

C (POST DEVELOPMENT): 0.62

AREAS:		<u>Post Dev.</u>	<u>Pre Dev.</u>
ROOF(ha):		0.4778	0.5938
PARKING(ha):		0.695	0.6861
GRASS(ha):		0.887	0.7799
TOTAL(ha):		2.0598	2.0598

ALLOWABLE PRE DEV. 0.586

ROOF DISCH. (cms): 0

UNCONTROLLED FLOW: 0.0

RELEASE RATE (cms): 0.586

TIME	I (mm/hr)	Q (cms)	STORE Q.
10	155.49	0.56	-18.18
11	145.97	0.52	-42.48
12	137.78	0.49	-67.41
13	130.66	0.47	-92.89
14	124.40	0.44	-118.86
15	118.83	0.42	-145.25
16	113.86	0.41	-172.02
17	109.37	0.39	-199.14
18	105.30	0.38	-226.56
19	101.60	0.36	-254.26
20	98.20	0.35	-282.22
21	95.07	0.34	-310.42
22	92.19	0.33	-338.83
23	89.51	0.32	-367.45
24	87.02	0.31	-396.25
25	84.70	0.30	-425.22
26	82.52	0.30	-454.36
27	80.48	0.29	-483.65
28	78.56	0.28	-513.09
29	76.76	0.27	-542.65
30	75.05	0.27	-572.35
31	73.44	0.26	-602.16
32	71.91	0.26	-632.09
33	70.46	0.25	-662.13
34	69.08	0.25	-692.26
35	67.76	0.24	-722.50

Storage Required (m ³):	0.0
Top of Water Elevation (m):	0.000
Oriface Elevation (m):	0.000
Head (m)	0.000
Q (cms)	0.000
g (m/s ²)	9.81
c	0.6
d (mm)	0

VICTORIA VILLAGE
 Flow to Wellington Street - 100 years storm.

Year	A	B
2	20.8	-0.683
5	27.9	-0.674
10	32.7	-0.67
25	38.6	-0.667
50	43	-0.665
100	47.4	-0.663

COPY COLUMNS A,B, FROM ABOVE
 FOR THE REQUIRED STORM INTO THE
 ROW BELOW:

47.4 -0.663

T.C. (min): 10

C (PRE DEVELOPMENT): 0.25

C (POST DEVELOPMENT): 0.85

AREAS:		<u>Post Dev.</u>
ROOF(ha):		0
PARKING(ha):		0.2452
GRASS(ha):		0.02
TOTAL(ha):		0.2652

ALLOWABLE PRE DEV. 0.029

ROOF DISCH. (cms): 0

UNCONTROLLED FLOW: 0.0

RELEASE RATE (cms): 0.029

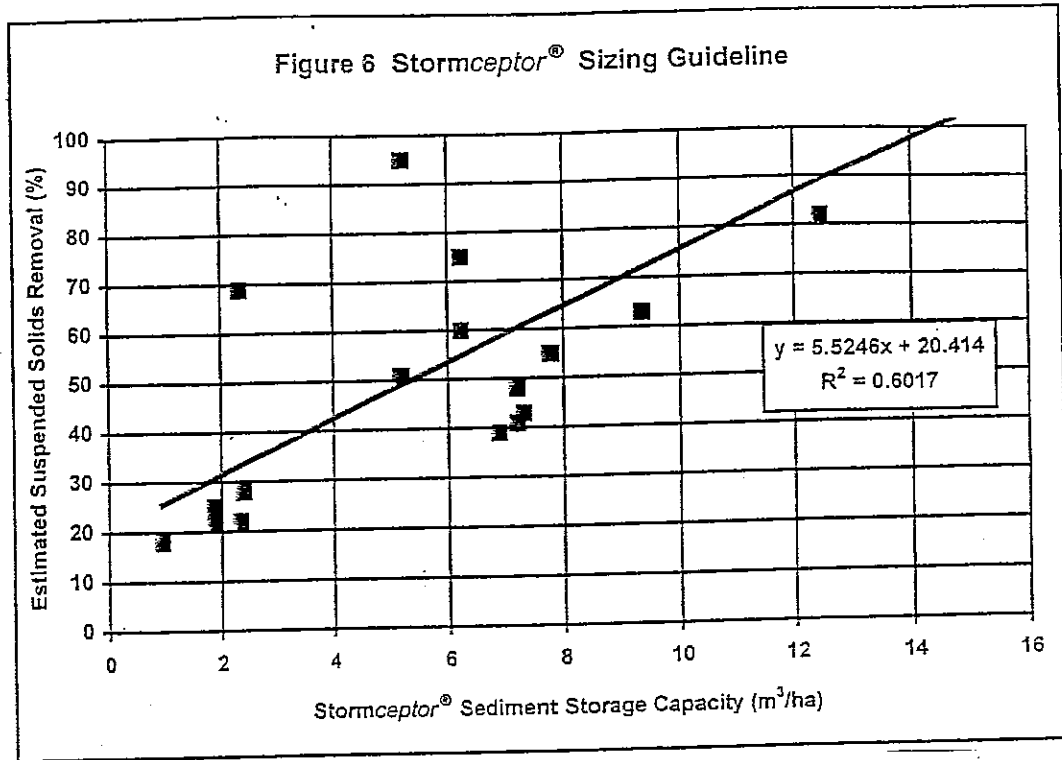


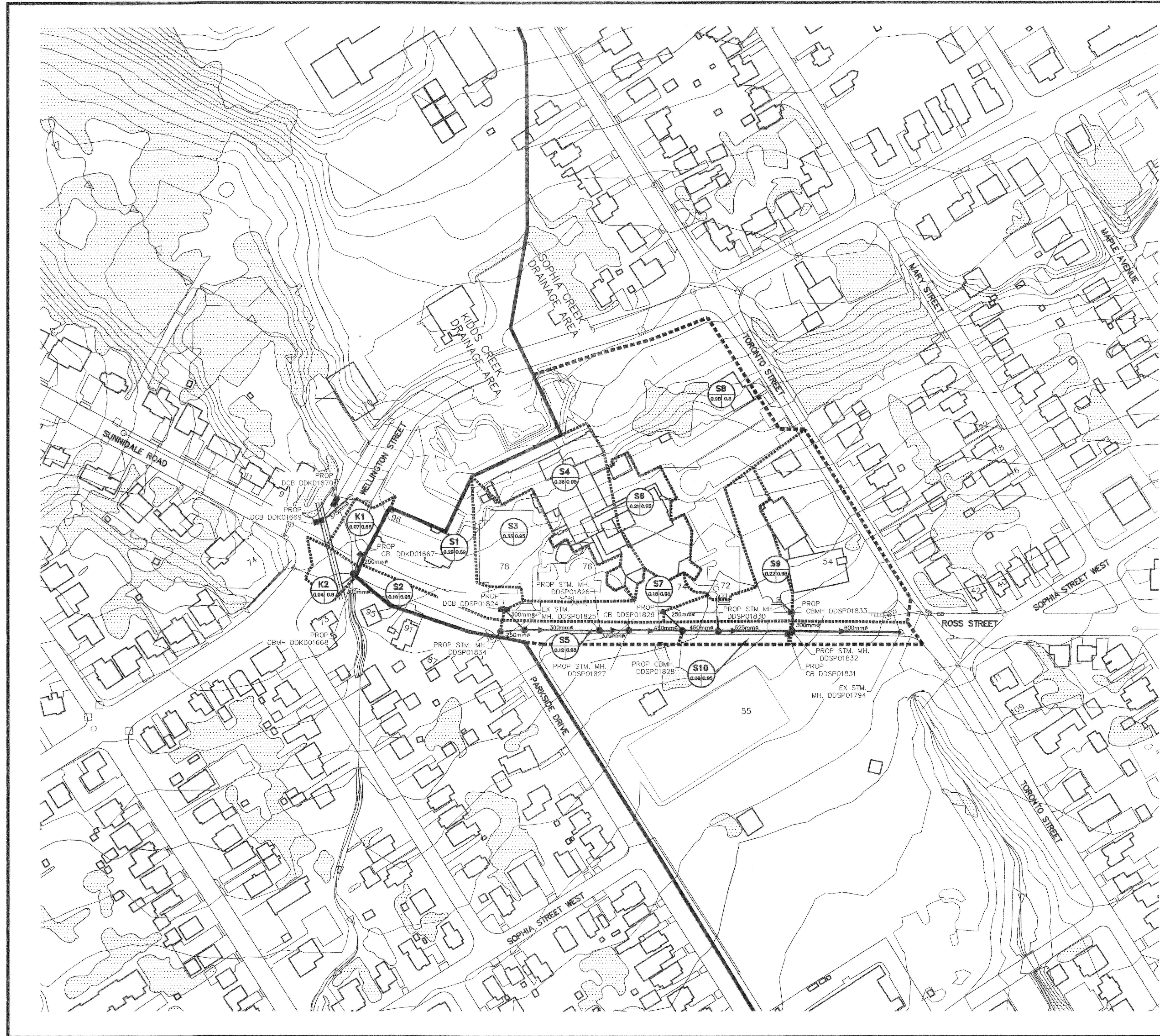
Table 5. Maximum Impervious Drainage Area Guidelines (ha)

Stormceptor Model (STA / STC)	Type 1 Habitat	Type 2 Habitat	Type 3 Habitat	Treatment Train*
750	0.20	0.25	0.30	0.35
1000	0.30	0.35	0.45	0.60
1500	0.50	0.60	0.75	1.05
2000	0.65	0.80	1.00	1.35
3000	1.05	1.30	1.60	2.15
4000	1.45	1.75	2.20	2.95
5000	1.85	2.25	2.80	3.75
6000	2.25	2.70	3.40	4.55

#1 & #2 →
#3 →

* 50% TSS removal

Table 5 indicates that there are 4 design levels for the Stormceptor. The first three design levels are based on the classification of the receiving waters (river, watercourse). These design levels are for stormwater management plans in which Stormceptor is the only stormwater quality measure being implemented. The fourth design level is intended for situations in which the Stormceptor is one of a number of stormwater quality control measures being implemented on a site (i.e. the interceptor discharges to a perforated pipe, sand filter, infiltration trench, etc.)



STORM LEGEND

- DRAINAGE BOUNDARY
- CATCHMENT BOUNDARY
- CATCHMENT BOUNDARY OUTSIDE SUBJECT AREA
- SUB-CATCHMENT BOUNDARY
- MAJOR SYSTEM FLOW
- MINOR SYSTEM FLOW
- SUBCATCHMENT
AREA (ha) RUNOFF COEFFICIENT
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- EXISTING STORM MANHOLE
- EXISTING CATCH BASIN
- PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN

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0 20.0m 40.0m

NO.	REVISIONS	DATE	APPROVED

CITY OF BARRIE
APPROVED
DATE: May 3, 2012
Russ Hank
DIRECTOR OF ENGINEERING

ROSS STREET RECONSTRUCTION

STORM DRAINAGE PLAN

The City of
BARRIE
ENGINEERING DEPARTMENT

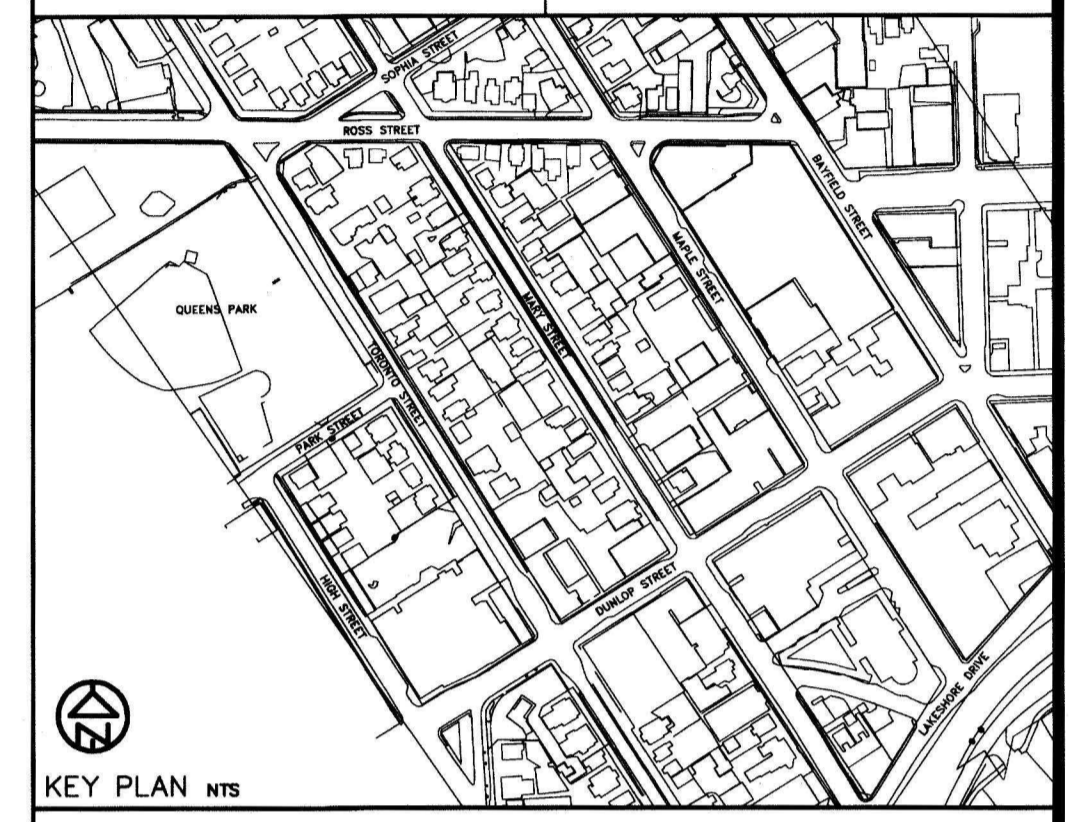
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DESIGN T.F.	DRAWN T.F.	SHEET NO. STM1
REVIEWED J.S.C.	DATE 2012.04.30	



CITY OF BARRIE
COUNTY OF SIMCOE



BURNSIDE
R. J. Burnside & Associates Limited
3 Ronell Crescent, Collingwood, Ontario
telephone (705) 446-0515 fax (705) 446-2399
web www.rjburnside.com



KEY PLAN nts

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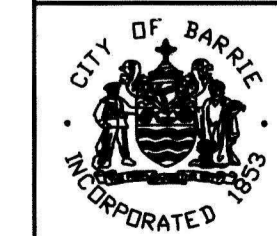
NO.	REVISIONS	DATE	APPROVED
0	ISSUED FOR TENDER	10.04.09	R.K.

CITY OF BARRIE
APPROVED
DATE: April 9, 2010
R. W. KERR
DIRECTOR OF ENGINEERING



TORONTO STREET RECONSTRUCTION

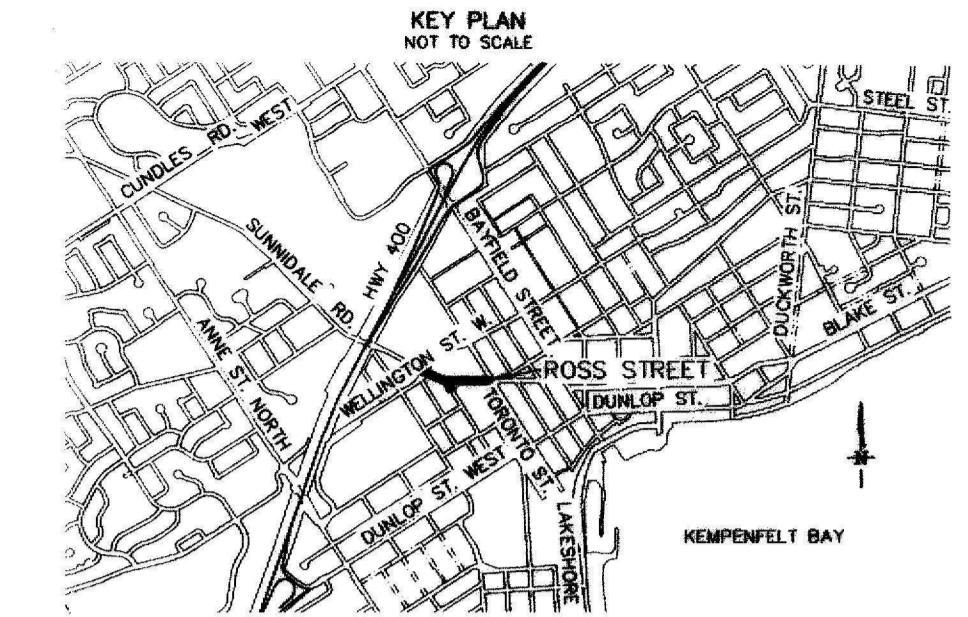
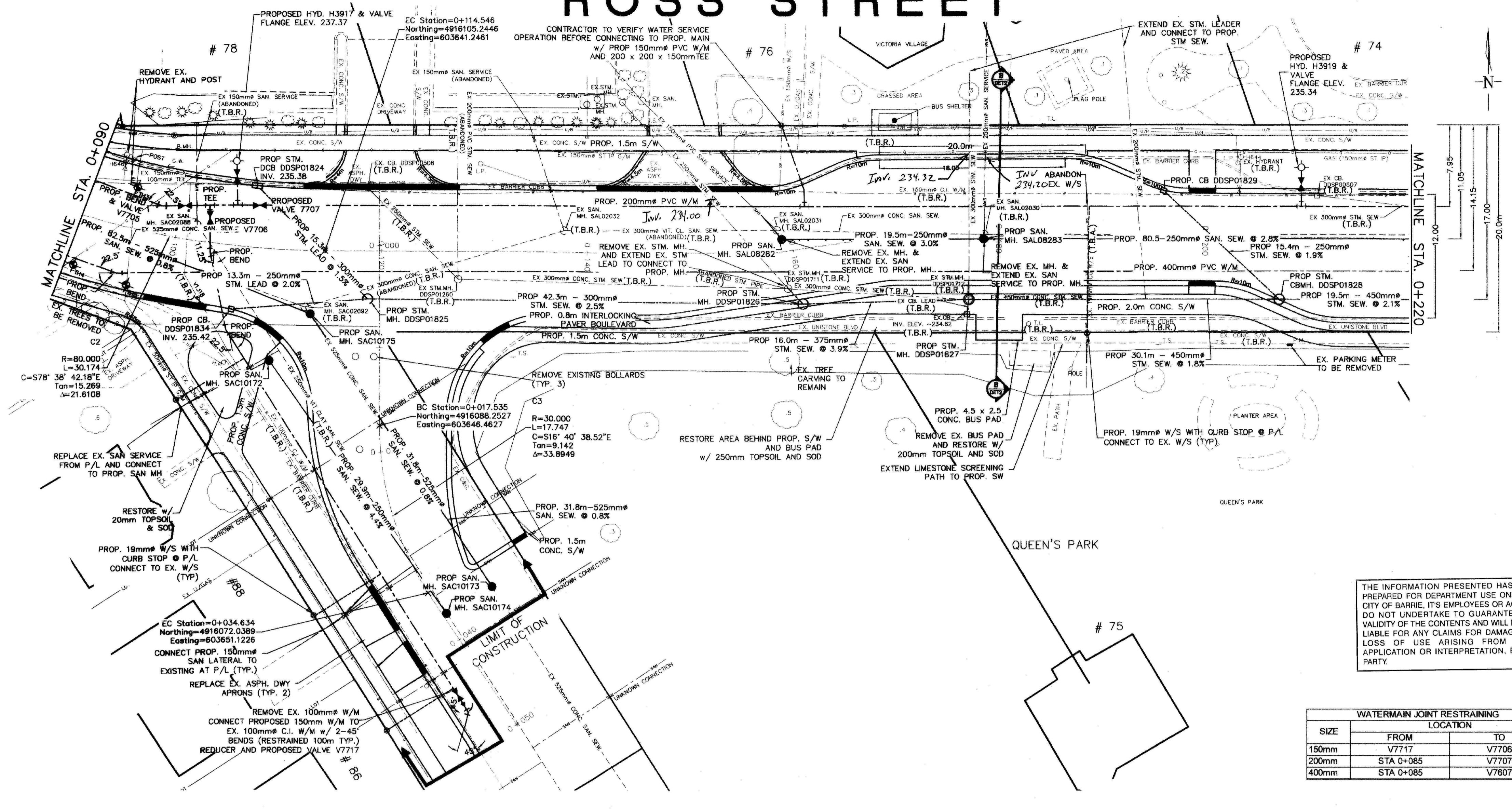
STORMWATER DRAINAGE AREA PLAN



CITY of BARRIE
ENGINEERING DEPARTMENT

SCALE	1:2000	CONTRACT NO.	2010-025T
DESIGN	T.L.	DRAWN	R.Y.
REVIEWED	R.W.K.	DATE	09.03.20
			SHEET NO. STM1

ROSS STREET

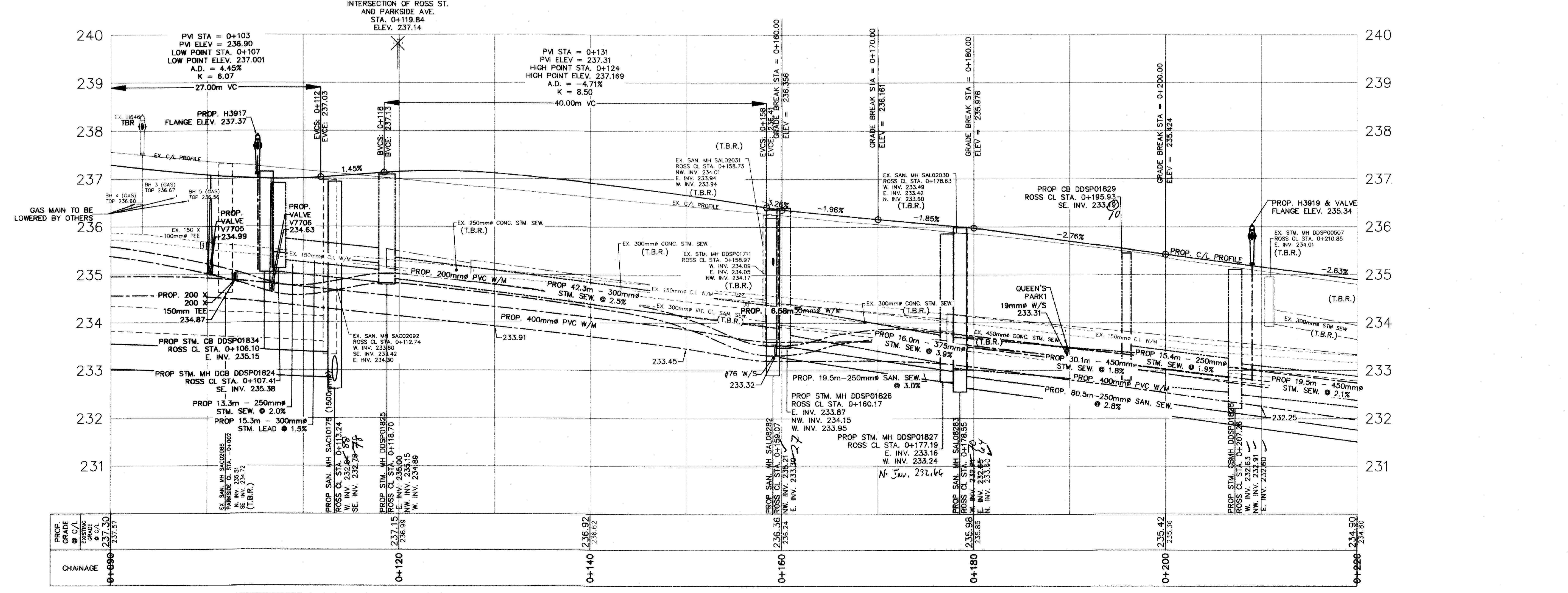


- GENERAL NOTES:**
- EXISTING SANITARY SERVICE TO BE MAINTAINED AT ALL TIMES.
 - EXISTING SANITARY LATERAL TO BE REMOVED FROM MAIN TO PROPERTY LINE UNLESS SHOWN OTHERWISE.
 - PROPOSED SANITARY LATERALS TO BE MINIMUM 150mm PVC-DR-28 UNLESS NOTED OTHERWISE OR EXISTING SERVICE IS FOUND IN THE FIELD TO BE LARGER, INSTALLED FROM NEW MAIN WITH APPROVED MANUFACTURER'S TEES AND CONNECTED TO THE EXISTING LATERALS AT RPPROPERTY LINE OR AS OTHERWISE SHOWN.
 - SANITARY SERVICE LATERALS ARE SHOWN BASED ON BEST AVAILABLE INFORMATION INCLUDING VIDEO INSPECTION. CONTRACTOR IS TO VERIFY LOCATIONS OF ALL SANITARY SERVICE LATERALS IN THE FIELD.
 - ALL SINGLE CATCHBASIN LEADS TO BE 250mm AND DOUBLE CATCHBASIN LEADS TO BE 300mm.
 - EXISTING UTILITY LOCATION INFORMATION PER SUBSURFACE UTILITY INVESTIGATION COMPLETED BY TSH/TBE. ALL EXISTING MAINS/LINES AND SERVICES TO BE FIELD LOCATED.

- WATERMAIN NOTES:**
- PROPOSED WATER SERVICES TO BE MINIMUM 19mm COPPER UNLESS NOTED OTHERWISE OR EXISTING SERVICE IS FOUND IN THE FIELD TO BE LARGER, INSTALLED FROM NEW 200mm PVC WATERMAIN TO NEW CURB STOP INSTALLED ON P/L INCLUDING CONNECTION TO THE EXISTING SERVICE.
 - EXISTING WATER SERVICE TO BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
 - FOR GENERAL WATERMAIN NOTES SEE DET1.

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SIZE	WATERMAIN JOINT RESTRAINING LOCATION	
	FROM	TO
150mm	V7717	V7706
200mm	STA 0+085	V7707
400mm	STA 0+085	V7607



BENCH MARKS

DISTANCE NOTE
DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996884

BEARING NOTE
BEARINGS HEREON ARE GRID BEARINGS AND ARE DERIVED FROM CONTROL MONUMENTS 031200400245 (N=4916082.773, E=603662.430) AND 03120040023 (N=4915573.518, E=603725.230) REFERRED TO THE CENTRAL MERIDIAN (81 DEGREES OF LONGITUDE) IN ZONE 17 AND ARE BASED ON NAD83

BENCH MARK
BAU119 232.449 - DEEP BM IN 0.20' MH IN QUEEN'S PARK NEAR INTERSECTION OF TORONTO ST. AND ROSS ST. 10.8m SOUTH OF SOUTH EDGE OF SIDEWALK ON ROSS ST., 44m FROM NE CORNER OF SIDEWALK INTERSECTION AT ROSS AND TORONTO STREETS. NOTE HAS A PROTECTIVE COVER.

JUL4555 229.1128 - FUNDAMENTAL BM IN QUEEN'S PARK, 12.2m NORTHEAST OF CURB AT NORTHEAST BOUNDARY BETWEEN PARK AND DRILL HALL GROUNDS, TABLET IN TOP OF CONCRETE SLAB.

BENCH MARKS WILL BE FROM CITY OF BARRIE VERTICAL CONTROL NETWORK. INITIAL BENCH MARK TO BE OF 2nd ORDER ACCURACY

NO.	REVISIONS	DATE	APPROVED

CITY OF BARRIE APPROVED

DATE: May 3, 2012

[Signature]
DIRECTOR OF ENGINEERING

ROSS STREET RECONSTRUCTION
(WELLINGTON ST. TO TORONTO ST.)
PARKSIDE DRIVE TO TORONTO STREET
STA. 0+090 TO 0+220

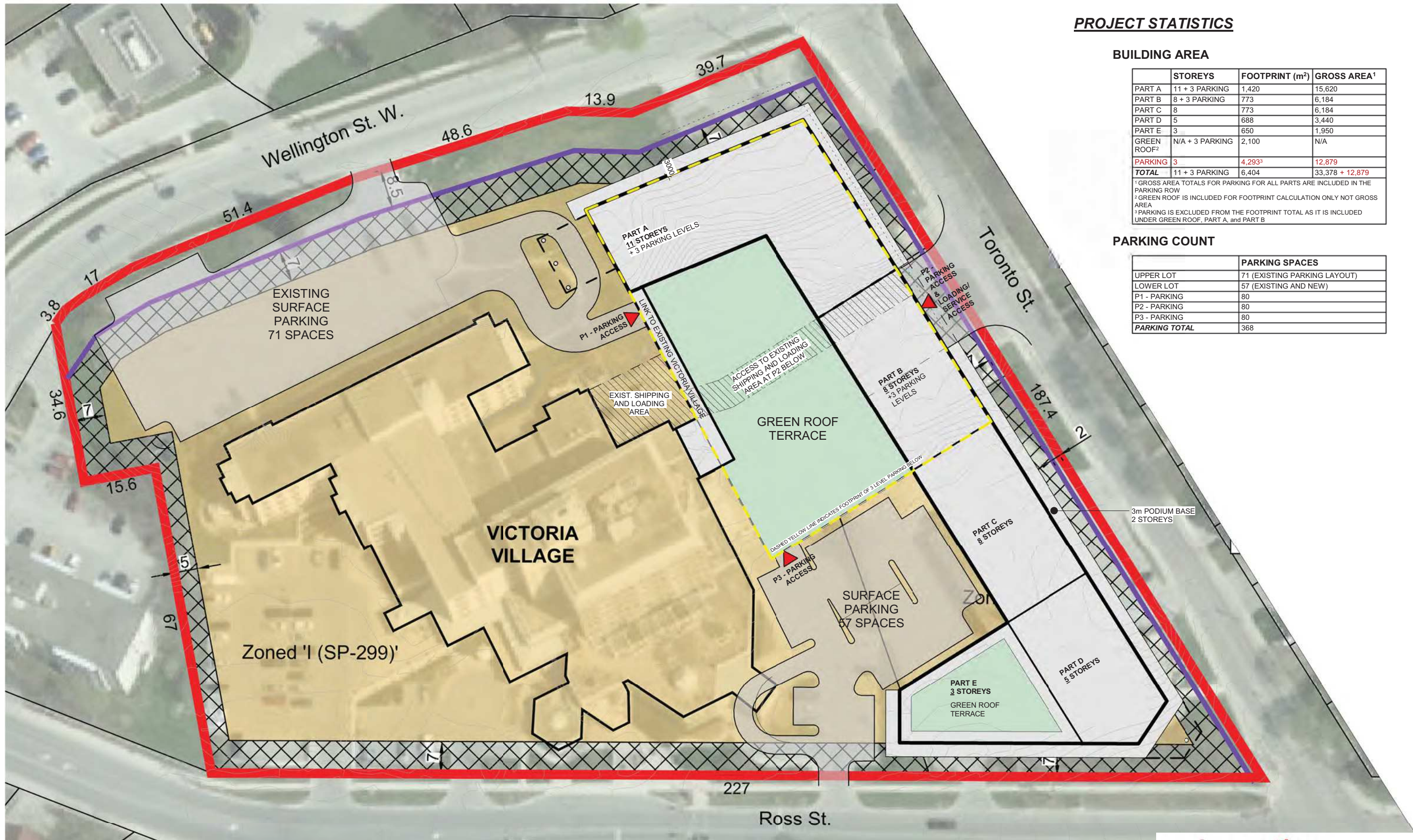
The City of **BARRIE** ENGINEERING DEPARTMENT

SCALE HOR. 1:250 VERT. 1:50 CONTRACT NO. 2012-060T
DESIGN T.F. DRAWN T.F. SHEET NO. PP2
REVIEWED J.S.C. DATE 2012.04.30

AsBuilt

Appendix B

Stormwater Calculations



PROJECT STATISTICS

BUILDING AREA

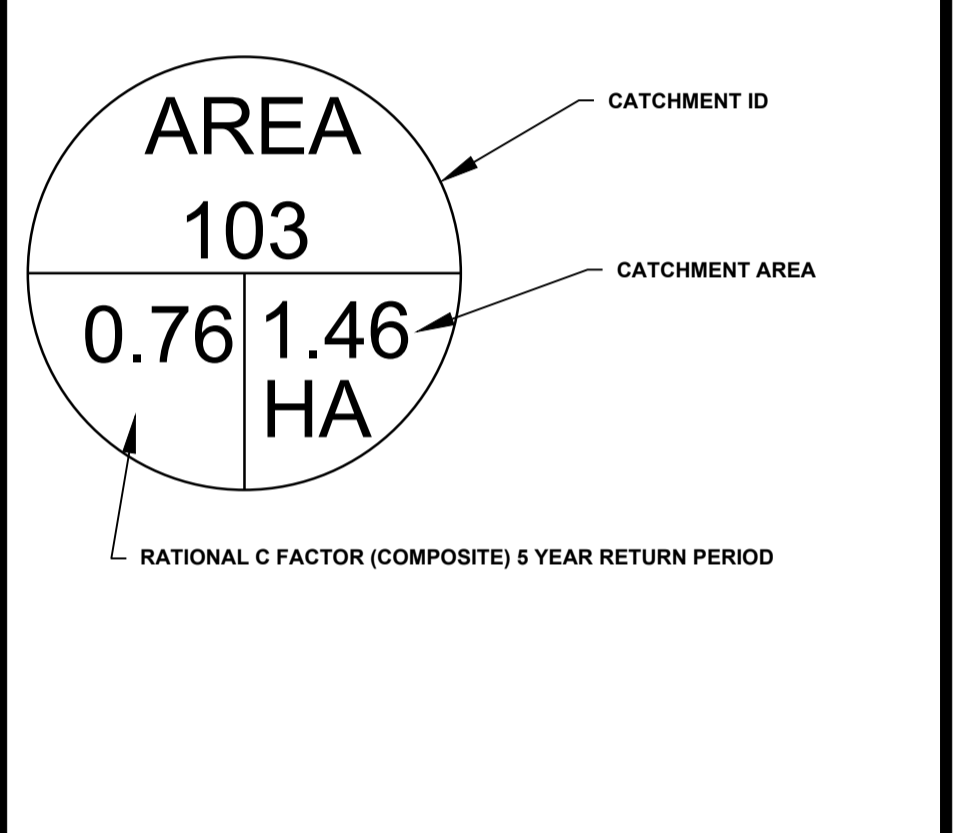
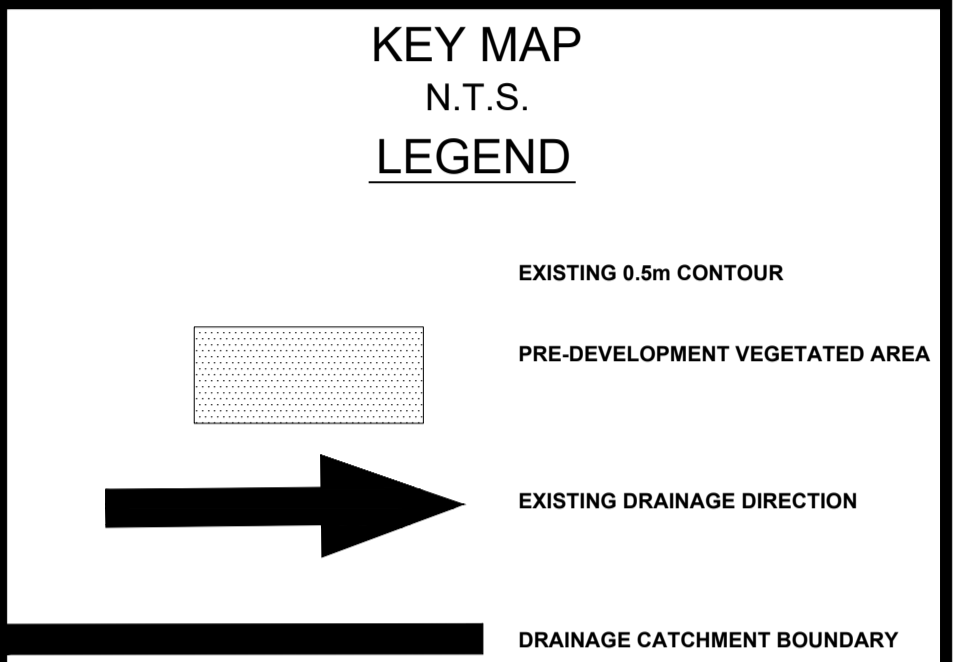
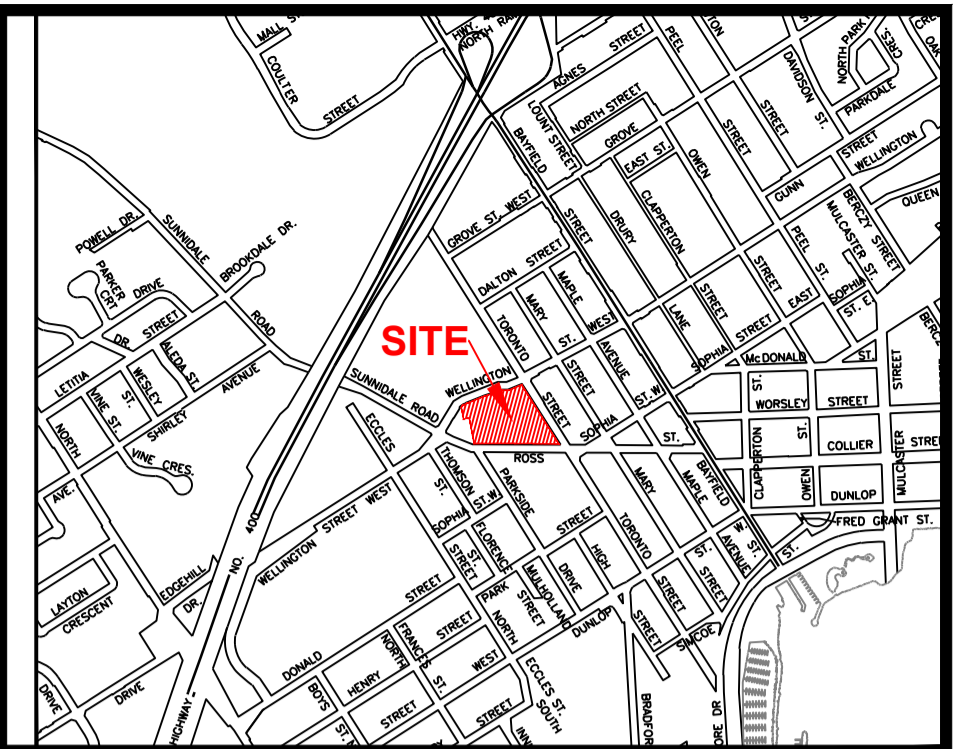
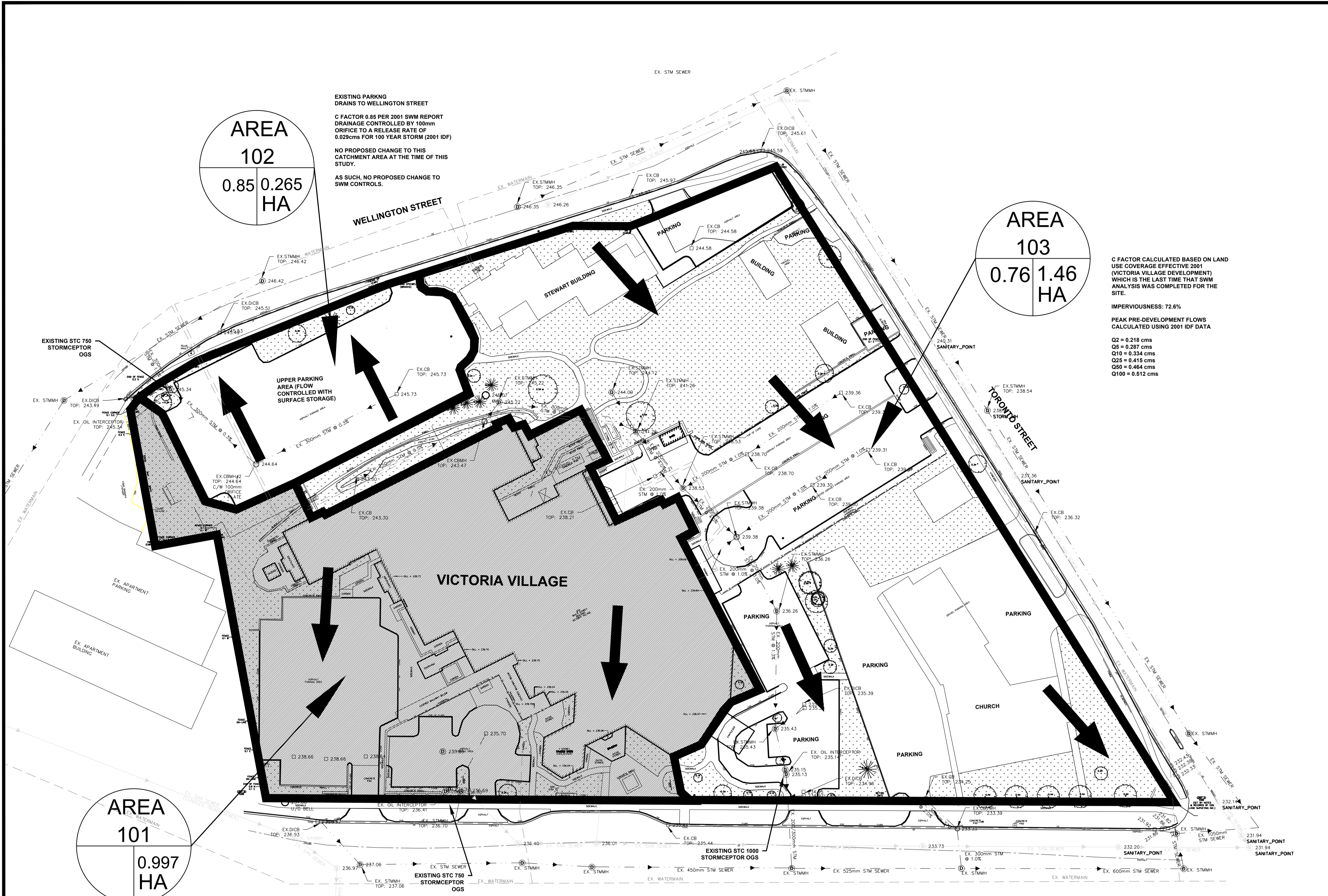
	STOREYS	FOOTPRINT (m ²)	GROSS AREA ¹
PART A	11 + 3 PARKING	1,420	15,620
PART B	8 + 3 PARKING	773	6,184
PART C	8	773	6,184
PART D	5	688	3,440
PART E	3	650	1,950
GREEN ROOF ²	N/A + 3 PARKING	2,100	N/A
PARKING	3	4,293³	12,879
TOTAL	11 + 3 PARKING	6,404	33,378 + 12,879

¹ GROSS AREA TOTALS FOR PARKING FOR ALL PARTS ARE INCLUDED IN THE PARKING ROW
² GREEN ROOF IS INCLUDED FOR FOOTPRINT CALCULATION ONLY NOT GROSS AREA
³ PARKING IS EXCLUDED FROM THE FOOTPRINT TOTAL AS IT IS INCLUDED UNDER GREEN ROOF, PART A, and PART B

PARKING COUNT

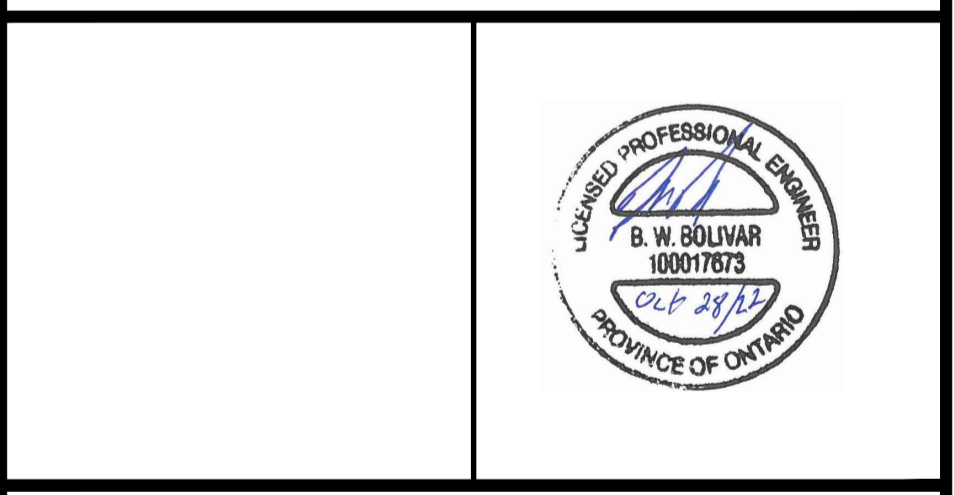
	PARKING SPACES
UPPER LOT	71 (EXISTING PARKING LAYOUT)
LOWER LOT	57 (EXISTING AND NEW)
P1 - PARKING	80
P2 - PARKING	80
P3 - PARKING	80
PARKING TOTAL	368

Site Plan - Proposal
As indicated



SCHEDULE OF REVISIONS

NO.	DATE	DESCRIPTION	CHECKED
1	OCT 28, 2022	RE-ZONING APPLICATION	BWB



**VICTORIA VILLAGE
PROPOSED DEVELOPMENT
150 TORONTO STREET
BARRIE**

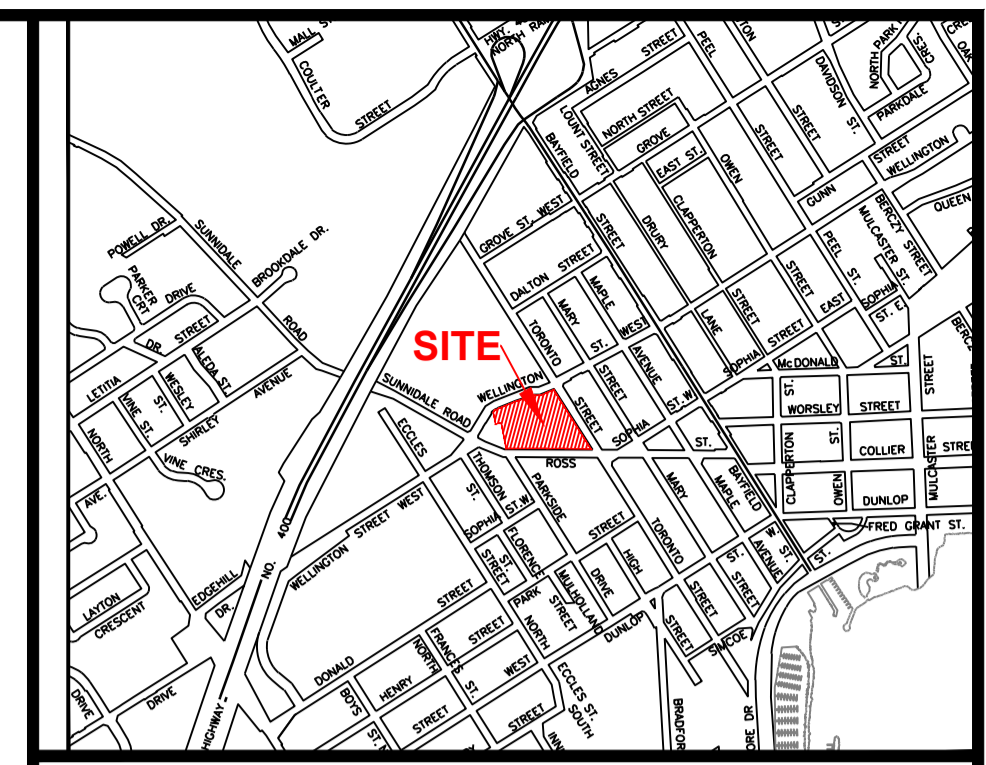
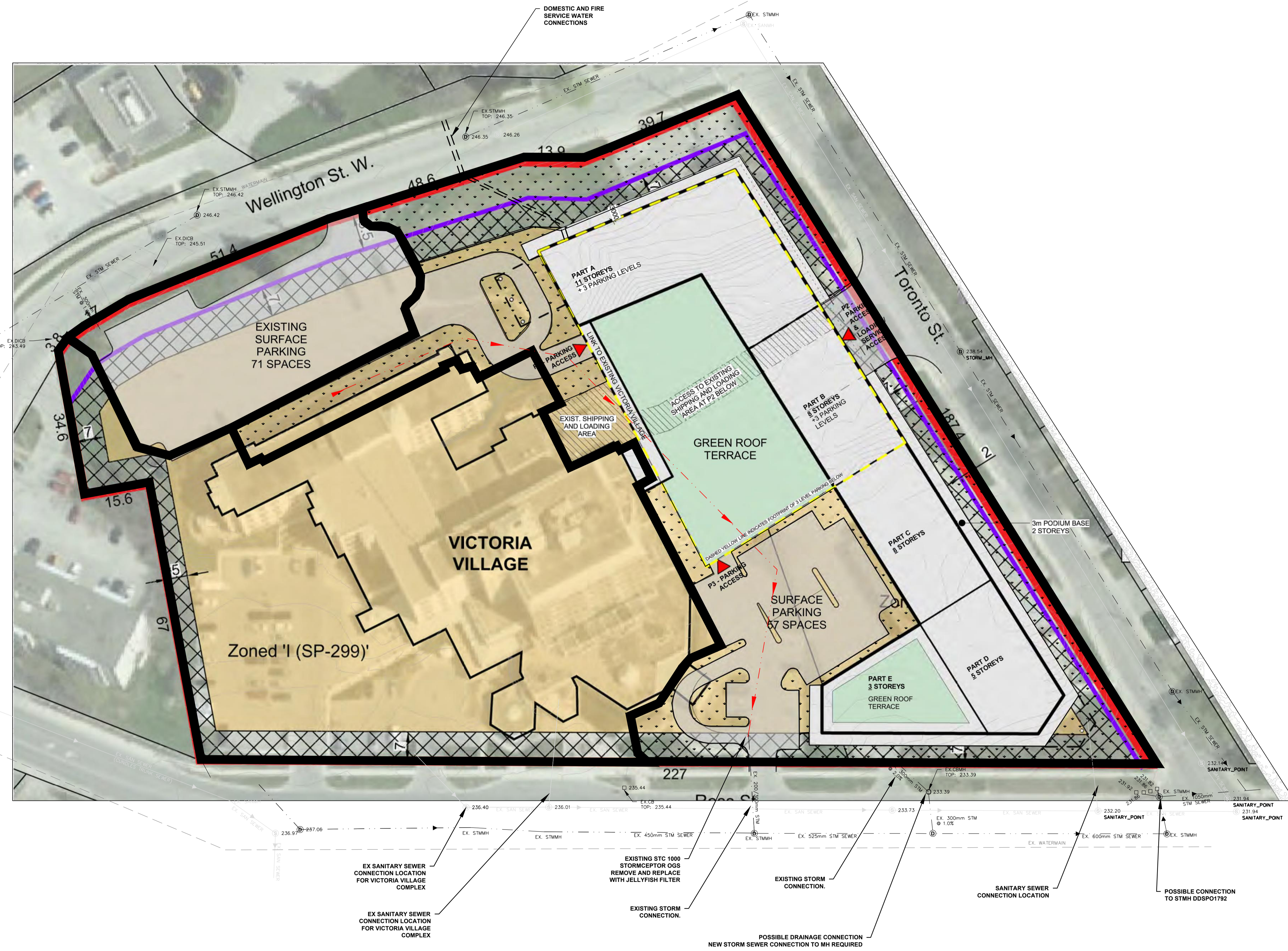
PRE-DEVELOPMENT DRAINAGE CATCHMENTS

PROJECT NO. 22-3554	DRWG NO. 3554-SWM1
DATE: OCTOBER 2022	SCALE: 1:500
DRAWN: NDK/BWB	CHECKED: APPROVED:

SBA Skelton Brumwell & Associates Inc.
ENGINEERING PLANNING ENVIRONMENTAL CONSULTANTS

93 BELL FARM ROAD, SUITE 107 BARRIE, ONTARIO L4M 5G1
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TELEPHONE (705) 726-1141
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**KEY MAP
N.T.S.
LEGEND**

- POST-DEVELOPMENT VEGETATED AREA
- EXISTING DRAINAGE DIRECTION
- DRAINAGE CATCHMENT BOUNDARY

**AREA
203**

0.76 1.46
HA

RATIONAL C FACTOR (COMPOSITE) 5 YEAR RETURN PERIOD

CATCHMENT ID
CATCHMENT AREA

SCHEDULE OF REVISIONS

NO.	DATE	DESCRIPTION	CHECKED
1	OCT 28, 2022	RE-ZONING APPLICATION	BWB



**VICTORIA VILLAGE
PROPOSED DEVELOPMENT
150 TORONTO STREET
BARRIE**

PROPOSED DRAINAGE CATCHMENTS

PROJECT NO. 22-3554	DRWG NO. 3554-SWM2
DATE: OCTOBER 2022	SCALE: 1:500
DRAWN: NDK/BWB	CHECKED: APPROVED:

SBA Skelton Brumwell & Associates Inc.
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