51, 53, 55 &75 Bradford Street and 20 Checkley Street

Functional Servicing and Stormwater Management Report
Rezoning and Official Plan Amendment

December 2019

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SUBMISSION HISTORY

Submission	Date	In Support Of	Distributed To
1st	December, 2019	Official Plan Amendment & Rezoning	City of Barrie

1.0 INTRODUCTION

SCS Consulting Group Ltd. has been retained by Barrie Lakeshore Developments to prepare a Functional Servicing and Stormwater Management Report for a proposed mixed use high density residential and commercial development at 51, 53, 55 &75 Bradford Street and 20 Checkley Street located in the City of Barrie.

1.1 Purpose of the Report

The Functional Servicing and Stormwater Management Report has been prepared in support of the Official Plan Amendment and Amendment to the Zoning By-Law applications for the proposed development. The Site Plan is provided in **Appendix A**. The proposed development will consist of the following:

- A proposed 6m wide private laneway with access from Bradford Street and Checkley Street;
- One 22 story high rise residential development (Tower 1), consisting of 332 residential units and 152 hotel units and 5 levels of above ground parking with access from Lakeshore Drive;
- One 42 story-high-rise residential development (Tower 2), consisting of 569 residential units and 5 levels of above ground parking with access from the proposed 6m wide private laneway;
- One 40 story high rise residential development (Tower 3), consisting of 535 residential units and 5 levels of above ground parking with access from the proposed 6m wide private laneway; and
- One 38 story high rise residential development (Tower 4), consisting of 419 residential units and 7 levels of above ground parking with access from the proposed 6m wide private laneway;

The purpose of this report is to demonstrate that the proposed development can be graded and serviced in accordance with the City of Barrie, Lake Simcoe Region Conservation Authority, the Ministry of Environment, Conservation and Parks (MECP) and Ontario Building Code design criteria.

A Preliminary Floodplain Analysis of Bunkers Creek has been completed by SCS Consulting Group Ltd. and is submitted with this package. The resulting preliminary Regulatory (100 year) floodplain limits that would have reflected the Regulatory floodplain prior to the Lakeshore Drive reconstruction are illustrated on the grading, servicing and stormwater drainage figures of this report. Further updates to the preliminary Bunker's Creek Regulatory floodplain modelling are underway to further refine the model. The preliminary grading, servicing and stormwater strategies demonstrated in this report will be revisited upon the completion of the Bunkers Creek Floodplain Analysis and revised accordingly.

1.2 Study Area

The subject lands are 3.5 ha in size and located within the Barrie Creek Watershed. They are comprised of open space, an existing vacant parking area and a vacant car dealership that is to

be demolished. Existing access to the subject lands is provided from Bradford Street and Checkley Street. As shown on **Figure 1.1**, the study lands are bound by:

- Existing condominiums (Grand Harbour Condominiums) and commercial development to the north;
- Bunker's Creek Eco-Park, an existing pond and existing condominiums and commercial development to the south;
- Lakeshore Drive to the east; and
- Bradford Street to the west.



Figure 1.1: Site Location Plan

1.3 Background Servicing Information

In preparation of the servicing and SWM strategies, the following design guidelines and standards were used:

- City of Barrie Engineering Design Specifications and Standard Drawings;
- Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (March 2003);
- Lake Simcoe Protection Plan;
- City of Barrie Low Impact Development Screening Process;
- The Ontario Building Code (2012); and
- LRSCA Technical Guidelines for Stormwater Management Submission (September 1, 2016).

The site servicing and SWM strategies in this report are based on the following reports:

- Water Distribution Modelling Draft, MES (December 2019) (**Appendix F**)
- Draft Hydrogeological Assessment, prepared by GHD (December 2019);

- Functional Servicing Report – Barrie Central Redevelopment, prepared by Pearson Engineering Ltd. (June 2019);
- Preliminary Bunker's Creek Regulatory Floodline Analysis, prepared by SCS Consulting Group Ltd. (December 2019); and
- Preliminary Geotechnical Report, prepared by McClymont & Rak (December 2019).

The site servicing and SWM strategies are also based on the following approved Engineering Drawings:

- Storm Drainage Plan – Bradford Street Reconstruction, Drawing STM1, prepared by City of Barrie Engineering Department, dated May 23, 2003;
- Storm Drainage Plan – Simcoe Street Reconstruction Bradford St. to Mary St., Drawing STM1, prepared by City of Barrie Engineering Department, dated May 5, 2006;
- Sanitary Drainage Plan – Bradford Street Reconstruction, Drawing SAN1, prepared by City of Barrie Engineering Department, dated May 23, 2003;
- Sanitary Drainage Plan – Simcoe Street Reconstruction Bradford St. to Mary St., Drawing SAN1, prepared by City of Barrie Engineering Department, dated May 5, 2006;
- Bradford Street STA. -0+010 to 0+150 – Bradford Street Reconstruction, Drawing PP1, prepared by City of Barrie Engineering Department, dated May 23, 2003;
- Bradford Street STA. 0+150 to 0+310 – Bradford Street Reconstruction, Drawing PP2, prepared by City of Barrie Engineering Department, dated May 23, 2003;
- Bradford Street STA. 0+310 to 0+470 – Bradford Street Reconstruction, Drawing PP3, prepared by City of Barrie Engineering Department, dated May 23, 2003;
- Bradford Street STA. 0+470 to 0+630 – Bradford Street Reconstruction, Drawing PP4, prepared by City of Barrie Engineering Department, dated May 2, 2003;
- Bradford Street STA. 0+630 to 0+790 – Bradford Street Reconstruction, Drawing PP5, prepared by City of Barrie Engineering Department, dated May 2, 2003;
- Bradford Street at Simcoe Street STA. 0+0400 to 0+190 – Simcoe Street Reconstruction (Bradford St. to Mary St.), Drawing PP4, prepared by City of Barrie Engineering Department, dated May 5, 2006;
- Simcoe Street at Bradford Street STA. -0+060 to 0+080 – Simcoe Street Reconstruction (Bradford St. to Mary St.), Drawing PP1, prepared by City of Barrie Engineering Department, dated May 5, 2006;
- Simcoe Street at Bradford Street STA. 0+080 to 0+220 – Simcoe Street Reconstruction (Bradford St. to Mary St.), Drawing PP2, prepared by City of Barrie Engineering Department, dated May 5, 2006;
- Lakeshore Drive STA. 0+140 to 0+290 – Heritage Well 14 to Centennial Well 15 Trunk Watermain, Drawing PP2, prepared by Ainley Group, dated January 2003;

- Lakeshore Drive STA. 0+290 to 0+440 – Heritage Well 14 to Centennial Well 15 Trunk Watermain, Drawing PP3, prepared by Ainley Group, dated January 2003;
- Lakeshore Drive at Toronto Street STA. 0+000 to 0+070 – Lakeshore Drive Reconstruction Toronto Street to Tiffin Street, Drawing PP1, prepared by City of Barrie Engineering Department, dated April 28, 2014;
- Lakeshore Drive at Toronto Street STA. 0+070 to 0+170 – Lakeshore Drive Reconstruction Toronto Street to Tiffin Street, Drawing PP1, prepared by City of Barrie Engineering Department, dated April 28, 2014;
- Lakeshore Drive at Bunker's Creek STA. 0+170 to 0+290 – Lakeshore Drive Reconstruction Toronto Street to Tiffin Street, Drawing PP3, prepared by City of Barrie Engineering Department, dated April 28, 2014;
- Lakeshore Drive STA. 0+290 to 0+390 – Lakeshore Drive Reconstruction Toronto Street to Tiffin Street, Drawing PP4, prepared by City of Barrie Engineering Department, dated April 28, 2014;
- Lakeshore Drive at Victoria Street STA. 0+390 to 0+540 – Lakeshore Drive Reconstruction Toronto Street to Tiffin Street, Drawing PP4, prepared by City of Barrie Engineering Department, dated April 28, 2014;
- High Street South Sanitary Sewer Reconstruction – Simcoe Street to Southern Limit, Drawing 88-24, prepared by City of Barrie Engineering Department, dated September 7, 1988; and
- High Street South of Simcoe Street STA. -0+020 to 0+080 – Simcoe Street Reconstruction (Bradford St. to Mary St.), Drawing PP10, prepared by City of Barrie Engineering Department, dated May 5, 2006.

The above listed drawings have been included in **Appendix B** on a USB stick.

2.0 STORMWATER MANAGEMENT

2.1 Stormwater Runoff Control Criteria

The following stormwater runoff control criteria have been established based on the design guidelines and standards listed in **Section 1.3**. The stormwater runoff criteria are summarized below in **Table 2.1**.

Table 2.1: Stormwater Runoff Control Criteria

Criteria	Control Measure
Quantity Control	Quantity control is not required as the proposed development outlets directly adjacent to Bunker's Creek and immediately upstream of Lake Simcoe.
Quality Control	MECP Enhanced Level Protection (80% TSS Removal).
Erosion Control	Erosion Control is not required as the proposed development outlets immediately upstream of Lake Simcoe.
Water Budget	Maintain existing groundwater recharge rates and appropriate distribution, ensuring the protection of related hydrology ecologic functions. At a minimum retain the equivalent of 5 mm of rainfall over the development block.
Phosphorus Budget	Per the Lake Simcoe Protection Plan, proposed phosphorus loading cannot exceed existing phosphorus loading, to the extent feasible. Per the LSRCA SWM Criteria, 80% of the proposed phosphorus loading is to be retained on-site. As all phosphorus exported is required to be offset per the LSRCA Phosphorus Offsetting program the target is "zero" loading.

2.2 Existing Drainage

As shown on **Figure 2.1**, major and minor system drainage from Catchment 102 (1.10 ha, **Figure 2.1**) outlets to the existing pond located within the Bunker's Creek Eco-Park which outlets to Lake Simcoe via Bunker's Creek. Major and minor system drainage from the remainder of the development, Catchment 101 (2.41 ha, **Figure 2.1**) outlets via overland flow to Bunker's Creek and ultimately to Lake Simcoe.

2.3 Allowable Release Rate

As noted in **Table 2.1**, due to the proximity to Lake Simcoe, the proposed development is not required to provide quantity controls.

2.4 Stormwater Best Management Practices Selection

In accordance with the MECP Stormwater Management Planning and Design Manual (2003), and the LRSCA Technical Guidelines for Stormwater Management Submission (September 1,

2016) a review of stormwater management best practices was completed using a treatment train approach, which evaluated lot level, conveyance system and end-of-pipe alternatives.

The following study area characteristics were taken into consideration:

- Based on the Geotechnical investigation, soils consist of silt, sandy silt to sand with clayey silt to silty clay layers;
- An in-situ percolation test was completed and indicates that the native soils have a percolation rate ranging from 50 to 75 mm/hr;
- Within the installed site wells, groundwater was observed at depths ranging between 0.27 m to 2.85 m below existing grade;
- The proposed development drains west to Bunker's Creek and ultimately to Lake Simcoe.

The following are examples of at-source, and conveyance controls that will be evaluated for use in the proposed development at the site plan application stage. While evaluating the following controls at the site plan application stage, cost, feasibility, groundwater and grading constraints will be taken into consideration.

At-Source Controls

At-source controls are that reduce runoff prior to stormwater entering the conveyance system are to be utilized, such as:

- Increased topsoil depth;
- Bioretention;
- Pervious pavements; and
- Infiltration trenches/soak-away pits.

Conveyance Controls

Conveyance controls provide treatment of stormwater during the transport of runoff from individual lots to the receiving watercourse. Examples of conveyance controls include:

- Grassed Swales; and
- Infiltration Trenches.

A comprehensive assessment of LID practices will be provided in support of the Site Plan Application stage. Since the site has high groundwater levels, the opportunity for LIDs are limited. At the site plan application stage, a water balance evaluation will be incorporated into the detailed stormwater management report that discusses the selection of LIDs in accordance with the City of Barrie Low Impact Development Screening Process document and quantify the proposed rainwater retention volume.

2.5 Proposed Storm Drainage

A proposed storm drainage plan (**Figure 2.2**) has been prepared for the proposed development. The proposed drainage patterns have been designed to convey the runoff to Lake Simcoe via Bunker's Creek. Minor system drainage from the majority of the proposed development, Catchment 201 (2.60 ha **Figure 2.2**) will be captured via a proposed internal storm sewer

system and outlet to the existing pond located within the Bunker's Creek Eco-Park which outlets to Lake Simcoe via Bunker's Creek. Based on our correspondence with City Staff, we understand that the Bunkers Creek Eco-Park pond is not a stormwater management pond and was constructed as an educational feature of the park. Major system drainage from majority of the proposed development, Catchment 202 (0.65 ha, **Figure 2.2**) will outlet overland into the existing pond located within the Bunker's Creek Eco-Park which outlets to Lake Simcoe via Bunker's Creek. A portion of the proposed development, Catchment 203 (0.25 ha, **Figure 2.2**) will drain uncontrolled to Bradford Street which will outlet into Bunker's Creek and ultimately outlet to Lake Simcoe.

2.5.1 Quantity Control

Quantity control for the proposed development is not required due to the proximity to Bunker's Creek and Lake Simcoe.

2.5.2 Quality Control

Quality control for the proposed high density block will be provided on-site. To achieve the required MECP Enhanced Level Protection (80% TSS Removal), a manufactured treatment device, a Jellyfish (or equivalent) is proposed. Details will be provided at the Site Plan application stage.

2.5.3 Erosion Control

As noted in **Section 2.1**, erosion control is not required as the proposed development outlets immediately upstream of Lake Simcoe.

2.5.4 Water Balance

As discussed in **Section 2.1**, the proposed development is required to match the existing annual runoff volume. To achieve this objective, the LID measures as mentioned in **Section 2.4** will be explored at the site plan application stage. A detailed water balance assessment will be submitted under separate cover.

2.5.5 Phosphorus Budget

Under the Lake Simcoe Protection Plan (LSPP), a stormwater management plan must demonstrate how phosphorus loadings are minimized between existing and proposed. The LSPP states that:

> "*Best efforts shall be employed such that any increase in loading (post development compared to pre development) is kept to a minimum. The target is "zero" increase in loading.*"

The MECP database application *Lake Simcoe Phosphorus Loading Development Tool* (v2, 01-April-2012 update) was used to complete the phosphorus budget for the proposed development.

<u>Existing Phosphorus Loadings</u>

The existing phosphorus loading was calculated based on the existing land uses as determined from topographic survey and satellite imagery. Existing land uses are classified as High Intensity Development, for the commercial portion of the lands, and Low Intensity development for the open space area as shown on **Figure 2.3**. The existing annual phosphorus loadings were calculated to be 1.65 kg/year for the area proposed to be disturbed. Refer to **Appendix D** for the phosphorus loading tool output.

Proposed Phosphorus Loadings

The proposed land uses are shown on **Figure 2.4**. The proposed development is considered High Intensity Development with small sections of Low Intensity Development for landscaped areas per the land classifications available in the MECP Phosphorous Tool. The proposed phosphorus loading with no best management practices (BMPs) was calculated to be 3.89 kg/year. Refer to **Appendix D** for the phosphorus loading tool output.

Opportunities to reduce the proposed phosphorus loadings will be explored at the detailed design stage via the use of LID's as outlined in **Section 2.4**.

2.5.6 Floodplain Analysis

A preliminary floodplain analysis of the Bunker's Creek is currently being completed in support of the proposed development. The Preliminary Bunker's Creek Regulatory Floodline Analysis is provided with this submission package. Further updates to the preliminary Bunker's Creek Regulatory floodplain modelling are underway to further refine the model to 1) reflect the current configuration of Lakeshore Drive and the Bunker's Creek and Kidd's Creek crossings, 2) balance the Regulatory floodlines of Bunker's and Kidd's Creeks at Lakeshore Drive, and 3) reflect the proposed Bunker's Creek Bradford Street culvert replacement and watercourse capacity improvements between Bradford Street and Lakeshore Drive. The preliminary grading, servicing and stormwater strategies demonstrated in this report will be revisited upon the completion of the Bunkers Creek Floodplain Analysis and revised accordingly.

3.0 STORM SERVICING

3.1 Existing Storm Sewer System

The location and sizes of the existing municipal storm sewers surrounding the proposed development are indicated in the City Record Drawings (**Appendix B**) and the Storm Servicing Figure (**Figure 3.1**) and summarized below:

- Two 2500 mm diameter CSP culverts located under Bradford Street which conveys Bunker's Creek east to Lake Simcoe;
- A series of storm sewers ranging in size from 300 mm to 450 mm flowing south on Bradford Street, ultimately outletting to the two existing 2500 mm CSP culverts;
- A 250 mm diameter concrete storm sewer flowing north on Checkley Street;
- A series of storm sewers ranging in size from 375 mm to 675 mm flowing south on Lakeshore Drive, ultimately outletting to Bunker's Creek under the existing Lakeshore Drive box culvert; and
- Four 1.5 m x 3.0 m concrete box culverts located under Lakeshore Drive which conveys Bunker's Creek east to Lake Simcoe.

Based on the City Record Drawings and the information available to us, there are no existing storm service connections provided for the subject lands.

A subsurface utility investigation will be completed prior to the detailed design stage to confirm the sizes, inverts and geometry of the existing municipal storm sewers surrounding the subject lands.

3.2 Proposed Storm Sewer System

Conveyance of stormwater flows from the proposed development are not accounted for in any of the existing storm sewers surrounding the proposed development. Storm drainage for the proposed development will be captured and continue to be conveyed to the existing pond within the Bunker's Creek Eco-Park via a private storm sewer network. The existing pond within Bunker's Creek Eco Park ultimately outlets to Lake Simcoe via Bunker's Creek. **Figure 3.1** shows the preliminary layout, pipe sizes and inverts of the proposed private storm sewer system for the proposed development.

The private storm sewer system (minor system) within the proposed development (**Figure 3.1**) is designed for the 5 year return storm per the Municipality standards. The depth of the proposed storm sewer system is constrained by the existing elevation at the proposed outlet point to the existing Bunker's Creek Eco-Park pond and the preliminary floodplain elevation of 220.28 m (Preliminary Bunker's Creek Regulatory Floodplain Analysis, prepared by SCS Consulting Group). As a result of these constraints, the proposed private storm sewer system will be insulated and has been designed with grades ranging from 0.2% to 1.2%. Upon completion of the final Bunker's Creek Regulatory Floodplain Analysis being completed by SCS Consulting Group Ltd., the preliminary design of the private storm sewer system will be revisited and adjusted accordingly.

The storm sewer system is designed in accordance with the City of Barrie design standards, Ontario Building Code and the MECP guidelines, including the following:

- Minor System Conveyance: 5 Year
- Time of Concentration: 10 minutes
- Minimum Velocity: 0.0.75 m/s (where possible)
- Maximum Velocity: 4.0 m/s
- Runoff coefficient for impervious area: 0.95

The rainfall intensity will be calculated using the A, B, and C values listed in **Table 3.1**:

Table 3.1 – Rainfall Intensity Parameters

Return Period Storm	A	B	C
5 Year	853.608	4.699	0.766
100 Year	1426.408	5.273	0.759

4.0 SANITARY SERVICING

4.1 Existing Sanitary Sewer System

The location and sizes of the existing municipal sanitary sewers surrounding the proposed development are indicated in the City Record Drawings (**Appendix B**) and the Sanitary Servicing Figure (**Figure 4.1**) and summarized below:

- 300 mm diameter PVC sanitary sewer flowing north on Bradford Street ultimately outletting to the existing 750 mm diameter sanitary trunk sewer on High Street;
- An abandoned 350 mm diameter A/C sanitary sewers on Bradford Street;
- A 250 mm diameter PVC sanitary sewer flowing north on Checkley Street outletting to the existing 825 mm diameter sanitary trunk sewer on Simcoe Street; and
- A 1350 mm sanitary sewers and one 1.8 m x 1.0 m sanitary box culvert flowing south on Lakeshore Drive, ultimately outletting to the Barrie Sewage Plan located at Lakeshore Drive and Tiffin Street.

Based on the City Record Drawings (**Appendix B**) and the information available, there are three existing 150 mm diameter sanitary service connections provided for the proposed development from Bradford Street. The existing 150 mm diameter service connections will not be utilized by the proposed development and will be decommissioned to the satisfaction of the City of Barrie.

A subsurface utility investigation will be completed prior to the detailed design stage to confirm the sizes, inverts and geometry of the existing municipal sanitary sewers surrounding the subject lands.

A sewer capacity analysis of the existing downstream municipal sanitary sewer system on Bradford Street, ending at the existing 750 mm sanitary trunk sewer on High Street, has been prepared using the City of Barrie's sanitary design criteria, the approved Bradford Street Reconstruction Sanitary Drainage Plan (**Appendix B**) and plan and profile record drawings (**Appendix B**). The proposed Barrie Central Development located at 34-50 Bradford Street is anticipated to be completed prior to the proposed development at 51, 53, 55 and 75 Bradford Street and therefore was included in the capacity analysis of the existing downstream municipal sanitary sewer system.

The existing sanitary sewer capacity analysis demonstrates that the existing 300 mm diameter PVC sanitary sewers on Bradford Street have a total capacity of 52.9 L/s and are flowing between 1% to 6% full south of the proposed Barrie Central Development and 28% full north of the proposed Barrie Central Development. Therefore the analysis confirms that there is residual capacity in the existing downstream sanitary sewer system on Bradford Street. Refer to the existing sanitary sewer design sheet (**Appendix E**) and supporting City record drawing Bradford Street Reconstruction Sanitary Drainage Plan (**Appendix B**).

City Staff have requested that a Hydraulic Grade Line Analysis of the existing Bradford Street sanitary sewer system be completed. City Staff have agreed to provide SCS Consulting Group Ltd. with the background information and parameters to complete the analysis however the

information was not yet received at the time that this report was completed and therefore City staff have agreed to postpone the requirement of the analysis until the second Zoning By-Law Amendment and/or first Site Plan Application submissions.

Tower 1 of the proposed development is proposed to connect to the existing 1350 mm diameter sanitary trunk sewer on Lakeshore Drive. City Staff have also requested that a Hydraulic Grade Line Analysis of the existing Lakeshore Drive sanitary sewer system be completed. City Staff have agreed to provide SCS Consulting Group Ltd. with the background information and parameters to complete the analysis however the information was not yet received at the time that this report was completed and therefore City staff have agreed to postpone the requirement of the analysis until the second Zoning By-Law Amendment and/or first Site Plan Application submissions.

4.2 Proposed Sanitary Sewer System

Towers 2 through 4 will outlet to the existing 300 mm diameter sanitary sewer on Bradford Street via three separate proposed 250 mm diameter sanitary service connections. The east building will outlet to the existing 1350 mm diameter sanitary trunk sewer on Lakeshore Drive via a proposed 250 mm diameter sanitary service connection.

The sanitary service connections for each of the four proposed towers will have slopes ranging between 0.5% and 2% (typically) and will be provided at 1.0 m to 3.0 m deep. The sanitary service connections have been designed in accordance with the City of Barrie criteria, including but not limited to:

- Residential Sanitary Generation Rate: 225 L/cap/day
- Residential Population Density:
  - 3.13 persons/unit (Low Density)
  - 2.34 persons/unit (Medium Density)
  - 1.67 persons/unit (High Density)
- Peaking Factor: Harmon's Equation (Min = 2.0)
- Infiltration Rate: 0.10 L/s/ha
- Minimum Pipe Size: 200 mm
- Minimum Full Flowing Velocity: 0.60 m/s
- Maximum Velocity: 3.0 m/s

The proposed service connections have been designed with slopes between 0.5% and 2.0% having a full flow capacity of 42 L/s and 84 L/s respectively and a full flow velocity of 0.86 m/s and 1.71 m/s respectively. The total sanitary flows generated by Tower 1 are 8.2 L/s, by Tower 2 are 9.6 L/s, by Tower 3 are 9.0 L/s and by Tower 4 are 7.9 L/s. Therefore each of the proposed sanitary service connections servicing their respective towers have been designed with adequate capacity to convey each building's proposed generated flows.

The size and preliminary location of the proposed sanitary service connections for each of the proposed buildings are indicated on the Preliminary Sanitary Servicing Figure (**Figure 4.1**).

The proposed sanitary flows generated by each of the three towers fronting Bradford Street were added to the existing conditions analysis. Refer to the Proposed Bradford Street Sanitary Drainage Plan (**Figure 4.2**) and the Proposed Conditions Sanitary Sewer Design Sheet

(**Appendix E**). The results of the proposed conditions capacity analysis confirms that the most constrained legs in the downstream sanitary sewer system are from manhole SAC01026 to SAC01023, flowing at 71% full, translating to a residual capacity of 15.1 L/s inclusive of the flows generated by the proposed development. Therefore there is residual capacity to convey the flows from the proposed development in the downstream sanitary sewer system on Bradford Street to the 750 mm diameter sanitary trunk sewer on High Street.

As discussed in **Section 4.1** of this report, a Hydraulic Grade Line Analysis of the existing and proposed conditions of the Bradford Street sanitary sewer system will be completed as part of the second Zoning By-Law Amendment and/or first Site Plan Application submission in support of this development to demonstrate that the proposed development does not have a negative impact on the downstream sanitary sewer system.

The proposed sanitary flows generated by Tower 1 will be conveyed to the existing 1350 mm sanitary trunk sewer on Lakeshore Drive. Based on the City Record Drawings (**Appendix B**) and the information available to us, the full flow capacity of the existing 1350 mm sanitary trunk sewer is 2134 L/s. The flows generated by Tower 1 of the proposed development translate to 0.3% of the capacity of the existing 1350 mm sanitary trunk sewer on Lakeshore Drive. As discussed in Section 4.1 of this report, a Hydraulic Grade Line Analysis of the existing and proposed Lakeshore Drive sanitary sewer system will be completed as part of the second Zoning By-Law Amendment and/or first Site Plan Application submissions to demonstrate that the proposed development does not have a negative impact on the downstream sanitary sewer system.

5.0 WATER SUPPLY AND DISTRIBUTION

5.1 Existing Water Distribution

The proposed development is located within the City of Barrie Water System Zone 1 which is designed to service an elevation 281.20 m. There is currently no water consumption from the existing site. The location and sizes of the existing municipal watermains surrounding the proposed development are indicated on the Preliminary Water Distribution Plan (**Figure 5.1**) and the City of Barrie Record Drawings (**Appendix E**) and summarized below:

- Abandoned 200 mm diameter municipal cast iron watermain on Bradford Street;
- 300 mm diameter municipal watermain on Bradford Street;
- 150 mm diameter watermain on Checkley Street;
- 300 mm diameter HDPE watermain on Lakeshore Drive; and
- 450 mm diameter HDPE watermain on Lakeshore Drive

Based on the City Record Drawings (**Appendix B**) and the information available, there are four existing 25 mm diameter water service connections provided for the proposed development from Bradford Street. The existing 25 mm diameter service connections will not be utilized by the proposed development and will be decommissioned to the satisfaction of the City of Barrie.

A subsurface utility investigation will be completed prior to the detailed design stage to confirm the sizes, depths and geometry of the existing municipal watermains surrounding the subject lands.

A hydrant flow test was completed on October 29, 2019 by Watermark to determine existing flows and pressures for the Bradford Street, Checkley Street and Lakeshore Drive watermains. Municipal Engineering Solutions (M.E.S.) prepared the Watermain Analysis for the proposed development by utilizing the hydrant flow tests to model existing boundary conditions and hydraulic grade lines for the Average Day, Maximum Day and Maximum Hour (Peak Flows). The results of the hydrant flow tests can be found in the appendices of the Watermain Analysis dated December, 2019, found in **Appendix F** of this report.

5.2 Proposed Water System

A Watermain Analysis dated December 2019 has been completed by Municipal Engineering Solutions (M.E.S.) and can be found in **Appendix F** of this report. The report concludes that the existing surrounding watermains provide adequate flows and pressures to service the proposed development. The layout of the proposed water service connections to each building within the proposed development are indicated on the Preliminary Water Distribution Figure (**Figure 5.1**). Sizing of the proposed watermains is provided by M.E.S.

Tower 1 will be provided with a combined 300 mm diameter fire and 150 mm diameter domestic water service connection from the existing 300 mm diameter watermain on Bradford Street. Tower 2 will be provided with a single 200 mm diameter fire service connection and a combined 200 mm diameter fire and 200 mm diameter domestic water service connection from the existing 300 mm diameter watermain on Bradford Street. Tower 3 will be provided with a single 200 mm diameter fire service connection and a combined 200 mm diameter fire and 150

mm diameter domestic water service connection from the existing 300 mm diameter watermain on Bradford Street. Tower 4 will be provided with a single 200 mm diameter fire service connection and a combined 200 mm diameter fire and 150 mm diameter domestic water service connection from the existing 300 mm diameter watermain on Bradford Street. Tower's 2, 3 and 4 have been provided with two fire service connections based on the criteria set out in the Ontario Building Code for buildings meeting or exceeding a height of 84 m.

The service pressures provided by the existing 300 mm diameter municipal watermain on Bradford Street and Lakeshore Drive are within the City of Barrie's required operating range but will exceed the operating range set by the Ontario Building Code, therefore a pressure reducing valve may be required for the proposed development and is to be confirmed by the mechanical engineer at the detailed design stage.

The proposed watermain service connections are designed in accordance with the City of Barrie Water Transmission & Distribution Policies and Guidelines.

6.0 GRADING

6.1 Existing Grading Conditions

The existing topography has slopes in the range of 0.50% to 5%. The ground surface elevations through the study area range from approximately 219.50 m in the southeast corner to approximately 222.50 m in the northwest corner.

The existing development topography is indicated on the Topographical Survey dated November 27, 2019 by Schaeffer Dzaldov Bennett Ltd. (**Appendix C**).

6.2 Proposed Grading Concept

A preliminary grading design has been completed for the proposed 6 m wide private laneway from Bradford Street to Checkley Street and the proposed Tower 1 parking area. Preliminary finished floor elevations are also indicated on the Preliminary Grading Plan (**Figure 6.1**)

As discussed in **Section 3.2** of this report, the proposed private storm sewer system from the proposed development will outlet to the existing pond in the Bunker's Creek Eco-Park. The preliminary grading of the proposed 6 m wide private laneway has been designed in a manner which helps maintain cover over the proposed storm sewer system and results in an outlet elevation at or above the preliminary Bunker's Creek floodline elevation, based on the Preliminary Bunker's Creek Regulatory Floodline Analysis, prepared by SCS Consulting Group Ltd. (December 2019). In order to achieve the proposed preliminary grading design along the 6 m wide private laneway, approximately 50 m of the proposed Checkley Street municipal right-of-way (which currently slopes towards the private development) must be regraded. The preliminary grading design proposes to slope Checkley Street away from the private development at 0.5% beginning at the property boundary shared with Checkley Street. Based on the existing survey data provided by Schaeffer Dzaldov, the required revisions to the existing road grades will not have a negative impact on the existing developments located along Checkley Street. The approximate extent of the grading revisions required on Checkley Street is indicated on the Preliminary Gradin Plan (**Figure 6.1**). Upon completion of the final Bunker's Creek Regulatory Floodplain Analysis being completed by SCS Consulting Group Ltd., the preliminary grading design will be revisited and revised if necessary.

In general, the proposed development has been graded in a manner which satisfies the City of Barrie's Lot Grading and Drainage Standards and Design Manual.

At the site plan application stage, the preliminary grading shown on **Figure 6.1** will be subject to a more in-depth analysis in an attempt to balance the cut and fill volumes and minimize slopes and retaining walls.

7.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

Erosion and sediment control measures will be designed and may include temporary sediment control fencing, a construction access driveway, check dams and temporary sediment control facilities where required. These measures will be designed and constructed as per the "Erosion and Sediment Control Guideline for Urban Construction" document (December 2006). The detailed erosion and sediment control plan will be approved by the Municipality prior to any site alteration being undertaken. The plan will address phasing, inspection and monitoring aspects of erosion and sediment control. All reasonable measures will be taken to ensure sediment loading to the adjacent properties and storm sewers is minimized both during and following construction.

8.0 SUMMARY

This Functional Servicing and Stormwater Management Report has outlined the means by which:

- The proposed development can be serviced with a combination of the existing municipal services and proposed internal storm sewer system services (i.e. storm, sanitary and water) within the proposed R.O.W.;
- The stormwater management criteria can be achieved; and
- The proposed development can be graded in a manner which satisfies the City of Barrie grading criteria and the stormwater management requirements for this development.

Respectfully Submitted:

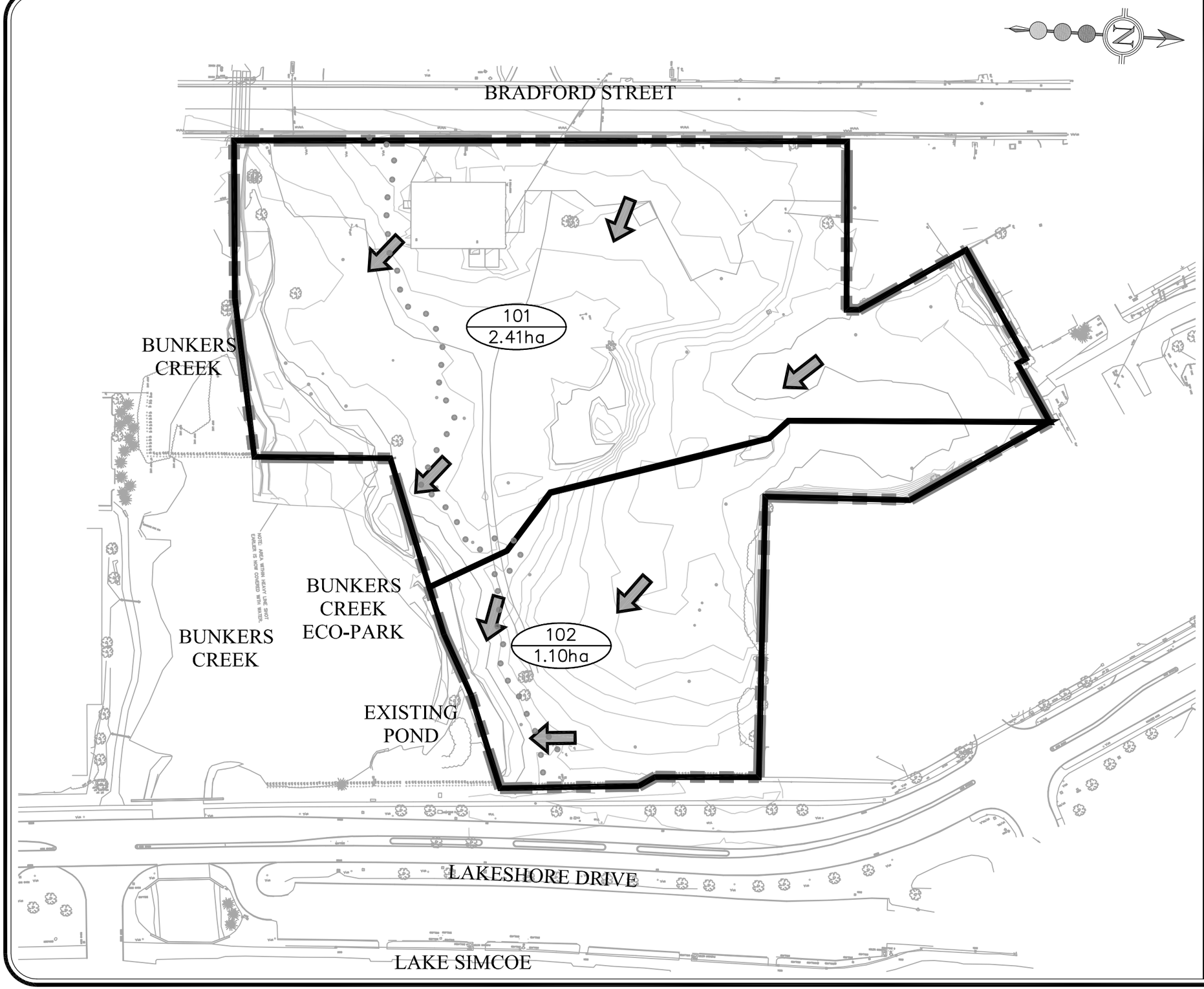
SCS Consulting Group Ltd.



Victor Szeghalmi, A. Sc. T
vszeghalmi@scsconsultinggroup.com

Paige Turchet, P.Eng
pturchet@scsconsultinggroup.com

P:\2196 51-75 Bradford Street\Design\Reports\FSP\2196-FSR (Rezoning & OP).docx



LEGEND:

PROPERTY BOUNDARY

270.25 — EXISTING CONTOUR AND ELEVATION

OVERLAND FLOW DIRECTION

101 / 2.41ha — CATCHMENT ID; DRAINAGE AREA (HECTARES)

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

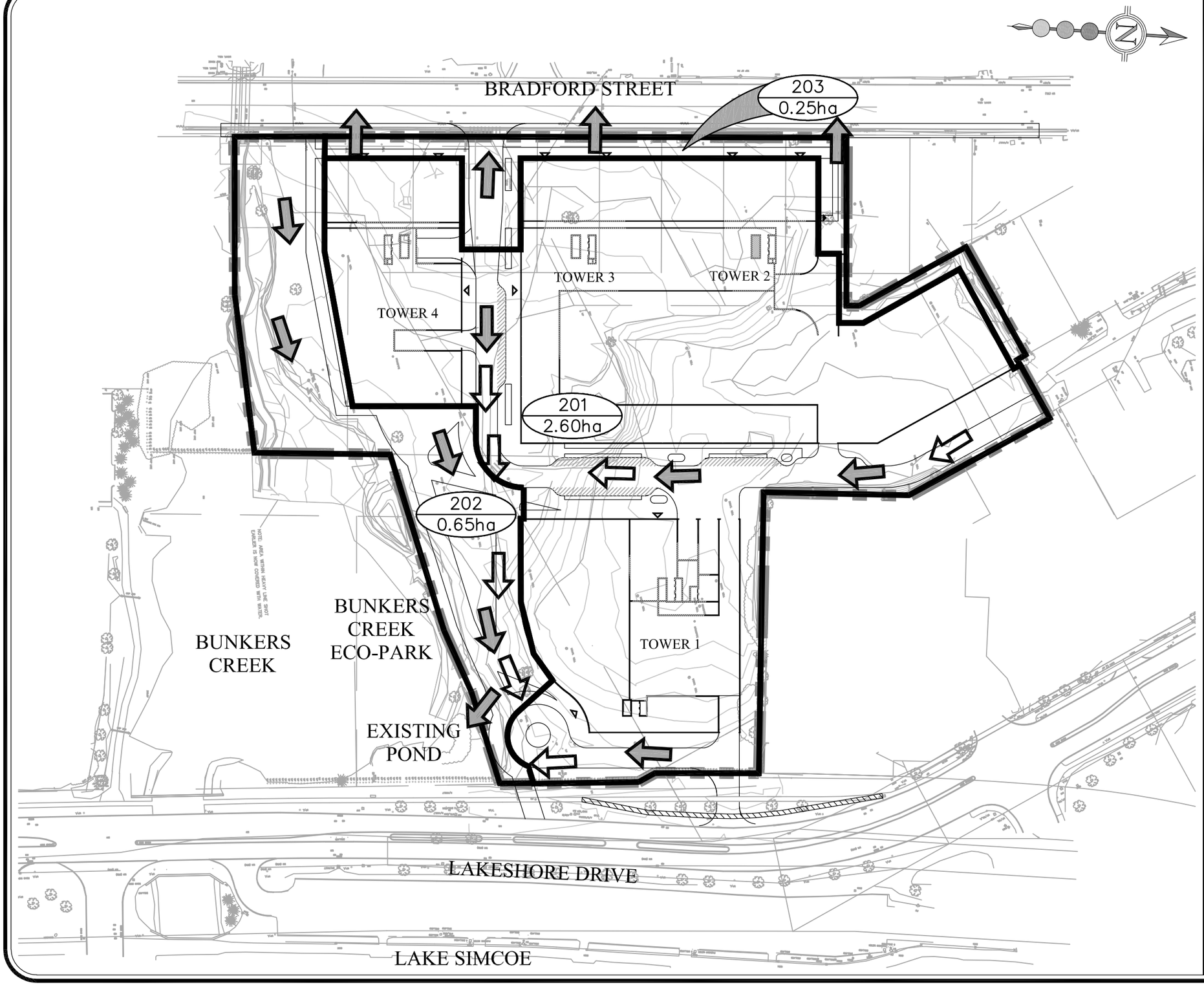
BARRIE LAKESHORE DEVELOPMENTS

51, 53, 55 & 75 BRADFORD STREET
AND 20 CHECKLEY STREET- BARRIE

EXISTING STORM DRAINAGE PLAN

DESIGNED BY: C.M..	CHECKED BY: P.A.T
SCALE: 1:1250	DATE: DECEMBER 2019
PROJECT No: 2196	FIGURE No: 2.1

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-STRM-EXST-2.1.dwg - Revised by <CMCCARTHY> : Tue, Dec 17 2019 - 10:36am



LEGEND:

- PROPERTY BOUNDARY
- PROPOSED STORM DRAINAGE BOUNDARY
- 270.25 — EXISTING CONTOUR AND ELEVATION
- 201 / 2.60ha — CATCHMENT ID; DRAINAGE AREA (HECTARES)
- MAJOR SYSTEM - OVERLAND FLOW
- MINOR SYSTEM - STORM SEWER

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

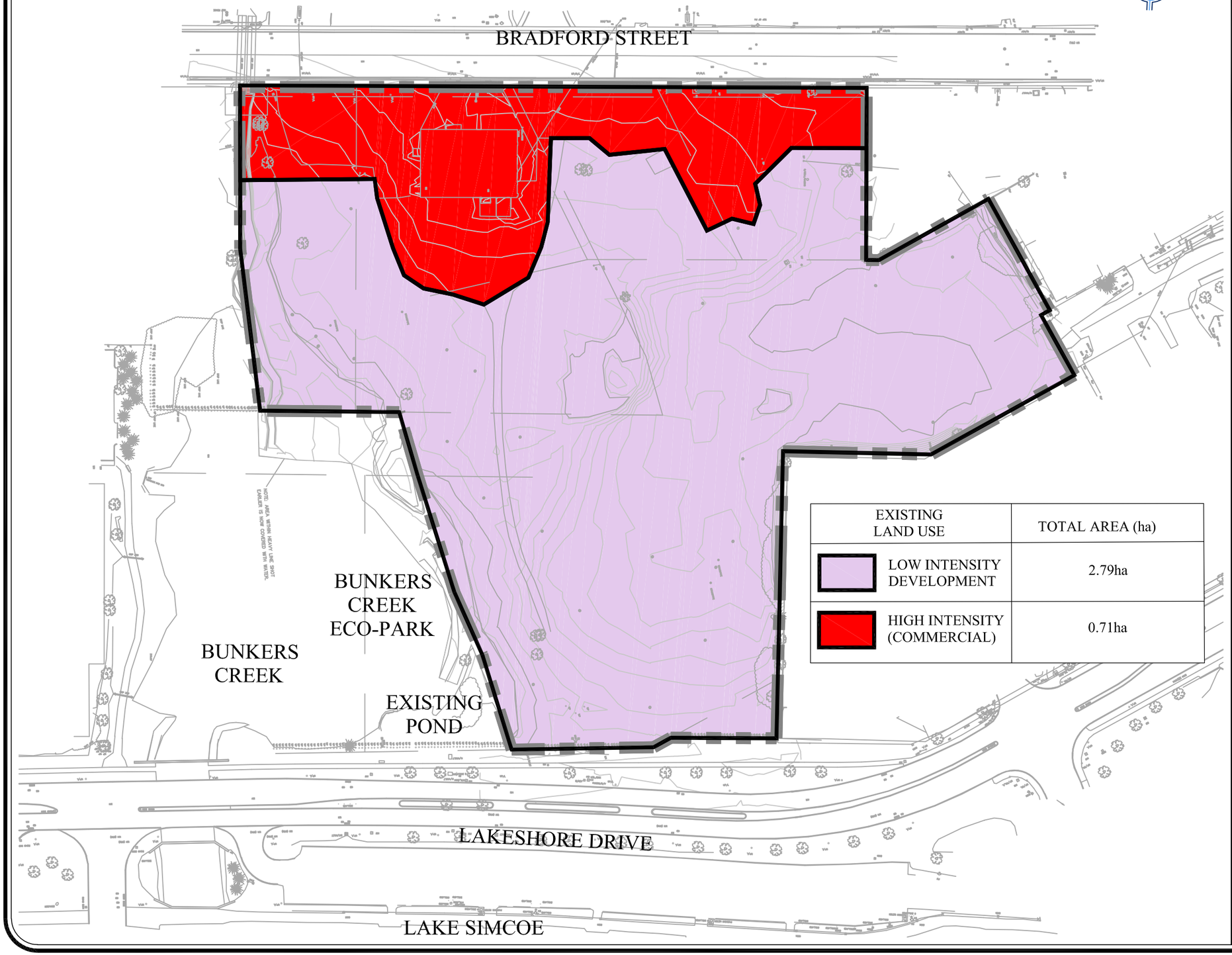
BARRIE LAKESHORE DEVELOPMENTS

51, 53, 55 & 75 BRADFORD STREET AND 20 CHECKLEY STREET- BARRIE

PROPOSED STORM DRAINAGE FIGURE

DESIGNED BY: C.M.	CHECKED BY: P.A.T..
SCALE: 1:1250	DATE: DECEMBER 2019
PROJECT No: 2196	FIGURE No: 2.2

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-STRM-PROP-2.2.dwg – Revised by <JLIM> : Tue, Dec 17 2019 – 5:47pm



EXISTING LAND USE	TOTAL AREA (ha)
LOW INTENSITY DEVELOPMENT	2.79ha
HIGH INTENSITY (COMMERCIAL)	0.71ha

LEGEND:

PROPERTY BOUNDARY

270.25 EXISTING CONTOUR AND ELEVATION

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

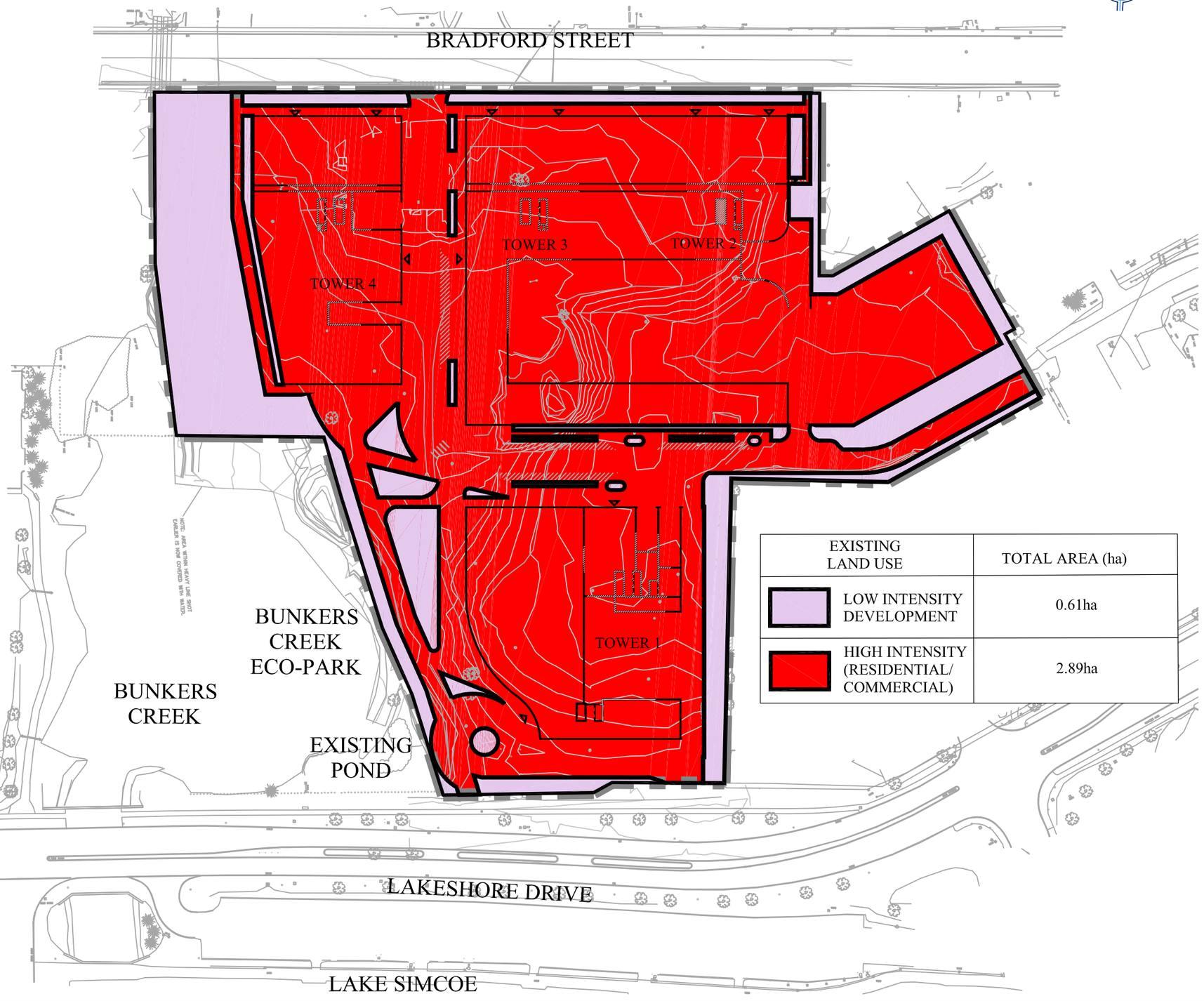
BARRIE LAKESHORE DEVELOPMENTS

51, 53, 55 & 75 BRADFORD STREET AND 20 CHECKLEY STREET- BARRIE

EXISTING PHOSPHOROUS BUDGET

DESIGNED BY: C.M.	CHECKED BY: P.A.T.
SCALE: 1:1250	DATE: DECEMBER 2019
PROJECT No: 2196	FIGURE No: 2.3

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-STRM-EXST-PHOS-2.3.dwg - Revised by <CMCCARTHY> : Tue, Dec 17 2019 - 10:53am



EXISTING LAND USE	TOTAL AREA (ha)
LOW INTENSITY DEVELOPMENT	0.61ha
HIGH INTENSITY (RESIDENTIAL/ COMMERCIAL)	2.89ha

LEGEND:

PROPERTY BOUNDARY

270.25 — EXISTING CONTOUR AND ELEVATION

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

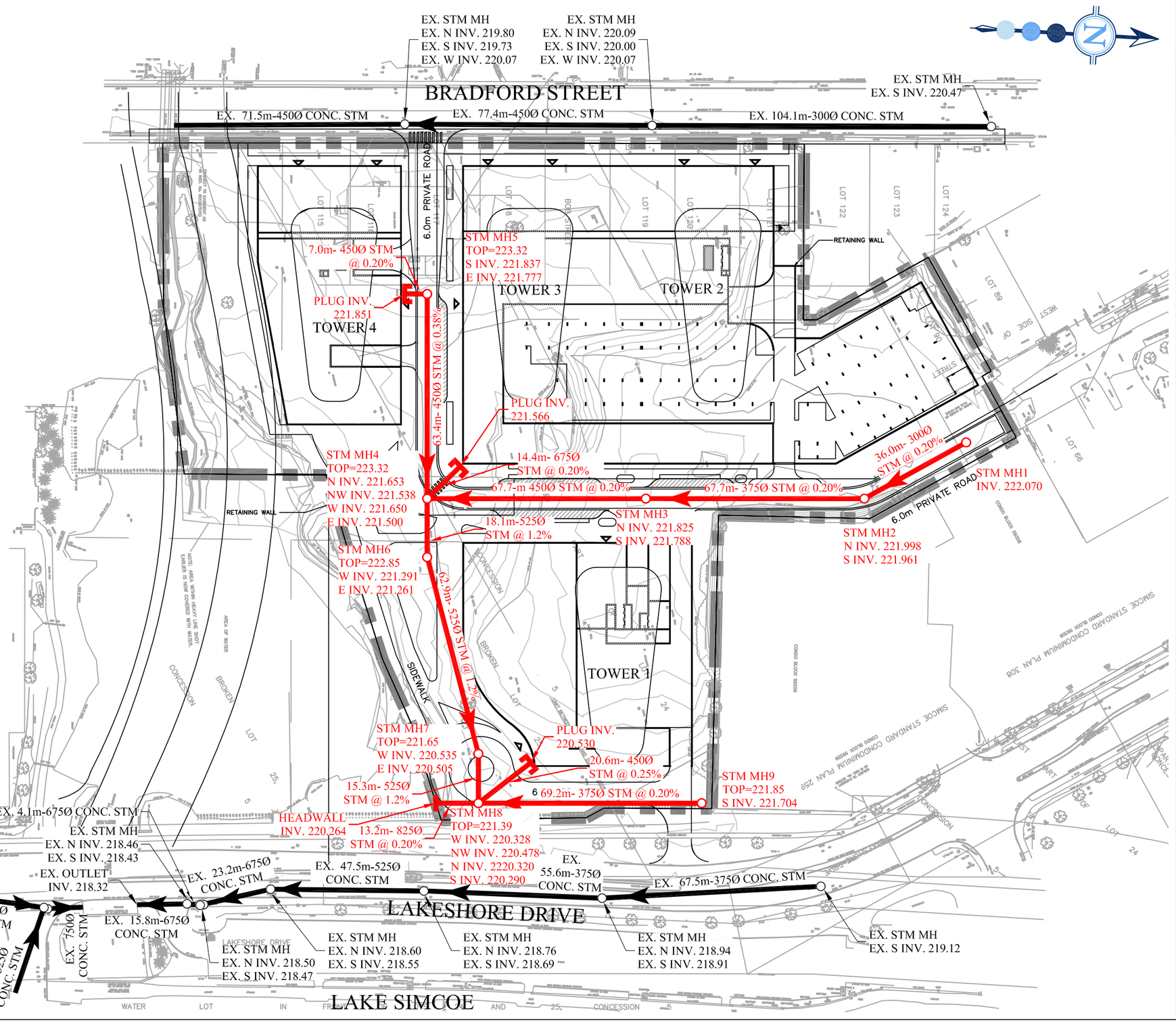
BARRIE LAKESHORE DEVELOPMENTS

51, 53, 55 & 75 BRADFORD STREET AND 20 CHECKLEY STREET- BARRIE

PROPOSED PHOSPHOROUS BUDGET

DESIGNED BY: C.M.	CHECKED BY: P.A.T.
SCALE: 1:1250	DATE: DECEMBER 2019
PROJECT No: 2196	FIGURE No: 2.4

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-STRM-PROP-PHOS-2.4.dwg - Revised by <CMCCARTHY> : Tue, Dec 17 2019 - 10:58am



LEGEND:

- PROPERTY BOUNDARY
- PROPOSED STORM SEWER AND MANHOLE
- EXISTING STORM SEWER AND MANHOLE

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

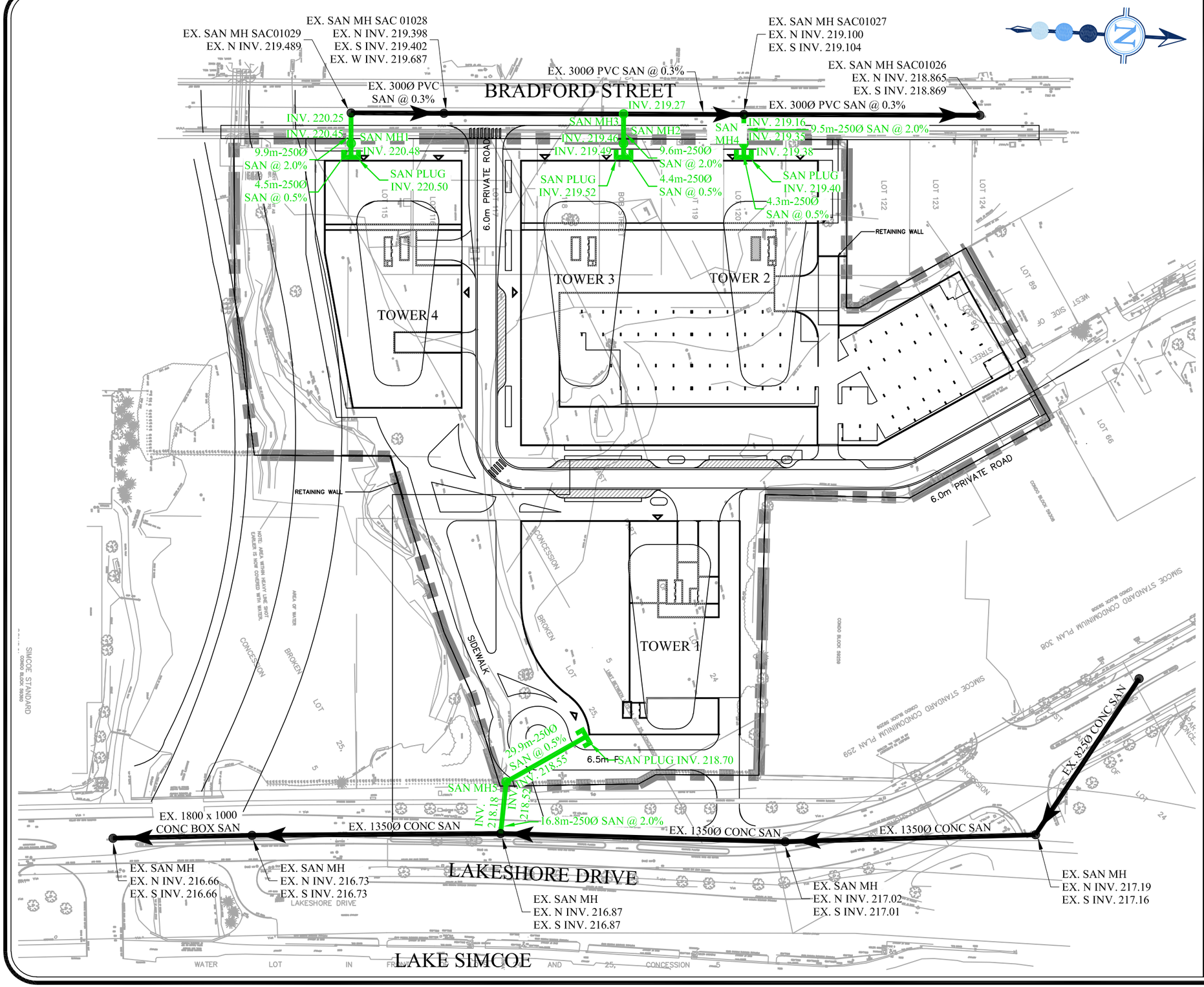
BARRIE LAKESHORE DEVELOPMENTS

51, 53, 55 & 75 BRADFORD STREET AND 20 CHECKLEY STREET- BARRIE

PRELIMINARY STORM SERVICING PLAN

DESIGNED BY: V.A.S.	CHECKED BY: P.G.
SCALE: 1:1250	DATE: DECEMBER 2019
PROJECT No: 2196	FIGURE No: 3.1

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-STRM-SERV-3.1.dwg - Revised by <JLIM> : Wed, Dec 18 2019 - 12:05pm



LEGEND:

- PROPERTY BOUNDARY
- PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

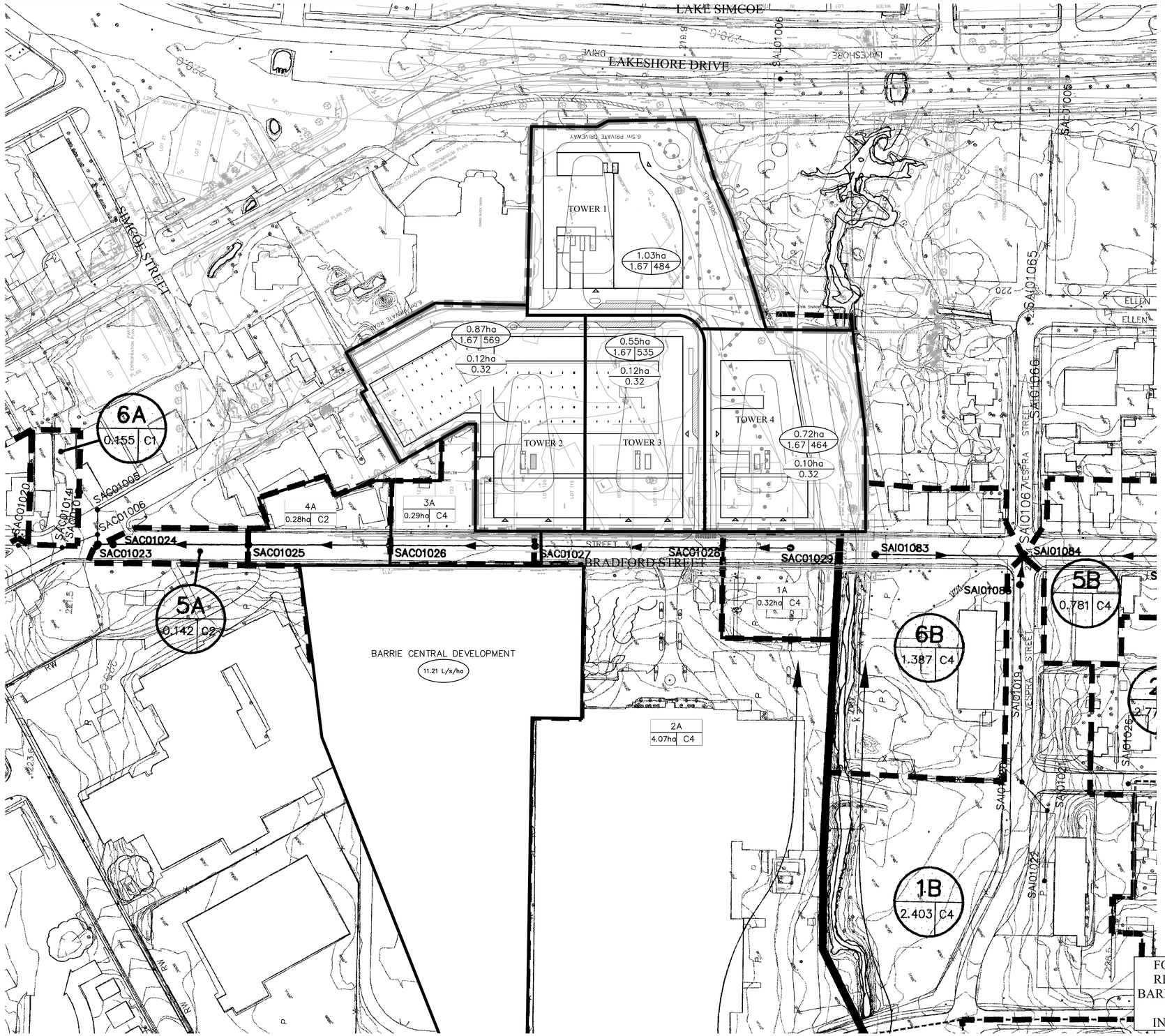
BARRIE LAKESHORE DEVELOPMENTS

51, 53, 55 & 75 BRADFORD STREET
AND 20 CHECKLEY STREET- BARRIE

PRELIMINARY SANITARY SERVICING PLAN

DESIGNED BY: V.A.S.	CHECKED BY: P.G.
SCALE: 1:1250	DATE: DECEMBER 2019
PROJECT No: 2196	FIGURE No: 4.1

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-SANI-SERV-4.1.dwg - Revised by <JLIM> : Wed, Dec 18 2019 - 12:08pm



FOR ORGINAL DRAINAGE BOUNDARIES, REFER TO DRAWING 2003-02 BY CITY OF BARRIE ENGINEER DEPARTMENT. DRAINAGE BOUNDARIES MODIFIED BASED ON INTRODUCTION OF NEW DEVELOPMENT

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

BARRIE LAKESHORE DEVELOPMENTS

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

LEGEND:

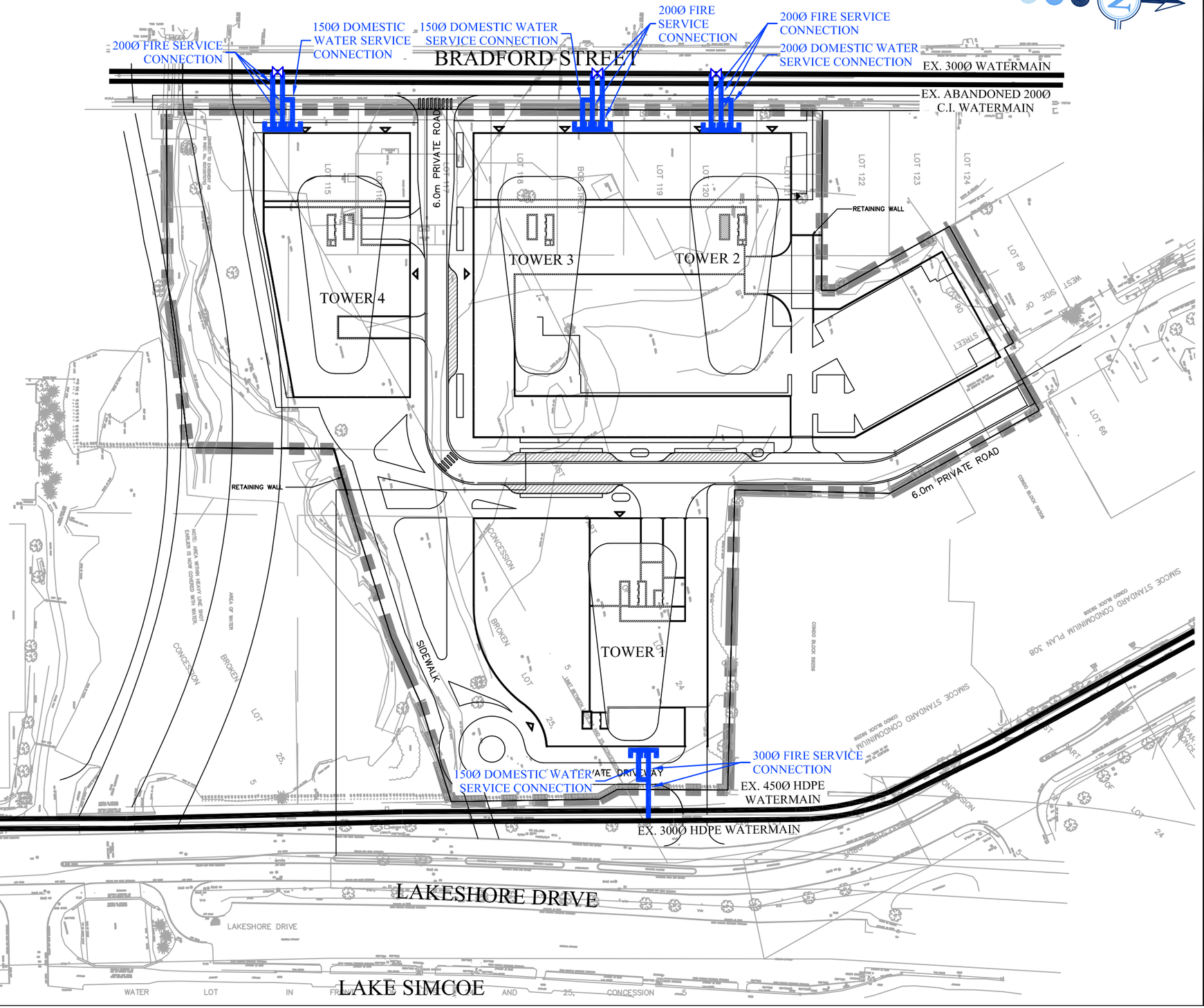
- PROPERTY BOUNDARY
- SANITARY DRAINAGE BOUNDARY
- EXTERNAL SANITARY DRAINAGE BOUNDARY
- 0.72ha / 1.67 / 464 — RESIDENTIAL SANITARY DRAINAGE AREA (HECTARES); NUMBER OF UNITS; POPULATION PER UNIT
- 0.09ha / 0.32 — RETAIL SANITARY DRAINAGE AREA (HECTARES); FLOW RATE (L/s/ha)
- 2A / 4.07ha C4 — MODIFIED AREA NUMBER; ZONING; MODIFIED SANITARY DRAINAGE AREA (HECTARES)
- 2A / 5.526 C4 — EXISTING AREA NUMBER; ZONING; EXISTING SANITARY DRAINAGE AREA (HECTARES)

51, 53, 55 & 75 BRADFORD STREET AND 20 CHECKLEY STREET- BARRIE

PROPOSED BRADFORD STREET SANITARY DRAINAGE PLAN

DESIGNED BY: V.A.S.	CHECKED BY: P.G.	PROJECT No: 2196	FIGURE No: 4.2
SCALE: 1:1000	DATE: DECEMBER 2019		

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-SANI-EXTR-X.X.dwg – Revised by <JLM> : Mon, Dec 16 2019 – 5:08pm



LEGEND:

- PROPERTY BOUNDARY
- PROPOSED WATERMAIN
- EXISTING WATERMAIN

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

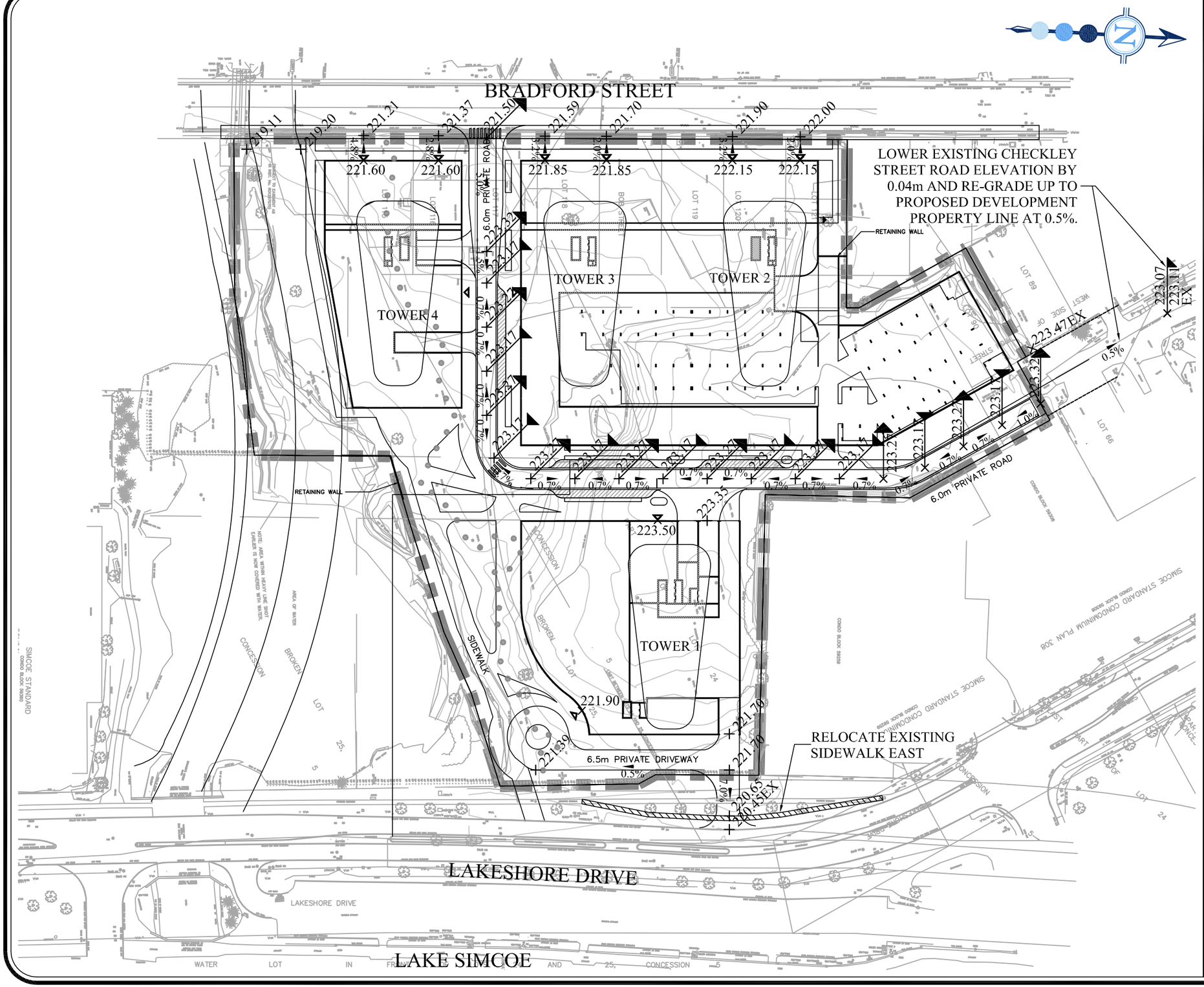
BARRIE LAKESHORE DEVELOPMENTS

51, 53, 55 & 75 BRADFORD STREET AND 20 CHECKLEY STREET- BARRIE

PRELIMINARY WATER DISTRIBUTION PLAN

DESIGNED BY: V.A.S.	CHECKED BY: P.G.
SCALE: 1:1250	DATE: DECEMBER 2019
PROJECT No: 2196	FIGURE No: 5.1

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-WTRM-5.1.dwg - Revised by <JLIM> : Wed, Dec 18 2019 - 12:12pm



LEGEND:

	PROPERTY BOUNDARY
270.25	EXISTING CONTOUR AND ELEVATION
× 223.91	PROPOSED ELEVATION
× 224.35EX	EXISTING ELEVATION
3.5%	PROPOSED ROAD GRADE
	EXISTNG REGULATORY FLOODLINE

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

BARRIE LAKESHORE DEVELOPMENTS

51, 53, 55 & 75 BRADFORD STREET AND 20 CHECKLEY STREET- BARRIE

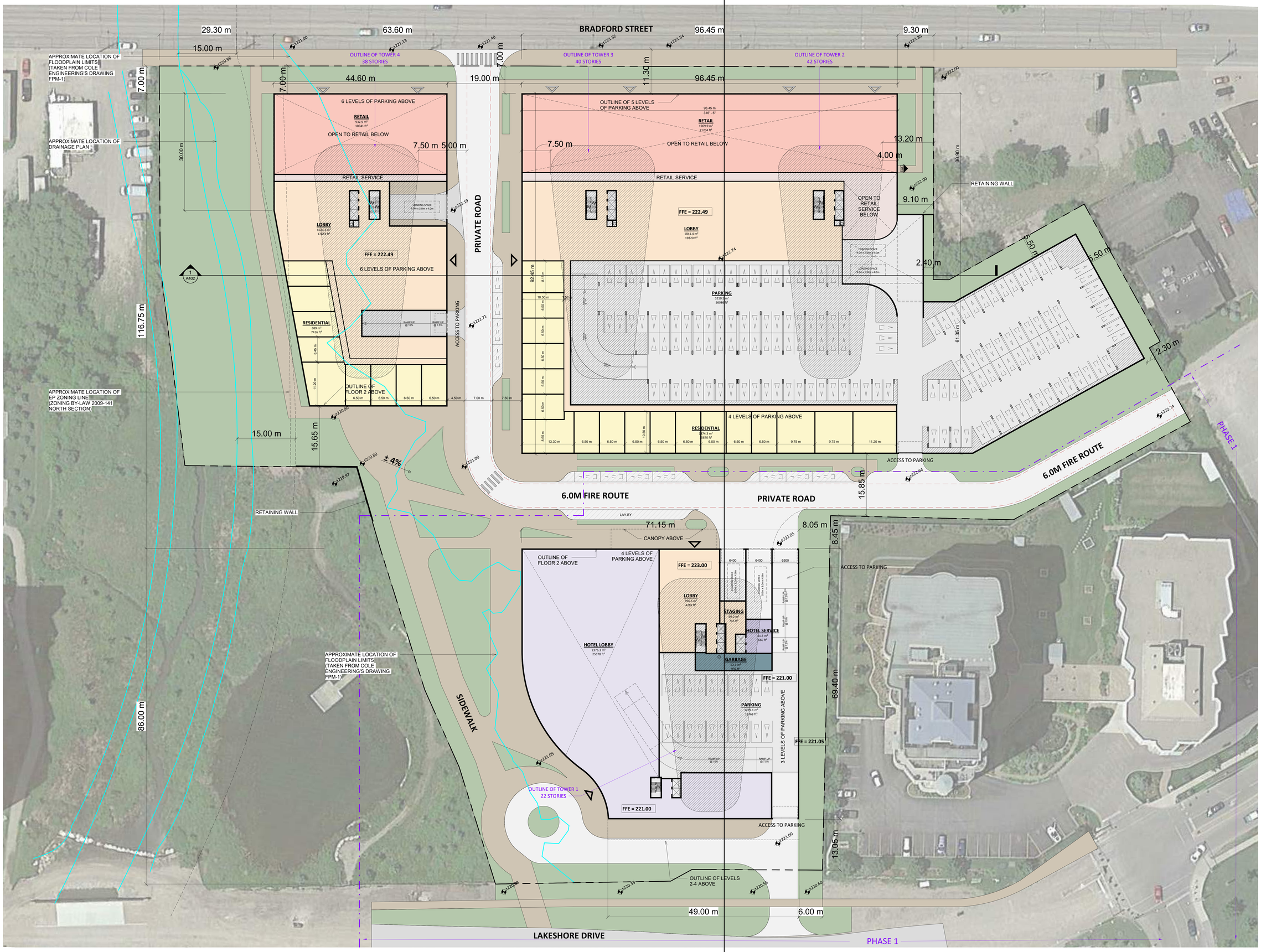
PRELIMINARY GRADING PLAN

DESIGNED BY: V.A.S.	CHECKED BY: P.G.
SCALE: 1:1250	DATE: DECEMBER 2019
PROJECT No: 2196	FIGURE No: 6.1

File: P:\2196 51-75 Bradford Street\Drawings\FSP\Fig\Report Figures\2196P-GRAD-6.1.dwg - Revised by <JLIM> : Wed, Dec 18 2019 - 12:05pm

APPENDIX A

SITE PLAN



TURNER FLEISCHER

Turner Fleischer Architects Inc.

67 Lesmill Road
Toronto, ON, M3B 2T8
T 416 425 2222
turnerfleischer.com

The issue of this record drawing is a representation by Turner Fleischer Architects Inc. that the construction, arrangement and quantities shown on this drawing are generally in accordance with the design documents prepared by Turner Fleischer Architects Inc. It is not a representation that the contractor sees it in conformity with a design intent. The contractor shall review all drawings and report any discrepancies with the design documents to the consultant. It shall not be both responsible for the accuracy of the information provided by Lotlea Companies Limited The revisions to the drawings and specifications resulting from the issue of this record drawing, and all other information that has been furnished by the contractor to Turner Fleischer Architects Inc., Turner Fleischer Architects Inc. shall not be held responsible for the accuracy or completeness of the information provided by the contractor

#	DATE	DESCRIPTION	BY

PROJECT
BARRIE WATERFRONT
BARRIE, ON

DRAWING
SITE PLAN WITH GRADING

PROJECT NO.	19.105BD
PROJECT DATE	2019-09-09
DRAWN BY	CPI
CHECKED BY	RMM
SCALE	1 : 300

DRAWING NO.
A008

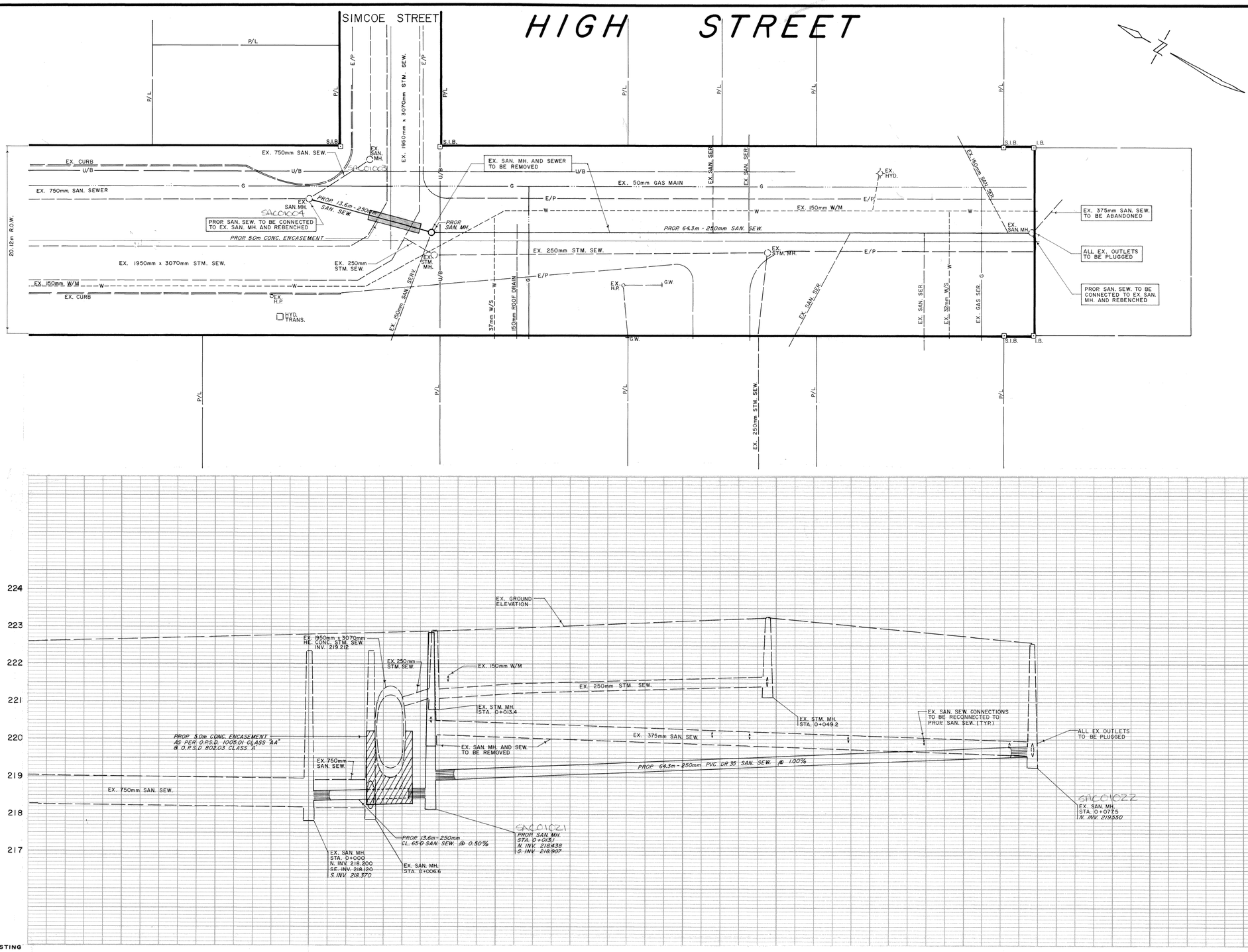
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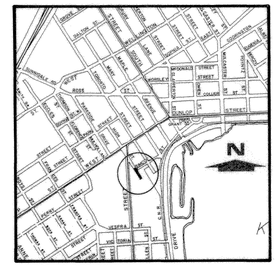
APPENDIX B

RECORD DRAWINGS AND BACKGROUND INFORMATION

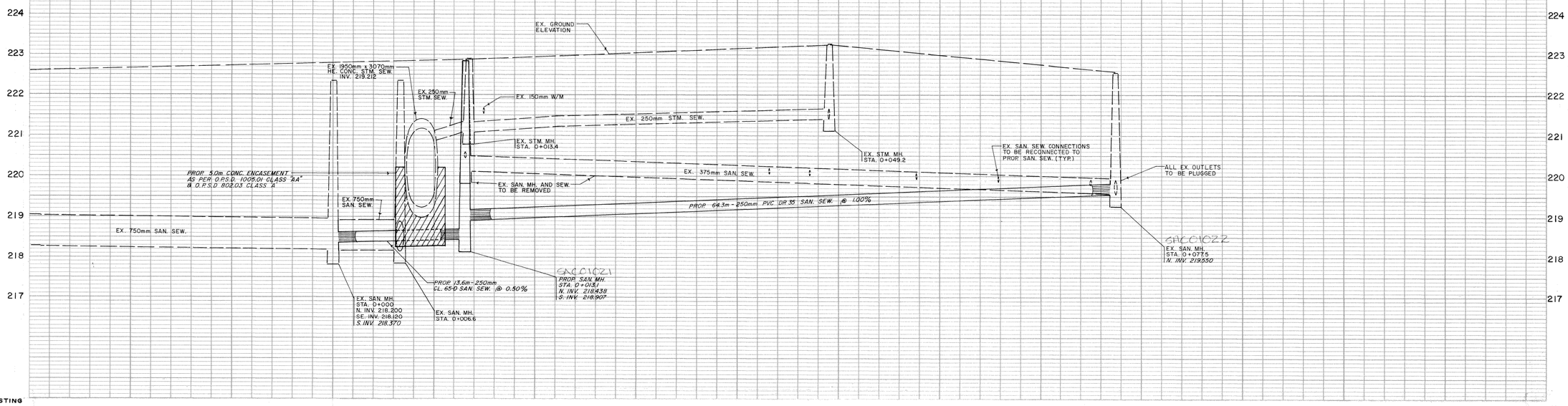
HIGH STREET

SIMCOE STREET





KEY PLAN



GENERAL NOTES

ALL TO BE ACCORDANCE WITH CURRENT CITY OF BARRIE STANDARDS AND SPECIFICATIONS AND TO THE SATISFACTION OF THE ENGINEERING DEPARTMENT.

ALL UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

ALL UTILITIES TO BE RELOCATED BY THE UTILITY CONCERNED. CONTRACTOR TO CO-ORDINATE.

BENCH MARKS

220.21 BRASS CAP IN CONCRETE ON THE GOVERNMENT DOCK AT THE BOTTOM OF BAYFIELD ST.

NO	REVISIONS	DATE	APPROVED

CITY OF BARRIE
APPROVED
DATE 1988-09-07
CITY ENGINEER

LICENSED PROFESSIONAL ENGINEER
W.G. GILBERT
PROVINCE OF ONTARIO

HIGH STREET SOUTH
SANITARY SEWER RECONSTRUCTION
SIMCOE STREET TO SOUTHERN LIMIT

CITY OF BARRIE INCORPORATED 1853
CITY of BARRIE
ENGINEERING DEPARTMENT

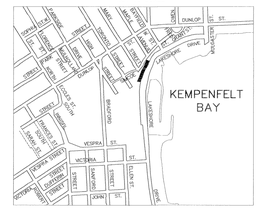
DESIGN B. GILBERT	SCALE HOR. 1:200	VERT. 1:50	
DRAWN G.E.M.	REVIEWED B.G.	DRAWING NO	88-24
DATE AUGUST, 1988	SHEET NO 1 OF 1		

TRANSLAR

1988-024-001



KEY PLAN
NOT TO SCALE



"This Record Drawing has been prepared, in part, based upon information furnished by others. While this information is believed to be reliable, the City does not warrant the accuracy of this information, and shall not be held responsible for any damages arising from the use of the Record Drawing. The user hereby releases and discharges the City, its employees or agents from any claims, losses or damages and agrees to indemnify and save harmless, the City, from any claims, losses, or damages arising from the use of the Record Drawing."

RECORD DRAWING

COMPILED BY	P.H.K.	DATE	DEC. 2002
CHECKED BY	T.F.H.	DATE	DEC. 2002
DRAWN BY	J.K.F.	DATE	JAN. 2003
CHECKED BY	P.H.K./T.F.H.	DATE	JAN. 2003

RECORD DRAWING
NOTICE TO USERS

This Record Drawing may include information provided by others. Ainley & Associates Limited believes this information to be reliable but has not verified its accuracy and/or completeness and, accordingly, shall not be responsible for any errors or omissions which may result from its incorporation herein.

Ainley GROUP
CONSULTING ENGINEERS PLANNERS

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 HEREIN ARE GRID BEARINGS AND ARE DERIVED FROM CONTROL MONUMENTS 001673109 (N=4915476.882, E=604476.676) AND 031910022 (N=4914136.772, E=604481.967) AND ARE REFERRED TO THE CENTRAL MERIDIAN (81 DEGREES OF LONGITUDE) IN ZONE, 17 AND ARE BASED ON NAD27 (76 ADJUSTMENT).

BENCH MARK 001673109
220.210 – BRASS CAP IN CONCRETE , LOCATED ON THE GOVERNMENT DOCK AT THE BOTTOM OF BAYFIELD STREET AT A POINT NEAR WHERE THE DOCK TAKES A DOG–LEG TO THE RIGHT.

BENCH MARK 458S
224.244 – BRASS CAP IN NORTH FOUNDATION WALL OF THE CENTER OF THREE BUILDINGS OF THE OLD C.N. RAILWAY STATION, 5.5m WEST OF NORTHEAST CORNER, 71.1m WEST OF A LIGHT STANDARD, 5cm ABOVE GRADE.

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

NO.	REVISIONS	DATE	APPROVED
	RECORD DRAWINGS	01/03/03	T.F.H.

CITY OF BARRIE
APPROVED
DATE. . . . . .
. . . . . .
DIRECTOR OF ENGINEERING

HERITAGE WELL 14 TO CENTENNIAL WELL 15 TRUNK WATERMAIN

LAKESHORE DRIVE

STA. 0+140 TO 0+290

CITY of BARRIE
INCORPORATED 1959

CITY of BARRIE
ENGINEERING DEPARTMENT

SCALE HOR.	1:250	VERT.	1:50	DRAWING NO.	2002–23
DESIGN	A&A	DRAWN	J.R.C.	SHEET NO.	PP2
REVIEWED	R.L.W.	DATE	2002.10.07		

PLOTTED BY: KFARQUHARSON, THE AINLEY GROUP PLOT DATE/TIME: May. 14, 2003 5:35pm
DWG FILE PATH NAME:\JA1001 K:\2002Projects\1002079\0\PLANS\dwg\PP2 PLOTSCALE: 1=100

LAKESHORE DRIVE

MATCH LINE — SEE DETAIL 'B' DWG. DET-5 FOR HYDRANT LOCATION — LINE

STA. 0+290 — STA. 0+440

SEE DWG. No. PP2 — SEE DWG. No. PP4

SEE DWG. No. PP8

TORONTO STREET

EX. KIDD'S CREEK STORM OUTFALL

HEAVY DUTY SILT FENCE

EX. 600mm STM. CULVERT

EX. 1050mmø SAN. SEWER

EX. 1200mmø HDPE SAN. SEWER

EX. FIBRE OPTICS CABLE

EX. 38mmø WATER SERVICE (ABANDONED)

EX. SAN.MH. SAL01014

EX. SAN.MH. SAL01015

EX. SAN.MH. SAL01009

EX. SAN.MH. SAL01007

FUTURE KIDD'S CREEK TWIN 1200 x 3000mm CONC. BOX CULVERTS

℄ CURVE DATA
P.I. = 0+334.450
ANGLE = 166° 31' 20"
TAN = 44.415m
ARC = 88.360m
RAD = 446.694m

450mmø HDPE TRANSMISSION WATERMAIN

300mmø HDPE WATERMAIN

450mmø FUSED COUPLER STA. 0+375.5

22.5° BEND

300x300x150mm HYD. TEE STA. 0+388

150mmø HDPE HYD. LEAD

REMOVED 19mmø COPPER WATER SERVICE TEST TAIL, MAIN STOP REMAINS

300x200mmø REDUCER

200mmø VALVE V5908 (RESTRAINED)

DEPTH TO TOP OF W/M 3.46m

DEPTH TO TOP OF W/M 5.18m

25.9m

21.2m

30.0m

26.78m

4.23m

3.60m

6.4m

6.68m

5.80m

5.96m

WROUGHT IRON FENCE

EX. CONC. CURB

EX. ASPHALT PARKING LOT

EX. ASPHALT DRIVEWAY

EX. 300mmø PVC WATERMAIN

EX. 300mmø STM. SEWER

EX. 1050mmø TRUNK SAN. SEWER

EX. 1200mmø TRUNK SAN. SEWER

EX. 250mmø SAN. SEWER (GRAND HARBOUR TOWERS)

EX. 200mmø SAN. SEWER

C.B.

C.T.V.B.

C.R. BOX

LAMP

POST

S.I.B.

I.B.

H.P.

T.M.

CTV

U/H

P/L

EX. C/L PROFILE WATERMAIN

EX. 800mmø CONC. CULVERT

FUTURE TWIN 1200 x 3000mm CONC. BOX CULVERTS

INV. 218.60

EX. 900mmø CSP CULVERTS

EX. U/G HYDRO

EX. 40mmø WATER SERVICE

EX. 1050mmø SANITARY TRUNK SEWER

300x300x150mm HYD. TEE

22.5° BEND

1.64m COVER

EX. 250mmø SAN. SEWER (GRAND HARBOUR TOWERS)

EX. 1200mmø SAN. SEWER

300mmø HDPE DR11 WATERMAIN

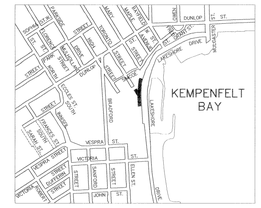
450mmø HDPE DR9 TRANSMISSION WATERMAIN

	0+290	0+300	0+320	0+340	0+360	0+380	0+400	0+420	0+440
FINISHED GRADE O.P.C.	219.91	219.84	219.67	219.71	219.72	219.39	219.88	219.95	219.85
EXISTING GRADE O.P.C.									

CHAINAGE

224 223 222 221 220 219 218 217 216 215 214 213 212 211

KEY PLAN
NOT TO SCALE



"This Record Drawing has been prepared, in part, based upon information furnished by others. While this information is believed to be reliable, the City does not warrant the accuracy of this information, and shall not be held responsible for damages arising from the use of the Record Drawing. The user hereby releases and discharges the City, its employees or agents from any claims, losses or damages and agrees to indemnify and save harmless, the City, from any claims, losses, or damages arising from the use of the Record Drawing."

RECORD DRAWING

COMPILED BY	P.H.K.	DATE	DEC. 2002
CHECKED BY	T.F.H.	DATE	DEC. 2002
DRAWN BY	J.K.F.	DATE	JAN. 2003
CHECKED BY	P.H.K./T.F.H.	DATE	JAN. 2003

RECORD DRAWING
NOTICE TO USERS

This Record Drawing may include information provided by others. Ainley & Associates Limited believes this information to be reliable but has not verified its accuracy and/or completeness and, accordingly, shall not be responsible for any errors or omissions which may result from its incorporation herein.

Ainley GROUP — CONSULTING ENGINEERS PLANNERS

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 HEREIN ARE GRID BEARINGS AND ARE DERIVED FROM CONTROL MONUMENTS 001673109 (N=4915476.882, E=604476.676) AND 031910022 (N=4914136.772, E=604481.967) AND ARE REFERRED TO THE CENTRAL MERIDIAN (81 DEGREES OF LONGITUDE) IN ZONE, 17 AND ARE BASED ON NAD27 (76 ADJUSTMENT).

BENCH MARK 001673109

220.210 – BRASS CAP IN CONCRETE , LOCATED ON THE GOVERNMENT DOCK AT THE BOTTOM OF BAYFIELD STREET AT A POINT NEAR WHERE THE DOCK TAKES A DOG-LEG TO THE RIGHT.

BENCH MARK 458S

224.244 – BRASS CAP IN NORTH FOUNDATION WALL OF THE CENTER OF THREE BUILDINGS OF THE OLD C.N. RAILWAY STATION, 5.5m WEST OF NORTHEAST CORNER, 71.1m WEST OF A LIGHT STANDARD, 5cm ABOVE GRADE.

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

NO.	REVISIONS	DATE	APPROVED
	RECORD DRAWINGS	01/03/03	T.F.H.

CITY OF BARRIE
APPROVED
DATE. . . . . .
. . . . . .
DIRECTOR OF ENGINEERING

HERITAGE WELL 14 TO CENTENNIAL WELL 15 TRUNK WATERMAIN

LAKESHORE DRIVE

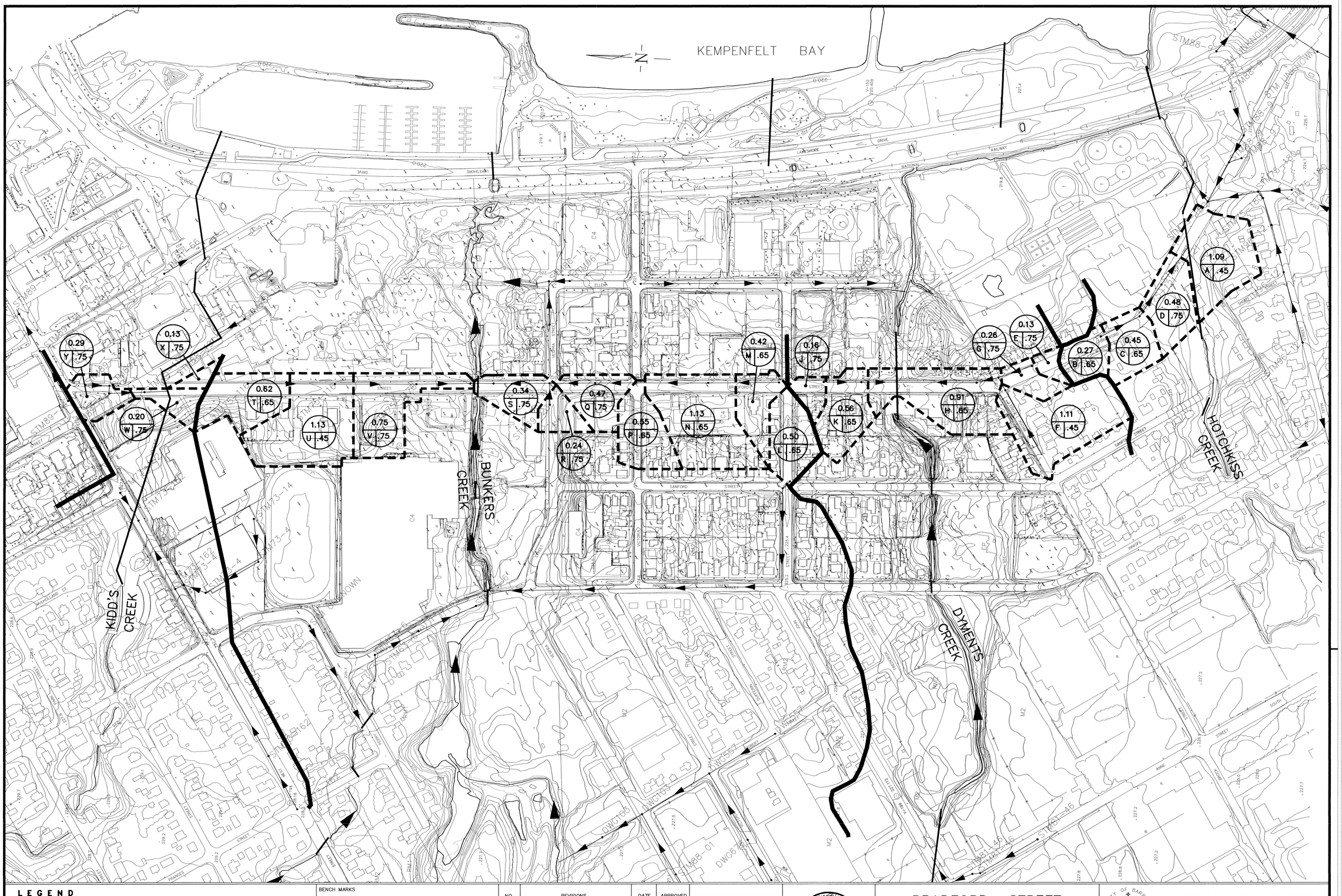
STA. 0+290 TO 0+440

CITY of BARRIE
ENGINEERING DEPARTMENT

SCALE HOR.	1:250	VERT.	1:50
DESIGN	A&A	DRAWN	J.R.C.
REVIEWED	R.L.W.	DATE	2002.10.07

DRAWING NO. 2002-23
SHEET NO. PP3

PLOTTED BY: KFARQUHARSON, THE AINLEY GROUP PLOT DATE\TIME: May. 14, 2003 5:34pm
DWG FILE PATH\NAME\LAYOUT: V:\LDDProjects\1202779\DrLand\dwg\PP3 PLOTSCALE: 1=100


KEMPENFELT BAY
N
BUNKERS CREEK
HOTCHKISS CREEK
KIDD'S CREEK
DYMENTS CREEK
0.29 Y .75
0.13 X .75
0.62 T .65
0.20 W .75
1.13 U .45
0.75 V .75
0.34 S .75
0.47 Q .75
0.24 R .75
0.55 P .65
1.13 N .65
0.42 M .65
0.16 J .75
0.50 L .65
0.56 K .65
0.91 H .65
0.26 G .75
0.13 E .75
0.27 B .65
0.45 C .65
0.48 D .75
1.09 A .45
1.11 F .45
STM89
STM73-14
STM73-4
STM73-3
STM73-2
STM73-1
STM88-01
STM88-02
STM88-03
STM88-04
STM88-05
STM88-06
STM88-07
STM88-08
STM88-09
STM88-10
STM88-11
STM88-12
STM88-13
STM88-14
STM88-15
STM88-16
STM88-17
STM88-18
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STM88-27
STM88-28
STM88-29
STM88-30
STM88-31
STM88-32
STM88-33
STM88-34
STM88-35
STM88-36
STM88-37
STM88-38
STM88-39
STM88-40

KEMPENFELT BAY

N

ESSA TRUNK SANITARY DRAINAGE AREA

INDUSTRIAL TRUNK SANITARY DRAINAGE AREA

CUNDLES TRUNK SANITARY DRAINAGE AREA

1A 0.834 C4
2A 5.526 C4
3A 0.493 C4
3A 0.713 I
3A 0.112 C2
4A 9.527 C2
5A 0.142 C2
6A 0.355 C1
7A 0.172 C1
6B 1.387 C4
1B 2.403 C4
5B 0.781 C4
2B 2.772 C4
4B .695 C4
3B 1.018 C4
2C 1.236 C4
3C 1.007 C4
4C 0.457 RA1
1C 7.002 RM2
4C 1.994 EP
9C 0.043 C4
7C 0.282 C4
8C 0.189 C4
6C 0.561 C4
5C 0.508 C4
4C 4.407 RM2
4C 0.978 M1
4C 0.278 M2
1B 0.055 M2
2B 0.125 EP
1B 5.892 EP
2B 6.376 RM2
2B 13.649 M2
2B 0.393 C4

LEGEND

- CATCHMENT BOUNDARY
- SUBCATCHMENT BOUNDARY
- ZONING BOUNDARY
- EXISTING SANITARY SEWER (SAE01004 – SAE01005)
- PROPOSED SANITARY SEWER (SAC01010)
- AREA NUMBER
- ZONING
- AREA (ha)

GENERAL NOTES

BENCH MARKS

NO.	REVISIONS	DATE	APPROVED

CITY OF BARRIE
APPROVED
DATE. May 23/05
DIRECTOR OF ENGINEERING

LICENSED PROFESSIONAL ENGINEER
L.H. BORGDORFF
MAY 23/05
PROVINCE OF ONTARIO

BRADFORD STREET RECONSTRUCTION

SANITARY DRAINAGE PLAN

CITY OF BARRIE INCORPORATED

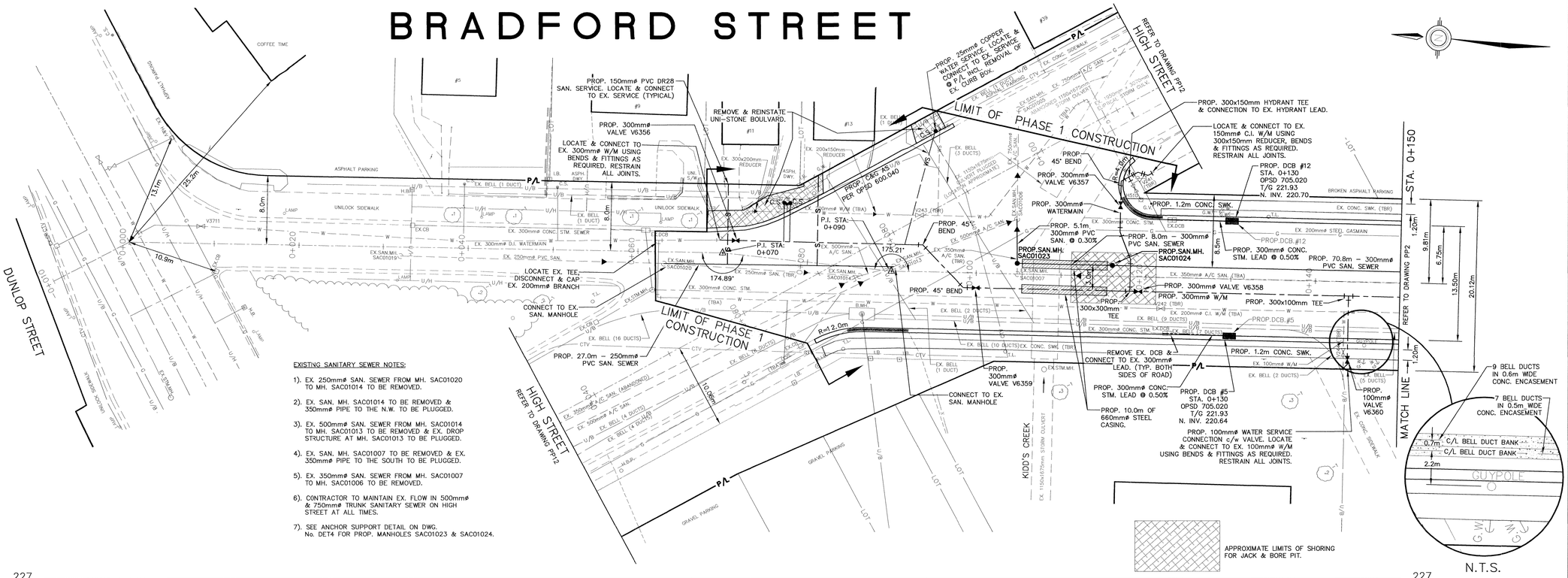
CITY of BARRIE
ENGINEERING DEPARTMENT

SCALE HOR.	1:2000	VERT.	----
DESIGN	R.M.	DRAWN	J.D.C./J.K.F.
REVIEWED	R.W.M.	DATE	2003.02.17

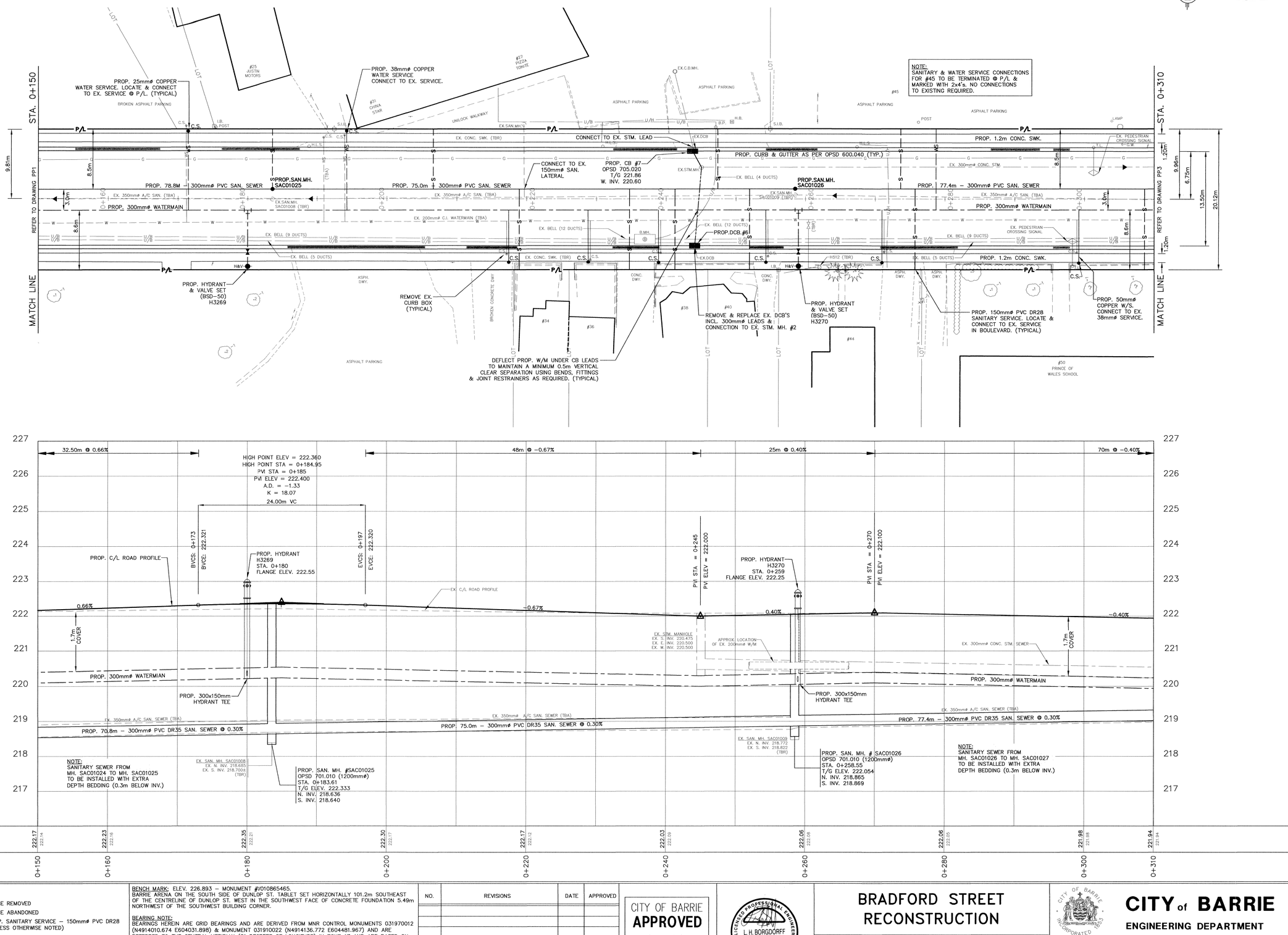
DRAWING NO. 2003-02
SHEET NO. SAN1

2003-002-003

BRADFORD STREET


DUNLOP STREET
HIGH STREET
REFER TO DRAWING PP12
LIMIT OF PHASE 1 CONSTRUCTION
KIDD'S CREEK
COFFEE TIME
ASPHALT PARKING
UNILOCK SIDEWALK
GRAVEL PARKING
PROP. 150mmø PVC DR28 SAN. SERVICE. LOCATE & CONNECT TO EX. SERVICE (TYPICAL)
PROP. 300mmø VALVE V6356
LOCATE & CONNECT TO EX. 300mmø W/M USING BENDS & FITTINGS AS REQUIRED. RESTRAIN ALL JOINTS.
REMOVE & REINSTATE UNI-STONE BOULVARD.
PROP. 26mmø COPPER WATER SERVICE. LOCATE & CONNECT TO EX. SERVICE @ P/L INCL. REMOVAL OF EX. CURB BOX.
PROP. 300x150mm HYDRANT TEE & CONNECTION TO EX. HYDRANT LEAD.
LOCATE & CONNECT TO EX. 150mmø C.I. W/M USING 300x150mm REDUCER, BENDS & FITTINGS AS REQUIRED. RESTRAIN ALL JOINTS.
PROP. DCB #12 STA. 0+130 OPSD 705.020 T/G 221.93 N. INV. 220.70
PROP. 45° BEND
PROP. 300mmø VALVE V6357
PROP. 300mmø WATERMAIN
PROP. 1.2m CONC. SWK.
PROP. 5.1m 300mmø PVC SAN. @ 0.30%
PROP. 8.0m – 300mmø PVC SAN. SEWER
PROP.SAN.MH. SAC01023
PROP.SAN.MH. SAC01024
PROP. 300mmø CONC. STM. LEAD @ 0.50%
PROP. 70.8m – 300mmø PVC SAN. SEWER
PROP. 300mmø VALVE V6358
PROP. 300mmø W/M
PROP. 300x100mm TEE
PROP. 45° BEND
PROP. 300x300mm TEE
PROP. 300mmø VALVE V6359
PROP. 1.2m CONC. SWK.
REMOVE EX. DCB & CONNECT TO EX. 300mmø LEAD. (TYP. BOTH SIDES OF ROAD)
PROP. 300mmø CONC. STM. LEAD @ 0.50%
PROP. DCB #5 STA. 0+130 OPSD 705.020 T/C 221.93 N. INV. 220.64
PROP. 10.0m OF 660mmø STEEL CASING.
PROP. 100mmø VALVE V6360
PROP. 100mmø WATER SERVICE CONNECTION c/w VALVE. LOCATE & CONNECT TO EX. 100mmø W/M USING BENDS & FITTINGS AS REQUIRED. RESTRAIN ALL JOINTS.
PROP. 27.0m – 250mmø PVC SAN. SEWER
CONNECT TO EX. SAN. MANHOLE
LOCATE EX. TEE, DISCONNECT & CAP EX. 200mmø BRANCH
P.I. STA: 0+070
P.I. STA: 0+090
174.89°
175.21°
R=2.0m
R=4.5m
R=6.0m
EX. SAN.MH. SAC01019
EX. SAN.MH. SAC01020
EX. SAN.MH. SAC01014
EX. SAN.MH. SAC01007
EX. SAN.MH. SAC01006
EX. SAN.MH. SAC01005
EX. SAN.MH. SAC01004
EX. SAN.MH. SAC01003
EX. SAN.MH. SAC01002
EX. SAN.MH. SAC01001
EX. 250mmø PVC SAN.
EX. 300mmø D.I. WATERMAIN
EX. 300mmø CONC. STM. SEWER
EX. 350mmø A/C SAN. (TBA)
EX. 500mmø A/C SAN.
EX. 200mmø C.I. W/M (TBA)
EX. 100mmø W/M
EX. 200mmø STEEL GASMAIN
EX. 1150x675mm STORM CULVERT
EX. 1950x3070mm ELIPTICAL CULVERT (LOCATION APPROXIMATE)
EX. 1500mmø STORM SEWER
EX. 1200mmø STORM SEWER
EX. 600mmø STORM SEWER
EX. 525mmø STORM SEWER
EX. 450mmø STORM SEWER
EX. 375mmø STORM SEWER
EX. 300mmø STORM SEWER
EX. 250mmø STORM SEWER
EX. 200mmø STORM SEWER
EX. 150mmø STORM SEWER
EX. 1200mmø STORM MAINTENANCE HOLE
EX. 1050mmø STORM MAINTENANCE HOLE
EX. 900mmø STORM MAINTENANCE HOLE
EX. 750mmø STORM MAINTENANCE HOLE
EX. 600mmø STORM MAINTENANCE HOLE
EX. 525mmø STORM MAINTENANCE HOLE
EX. 450mmø STORM MAINTENANCE HOLE
EX. 375mmø STORM MAINTENANCE HOLE
EX. 300mmø STORM MAINTENANCE HOLE
EX. 250mmø STORM MAINTENANCE HOLE
EX. 200mmø STORM MAINTENANCE HOLE
EX. 150mmø STORM MAINTENANCE HOLE
EX. STM. CB
EX. STM. DCB
EX. STM. MANHOLE
EX. SAN. MANHOLE
EX. 200mmø SAN. SERVICE
EX. 150mmø SAN. SERVICE
EX. 100mmø SAN. SERVICE
EX. 50mmø W/S
EX. 25mmø W/S
EX. 19mmø W/S
EX. 150mmø W/M
EX. 100mmø W/M
EX. 50mmø W/M
EX. 25mmø W/M
EX. 19mmø W/M
EX. 200mmø W/M
EX. 300mmø W/M
EX. 400mmø W/M
EX. 600mmø W/M
EX. 750mmø W/M
EX. 900mmø W/M
EX. 1050mmø W/M
EX. 1200mmø W/M
EX. 1500mmø W/M
EX. 1800mmø W/M
EX. 2100mmø W/M
EX. 2400mmø W/M
EX. 2700mmø W/M
EX. 3000mmø W/M
EX. 3300mmø W/M
EX. 3600mmø W/M
EX. 3900mmø W/M
EX. 4200mmø W/M
EX. 4500mmø W/M
EX. 4800mmø W/M
EX.

BRADFORD STREET



| | | |

BRADFORD STREET

NOTE:
SANITARY & WATER SERVICE CONNECTIONS FOR #55 TO BE TERMINATED @ P/L & MARKED WITH 2x4's. NO CONNECTIONS TO EXISTING REQUIRED.

STA. 0+310 — MATCH LINE — REFER TO DRAWING PP2

STA. 0+470 — MATCH LINE — REFER TO DRAWING PP4

REMOVE & REPLACE EX. CB'S INCL. 250mmø LEADS & CONNECTION TO EX. STM. MH. #3

TERMINATE PROP. SANITARY & WATER SERVICES @ P/L & MARK WITH 2x4's. NO CONNECTION TO EX. REQUIRED.

PROP. 25mmø COPPER WATER SERVICE. LOCATE & CONNECT TO EX. SERVICE @ P/L. (TYPICAL)

PROP. 150mmø PVC DR28 SANITARY SERVICE. LOCATE & CONNECT TO EX. SERVICE IN BOULEVARD. (TYPICAL)

PROP. 1.2m CONC. SIDEWALK

PROP. CURB & GUTTER AS PER OPSD 600.040 (TYP.)

PROP. 77.4m – 300mmø PVC SAN. SEWER

PROP.SAN.MH. SAC01027

PROP. 11.4m – 150mmø PVC SAN. SEWER. EX. PIPE TO BE REMOVED.

PROP. 98.0m – 300mmø PVC SAN. SEWER

PROP.SAN.MH. SAC01028

PROP. 29.0m – 300mmø PVC SAN. SEWER

PROP.SAN.MH. SAC01029

PROP. 300mmø WATERMAIN

PROP. HYDRANT & VALVE SET (BSD-50) H3271

PROP. CB #9 OPSD 705.010 T/G 221.59 E. INV. 220.30 S.W. INV. 220.49 CONNECT TO EX. S.W. LEAD.

DEFLECT PROP. CURB AROUND EX. BELL MANHOLE

PROP. HYDRANT & VALVE SET (BSD-50) H3272

PROP. 15.0m – 150mmø PVC SAN. SEWER.

REMOVE EX. CURB BOX. (TYPICAL)

PROP. CB #11 OPSD 705.010 T/G 221.18 E. INV. 220.02 N.W. INV. 220.37 CONNECT TO EX. CB LEAD.

DEFLECT PROP. W/M UNDER CB LEADS TO MAINTAIN A MINIMUM 0.5m VERTICAL CLEAR SEPARATION USING BENDS, FITTINGS & JOINT RESTRAINERS AS REQUIRED. (TYPICAL)

PRINCE OF WALES SCHOOL

TIM HORTON'S

HURONIA TIRE AND AUTO CENTRE

#80 BARRIE BY-THE-BAY

70m @ −0.40% | 120m @ −0.55% | 65.50m @ −0.68%

PROP. HYDRANT H3271 STA. 0+338 FLANGE ELEV. 221.95

PVI STA = 0+340
PVI ELEV = 221.820

PROP. C/L ROAD PROFILE

EX. C/L ROAD PROFILE

PROP. HYDRANT H3272 STA. 0+420 FLANGE ELEV. 221.60

PVI STA = 0+460
PVI ELEV = 221.160

−0.55%

1.7m COVER

EX. 300mmø CONC. STM. SEWER

EX. STM. MANHOLE
EX. N. INV. 220.094
EX. S. INV. 220.004
EX. W. INV. 220.074

EX. 450mmø CONC. STM. SEWER

EX. STM. MANHOLE
EX. N. INV. 219.80
EX. S. INV. 219.73
EX. W. INV. 220.07

EX. SAN. MH. SAC01012
EX. N. INV. 219.407 (TBR)

EX. SAN. MH. SAC01011
EX. N. INV. 219.167
EX. S. INV. 219.317
EX. W. INV. 219.687 (TBR)

EX. 350mmø A/C SAN. SEWER (TBA)

PROP. 77.4m – 300mmø PVC DR35 SAN. SEWER @ 0.30%

PROP. 98.0m – 300mmø PVC DR35 SAN. SEWER @ 0.30%

PROP. 300mmø WATERMAIN

EX. SAN. MH. SAC01010
EX. N. INV. 219.659
EX. S. INV. 219.679 (TBR)

APPROX. LOCATION OF EX. 200mmø W/M

PROP. SAN. MH. #SAC01027
OPSD 701.010 (1200mmø)
STA. 0+335.96
T/G ELEV. 221.836
N. INV. 219.100
S. INV. 219.104

PROP. 300x150mm HYDRANT TEE

PROP. 300x150mm HYDRANT TEE

PROP. 45° VERTICAL BENDS

PROP. 45° VERTICAL BENDS

PROP. SAN. MH. #SAC01028
OPSD 701.010 (1200mmø)
STA. 0+433.96
T/G ELEV. 221.303
N. INV. 219.398
S. INV. 219.402
W. INV. 219.687

PROP. SAN. MH. #SAC01029
OPSD 701.010 (1200mmø)
STA. 0+462.96
T/G ELEV. 221.091
N. INV. 219.489

PROP. 29.0m – 300mmø PVC DR35 SAN. SEWER @ 0.30%

MAINTAIN A MIN. 0.5m VERTICAL CLEAR SEPARATION BETWEEN SEWERS & WATERMAIN (TYPICAL)

NOTE:
SANITARY SEWER FROM MH. SAC01026 TO MH. SAC01027 TO BE INSTALLED WITH EXTRA DEPTH BEDDING (0.3m BELOW INV.)

NOTE:
SANITARY SEWER FROM MH. SAC01027 TO MH. SAC01028 TO BE INSTALLED WITH EXTRA DEPTH BEDDING (0.3m BELOW INV.)

NOTE:
WATERMAIN TO BE INSTALLED WITH EXTRA DEPTH BEDDING FROM STA. 0+310 TO 0+440.

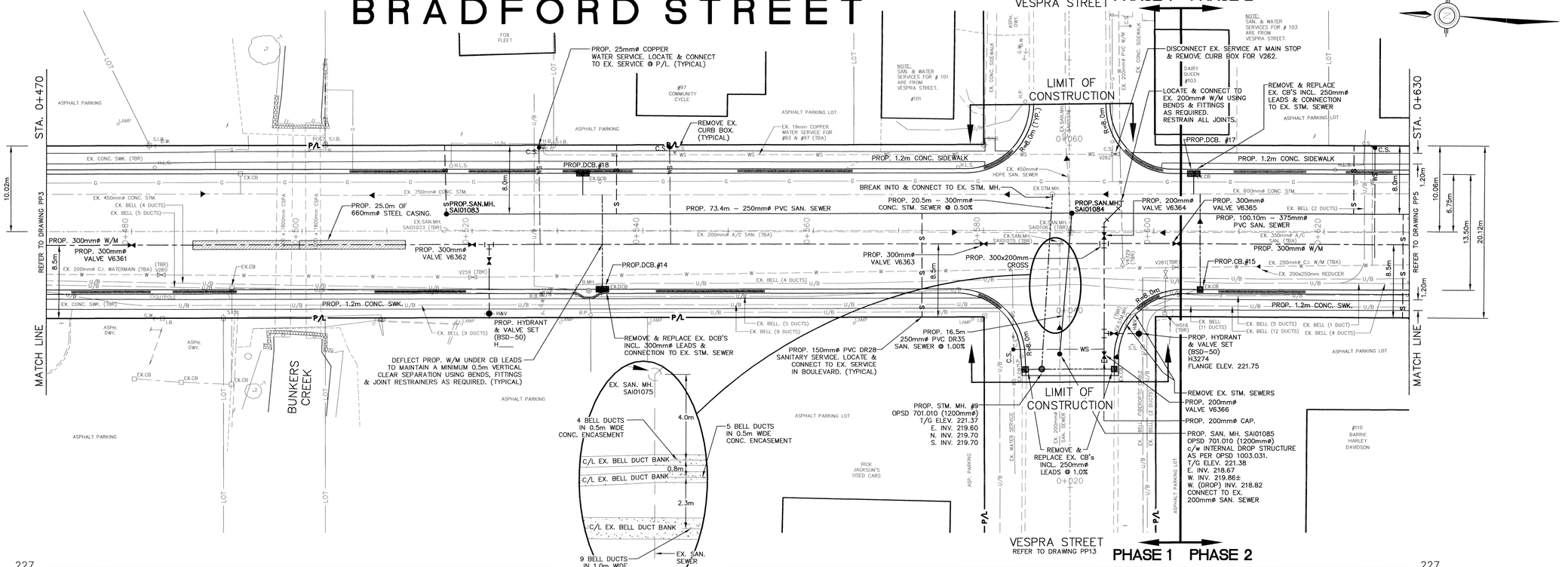
RESTRAIN ALL WATERMAIN JOINTS FROM STA. 0+320 TO 0+360 (MIN.)

RESTRAIN ALL WATERMAIN JOINTS FROM STA. 0+420 TO 0+447 (MIN.)

RESTRAIN ALL WATERMAIN JOINTS FROM STA. 0+460 TO 0+540 (MIN.)

| | | |

BRADFORD STREET



LEGEND

(TBR) TO BE REMOVED

(TBA) TO BE ABANDONED

—S—S— PROP. SANITARY SERVICE – 150mmø PVC DR28 (UNLESS OTHERWISE NOTED)

—WS—C.S. PROP. WATER SERVICE CONNECTION– 25mmø (UNLESS OTHERWISE NOTED)

BENCH MARK: ELEV. 226.893 – MONUMENT #V010865465. BARRIE ARENA ON THE SOUTH SIDE OF DUNLOP ST. TABLET SET HORIZONTALLY 101.2m SOUTHEAST OF THE CENTRELINE OF DUNLOP ST. WEST IN THE SOUTHWEST FACE OF CONCRETE FOUNDATION 5.49m NORTHWEST OF THE SOUTHWEST BUILDING CORNER.

BEARING NOTE: BEARINGS HEREIN ARE GRID BEARINGS AND ARE DERIVED FROM MNR CONTROL MONUMENTS 031970012 (N4914010.674 E604031.898) & MONUMENT 031910022 (N4914136.772 E604481.967) AND ARE REFERRED TO THE CENTRAL MERIDIAN (81 DEGREES OF LONGITUDE) IN ZONE 17 AND ARE BASED ON NAD27 (76 ADJUSTMENT).
DISTANCE NOTE: DISTANCES SHOWN HEREON ARE GROUND LEVEL DISTANCES AND CAN BE USED TO COMPUTE GRID CO-ORDINATES BY MULTIPLYING BY A COMBIMED SCALE FACTOR OF 0.9996995.

NO.	REVISIONS	DATE	APPROVED

CITY OF BARRIE
APPROVED
DATE. May 27/03.
DIRECTOR OF ENGINEERING

LICENSED PROFESSIONAL ENGINEER
L.H. BORSDORFF
MAY 27/03
PROVINCE OF ONTARIO

BRADFORD STREET RECONSTRUCTION

BRADFORD STREET
STA. 0+470 TO 0+630

CITY OF BARRIE INCORPORATED

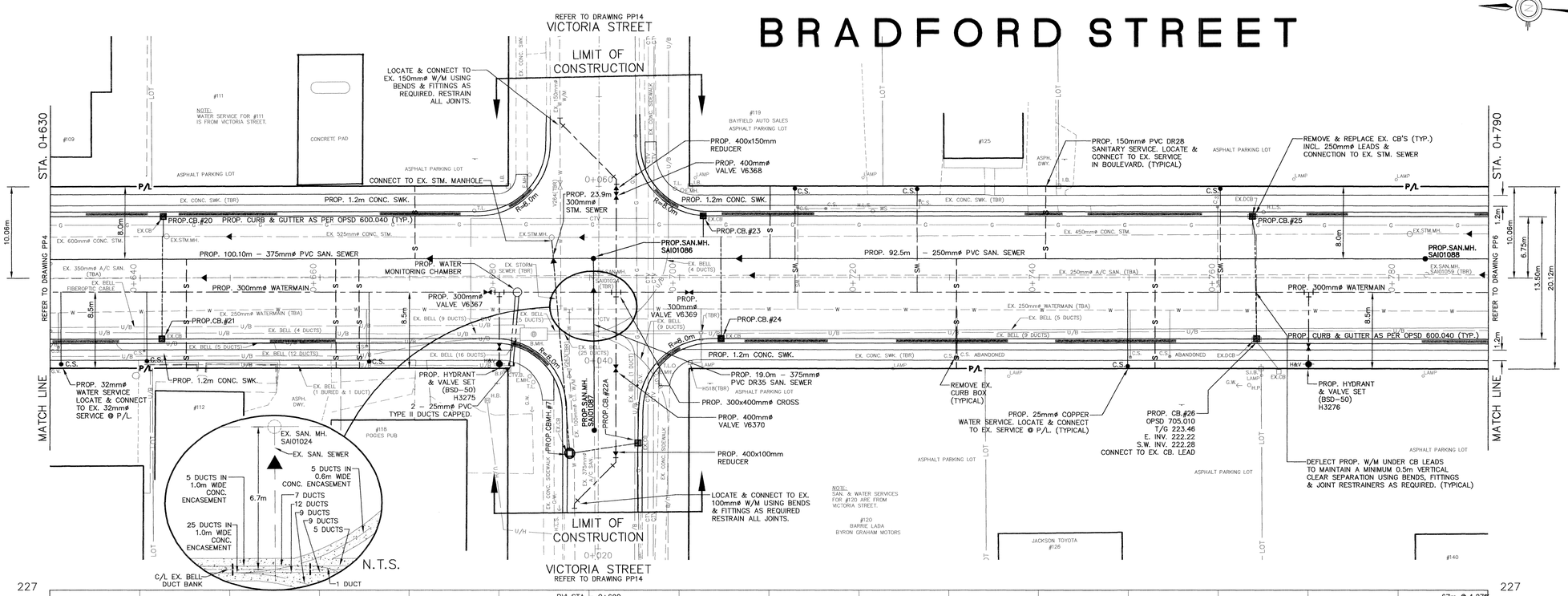
CITY of BARRIE
ENGINEERING DEPARTMENT

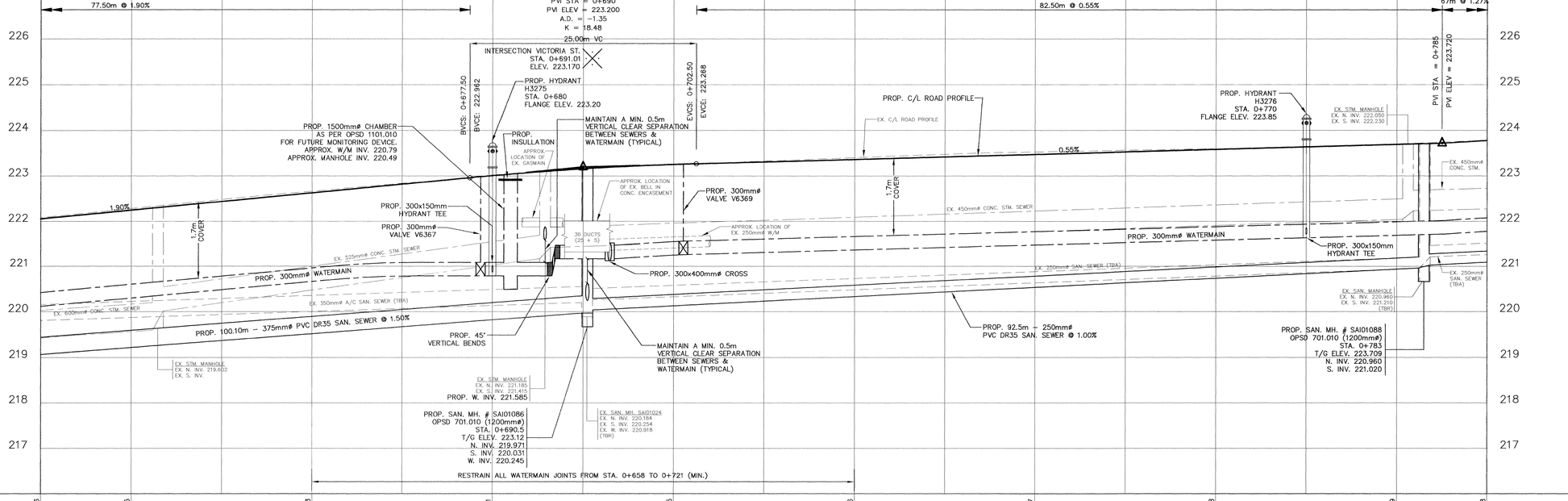
SCALE HOR.	1:250	VERT.	1:50	DRAWING NO.	2003-02
DESIGN	R.M.	DRAWN	J.D.C.	SHEET NO.	PP4
REVIEWED	R.W.M.	DATE	03.01.08		

Plotted by: JCHAPMAN on May 21, 2003 at 6:13pm
File: V:\LDDProjects\2022nd\dwg\BRAD-GP.dwg Layout: PP4

2003–002–007

BRADFORD STREET





227 227

LEGEND

(TBR)	TO BE REMOVED
(TBA)	TO BE ABANDONED
—S— —S— —S—	PROP. SANITARY SERVICE – 150mmø PVC DR28 (UNLESS OTHERWISE NOTED)
— — — — — WS —●C.S.	PROP. WATER SERVICE CONNECTION– 25mmø (UNLESS OTHERWISE NOTED)

BENCH MARK: ELEV. 226.893 – MONUMENT #V010865465.
BARRIE ARENA ON THE SOUTH SIDE OF DUNLOP ST. TABLET SET HORIZONTALLY 101.2m SOUTHEAST OF THE CENTRELINE OF DUNLOP ST. WEST IN THE SOUTHWEST FACE OF CONCRETE FOUNDATION 5.49m NORTHWEST OF THE SOUTHWEST BUILDING CORNER.

BEARING NOTE:
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DISTANCE NOTE:
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NO.	REVISIONS	DATE	APPROVED

CITY OF BARRIE **APPROVED**
DATE: May 23/07
R.W.M. Williams P.Eng
DIRECTOR OF ENGINEERING

LICENSED PROFESSIONAL ENGINEER L.H. BORGDORFF 90012283 PROVINCE OF ONTARIO

BRADFORD STREET RECONSTRUCTION

BRADFORD STREET
STA. 0+630 TO 0+790

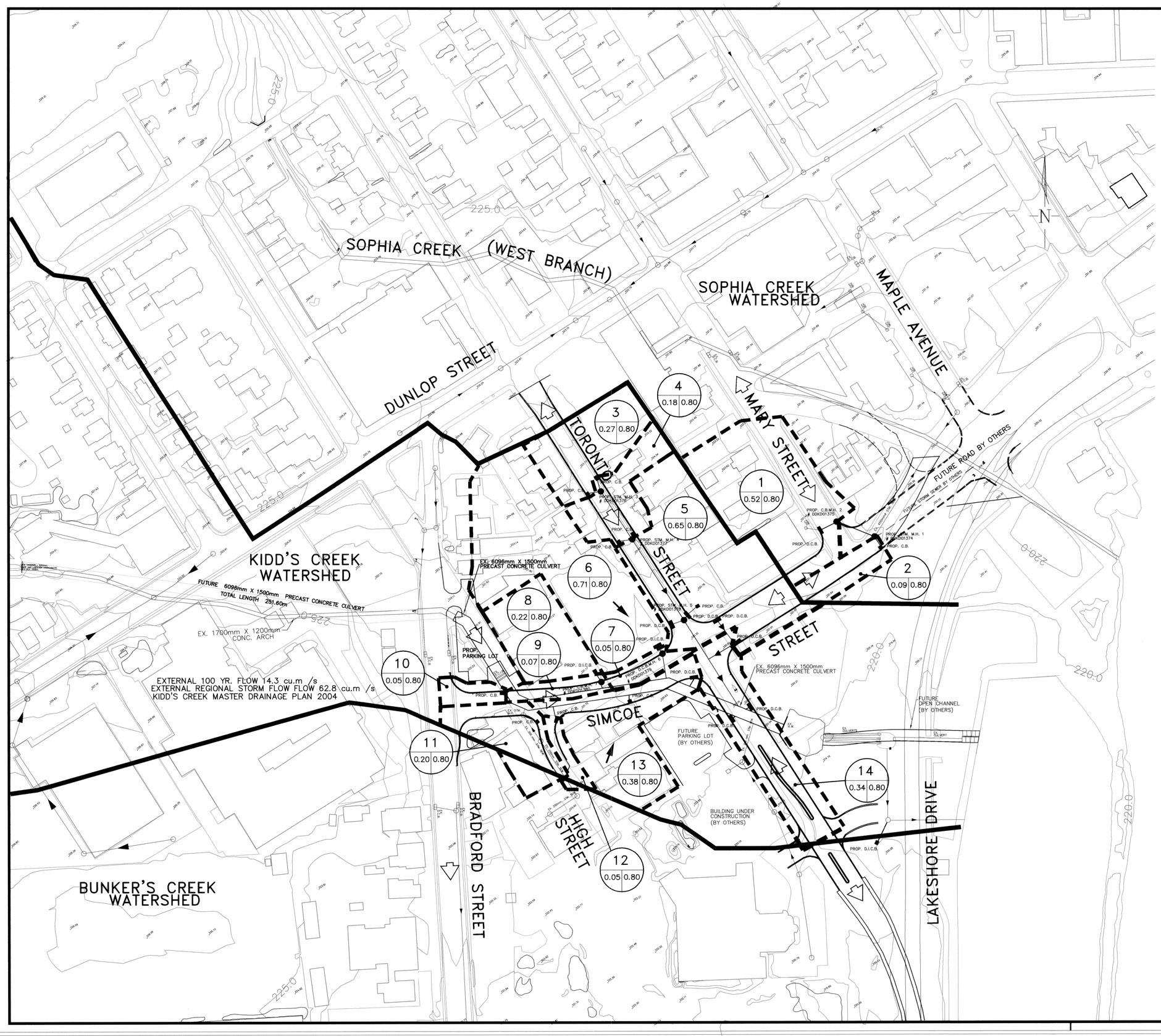
CITY OF BARRIE INCORPORATED 1959

CITY of BARRIE
ENGINEERING DEPARTMENT

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DESIGN	R.M.	DRAWN	J.D.C.	SHEET NO.	PP5
REVIEWED	R.W.M.	DATE	03.01.08		

Plotted by: JOHNMAN on May 22, 2003 at 11:20am
File: K:\Jobs\Projects\2002\2709\dwg\BR40-SP5.dwg Layout: PP5

2003–002–008



STORM LEGEND

- DRAINAGE BOUNDARY
- SUB-CATCHMENT BOUNDARY
- MINOR SYSTEM FLOW
- MAJOR SYSTEM FLOW
- 1 / AREA (ha) 2.45 | 0.70 / RUNOFF COEFFICIENT — SUBCATCHMENT
- 2 — 375mmø — 3 — PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN
- FUTURE STORM SEWER (BY OTHERS)
- EXISTING STORM MANHOLE
- EXISTING CATCH BASIN
- EXISTING STORM SEWER

NO.	REVISIONS	DATE	APPROVED

CITY OF BARRIE
APPROVED
DATE. . . . . .
. . . . . .
DIRECTOR OF ENGINEERING

LICENSED PROFESSIONAL ENGINEER
L.H. BORGDORFF
PROVINCE OF ONTARIO

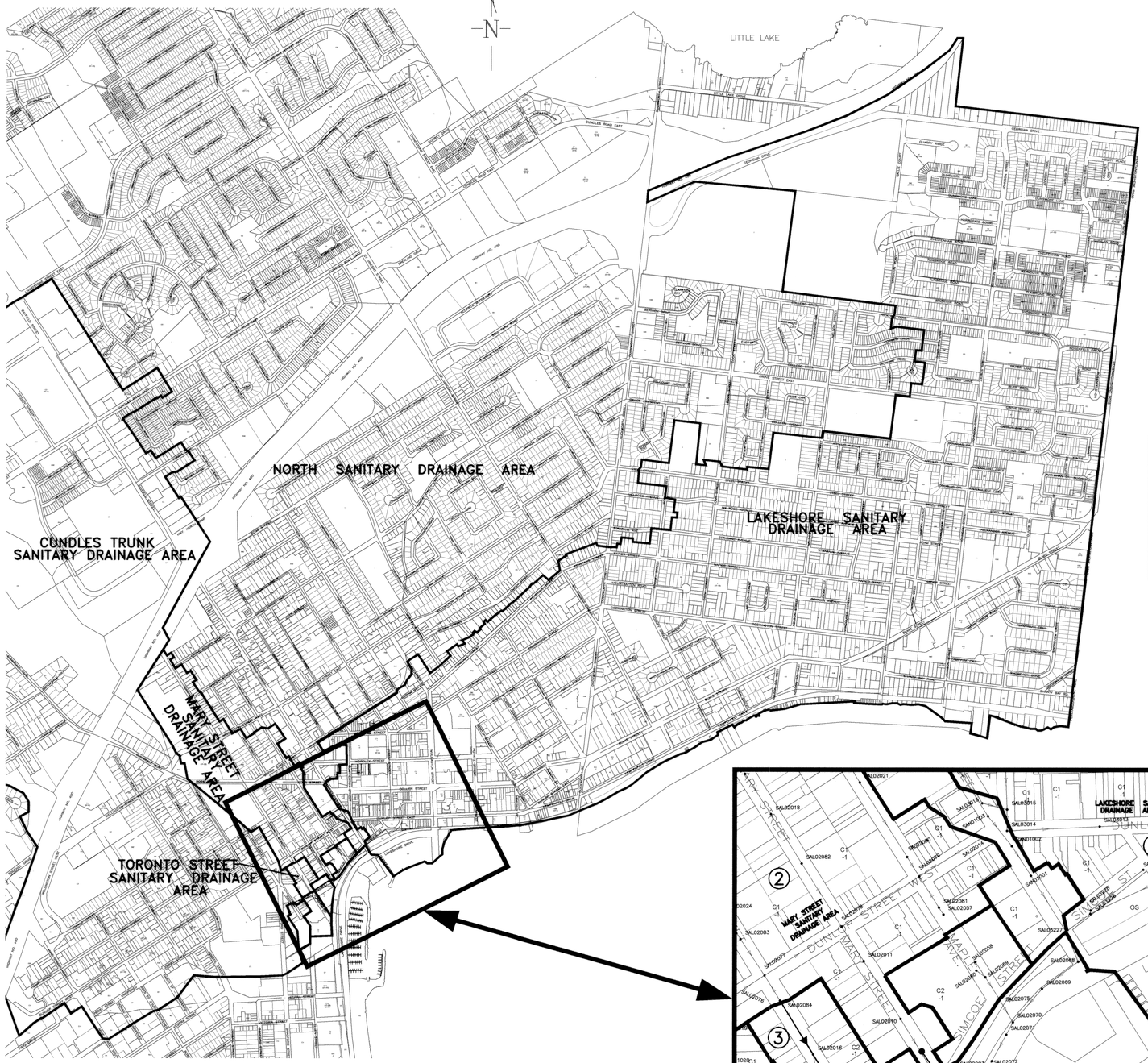
SIMCOE STREET RECONSTRUCTION
BRADFORD ST. TO MARY ST.

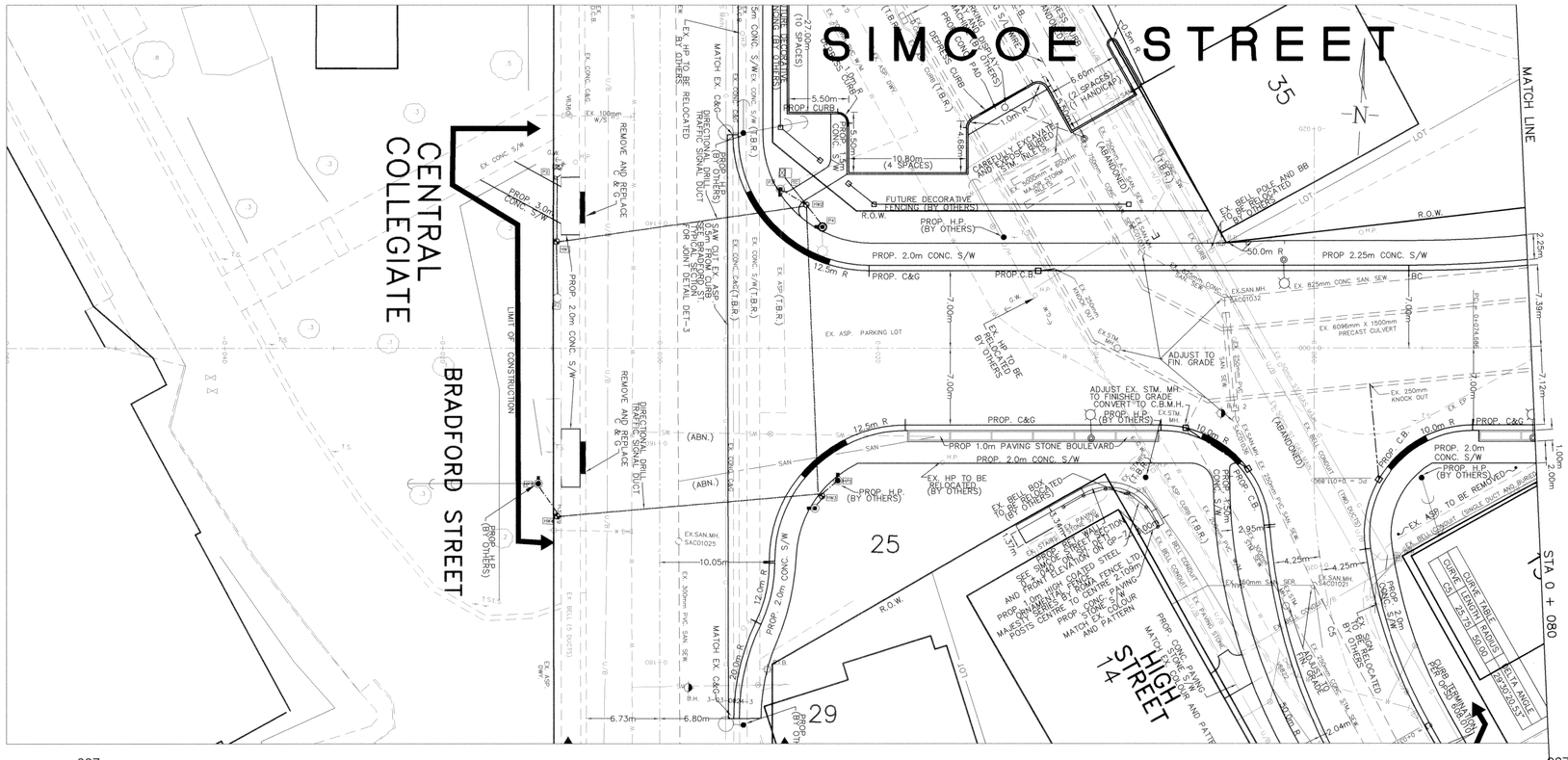
STORM DRAINAGE PLAN

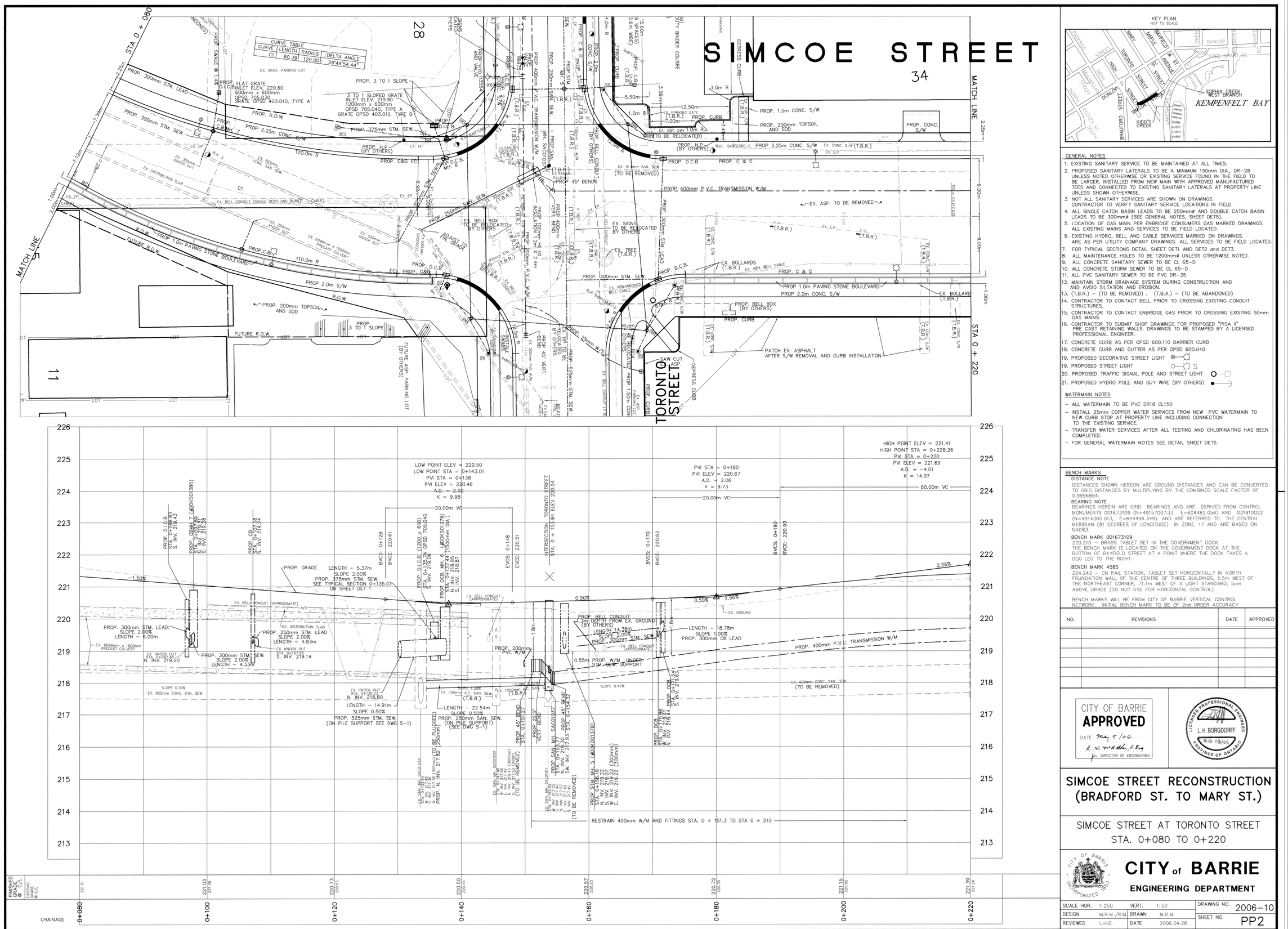
CITY of BARRIE
ENGINEERING DEPARTMENT

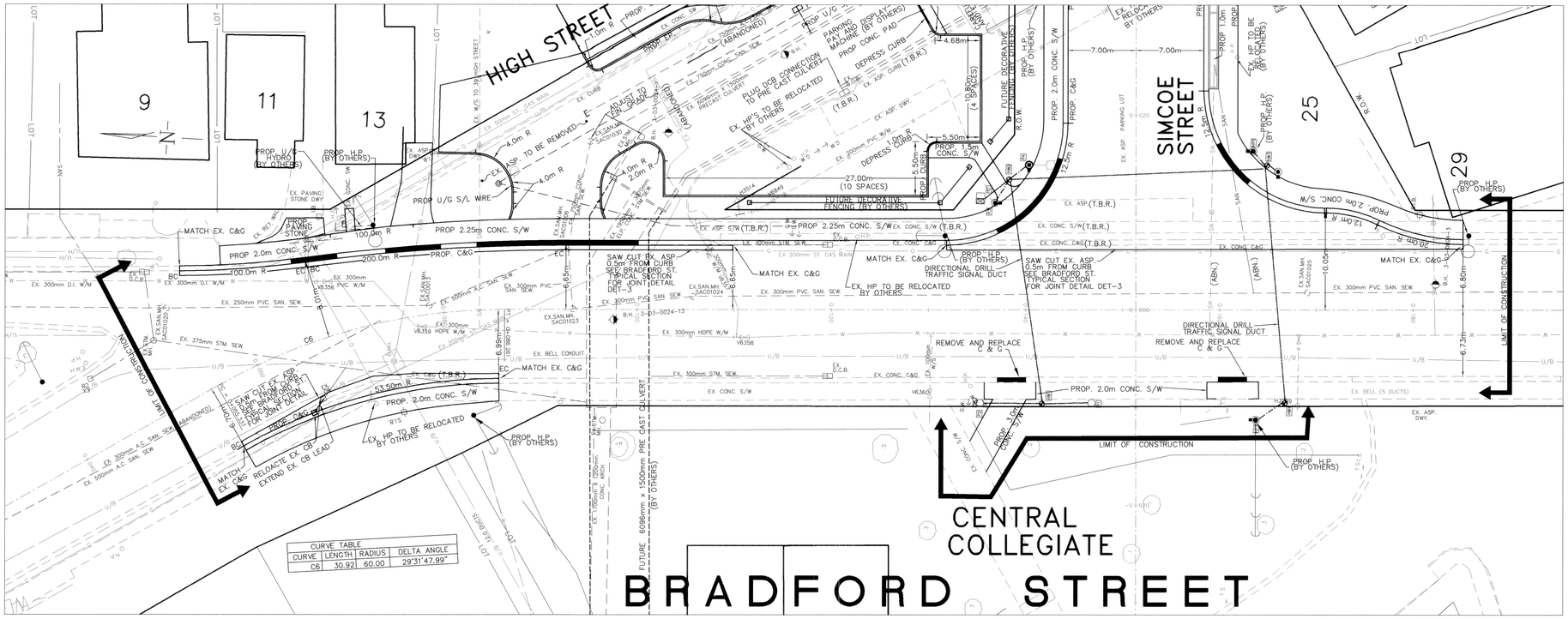
SCALE HOR.	1:1000	VERT.	-----	DRAWING NO.	2006-10
DESIGN	M.M. R.M.	DRAWN	M.M. R.M.	SHEET NO.	STM1
REVIEWED	L.H.B.	DATE	2006.04.28		

2006-010-002

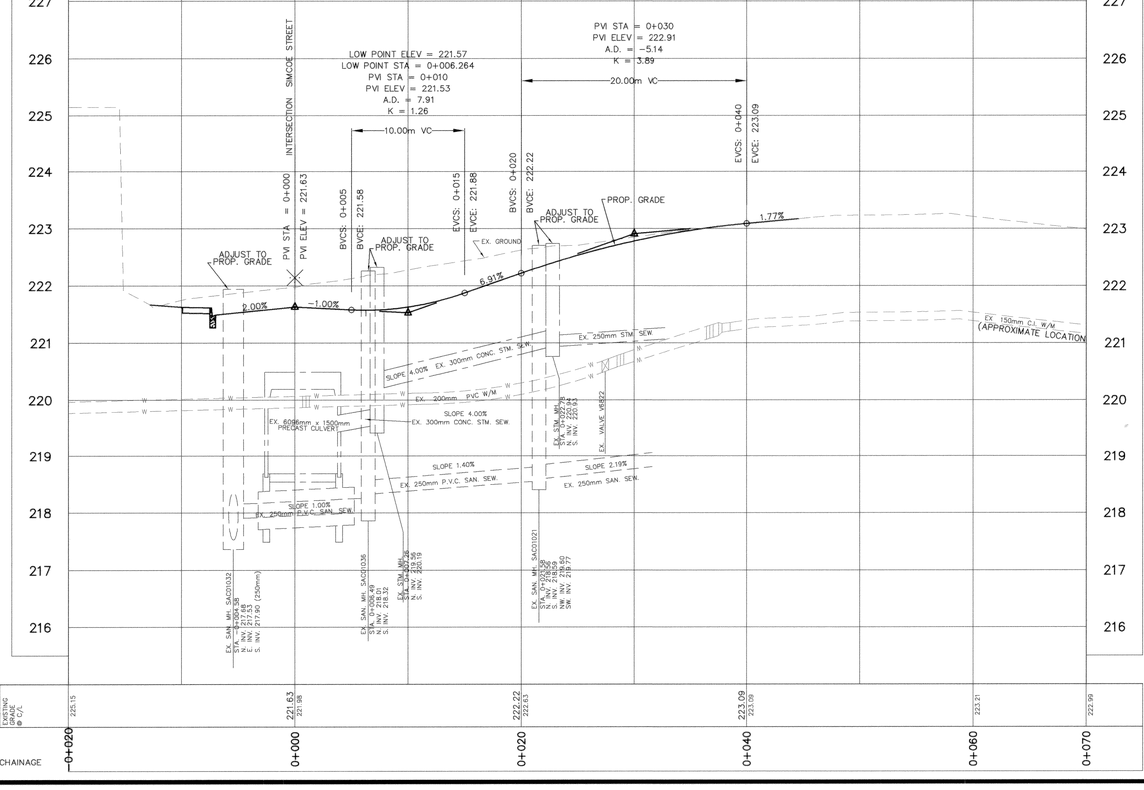

N
LITTLE LAKE
NORTH SANITARY DRAINAGE AREA
LAKESHORE SANITARY DRAINAGE AREA
CUNDLES TRUNK SANITARY DRAINAGE AREA
MARY STREET SANITARY DRAINAGE AREA
TORONTO STREET SANITARY DRAINAGE AREA
CUNDLES ROAD EAST
GEORGIAN DRIVE
HIGHWAY 400 NORTH
HIGHWAY 400
BRYNE DRIVE
QUARRY RIDGE
CHESTNUT DRIVE
SPRUCE STREET
MAPLE AVENUE
BLAKE STREET
BRADFORD STREET
DUNLOP STREET WEST
DUNLOP STREET EAST
MARY STREET
SIMCOE STREET
TORONTO STREET
HIGHWAY 400
LAKESHORE DRIVE
OS
PROP.SAN. MH. SAC01030
PROP.SAN. MH. SAC01032
PROP.SAN. MH. SAC01038
PROP.SAN. MH. SAC01037
PROP.SAN. MH. SAC02097
PROP.SAN. MH. SAC02096
PROP.SAN. MH. SAC02098
SAC01035
SAC01036
SAC01039
SAC01040
SAC01041
SAC01042
SAC01043
SAC01044
SAC01045
SAC01046
SAC01047
SAC01048
SAC01049
SAC01050
SAC01051
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SAC01071
SAC01072
SAC01073
SAC01074
SAC01075
SAC01076
SAC01077
SAC01078


SIMCOE STREET
CENTRAL COLLEGIATE
BRADFORD STREET
LIMIT OF CONSTRUCTION
MATCH LINE
STA 0 + 080
HIGH STREET
35
25
29
14
N
REMOVE AND REPLACE C & G
SAW CUT EX. ASP. 0.5m FROM CURB FOR FULL DEPTH REMOVAL FOR JOINT DETAIL DET-3
DIRECTIONAL DRILL TRAFFIC SIGNAL DUCT
PROP. 2.0m CONC. S/W
PROP. 2.25m CONC. S/W
PROP. 1.0m PAVING STONE BOULEVARD
PROP. C&G
PROP. C.B.
EX. HP TO BE RELOCATED BY OTHERS
PROP. H.P. (BY OTHERS)
EX. BELL BOX TO BE RELOCATED BY OTHERS
FUTURE DECORATIVE FENCING (BY OTHERS)
ADJUST TO FIN. GRADE
ADJUST EX. STM. MH. TO FINISHED GRADE CONVERT TO C.B.M.H.
EX. 6096mm x 1500mm PRECAST CULVERT
EX. 825mm CONC SAN. SEW
EX. 250mm KNOCK OUT
EX. 50mm GAS MAIN (ABANDONED)
EX. BELL CONDUIT (SINGLE DUCT AND BURIED)
EX. ASP. TO BE REMOVED
CURB TABLE
CURB NO. | LENGTH | RADIUS
C1 | 25.75 | 50.00
C2 | 24.30 | 48.53
DELTA ANGLE
CONCRETE PAVING STONE COLOUR AND PATTERN TO MATCH EX. PAVING
SEE DETAIL SHEET DET4 FOR STREET SECTION
PROP. 1.0m HIGH TUBULAR PICKET FENCE 2109mm FROM ELEVATION OF SIDEWALK AND 1.0m FROM PROP. ROW
PROP. 1.0m HIGH PAINTED STEEL LTD. ORNAMENTAL FENCE 2109mm MAJESTIC SERIES BY ROMA POSTS CENTRE TO CENTRE 2109mm
PROP. STONE PAVING MATCH STONE COLOUR AND PATTERN
PROP. CONCRETE PAVING MATCH CONC. S/W COLOUR AND PATTERN
EX. SAN. MH. SA001031
EX. STM. MH. SA001032
EX. 300mm PVC SAN. SEW.
EX. 200mm PVC W/M
EX. ASP. PARKING LOT
EX. CONC. C&G
EX. CONC. S/W
EX. ASP. (T.B.R.)
EX. CURB (T.B.R.)
EX. BELL (4) DUCTS
EX. BELL CONDUIT
EX. PAVING STONE
EX. CONC. PAVING
EX. ASP. CURB (T.B.R.)
EX. CONC. CURB (T.B.R.)
EX. CONC. S/W (T.B.R.)
EX. ASP. S/W
EX. ASP. CURB
EX. CONC. C&G
EX. CONC. S/W (T.B.R.)
EX. ASP. S/W
EX. ASP. CURB (T.B.R.)
EX. CONC. CURB (T.B.R.)
EX. CONC. S/W (T.B.R.)
EX. ASP. (T.B.R.)
EX. CONC. S/W
EX. ASP. DWY.
EX. CONC. C&G
EX. 100mm W/S
EX. HP TO BE RELOCATED
EX. BELL BOX
EX. BELL (SINGLE DUCT AND BURIED)
EX. BELL (2 DUCTS)
EX. BELL (4 DUCTS)
EX. BELL CONDUIT (ABANDONED)
EX. 750mm CSP SEW. (ABANDONED)
EX. 600mm STORM SEWER
EX. 375mm STORM SEWER
EX. 250mm PVC SAN. SEW.
EX. 200mm PVC SAN. SEW.
EX. 200mm PVC W/M
EX. 150mm W/M
EX. 100mm W/S
EX. 50mm GAS MAIN
EX. 50mm GAS MAIN (ABANDONED)
EX. 6096mm x 1500mm PRECAST CULVERT
EX. SAN. MH. SA001025
EX. SAN. MH. SA001021
EX. STM. MH. SA001032
EX. STM. MH. SA001031
EX. SAN. MH. SA001032
EX. SAN. MH. SA001033
EX. SAN. MH. SA001034
EX. SAN. MH. SA001035
EX. SAN. MH. SA001036
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EX. SAN. MH. SA001039
EX. SAN. MH. SA001040
EX. SAN. MH.

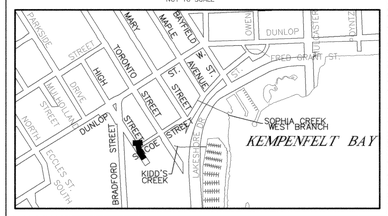

SIMCOE STREET
TORONTO STREET
MATCH LINE
STA 0 + 080
STA 0 + 220
CURVE TABLE
CURVE | LENGTH | RADIUS | DELTA ANGLE
C1 | 60.39 | 120.00 | 28°49'54.44"
PROP. 300mm STM. LEAD
PROP. 300mm STM. SEW.
PROP. 2.25m CONC. S/W
PROP. R.O.W.
PROP. FLAT GRATE INLET ELEV. 220.60 600mm x 600mm OPSD 705.030 GRATE OPSD 403.010, TYPE A
3 TO 1 SLOPED GRATE INLET ELEV. 219.90 1200mm x 600mm OPSD 705.040, TYPE A GRATE OPSD 403.010, TYPE B
PROP. 3 TO 1 SLOPE
PROP. 375mm STM. SEW.
PROP. H.P. (BY OTHERS)
PROP. C&G
EX. ASP. TO BE RELOCATED
PROP. 1.5m CONC. S/W
PROP. 200mm TOPSOIL AND SOD
PROP. CONC. S/W
PROP. 2.25m CONC. S/W (T.B.R.)
PROP. C & G
EX. 91mm SAN. SEW. (TO BE REMOVED)
PROP. 45° BENDS
PROP. 400mm P.V.C. TRANSMISSION W/M
EX. ASP. TO BE REMOVED
EX. BELL CONDUIT (SINGLE DUCT AND BURIED CABLE)
EX. BELL BOX TO BE RELOCATED BY OTHERS
EX. SIGNS TO BE RELOCATED BY OTHERS
EX. TREE (T.B.R.)
PROP. 300mm STM. LEAD
EX. BOLLARDS (T.B.R.)
EX. ABN. BELL CABLE
PROP. 1.0m PAVING STONE BOULEVARD
PROP 2.0m CONC. S/W
EX. BOLLARD (T.B.R.)
PROP. BELL BOX (BY OTHERS)
PROP. CURB
PROP. 200mm TOPSOIL AND SOD
PROP. 3 TO 1 SLOPE
FUTURE R.O.W.
FUTURE ASP. PARKING LOT (BY OTHERS)
PATCH EX. ASPHALT AFTER S/W REMOVAL AND CURB INSTALLATION
SAW CUT ASP.
DEPRESS CURB
PROP. 525mm STM. SEW.
PROP. 250mm SAN. SEW.
PROP. 400mm P.V.C. TRANSMISSION W/M
PROP. 2.0m S/W
PROP. 1.0m PAVING STONE BOULEVARD
EX. 8096mm x 1500mm PRECAST CULVERT
EX. 600mm x 1600mm PRECAST CULVERT
EX. 825mm CONC. SAN. SEW.
EX. DISTRIBUTION SLAB
EX. 300mm KNOCK OUT
EX. 250mm KNOCK OUT
EX. 525mm KNOCK OUT
EX. 375mm KNOCK OUT
EX. 450mm KNOCK OUT
EX. 300mm KNOCK OUT
EX. 525mm STM. SEW.
EX. 1050mm STM. SEW.
EX. 750mm A.C. SAN. SEW.
EX. 200mm PVC W/M
EX. 150mm CONC. S/W
EX. 1.5m CONC. S/W
EX. GRAV. PARKING LOT
EX. ABANDONED BELL CABLE
EX. BELL CONDUIT (T.B.R.)
EX. BELL CONDUIT (APPROXIMATE)
EX. GROUND
PROP. 1.0m R
PROP. 3.0m R
PROP. 4.0m R
PROP. 5.0m R
PROP. 12.0m R
PROP. 120.0m R
PROP. 110.0m R
PROP. 1.5m CONC. S/W
PROP. 2.25m CONC. S/W
PROP. 2.0m S/W
PROP. 1.0m PAVING STONE BOULEVARD
PROP. 1.5m CONC. S/W
PROP. 2.0m S/W
PROP. 1.0m PAVING STONE BOULEVARD
PROP. 2.25m CONC. S/W


HIGH STREET
SIMCOE STREET
BRADFORD STREET
CENTRAL COLLEGIATE
9
11
13
25
29
MATCH EX. C&G
PROP 2.25m CONC. S/W
PROP 2.0m CONC. S/W
PROP 1.5m CONC. S/W
PROP 2.0m CONC. C&G
PROP U/G S/L WIRE
PROP U/G HYDRO (BY OTHERS)
PROP. H.P (BY OTHERS)
EX. ASP. TO BE REMOVED
EX. ASP. DWY.
EX. PAVING STONE DWY.
EX. REC. W/M
EX. 300mm D.I. W/M
EX. 300mm PVC. SAN. SEW.
EX. 375mm STM. SEW.
EX. 300mm A.C. SAN. SEW.
EX. 300mm HDPE W/M
EX. BELL CONDUIT
EX. BELL (5 DUCTS)
EX. CONC. C&G
EX. CONC. S/W
EX. ASP. (T.B.R.)
EX. CONC. C&G(T.B.R.)
EX. CONC. S/W(T.B.R.)
EX. HP TO BE RELOCATED BY OTHERS
PROP. H.P (BY OTHERS)
PROP. 2.0m CONC. S/W
PROP. 2.0m CONC. C&G
PROP. 1.0m CONC. S/W
PROP. 2.0m CONC. S/W
PROP. 2.25m CONC. S/W
PROP. 2.0m CONC. S/W
PROP. 1.5m CONC. S/W
PROP. 2.0m CONC. C&G
PROP. 2.0m CONC. S/W
PROP. 2.0m CONC. S/W
PROP. 2.0m CONC. S/W





KEY PLAN
NOT TO SCALE



GENERAL NOTES

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 HEREIN ARE GRID BEARINGS AND ARE DERIVED FROM CONTROL MONUMENTS 001673109 (N=4915700.133, E=604482.056) AND 031910022 (N=4914360.013, E=604496.349), AND ARE REFERRED TO THE CENTRAL MERIDIAN (81 DEGREES OF LONGITUDE) IN ZONE, 17 AND ARE BASED ON NAD83.

BENCH MARK 001673109

220.210 – BRASS TABLET SET IN THE GOVERNMENT DOCK THE BENCH MARK IS LOCATED ON THE GOVERNMENT DOCK AT THE BOTTOM OF BAYFIELD STREET AT A POINT WHERE THE DOCK TAKES A DOG LEG TO THE RIGHT.

BENCH MARK 458S

224.243 – CN RAIL STATION, TABLET SET HORIZONTALLY IN NORTH FOUNDATION WALL OF THE CENTRE OF THREE BUILDINGS, 5.5m WEST OF THE NORTHEAST CORNER, 71.1m WEST OF A LIGHT STANDARD, 5cm ABOVE GRADE (DO NOT USE FOR HORIZONTAL CONTROL).

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 5/06...
R. M. McArthur, P. Eng.
for DIRECTOR OF ENGINEERING

LICENSED PROFESSIONAL ENGINEER
L. H. BORGDORFF
MAY 5/06
PROVINCE OF ONTARIO

SIMCOE STREET RECONSTRUCTION (BRADFORD ST. TO MARY ST.)

HIGH STREET SOUTH OF SIMCOE STREET
STA. -0+020 TO 0+080

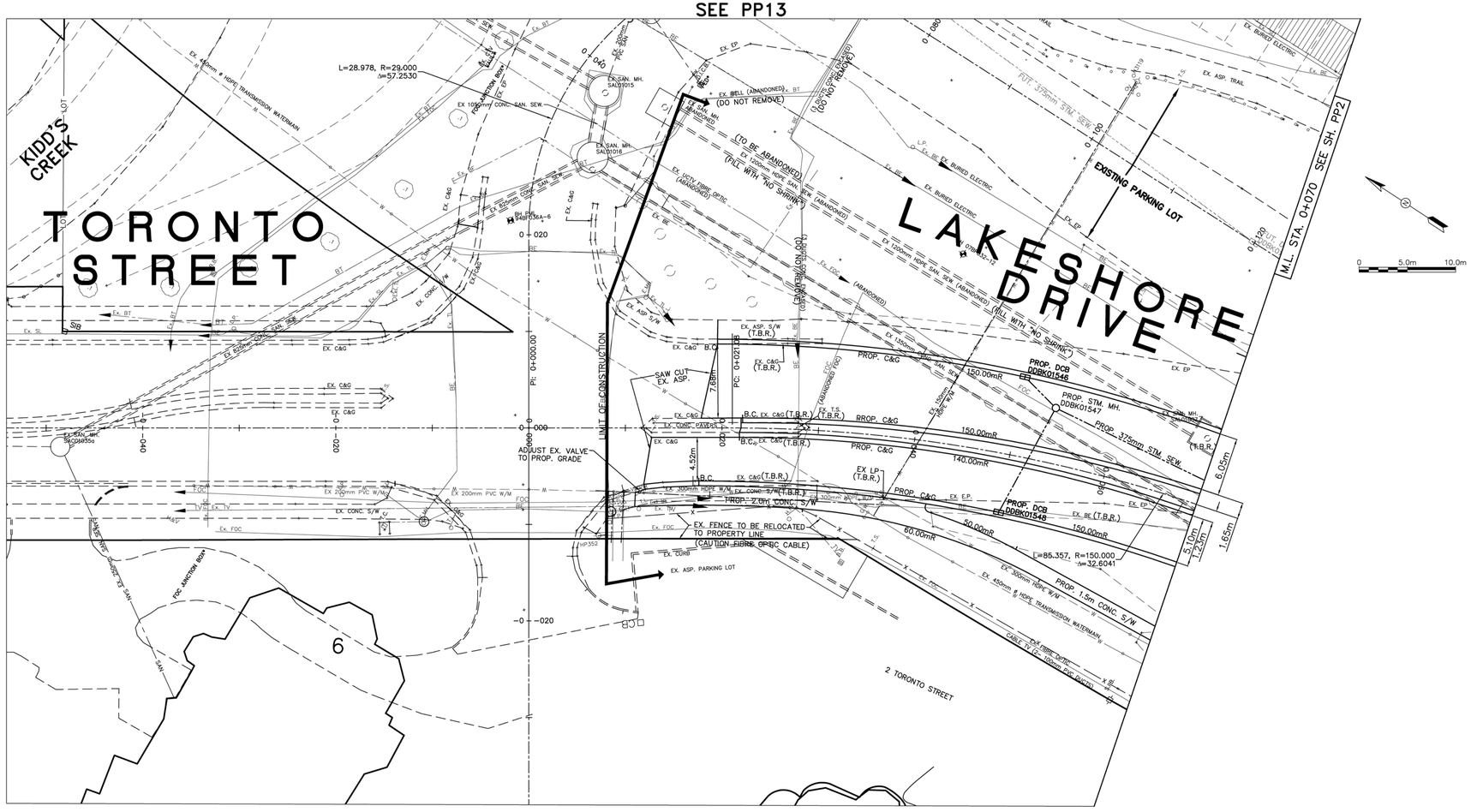
CITY OF BARRIE INCORPORATED 1853

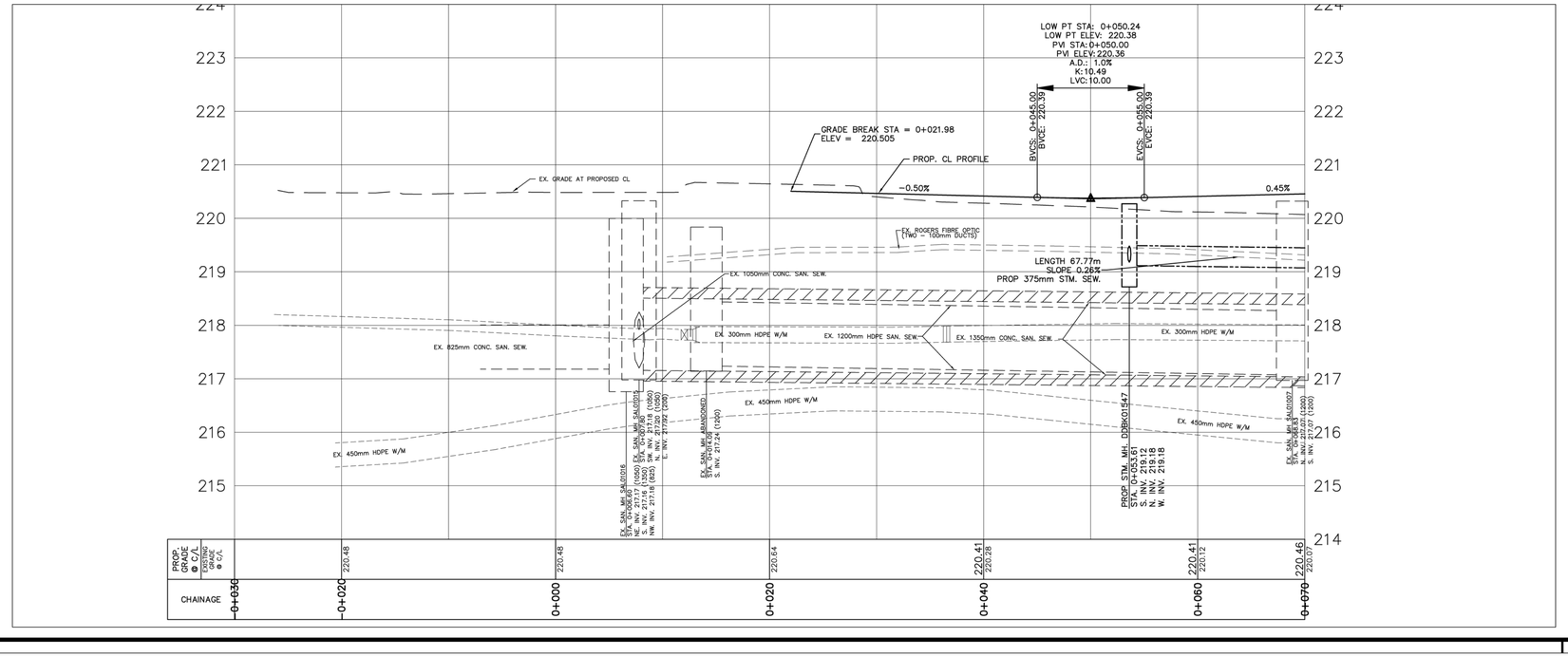
CITY of BARRIE
ENGINEERING DEPARTMENT

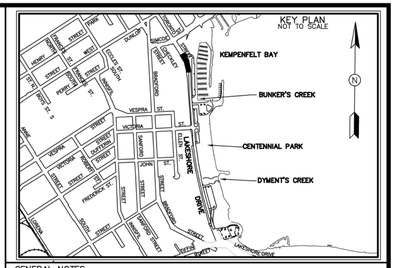
SCALE HOR.	1:250	VERT.	1:50	DRAWING NO.	2006-10
DESIGN	M.R.M. / R.M.	DRAWN	M.R.M.	SHEET NO.	PP10
REVIEWED	L.H.B.	DATE	2006.04.28		

2006-010-013

SEE PP13







GENERAL NOTES

1. WHERE PROPOSED SEWER STUBS TERMINATE AS PART OF CONTRACT 2 , THE SEWER IS TO BE CAPPED WATERTIGHT AND AN ASBUILT 3D COORDINATE OF THE INVERT IS TO BE SUPPLIED TO THE CONTRACT ADMINISTRATOR. MARK LOCATION WILL STEEL T BAR FENCE POST SET FLUSH TO GRADE.
2. EXISTING SANITARY SERVICE TO BE MAINTAINED AT ALL TIMES.
3. ALL SINGLE CATCH BASIN LEADS TO BE 250mmø AND DOUBLE CATCH BASIN LEADS TO BE 300mmø (SEE GENERAL NOTES SHEET DET9).
4. ALL EXISTING UTILITIES TO BE FIELD LOCATED.
5. ALL MAINTENANCE HOLES TO BE 1200mmø UNLESS OTHERWISE NOTED.
6. ALL STORM SEWER TO BE INSULATED.
7. ALL CONCRETE STORM SEWER TO BE CL 65-D
8. ALL PVC SANITARY SEWER TO BE PVC DR-35
9. MAINTAIN STORM DRAINAGE SYSTEM DURING CONSTRUCTION AND AVOID SILTATION AND EROSION.
10. (T.B.R.) – (TO BE REMOVED) ; (T.B.A.) – (TO BE ABANDONED)
11. CONCRETE CURB AS PER OPSD 600.110 BARRIER CURB
12. CONCRETE CURB AND GUTTER AS PER OPSD 600.040
13. CONTRACTOR TO CONFIRM WITH POWERSTREAM AND ROGERS CABLE THAT ALL EX. UTILITIES MARKED AS ABANDONED ARE IN FACT ABANDONED AND NOT STILL LIVE.
14. CONFIRM PAVING STONE PATTERN AND COLOUR WITH CONTRACT ADMINISTRATOR PRIOR TO PLACEMENT.
15. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF ALL TEMPORARY COFFERDAMS.
16. EXISTING ABANDONED 1200mm HDPE SANITARY SEWER TO BE FILLED WITH "NO SHRINK" FLOWABLE FILL. WATER IN THE EXISTING SEWER TO BE PUMPED OUT TO THE SANITARY SEWER DURING THE FILLING OPERATION
17. ALL FUTURE WORK BY OTHERS.
18. EXISTING PRECAST CURB WITHIN LIMITS OF CONSTRUCTION TO BE REUSED BY THE CONTRACTOR TO DELINEATE BIKE TRAILS.
19. ALL STORM AND SANITARY SEWER INCLUDING CATCH BASIN LEADS TO BE SUPPORTED ON PILE AND GRADE BEAM FOUNDATION.
20. ALL MAINTENANCE HOLES, CATCH BASINS AND PERMANENT DITCH INLET CATCH BASINS TO BE SUPPORTED ON PILE AND GRADE BEAM FOUNDATION.

WATERMAIN NOTES

1. ALL 200mm WATER MAIN TO BE IPEX FUSIBLE BRUTE DR 18 PVC INSTALLED AS A CONTINUOUS, MONOLITHIC, FULLY RESTRAINED PVC PIPE.THE 200mm FUSIBLE PVC PIPE MUST BE INSTALLED AS PER THE MANUFACTURERS INSTRUCTIONS BY AN IPEX TRAINED AND LICENSED CONTRACTOR.
2. SEE DRAWING DET 10 FOR GEOGRID WATERMAIN FOUNDATION AND BEDDING DETAIL. THIS DETAIL IS TO BE USED FOR THE 200mm FUSIBLE PVC AND THE 500mm CPP WATERMAIN.
3. ALL FUTURE WATERMAIN BY OTHERS.

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 0.9997054.

BEARING NOTE

BEARINGS HEREIN ARE GRID BEARINGS AND ARE DERIVED FROM CONTROL MONUMENTS 001673109 (N=4915700.133, E=604482.056) AND 03120080001 (N=4914612.840, E=604486.685). AND ARE REFERRED TO THE CENTRAL MERIDIAN (81 DEGREES OF LONGITUDE) IN ZONE, 17 AND ARE BASED ON NAD83.

BENCH MARK 001673109

220.210 – BRASS TABLET SET IN THE GOVERNMENT DOCK
THE BENCH MARK IS LOCATED ON THE GOVERNMENT DOCK AT THE BOTTOM OF BAYFIELD STREET AT A POINT WHERE THE DOCK TAKES A DOG LEG TO THE RIGHT.

BENCH MARK 0011931U485S

224.243 – CN RAIL STATION, TABLET SET HORIZONTALLY IN NORTH FOUNDATION WALL OF THE CENTRE OF THREE BUILDINGS, 5.5m WEST OF THE NORTHEAST CORNER, 71.1m WEST OF A LIGHT STANDARD, 5cm ABOVE GRADE (DO NOT USE FOR HORIZONTAL CONTROL).

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

NO.	REVISIONS	DATE	APPROVED
2	ISSUED FOR TENDER	MAY 2014	L.H.B.
1	ISSUED FOR M.O.E. ECA	NOV. 2013	L.H.B.

CITY OF BARRIE
APPROVED
DATE. April 28, 2014
DIRECTOR OF ENGINEERING

LICENSED PROFESSIONAL ENGINEER
L. H. BORGDORFF
2014/04/28
PROVINCE OF ONTARIO

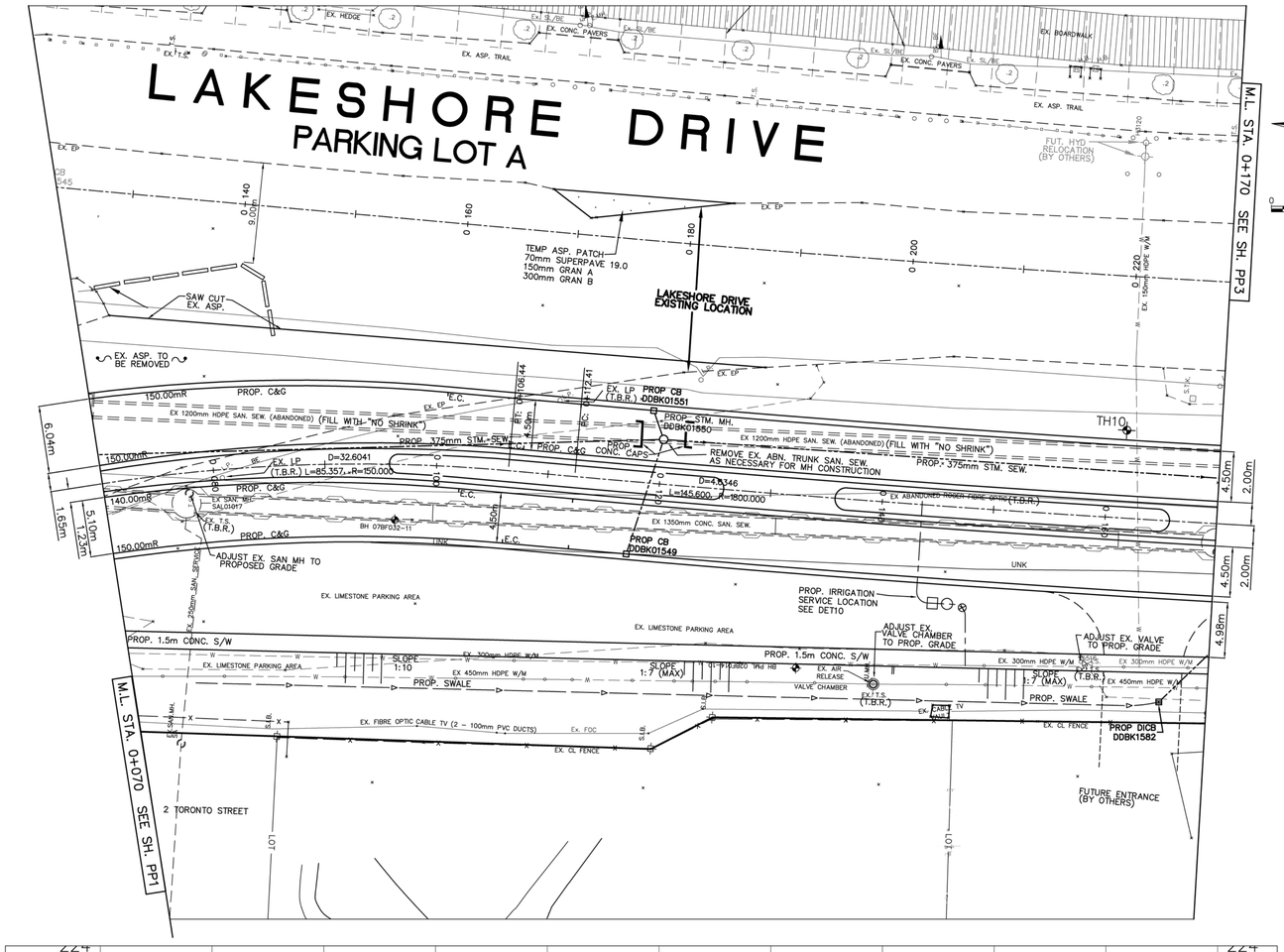
LAKESHORE DRIVE RECONSTRUCTION
TORONTO STREET TO TIFFIN STREET

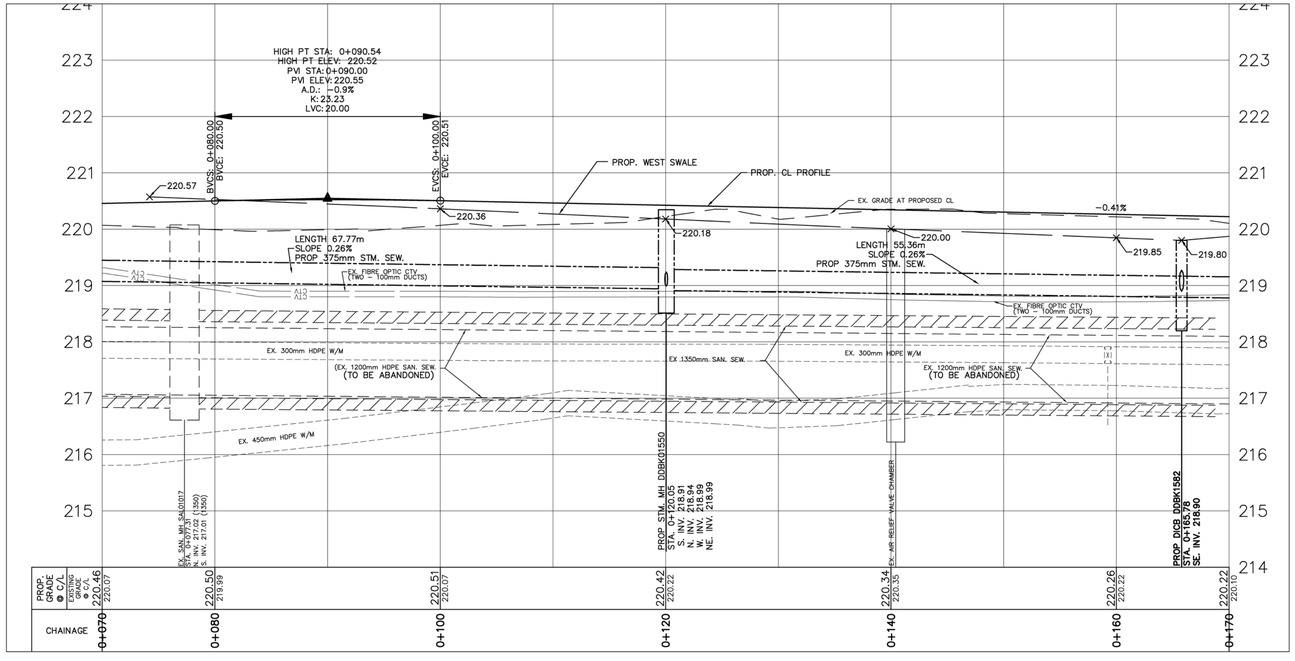
LAKESHORE DRIVE AT TORONTO STREET
(STA. 0 + 000 TO STA. 0+ 070)

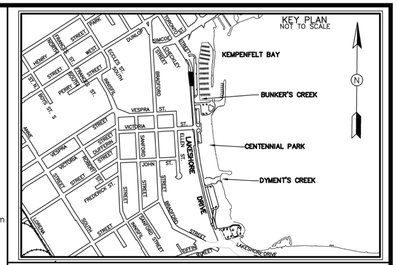
The City of BARRIE
ENGINEERING DEPARTMENT

SCALE HOR.	1:250	VERT.	1:50	DRAWING NO.	2014–001T
DESIGN	M.R.M.	DRAWN	M.R.M.	SHEET NO.	PP1
REVIEWED	L.H.B.	DATE	APR. 2014		

2014-001-012







GENERAL NOTES

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5. ALL MAINTENANCE HOLES TO BE 1200mmø UNLESS OTHERWISE NOTED.
6. ALL STORM SEWER TO BE INSULATED.
7. ALL CONCRETE STORM SEWER TO BE CL 65–D
8. ALL PVC SANITARY SEWER TO BE PVC DR–35
9. MAINTAIN STORM DRAINAGE SYSTEM DURING CONSTRUCTION AND AVOID SILTATION AND EROSION.
10. (T.B.R.) – (TO BE REMOVED) ; (T.B.A.) – (TO BE ABANDONED)
11. CONCRETE CURB AS PER OPSD 600.110 BARRIER CURB
12. CONCRETE CURB AND GUTTER AS PER OPSD 600.040
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14. CONFIRM PAVING STONE PATTERN AND COLOUR WITH CONTRACT ADMINISTRATOR PRIOR TO PLACEMENT.
15. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF ALL TEMPORARY COFFERDAMS.
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17. ALL FUTURE WORK BY OTHERS.
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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 0.9997054

BEARING NOTE

BEARINGS HEREIN ARE GRID BEARINGS AND ARE DERIVED FROM CONTROL MONUMENTS 001673109 (N=4915700.133, E=604482.056) AND 03120080001 (N=4914612.840, E=604486.685) AND ARE REFERRED TO THE CENTRAL MERIDIAN (81 DEGREES OF LONGITUDE) IN ZONE, 17 AND ARE BASED ON NAD83.

BENCH MARK 001673109

220.210 – BRASS TABLET SET IN THE GOVERNMENT DOCK
THE BENCH MARK IS LOCATED ON THE GOVERNMENT DOCK AT THE BOTTOM OF BAYFIELD STREET AT A POINT WHERE THE DOCK TAKES A DOG LEG TO THE RIGHT.

BENCH MARK 001931U485S

224.243 – CN RAIL STATION, TABLET SET HORIZONTALLY IN NORTH FOUNDATION WALL OF THE CENTRE OF THREE BUILDINGS, 5.5m WEST OF THE NORTHEAST CORNER, 71.1m WEST OF A LIGHT STANDARD, 5cm ABOVE GRADE (DO NOT USE FOR HORIZONTAL CONTROL).

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

NO.	REVISIONS	DATE	APPROVED
2	ISSUED FOR TENDER	MAY 2014	L.H.B.
1	ISSUED FOR M.O.E. ECA	NOV. 2013	L.H.B.

CITY OF BARRIE
APPROVED
DATE. April 28, 2014
DIRECTOR OF ENGINEERING

LICENSED PROFESSIONAL ENGINEER
L.H. BORGDORFF
2014/04/28
PROVINCE OF ONTARIO

LAKESHORE DRIVE RECONSTRUCTION

TORONTO STREET TO TIFFIN STREET

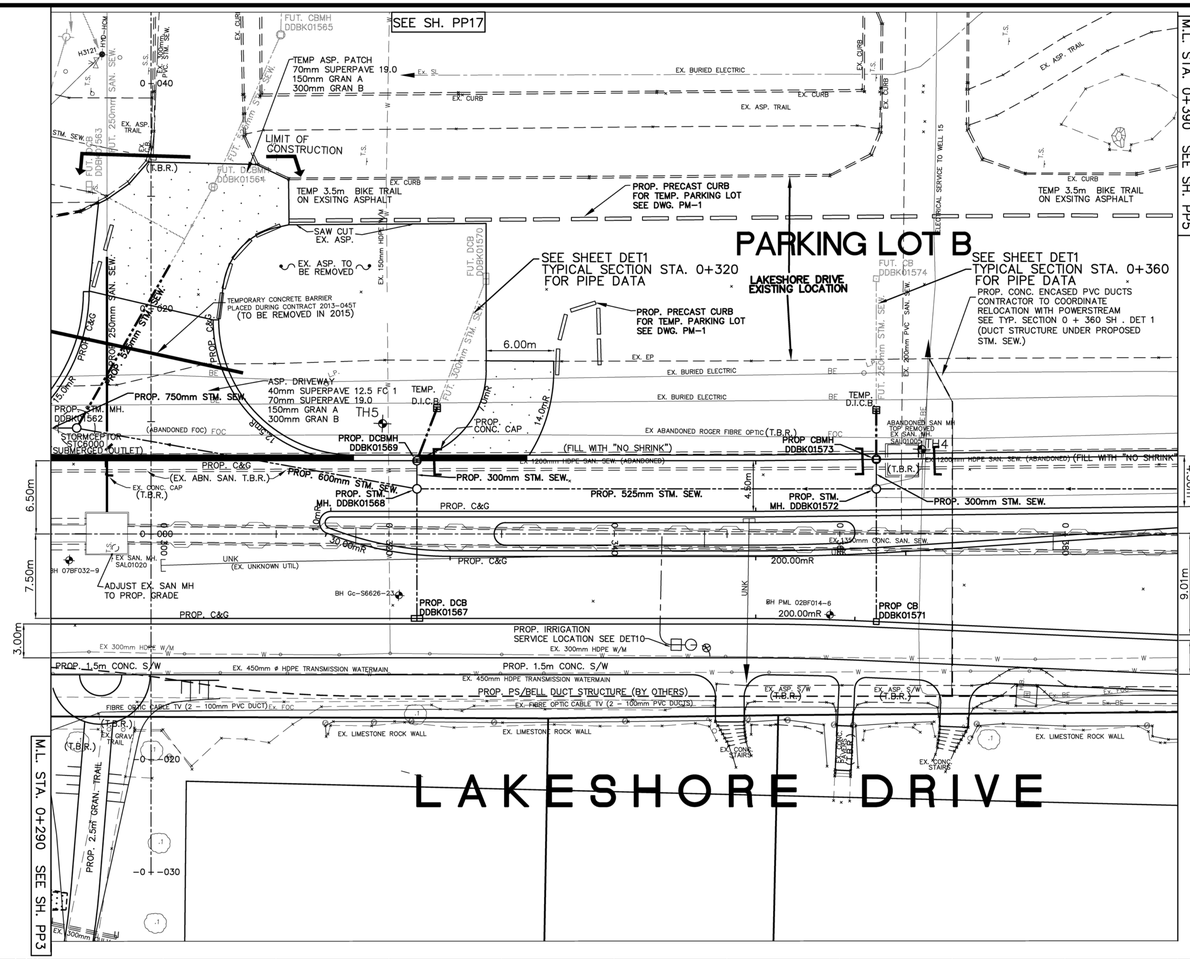
LAKESHORE DRIVE
(STA. 0 + 070 TO STA. 0 + 170)

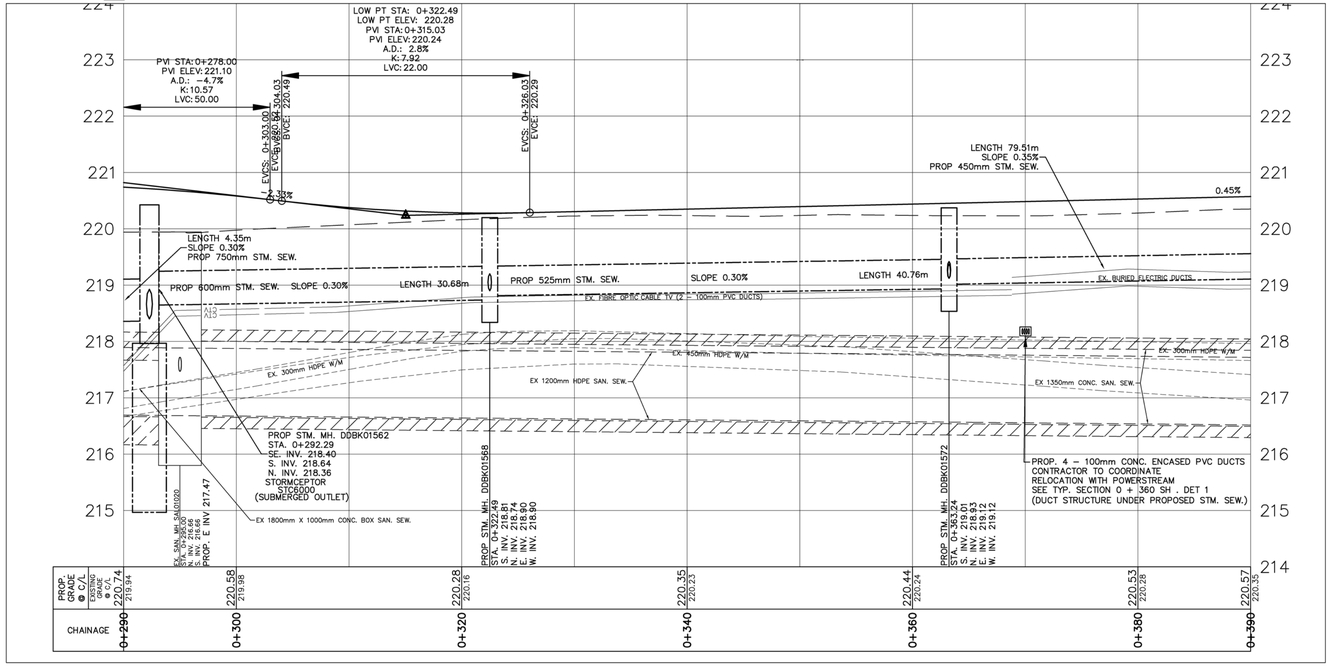
The City of BARRIE
ENGINEERING DEPARTMENT

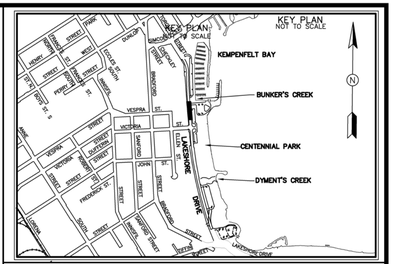
SCALE HOR.	1:250	VERT.	1:50
DESIGN	M.R.M.	DRAWN	M.R.M.
REVIEWED	L.H.B.	DATE	APR. 2014

DRAWING NO. 2014–001T
SHEET NO. PP2

2014-001-013







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224.243 - CN RAIL STATION, TABLET SET HORIZONTALLY IN NORTH FOUNDATION WALL OF THE CENTRE OF THREE BUILDINGS, 5.5m WEST OF THE NORTHEAST CORNER, 71.1m WEST OF A LIGHT STANDARD, 5cm ABOVE GRADE (DO NOT USE FOR HORIZONTAL CONTROL).

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CITY OF BARRIE
APPROVED
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DIRECTOR OF ENGINEERING

LICENCED PROFESSIONAL ENGINEER
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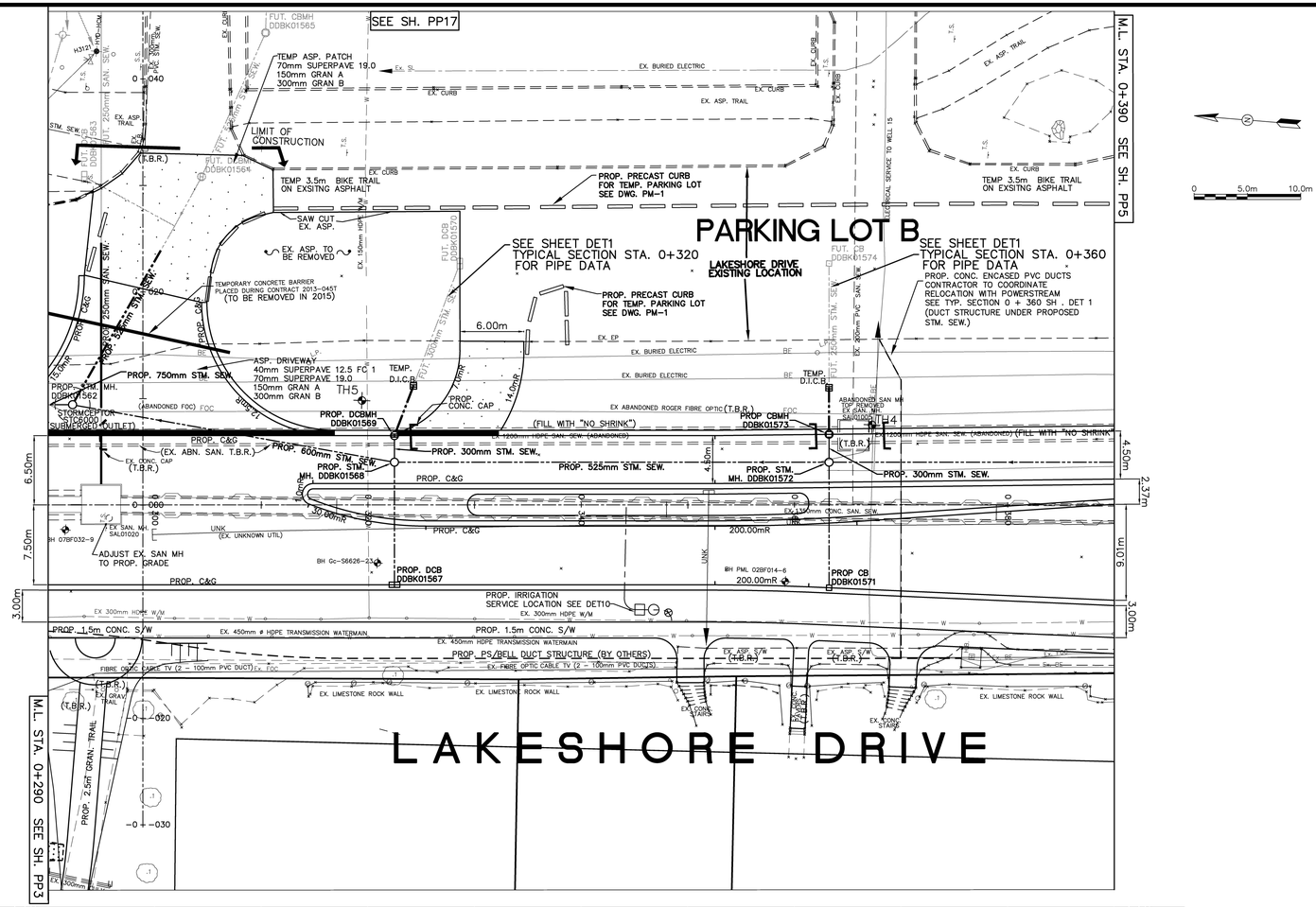
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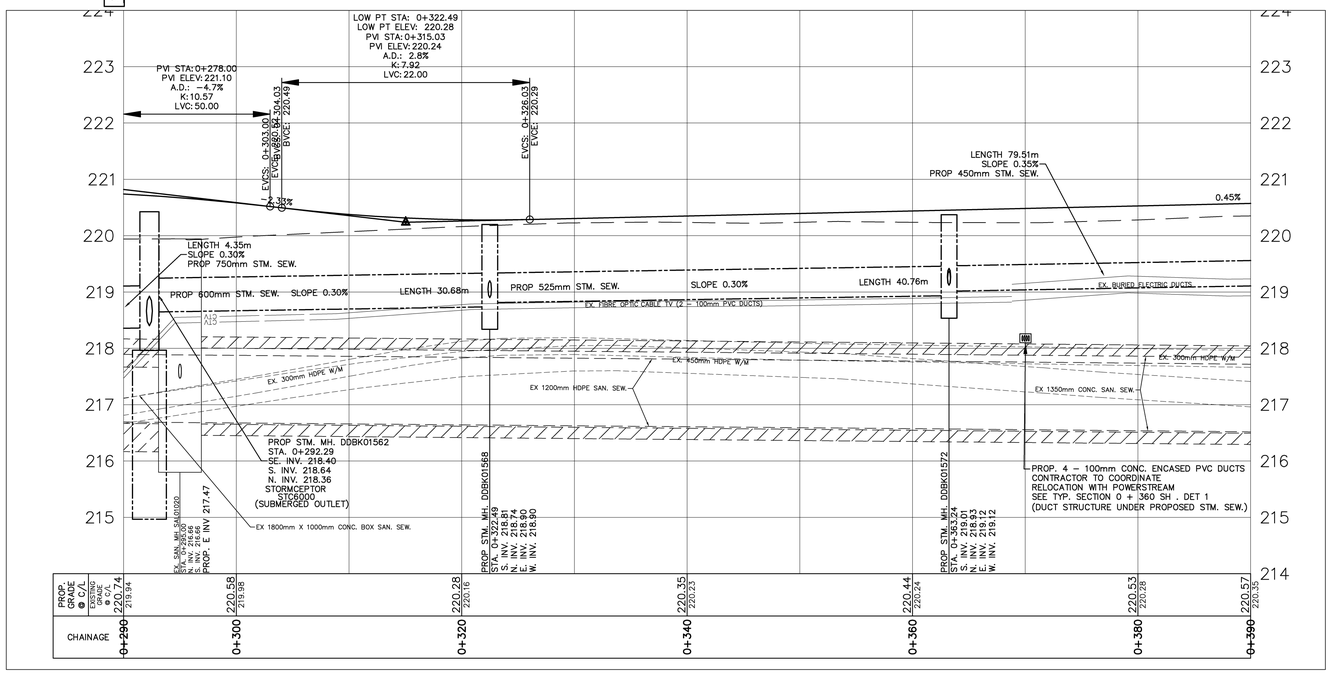
The City of BARRIE
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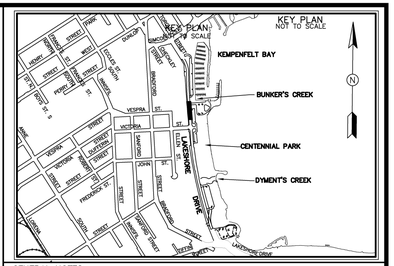
SCALE HOR. 1:250	VERT. 1:50	DRAWING NO.	2014-001T
DESIGN M.R.M.	DRAWN M.R.M.	SHEET NO.	PP4
REVIEWED L.H.B.	DATE APR. 2014		

2014-001-015

PLOT DATE May 11, 2014







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CITY OF BARRIE
APPROVED
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L.H. BORGDORFF
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LAKESHORE DRIVE RECONSTRUCTION
TORONTO STREET TO TIFFIN STREET

LAKESHORE DRIVE
(STA. 0 + 290 TO STA. 0 + 390)

The City of BARRIE
ENGINEERING DEPARTMENT

SCALE HOR.	1:250	VERT.	1:50
DESIGN	M.R.M.	DRAWN	M.R.M.
REVIEWED	L.H.B.	DATE	APR. 2014

DRAWING NO. 2014-001T
SHEET NO. PP4

2014-001-015

PLOT DATE May 11, 2014

APPENDIX C

TOPOGRAPHIC SURVEY

METRIC: DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

TOPOGRAPHIC PLAN OF SURVEY OF

ALL OF LOT 90
WEST SIDE OF HIGH STREET
PART OF LOT 65
EAST SIDE OF HIGH STREET
PART OF HIGH STREET
REGISTERED PLAN 115
ALL OF LOTS 115 TO 120, BOTH INCLUSIVE
PART OF LOT 121
ALL OF BOB STREET
ROBERT ROSS UNREGISTERED PLAN
PART OF ELLEN STREET
(CLOSED BY BY-LAW No. 2005-115, INST. No. SC450705)
REGISTERED PLAN 22
EAST PART OF LOT 24 AND
EAST PART OF BROKEN LOT 25
CONCESSION 5
(GEOGRAPHIC TOWNSHIP OF VESPRA)
CITY OF BARRIE
COUNTY OF SIMCOE
SCALE 1:300

5 2.5 0 5 10 15 20 METRES

SCHAEFFER DZALDOV BENNETT LTD.

© COPYRIGHT

SIMCOE STANDARD CONDOMINIUM PLAN No. 259
CONDO BLOCK 59259

NOTES

□	DENOTES	PLANTED MONUMENT
■	-	FOUND MONUMENT
SSIB	-	SHORT STANDARD IRON BAR
IB	-	IRON BAR
SIB	-	STANDARD IRON BAR
CP	-	CONCRETE PIN
P	-	PLAN 51R-37947
M	-	MEASURED
CDN	-	CDN LAND SURVEYORS INC.
1403	-	W.D. SMITH, O.L.S.
1546	-	RUDY MAK, O.L.S.
CLF	-	CHAIN LINK FENCE
IF	-	IRON FENCE
GR	-	GUARD RAIL

BEARINGS ARE GRID, DERIVED FROM UTM ZONE 17, NAD83 (ORIGINAL).

TOPOGRAPHIC NOTES

BB	☒	DENOTES BELL BOX
CB	■	DENOTES CATCH BASIN
MH	⊛	DENOTES MANHOLE
GM	⊕	DENOTES GAS METER
UP	●	DENOTES UTILITY POLE
WP	●	DENOTES WOOD POST
MP	●	DENOTES METAL POST
M		DENOTES METAL
L		DENOTES LIGHT
H		DENOTES HYDRO
T		DENOTES TELEPHONE
OW		DENOTES OVERHEAD WIRES
GS		DENOTES GARAGE SILL
DS		DENOTES DOOR SILL
D/T 0.10		DENOTES DECIDUOUS TREE 0.10m dia.
C/T 0.10		DENOTES CONIFEROUS TREE 0.10m dia.
CSP (500)		DENOTES CORRUGATED STEEL PIPE (500mm DIA.)
GUY	—○	DENOTES GUY WIRE/POLE
INV	◁	DENOTES CULVERT INVERT

BENCHMARK

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF BARRIE MONUMENT No. 031208B0022 HAVING A PUBLISHED ELEVATION OF 222.437 METRES

CONTOUR INTERVAL 0.50m

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON 21ST DAY OF MAY, 2019.

DATE: JUNE 5, 2019.

ORHIR N. DZALDOV
ONTARIO LAND SURVEYOR

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2071175

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

SCHAEFFER DZALDOV BENNETT LTD.
ONTARIO LAND SURVEYORS
64 JARDIN DRIVE CONCORD, ONTARIO L4K 3P3 TEL.(416)987-0101

CALC. SL	DRAWN SAMI/LW	CHECKED	SCALE 1:300	JOB NO. 19-047-00

APPENDIX D

PHOSPHOROUS BUDGET CALCULATIONS

SCS consulting group ltd

Ontario

MINISTRY OF THE ENVIRONMENT

Database Version: V 2.0 Release Update
Update Date: 30-Mar-12

Project DEVELOPMENT Summary

DEVELOPMENT: 51-75 Bradford Street
Subwatershed: Barrie Creeks

Total Pre-Development Area (ha):	3.5	Total Pre-Development Phosphorus Load (kg/yr):	1.65

Pre-Development Land Use	Area (ha)	P coeff. (kg/ha)	P Load (kg/yr)
High Intensity - Comm/Industrial	0.71	1.82	1.29
Low Intensity Development	2.79	0.13	0.36

POST-DEVELOPMENT LOAD

Post-Development Land Use	Area (ha)	P coeff. (kg/ha)	Best Management Practice applied with P Removal Efficiency		P Load (kg/yr)
High Intensity - Residential	2.89	1.32	NONE	0%	3.81
Low Intensity Development	0.61	0.13	NONE	0%	0.08

Post-Development Area Altered:	**3.50**
Total Pre-Development Area:	**3.50**
Unaffected Area:	**0**

	P Load (kg/yr)
Pre-Development:	**1.65**
Post-Development:	**3.89**
Change (Pre - Post):	**-2.24**
135% Net Increase in Load	
Post-Development (with BMPs):	**3.89**
Change (Pre - Post):	**-2.24**
135.31% Net Increase in Load	

DEVELOPMENT: 51-75 Bradford Street
Subwatershed: Barrie Creeks

CONSTRUCTION PHASE LOAD

SUMMARY WITH IMPLEMENTATION OF BMPs	P Load (kg/yr)
Pre-Development:	**1.65**
Construction Phase Amortized Over 8 Years :	to be determined
Post-Development:	**3.89**
Post-Development + Amortized Construction:	**to be determined**
Pre-Development Load - Post-Development Load:	**-2.24**
Conclusion:	**135% Increase in Load**
Pre-Development Load - (Post-Development + Amortized Construction Load):	**to be determined**
Conclusion:	**to be determined**

Based on a comparison of Pre-Development and Post-Development loads, and in consideration of Construction Phase loads, the Ministry would encourage the Municipality to:

Not approve development as site specific appropriate

APPENDIX E

SANITARY FLOW CALCULATIONS

Sanitary Design Sheet - Existing Conditions
51, 53, 55 & 75 Bradford Street and 20 Checkley Street
Barrie Lakeshore Developments
Barrie, Ontario

Minimum Sewer Diameter (mm) =	200	Avg. Domestic Flow (l/cap/day) =	225
Mannings n =	0.013	Infiltration Rate (l/s/ha) =	0.1
Minimum Velocity (m/s) =	0.60	Max. Harmon Peaking Factor =	10.0
Maximum Velocity (m/s) =	3	Min. Harmon Peaking Factor =	2.0
Minimum Pipe Slope (%) =	0.40	NOMINAL PIPE SIZE USED	

City of Barrie Flow Rate Based on Zoning Converted from 28m3/day/ha

Flow Rate Sourced From Barrie Central Development Functional Servicing Report

Project: 51, 53, 55 & 75 Bradford Street and 20 Checkley Street
Project No. 2196
Date: 19-Dec-19
Designed By: V.A.S./J.Y.L.
Reviewed By: P.G.

P:\2196 51-75 Bradford Street\Design\Pipe Design\Sanitary\[2019 11(Nov) 26 - Sanitary Sheet Design Sheet - Existing.xlsm]Design

LOCATION			RESIDENTIAL							INDUSTRIAL/COMMERCIAL/INSTITUTIONAL					FLOW CALCULATIONS								PIPE DATA				
STREET	MANHOLE		AREA	ACCUM. AREA	UNITS	DENSITY		RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA	ACCUM. AREA	POPULATION DENSITY	FLOW RATE	ACCUM. EQUIV. POPULATION	INFILTRATION	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW	ACCUM. AVG. DOMESTIC FLOW	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW	ICI FLOW	TOTAL FLOW	LENGTH	PIPE DIAMETER	SLOPE	FULL FLOW CAPACITY	FULL FLOW VELOCITY
	FROM	TO				PER UNIT	PER HA																				
			(ha)	(ha)	(#)	(p/unit)	(p/ha)			(ha)	(ha)	(p/ha)	(l/s/ha)		(L/s)		(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/s)	(m/s)
Bradford Street	SAC01029	SAC01028	0	0	0			0	0	0.834	0.834	0	0.32	0	0.1	0	0.0	0.0	4.50	0.0	0.27	0.35	29.0	300	0.30	52.9	0.75
Bradford Street	SAC01028	SAC01027	0	0	0			0	0	5.526	6.36	0	0.32	0	0.6	0	0.0	0.0	4.50	0.0	2.06	2.70	98.0	300	0.30	52.9	0.75
Bradford Street	SAC01027	SAC01026	0	0	0			0	0	1.318	7.678	0	0.32	0	0.8	0	0.0	0.0	4.50	0.0	2.49	3.26	77.4	300	0.30	52.9	0.75
Bradford Street	BARRIE CENTRAL	SAC01026	0	0	0			0	0	1	1	0	11.21	0	0.1	0	0.0	0.0	4.50	0.0	11.21	11.21	100.0	200	1.00	32.8	1.04
Bradford Street	SAC01026	SAC01025	0	0	0			0	0	0.527	9.205	0	0.32	0	0.9	0	0.0	0.0	4.50	0.0	13.87	14.79	75.0	300	0.30	52.9	0.75
Bradford Street	SAC01025	SAC01024	0	0	0			0	0	0.142	9.347	0	0.32	0	0.9	0	0.0	0.0	4.50	0.0	13.92	14.85	67.6	300	0.30	52.9	0.75
Bradford Street	SAC01024	SAC01023	0	0	0			0	0	0	9.347	0	0	0	0.9	0	0.0	0.0	4.50	0.0	13.92	14.85	11.2	300	0.30	52.9	0.75

Sanitary Design Sheet - Proposed Condition
51, 53, 55 & 75 Bradford Street and 20 Checkley Street
Barrie Lakeshore Developments
Barrie, Ontario

Minimum Sewer Diameter (mm) =	200	Avg. Domestic Flow (l/cap/day) =	225
Mannings n =	0.013	Infiltration Rate (l/s/ha) =	0.1
Minimum Velocity (m/s) =	0.60	Max. Harmon Peaking Factor =	10.0
Maximum Velocity (m/s) =	3	Min. Harmon Peaking Factor =	2.0
Minimum Pipe Slope (%) =	0.40	NOMINAL PIPE SIZE USED	

City of Barrie Flow Rate Based on Zoning Converted from 28m3/day/ha

Flow Rate Sourced From Barrie Central Development Functional Servicing Report

Project: 51, 53, 55 & 75 Bradford Street and 20 Checkley Street
Project No. 2196
Date: 19-Dec-19
Designed By: J.Y.L.
Reviewed By: P.G.

P:\2196 51-75 Bradford Street\Design\Pipe Design\Sanitary\[2019 11(Nov) 26 - Sanitary Sheet Design Sheet - Proposed.xlsm]Design

LOCATION			RESIDENTIAL							INDUSTRIAL/COMMERCIAL/INSTITUTIONAL					FLOW CALCULATIONS								PIPE DATA				
STREET	MANHOLE		AREA	ACCUM. AREA	UNITS	DENSITY		RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA	ACCUM. AREA	POPULATION DENSITY	FLOW RATE	ACCUM. EQUIV. POPULATION	INFILTRATION	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW	ACCUM. AVG. DOMESTIC FLOW	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW	ICI FLOW	TOTAL FLOW	LENGTH	PIPE DIAMETER	SLOPE	FULL FLOW CAPACITY	FULL FLOW VELOCITY
	FROM	TO	(ha)	(ha)	(#)	PER UNIT (p/unit)	PER HA (p/ha)			(ha)	(ha)	(p/ha)	(l/s/ha)		(L/s)		(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/s)	(m/s)
BRADFORD STREET	TOWER 4	SANMH1	0.72	0.72	464	1.67		774.88	774.88	0.10	0.10	0	0.32	0	0.1	774.88	2.0	2.0	3.87	7.81	0.03	7.92	4.5	250	0.50	42.0	0.86
BRADFORD STREET	SANMH1	SAC01029	0	0.72	0			0	774.88	0.00	0.10	0	0.00	0	0.1	774.88	0.0	2.0	3.87	7.81	0.03	7.92	9.9	250	2.00	84.1	1.71
BRADFORD STREET	SAC01029	SAC01028	0	0.72	0			0	774.88	0.32	0.42	0	0.32	0	0.1	774.88	0.0	2.0	3.87	7.81	0.14	8.06	29.0	300	0.30	52.9	0.75
BRADFORD STREET	SAC01028	SANMH3	0	0.72	0			0	774.88	4.08	4.50	0	0.32	0	0.5	774.88	0.0	2.0	3.87	7.81	1.46	9.79	58.2	300	0.30	52.9	0.75
BRADFORD STREET	TOWER 3	SANMH2	0.55	0.55	535	1.67		893.45	893.45	0.12	0.12	0	0.32	0	0.1	893.45	2.3	2.3	3.83	8.91	0.04	9.02	4.4	250	0.50	42.0	0.86
BRADFORD STREET	SANMH2	SANMH3	0	0.55	0			0	893.45	0.00	0.12	0	0.00	0	0.1	893.45	0.0	2.3	3.83	8.91	0.04	9.02	9.6	250	2.00	84.1	1.71
BRADFORD STREET	SANMH3	SAC01027	0	1.27	0			0	1668.33	0.00	4.62	0	0.00	0	0.6	1668.33	0.0	4.3	3.65	15.84	1.50	17.92	38.4	300	0.30	52.9	0.75
BRADFORD STREET	TOWER 2	SANMH4	0.87	0.87	569	1.67		950.23	950.23	0.12	0.12	0	0.32	0	0.1	950.23	2.5	2.5	3.81	9.44	0.04	9.58	4.3	250	0.50	42.0	0.86
BRADFORD STREET	SANMH4	SAC01027	0	0.87	0			0	950.23	0.00	0.12	0	0.00	0	0.1	950.23	0.0	2.5	3.81	9.44	0.04	9.58	9.5	250	2.00	84.1	1.71
BRADFORD STREET	SAC01027	SAC01026	0	2.14	0			0	2618.56	0.29	5.03	0	0.32	0	0.7	2618.56	0.0	6.8	3.49	23.81	1.63	26.16	77.4	300	0.30	52.9	0.75
BRADFORD STREET	RRIE CENTR	SAC01026	0	0	0			0	0	1.00	1.00	0	11.21	0	0.1	0	0.0	0.0	4.50	0.00	11.21	11.21	100.0	200	1.00	32.8	1.04
BRADFORD STREET	SAC01026	SAC01025	0	2.14	0			0	2618.56	0.53	6.55	0	0.32	0	0.9	2618.56	0.0	6.8	3.49	23.81	13.01	37.69	75.0	300	0.30	52.9	0.75
BRADFORD STREET	SAC01025	SAC01024	0	2.14	0			0	2618.56	0.14	6.70	0	0.32	0	0.9	2618.56	0.0	6.8	3.49	23.81	13.06	37.75	67.6	300	0.30	52.9	0.75
BRADFORD STREET	SAC01024	SAC01023	0	2.14	0			0	2618.56	0.00	6.70	0	0.00	0	0.9	2618.56	0.0	6.8	3.49	23.81	13.06	37.75	11.2	300	0.30	52.9	0.75
LAKESHORE DRIVE	TOWER 1	SANMH5	1.026	1.026	484	1.67		808.28	808.28	0	0	0	0	0	0.1	808.28	2.1	2.1	3.86	8.12	0.00	8.22	29.9	250	0.50	42.0	0.86
LAKESHORE DRIVE	SANMH5	SAL01018	0	1.026	0			0	808.28	0	0	0	0	0	0.1	808.28	0.0	2.1	3.86	8.12	0.00	8.22	16.8	250	2.00	84.1	1.71

APPENDIX F

WATER MODELLING ANALYSIS

SCS consulting group ltd

Municipal Engineering Solutions

December 17, 2019 Project No. 17002-70

Sent via email
Mr. Victor Szeghalmi
SCS Consulting Group Ltd.
30 Centurian Drive, Suite 100
Markham, ON,
L3R 8B8

Subject: Bradford Street Development Watermain Analysis
City of Barrie

Dear Mr. Szeghalmi,

We are pleased to submit our report entitled "Bradford Street Development Watermain Analysis" outlining the results of our water distribution analysis for a high-rise residential development in the City of Barrie.

This development was incorporated into an Infowater sub-model of the development site and modeled utilizing the design information provided to Municipal Engineering Solutions. The findings of our analysis are summarized in the following report.

We trust you find this report satisfactory. Should you have any questions or require further clarification, please call.

Yours truly,

Municipal Engineering Solutions

Per: John C. Bourrie, P.Eng.

/LMC

File Location: D:\Projects\2019\19-030 Bradford St Barrie SCS 17002-70\3.0 Report\Final Report\17002-70_Bradford St Watermain Analysis_20191217.docx

55 Gilbank Drive, Aurora, Ontario L4G 6H9

Tel: 905.726.1016 Cell: 416.434.0186 Fax: 905.726.1225

BRADFORD STREET DEVELOPMENT

WATERMAIN ANALYSIS

PREPARED BY:

MUNICIPAL ENGINEERING SOLUTIONS

FOR:

SCS CONSULTING GROUP LTD.
December 2019

Project Number: 17002-70

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APPENDICES

Appendix A Demands
Appendix B Model Results

Section 1 – INTRODUCTION

Municipal Engineering Solutions ("MES") was retained by SCS Consulting Group Ltd. to conduct a hydraulic water analysis for the proposed Bradford Street Development located in the City of Barrie. As part of this hydraulic assessment MES was requested to undertake the following:

1. Calculate/verify water demands for the proposed development using City of Barrie, provincial and industry design standards;
2. Add the subject watermains/development/boundary information to a development water model;
3. Run the model to size the subject mains to achieve service criteria during Minimum Hour, Peak Hour and fire flow during Maximum Day demand; and
4. Prepare a Report summarizing the modeling results for agency review and design purposes.

1.1 Development Background

The Bradford Street Development site is located between Bradford Street and Lakeshore Drive south of Simcoe Street in the City of Barrie. The residential development consists of four high-rise towers that are a combination of 1,900 residential apartments, 3,371 m^2 of commercial area and 152 hotel rooms. The demands for the site are shown in **Appendix A**. The proposed development is shown below on **Figure 1**.

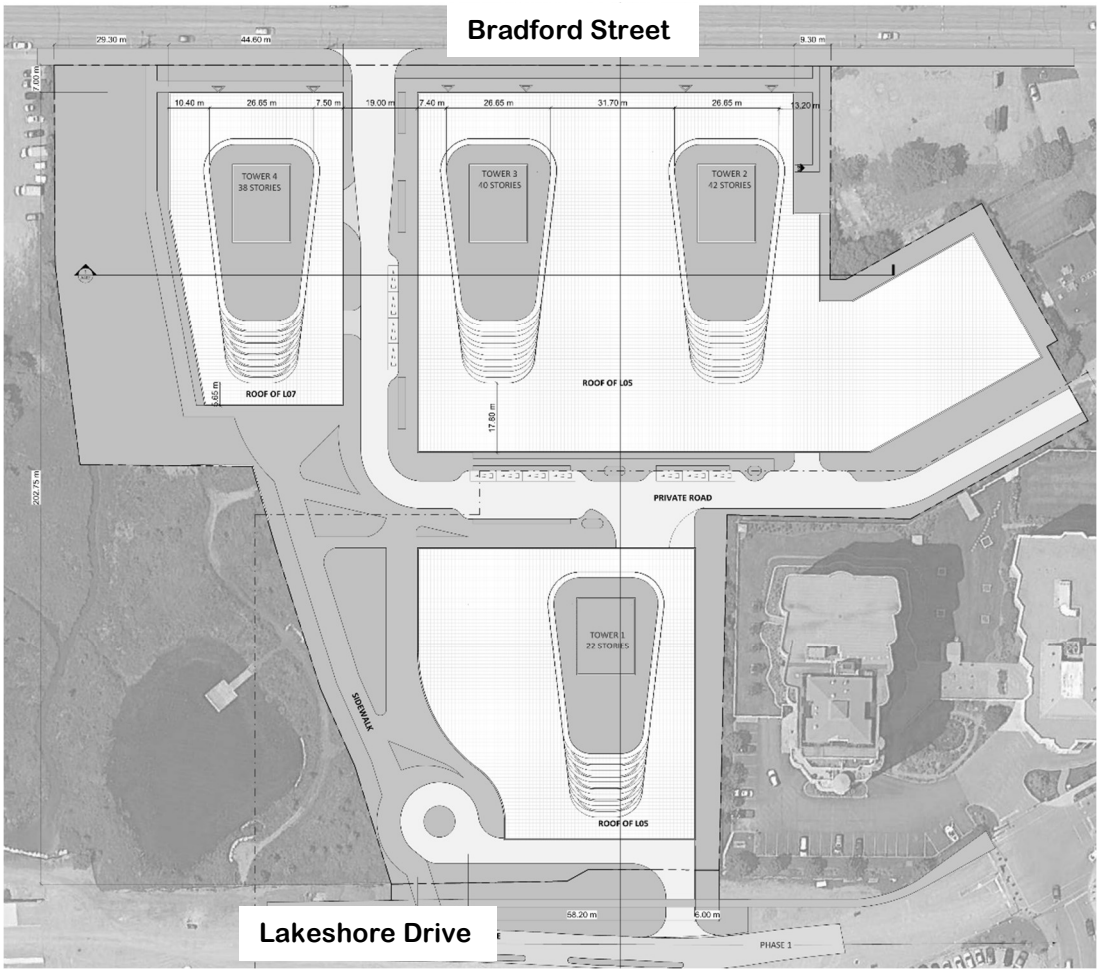


Figure 1 - Proposed Bradford Street Development

Section 2 – WATERMAIN DESIGN CRITERIA

The design criteria utilized to estimate the water demands for the hydraulic water model follows general industry standards and is calculated using the design criteria and guidelines outlined in the City of Barrie Water Transmission & Distribution Policies Design Guidelines, the Ministry of the Environment Conservation and Parks (MECP) Watermain Design Criteria, and the Fire Underwriters Survey.

The following sections summarize the specific design criteria used to carry out the hydraulic watermain assessment for this development.

2.1 Equivalent Population Densities & Water Design Factors

To calculate the equivalent population and water design factors for this development MES used City of Barrie standard population densities as noted in the *"Water Transmission & Distribution Policies Design Guidelines Dec 2017"* and *"Sanitary Sewage Collection System Policies and Design Guidelines Oct 2017"*. **Table 1** summarizes the population densities and **Table 2** summarizes the average daily demand and peaking factors used for this analysis.

Table 1 – Equivalent Population Density

Type of Development	Population
Single Family	3.13 ppu
Townhouse	2.34 ppu
Apartment	1.67 ppu
Light Commercial	142 persons/ha

Source: Sanitary Sewage Collection System Policies & Design Guidelines Oct 2017

Table 2 - Water Design Factors

Type of Development	Average Daily Demand (L per capita)	Minimum Hour Peaking Factor	Maximum Daily Peaking Factor	Peak Hour Peaking Factor
Residential & ICI	225	0.5	2.0	3.0

Source: Water Transmission & Distribution Policies & Design Guidelines Dec 2017, Sanitary Sewage Collection System Policies & Design Guidelines Oct 2017 and MECP

Section 3 –FLOW DEMANDS

Utilizing the equivalent population data from Table 1 and the corresponding Average Day and Maximum Day data from Table 2 the water demands for this development were calculated.

3.1 Equivalent Population Flow Demands

The calculated demands for the development are summarized in **Table 3**. For additional details on the development water demands and assigned demand nodes used in the water model see **Appendix A**.

Table 3 – Water Demand for Bradford Street Development

	Average Day Demand (L/S)	Minimum Hour Demand (L/S)	Maximum Day Demand (L/S)	Peak Hour Demand (L/S)
Bradford Street Development	9.37	4.69	18.74	28.11

3.2 Fire Flow Demands

The fire demands for this development are based on the City of Barrie Engineering Design Standards & Criteria, December 2017. The City's 'Preferred' fire flows are shown in **Table 4**.

Table 4 – City Criteria Fire Flow Requirements

Type of Development	Fire Flow (L/S)
Single Family Homes	76
Townhomes	None
Institutional/Convenience Commercial	114
Industrial/ Commercial	152
Downtown Commercial	189

Source: City of Barrie Engineering Design Standards & Criteria, December 2017

It should be noted that the site will comprise mainly of apartments and the City's criteria does not have values for apartments. The most recent City of Barrie "*Water Storage and Distribution Master Plan Oct 2013*" reviewed the City's fire flows. The report did breakdown the types of land use differently and increased the flows for ICI developments and included an apartment fire flow of 117 L/s. However, based on the proximity of this development to the Downtown area, the Downtown Commercial flow (189 L/s) was assumed for this report for all buildings.

3.3 External Demands

The hydrant test results would have considered external demands.

Section 4 – OTHER SYSTEM REQUIREMENTS

4.1 System Pressure Requirements

In addition to meeting the various flow requirements, the system must also satisfy minimum and maximum pressure requirements as outlined by the City of Barrie. The City's pressure requirements are outlined in the Design Criteria and stipulate the following:

1. The minimum system pressure shall not be less than 140 kPa (20 psi) at any point in the water system under fire flow conditions.
2. The minimum pressure shall be 350 kPa (50 psi).
3. The maximum pressure shall be 550 kPa (80 psi). Pressure reducing valves may need to be installed on individual services.

4.2 Watermain Sizing

The City of Barrie also stipulates that all watermains are adequately sized to maintain demand flows at the required pressures without causing excessive energy loss or result in water quality decay. The watermain system must therefore be designed to accommodate the Maximum day plus fire demand.

For distribution systems providing fire protection the minimum pipe size shall be 150 mm diameter in accordance with Ministry of the Environment Conservation and Parks (MECP) and NFPA requirements.

To provide appropriate fire protection, reliable supply and pressures the water distribution system should be looped wherever possible to improve supply security and water quality and also have two connections to the existing system where possible.

4.3 Watermain C-Factor

In designing and modeling of the pipes the Coefficient of Roughness (C-Factor) factors are not mentioned in the design criteria. The C-Factor were based on those stated in the MECP criteria. The Coefficient of Roughness assigned to each pipe size in summarized in **Table 5** below.

Table 5 - Hazen-Williams Coefficient of Roughness (C-Factors)

Size of Pipe (Diameter in mm)	Coefficient of Roughness (C)
150 mm	100
200 mm to 250 mm	110
Greater Than 300 mm	120

Source: MECP

Section 5 – ANALYSIS & MODELING RESULTS

To conduct the hydraulic water analysis for the proposed development the water demands were estimated by MES using the design criteria previously discussed and incorporated the demands into an InfoWater model provided by the City. The following sections discusses the model setup and results.

5.1 Model Setup

The Bradford Street Development is located within the City of Barrie water system in the 1 Zone that has top water elevation of 281.2 m. Elevations within the development range from 220 m to 2248 m and should be adequately serviced by this zone.

The development was modeled under existing conditions to confirm that the development could be serviced from the existing watermains on Bradford Street and Lakeshore Drive. Three hydrant tests were performed on the surrounding streets. Boundary conditions were based on the hydrant test on Bradford Street north of Simcoe Street as it had the best results and hydrants located close to the watermain. The hydrants for the other two tests have long hydrant leads reducing the accuracy of the watermain capabilities. All three test results are included in **Appendix B.**

Fire flows were based on the flow noted in **Table 4**. Nodes were created to add the flow demands and service elevation information from the development to the Infowater hydraulic water model and the development analysis was carried out. Friction factor for the pipes were assigned according to **Table 5**.

5.2 Watermain Sizing and System Pressures

The analysis was conducted under existing and future servicing conditions for Minimum Hour, Peak Hour, Maximum Day and Maximum day plus Fire demands to size the watermains and meet the pressure requirements. The pipe size and layout are shown in **Appendix B**.

The Bradford Street Development is located between Bradford Street and Lakeshore Drive. Three of the proposed apartment buildings, fronting on Bradford Street will be supplied from the existing Bradford Street 300 mm watermain via two connections to each building (building code requirement for high rises exceeding 84 m in height) – one fire only connection and one combined fire and domestic supply. The residential/hotel building will be supplied from a single combined fire and domestic supply from the existing 300 mm watermain on Lakeshore Drive.

The pressures will be above the Ontario Building Code (OBC) pressure of 80 psi (550 kPa) in all demand scenarios. Pressure reduction will be necessary to maintain pressures below this limit.

Modeled service pressures are summarized in **Table 6**. Fire flow demand can be met under maximum day conditions under existing conditions based on the assumptions outlined in this report. Detailed pipe and node tables for the various scenarios modelled are attached to this report in **Appendix B**.

Table 6- Modeled Service Pressures

Scenario	Minimum Hour	Maximum Day	Peak Hour	Max. Day + Fire
Existing Conditions	85.2 to 90.9 psi (587 to 627 kPa)	84.8 to 90.4 psi (585 to 624 kPa)	84.3 to 89.8 psi (581 to 619 kPa)	194 to 241 L/s @ 20 psi (140 kPa)

Section 6 – CONCLUSIONS/RECOMMENDATIONS

The proposed supply watermains for the Bradford Street Development can achieve hydraulic requirements as prescribed by the City of Barrie watermain design criteria as summarized below.

- The service pressures are expected to range from 84.3 to 90.9 psi (581 to 627 kPa) under existing conditions.
- Pressure reducing valves will be required to meet the OBC requirements. Pressures are above 550 kPa (80 psi) in all demand scenarios modeled.
- The available fire flow within the site meets or exceeds the fire flow demands as noted in Table 4 at the minimum pressure of 20 psi (140 kPa) based on the proposed watermain configuration.
- It should be noted that the theoretical available fire flow to this site, based on the modeling and assumptions in this report, are only slightly greater than the fire flow required (i.e. 189L/s required vs. 194 L/s available). As such, it is possible that the actual available fire flow for this development, at the time of construction, may be lower than indicated within this report and that the final building design will need to be designed to suit the available flow and pressure at the time of construction.
- Should it be determined, based on the final site, building design and discussions with the City, that greater fire flows than those noted in Table 4 are required or fire flows must be calculated using the Fire Underwriters survey formula, the fire flows must be reviewed and updated where necessary.
- Once the building designs have been completed all fire flow requirements, including all theoretical modeled fire flows and pressures noted within this report, must be confirmed prior to construction.
- Required fire flows for all proposed buildings must be confirmed with the appropriate designer (architect or mechanical designer) as well as the City to determine the appropriate level of fire protection required.
- The hydrant test used for the boundary conditions provides a snapshot of the system performance and does not capture the system variations as accurately as boundary information from a calibrated model or system monitoring. The City of Barrie must confirm that the results presented in this report are in keeping with the pressures and flows currently measured in this area.
- Confirmation and/or changes to the criteria should also be provided to and reviewed with MES prior to the construction of the watermain system. Final design parameters are to be provided to MES prior to construction for further review to confirm that the actual (final) site conditions and building design(s) reflect those modeled by MES within this report.
- This report, including all modeling assumptions used, is to be submitted to and reviewed by the water operating authority (municipality) to confirm that the modeling parameters used are acceptable to the operating authority and/or confirm if modified domestic or fire flow requirements are required or should be implemented for this particular development.

Appendix A

Demands

Barrie Design Criteria

Water Transmission & Distribution Policies Design Guidelines Dec 2017 (unless otherwise stated)

Equivalent Population by Unit

(Sanitary Sewage Collection System Policies and Design Guidelines Oct 2017 for population and Average Day Demand)

Type of Development	Equivalent Population Density *(Person/Unit)*
Single Family or Semi-Detached	3.13
Townhouse	2.34
Apartment	1.67

Equivalent Population by Area

Type of Development	Equivalent Population Density *(Person/Hectare)*	Average Day Demands *(m3/ha/day)*
Single Family, Duplex, Semis	78.25	
Triplex and 4-plex	81.9	
Townhouse	110	
Apartments (>6 stories)	500	
Light Commercial Areas	124	28.00
Community Services	124	28.00
Light Industrial Areas	155	35.00
Hospitals (persons/bed)		

Water Design Factors

Average Daily Demand (m3/capita)	0.225	
Minimum Hourly Demand P.F.	0.5	MECP (3001-10000 Persons)
Maximum Daily Demand P.F.	2	MECP
Maximum Hourly Demand P.F.		
Residential	*3*	MECP
I/C/I	*3*	MECP

Cofficient of Roughness

Size of Pipe (mm Dia.)	Coefficient of Roughness (C)
150	130
200-250	130
300-600	130
Over 600	130

Minimum Pipe Size

Type of Development	Size of Pipe (mm Dia.)
Designed for Fire Protection	150
Domestic supply only	75

Working Pressures

Parameter	Pressure
Normal Condition	
Minimum Pressure	345kPa (50 psi)
Maximum (Building Code)	550 kPa (80 psi)
Maximum	620 kPa (90 psi)
Fire Flow Conditions	
Minimum Pressure	140 kPa (20 psi)

Water Demand
Bradford Street, Innisfil, ON
December 17, 2019

Municipal Engineering Solutions

Node	Note	Elevation	Type of Development		Equivalent Population		Demands				Fire Flow Demands
			Apartments	Commercial	Total Population	Total Population	ADD	MHD	MDD	PHD	
		(m)	*(units)*	*(ha)*	*(Residential)*	*(ICI)*	*(L/s)*	*(L/s)*	*(L/s)*	*(L/s)*	*(L/s)*
J-100		221.19			0	0	0.00	0.00	0.00	0.00	
J-101		221.63			0	0	0.00	0.00	0.00	0.00	
J-102		221.85			0	0	0.00	0.00	0.00	0.00	
J-103		224.00			0	0	0.00	0.00	0.00	0.00	
J-104		224.10			0	0	0.00	0.00	0.00	0.00	
J-105		221.50			0	0	0.00	0.00	0.00	0.00	
J-106		220.67			0	0	0.00	0.00	0.00	0.00	
J-109		222.00			0	0	0.00	0.00	0.00	0.00	
J-110	T4 Fire	222.00			0	0	0.00	0.00	0.00	0.00	189
J-111	T4 Dom	222.00	464	*0.1*	775	12	2.05	1.03	4.10	6.15	
J-112		222.00			0	0	0.00	0.00	0.00	0.00	
J-113	T2 Fire	222.00			0	0	0.00	0.00	0.00	0.00	189
J-114	T2 Dom	222.00	569	*0.12*	950	15	2.51	1.26	5.03	7.54	
J-115		222.00			0	0	0.00	0.00	0.00	0.00	
J-116	T3 Fire	222.00			0	0	0.00	0.00	0.00	0.00	189
J-117	T3 Dom	222.00	535	*0.12*	893	15	2.37	1.18	4.73	7.10	
J-118		220.00			0	0	0.00	0.00	0.00	0.00	
J-119	T1 Fire	220.00			0	0	0.00	0.00	0.00	0.00	189
J-120	T1 Dom	220.00	484	*1.05*	808	130	2.44	1.22	4.89	7.33	
J-121		221.19			0	0	0.00	0.00	0.00	0.00	
J-122	T4 Fire	222.00			0	0	0.00	0.00	0.00	0.00	189
J-123		221.65			0	0	0.00	0.00	0.00	0.00	
J-124	T2 Fire	222.00			0	0	0.00	0.00	0.00	0.00	189
J-125		221.82			0	0	0.00	0.00	0.00	0.00	
J-126	T3 Fire	222.00			0	0	0.00	0.00	0.00	0.00	189
J-127		221.69			0	0	0.00	0.00	0.00	0.00	
J-128		221.35			0	0	0.00	0.00	0.00	0.00	
J-129		222.12			0	0	0.00	0.00	0.00	0.00	
J-130		221.13			0	0	0.00	0.00	0.00	0.00	
J-132		222.55			0	0	0.00	0.00	0.00	0.00	
J-133		221.36			0	0	0.00	0.00	0.00	0.00	
J-134		222.49			0	0	0.00	0.00	0.00	0.00	
Total			**2052**	**1.39**	**3427**	**172**	**9.37**	**4.69**	**18.74**	**28.11**	

Location Maps: Checkley Street



Fire Flow Test Report: Checkley Street

Owner:	City of Barrie
Project Number:	Smart Centres
Test Number:	3

Date:	Tuesday, October 29, 2019
Time:	13:59:00 AM

Material	HDPE		
Age	Years		
Nominal Diameter	Inches	8	
Internal Diameter	Inches	8	
Area	Sq. Feet	0.342	
Hydraulic Perimeter	Feet		
Number of Tests	1		

Location		Address	Hydrant Number
Q1	Flow Hydrant	Simcoe Street / Checkley Street	H3830
Q2	Flow Hydrant		
R2	Residual Hydrant		
R1	Residual Hydrant	Bradford Street / High Street	H3514

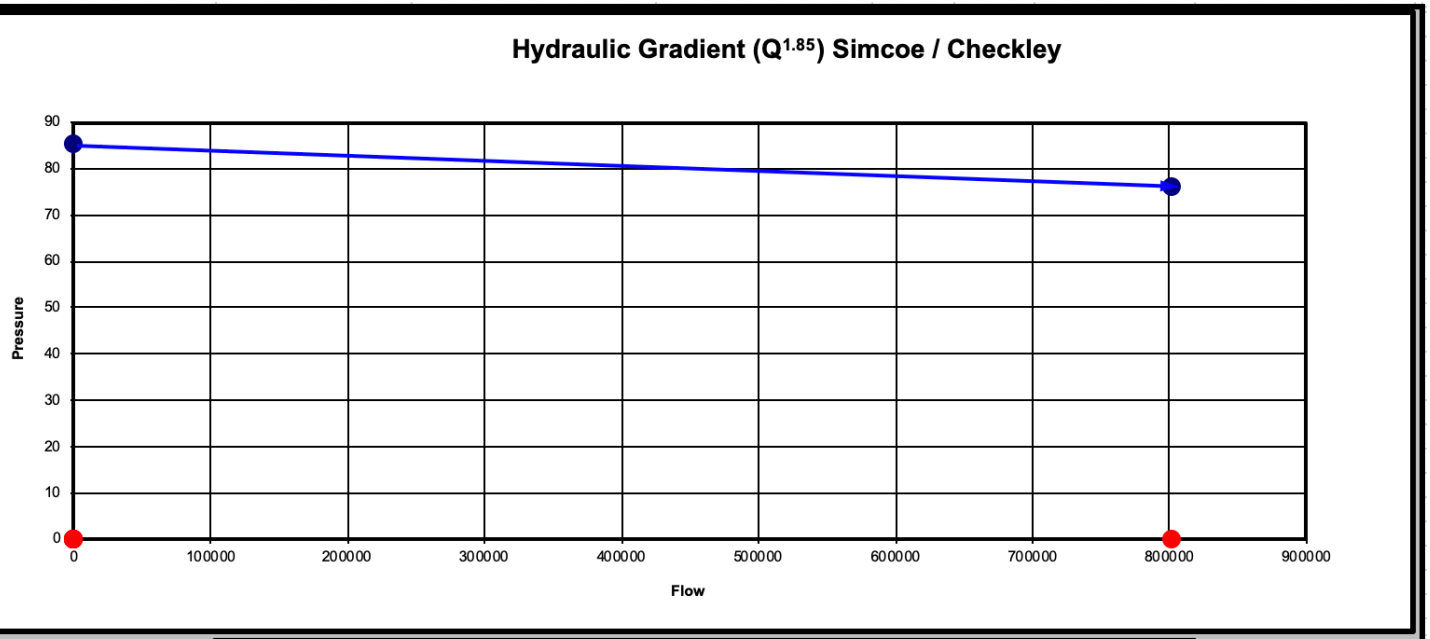
Static Pressure	R1	R2	PSI
	85		

Test	Configuration	Pitot 1	Pitot 2	Pitot 3	Pitot 4	Flow		Residual Pressure	
						Nozzle Coefficient	USGPM	R1	R2
A	1 X 2.5"	HoseMonster							
B	2 X 2.5"	HoseMonster				0.9	1554	76.0	
C							0		
D							0		
E							0		
F							0		
G							0		
H							0		
I							0		

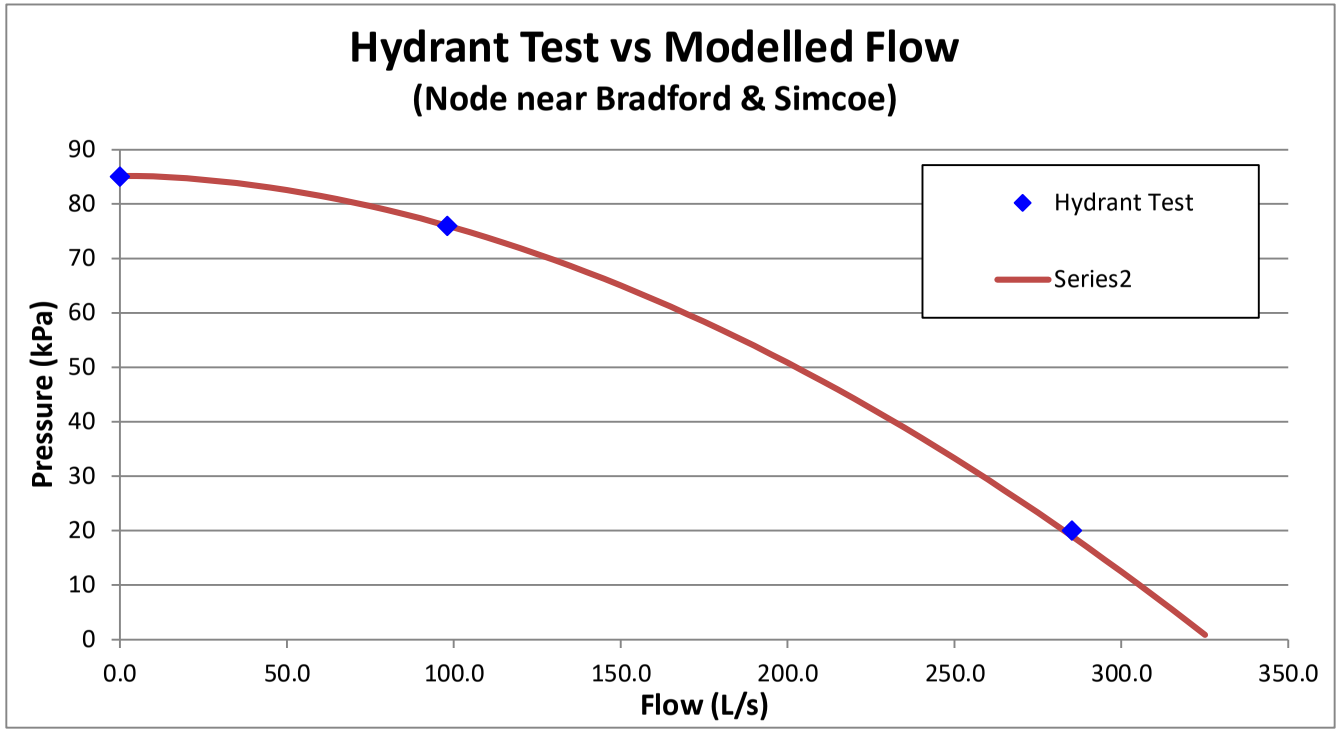
Test	Flow Characteristics				Projected Flow @ 20 PSI		NFPA Rating	
	Velocity (fps)	USGPM	MGD	cu. ft per min	R1	R2	R1	R2
A								
B	10.123	1554	2.2	3.462	4520		CLASS AA - BLUE	
C					0			
D					0			
E					0			
F					0			
G					0			
H					0			
I					0			

Notes	

Fire Flow Test Report and Hydraulic Graph: Checkley Street

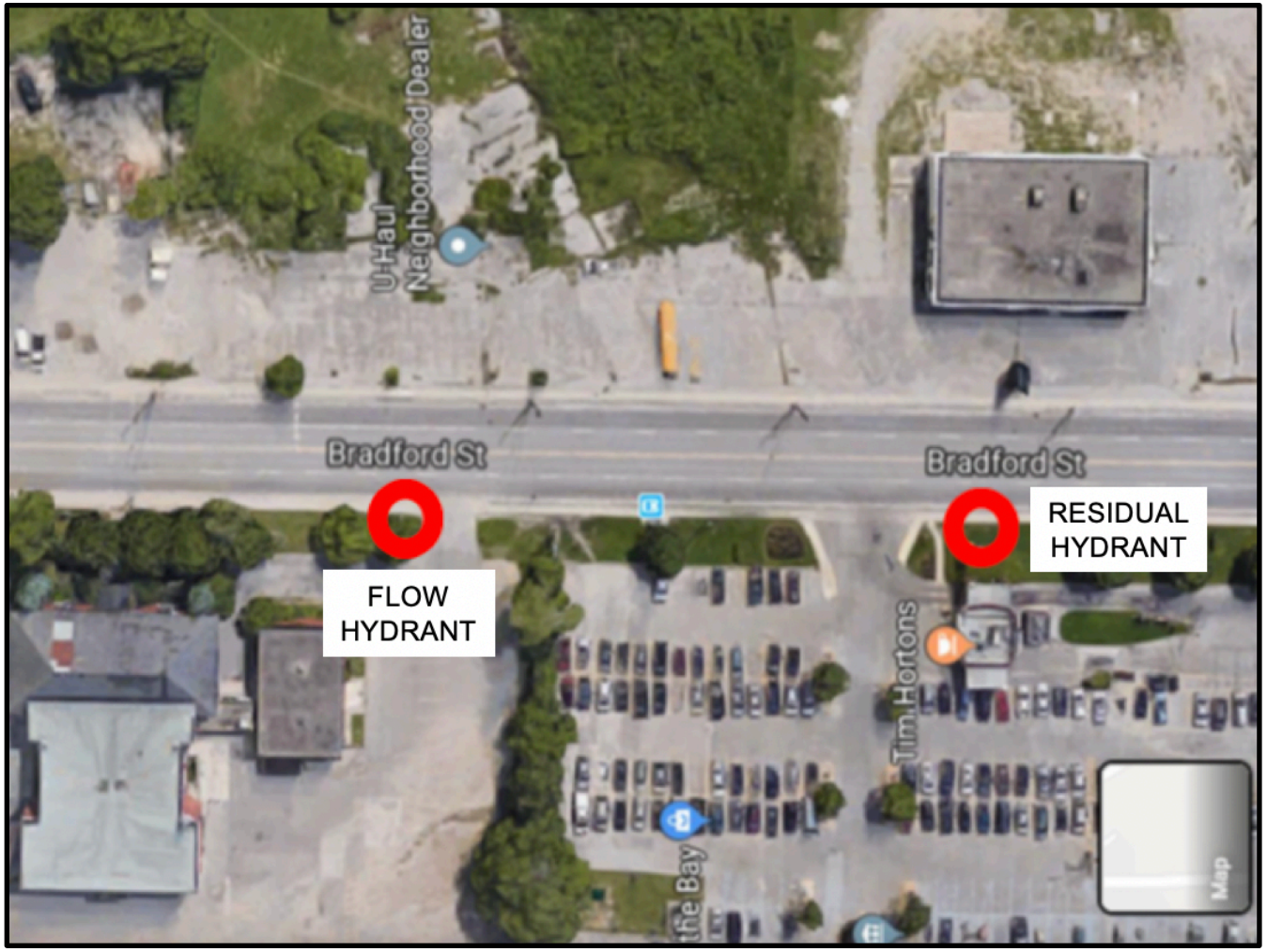


Test	Flow (USGPM)	Flow ($Q^{1.85}$)	R1	R1
Static	0	0	85	0
A	0	0	0	0
B	1554	802018.4826	76	0
C	0	0	0	0
D	0	0	0	0
E	0	0	0	0
F	0	0	0	0
G	0	0	0	0
H	0	0	0	0



	Static Pressure	Residual Pressure	Test Flow	Theoretical Flow at 20 psi (140 kPa)
	(psi)	(psi)	(L/s)	(L/s)
Hydrant Test	85.0	76.0	98.0	285.2
Model	85.2	75.7	100.0	280.0

Location Maps: Bradford Street



Fire Flow Test Report: Bradford Street

Owner:	City of Barrie
Project Number:	Smart Centres
Test Number:	1

Date:	Tuesday, October 29, 2019
Time:	11:09:00 AM

Location		Address	Hydrant Number
Q1	Flow Hydrant	Bradford Street Prince Wales School	H3271
Q2	Flow Hydrant		
R2	Residual Hydrant		
R1	Residual Hydrant	Bradford Street Tim Hortons	H3272

Material	PVC	
Age	Years	
Nominal Diameter	Inches	12
Internal Diameter	Inches	12
Area	Sq. Feet	0.785
Hydraulic Perimeter	Feet	
Number of Tests	1	

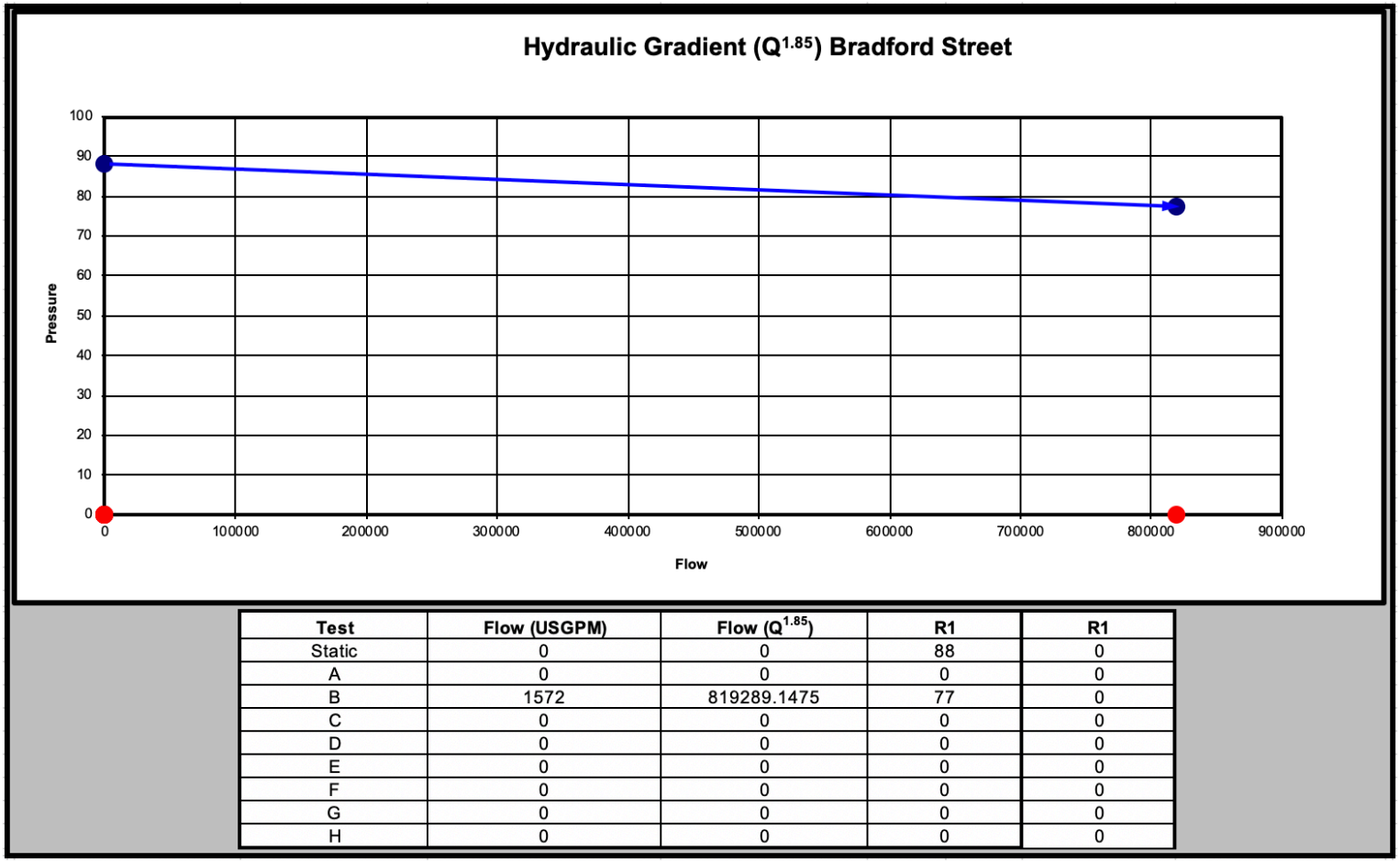
Static Pressure	**R1**	**R2**	PSI
	88		

Test	Configuration	Pitot 1	Pitot 2	Pitot 3	Pitot 4	**Flow** Nozzle Coefficient	**Flow** USGPM	**Residual Pressure** R1	**Residual Pressure** R2
A	1 X 2.5"	HoseMonster							
B	2 X 2.5"	HoseMonster				0.9	1572	77.0	
C							0		
D							0		
E							0		
F							0		
G							0		
H							0		
I							0		

Test	**Flow Characteristics** Velocity (fps)	USGPM	MGD	cu. ft per min	**Projected Flow @ 20 PSI** R1	R2	**NFPA Rating** R1	R2
A								
B	4.461	1572	2.3	3.502	4204		CLASS AA - BLUE	
C					0			
D					0			
E					0			
F					0			
G					0			
H					0			
I					0			

Notes	

Fire Flow Hydraulic Gradient Line Graph: Bradford Street



Test	Flow (USGPM)	Flow ($Q^{1.85}$)	R1	R1
Static	0	0	88	0
A	0	0	0	0
B	1572	819289.1475	77	0
C	0	0	0	0
D	0	0	0	0
E	0	0	0	0
F	0	0	0	0
G	0	0	0	0
H	0	0	0	0

Location Maps: Lakeshore Drive



Fire Flow Test Report: Lakeshore Drive

Owner:	City of Barrie
Project Number:	Smart Centres
Test Number:	2

Date:	Tuesday, October 29, 2019
Time:	13:38:00 AM

Location		Address	Hydrant Number
Q1	Flow Hydrant	Lakeshore Drive / Toronto Street	H3120
Q2	Flow Hydrant		
R2	Residual Hydrant		
R1	Residual Hydrant	Lakeshore Drive / Toronto Street	H3119

Material	HDPE	
Age	Years	
Nominal Diameter	Inches	6
Internal Diameter	Inches	6
Area	Sq. Feet	0.196
Hydraulic Perimeter	Feet	
Number of Tests	1	

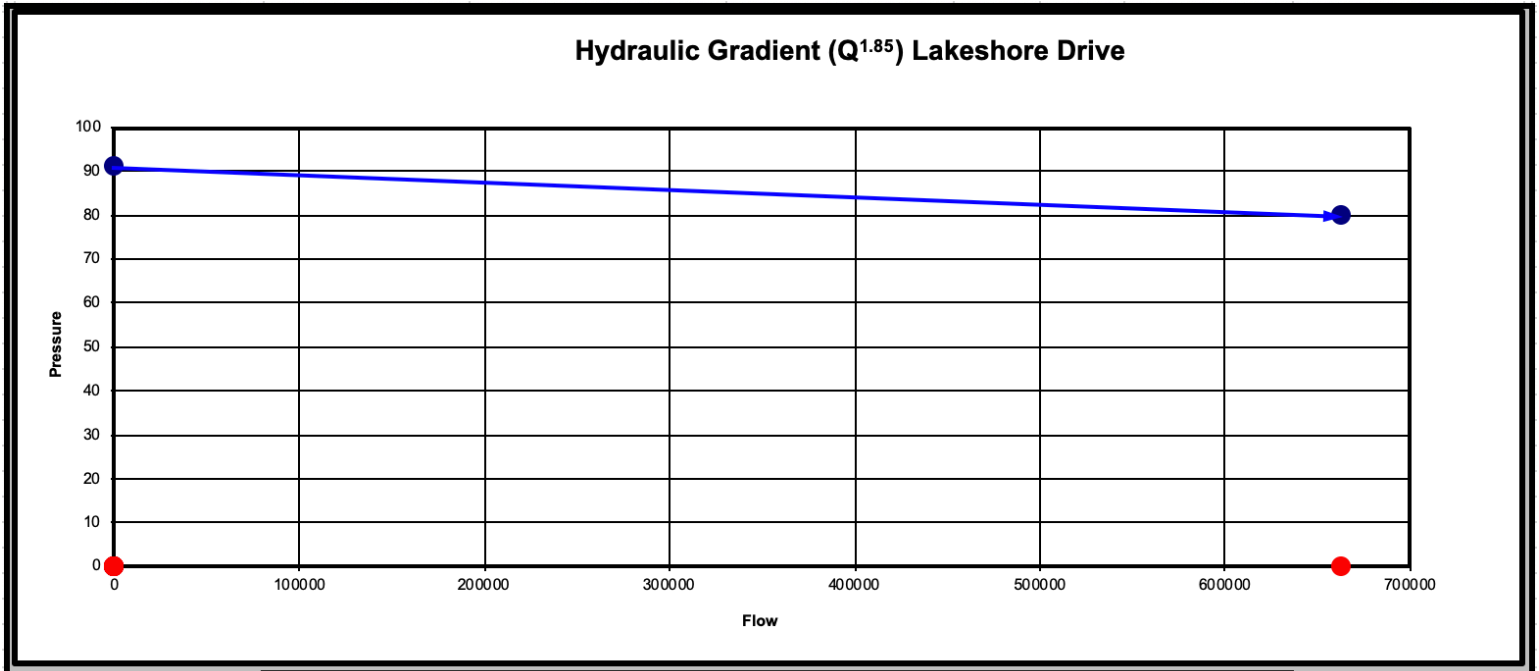
Static Pressure	**R1**	**R2**	PSI
	91		

						Flow		**Residual Pressure**	
Test	Configuration	Pitot 1	Pitot 2	Pitot 3	Pitot 4	Nozzle Coefficient	USGPM	R1	R2
A	1 X 2.5"	HoseMonster							
B	2 X 2.5"	HoseMonster				0.9	1402	80.0	
C							0		
D							0		
E							0		
F							0		
G							0		
H							0		
I							0		

Test	**Flow Characteristics**				**Projected Flow @ 20 PSI**		**NFPA Rating**	
	Velocity (fps)	USGPM	MGD	cu. ft per min	R1	R2	**R1**	**R2**
A								
B	15.908	1402	2.0	3.123	3838		CLASS AA - BLUE	
C					0			
D					0			
E					0			
F					0			
G					0			
H					0			
I					0			

Notes	

Fire Flow Hydraulic Gradient Line Graph: Lakeshore Drive



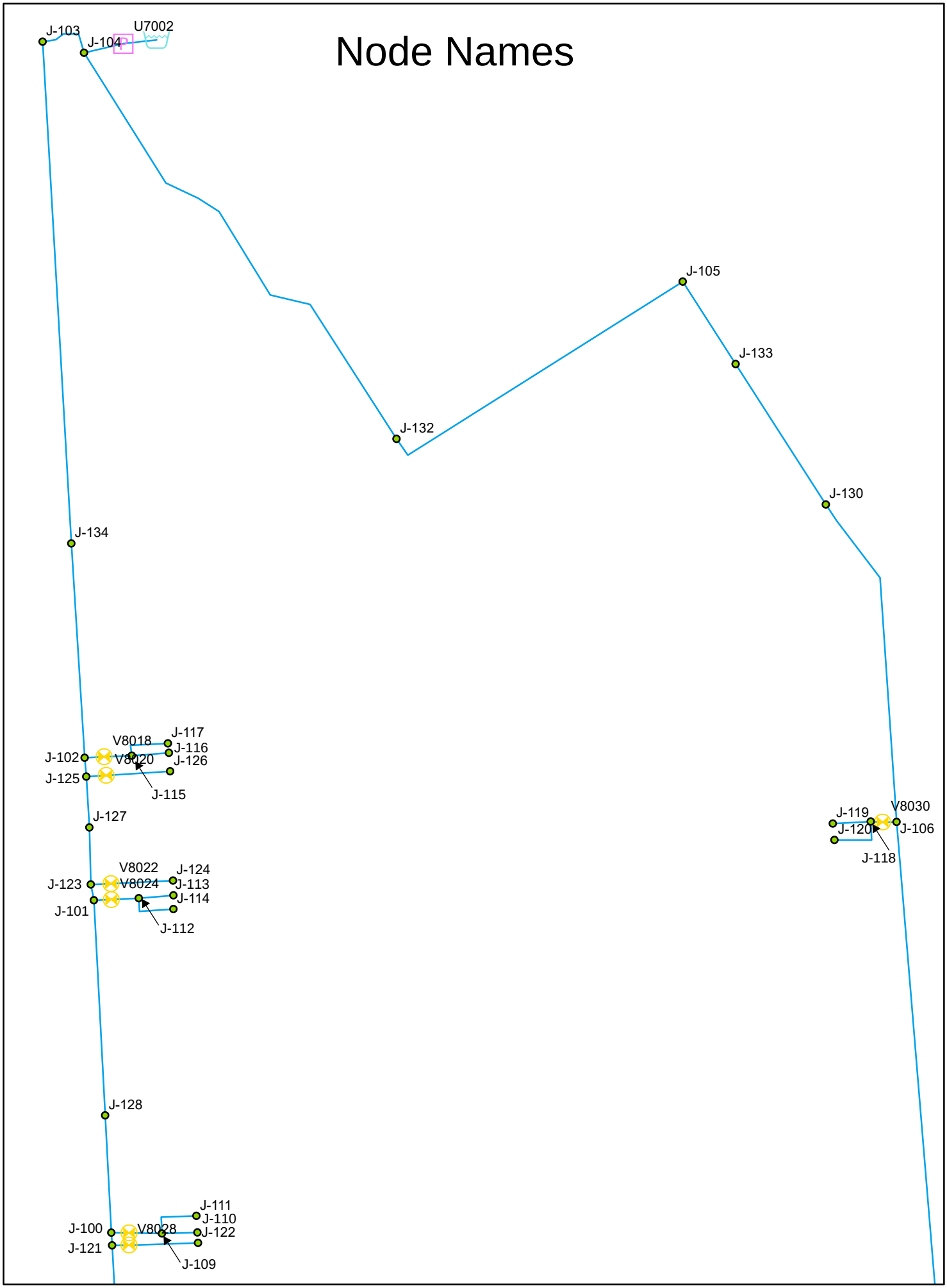
Test	Flow (USGPM)	Flow ($Q^{1.85}$)	R1	R1
Static	0	0	91	0
A	0	0	0	0
B	1402	662954.6563	80	0
C	0	0	0	0
D	0	0	0	0
E	0	0	0	0
F	0	0	0	0
G	0	0	0	0
H	0	0	0	0

Static & Residual Pressure Graph: Lakeshore Drive

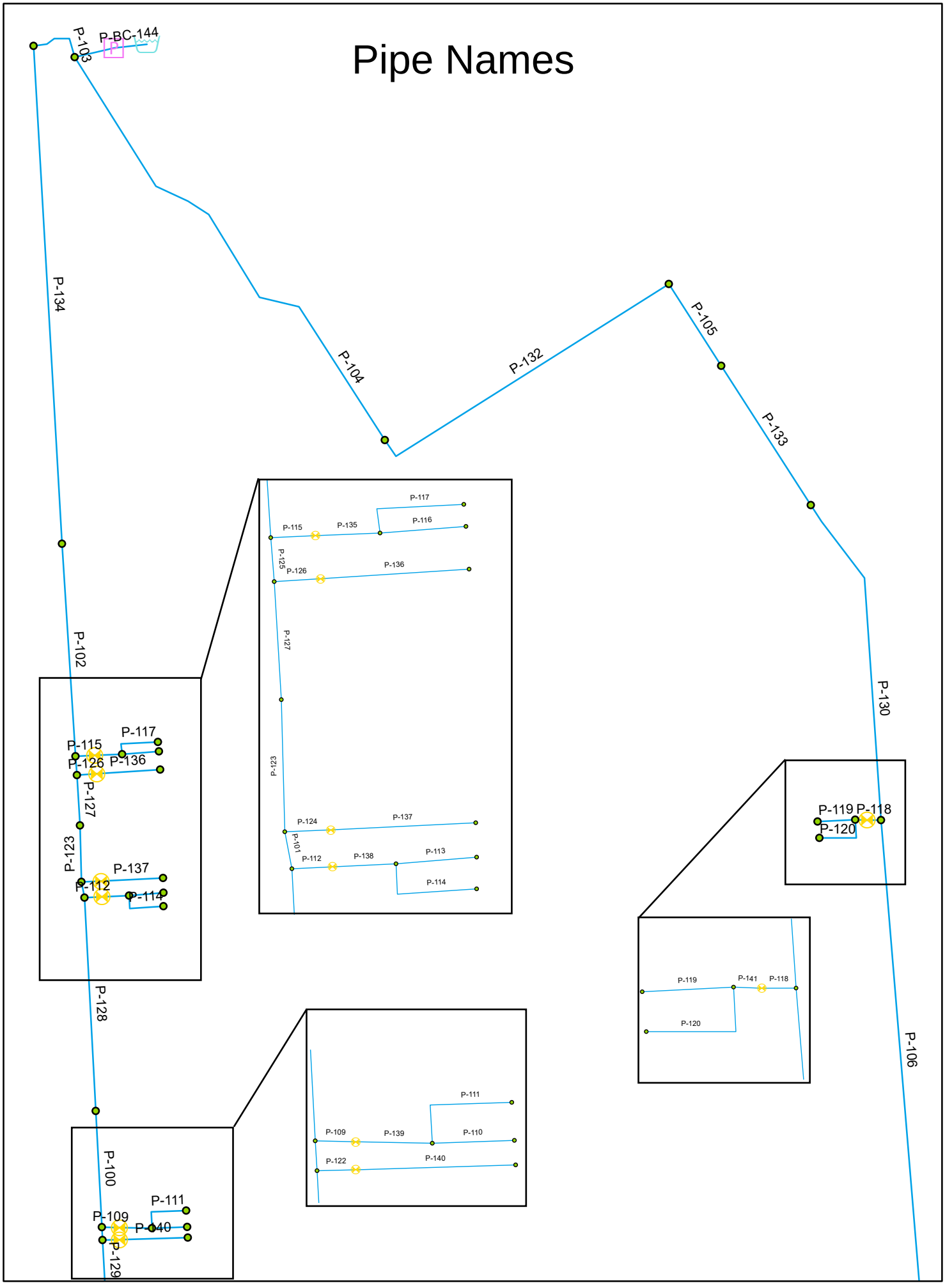
Appendix B

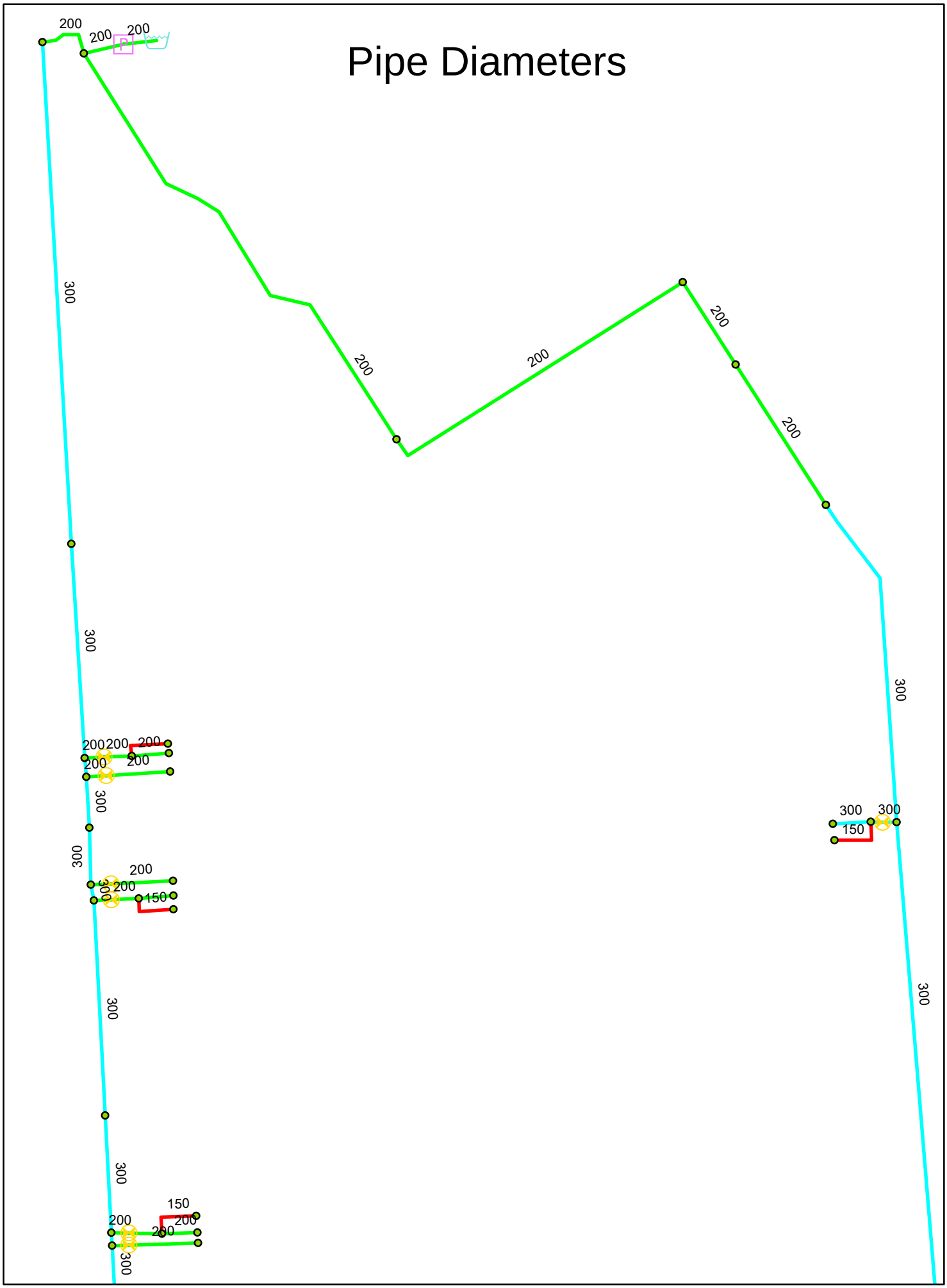
Model Results

Node Names


J-103
U7002
J-104
J-105
J-133
J-132
J-130
J-134
V8018
J-117
J-116
J-102
V8020
J-126
J-125
J-115
J-127
J-119
V8030
J-120
J-106
J-118
V8022
J-124
J-123
V8024
J-113
J-114
J-101
J-112
J-128
J-111
J-110
J-100
V8028
J-122
J-121
J-109

Pipe Names


P-103
P-BC-144
P-134
P-104
P-132
P-105
P-133
P-130
P-106
P-102
P-115
P-117
P-126
P-136
P-127
P-123
P-137
P-112
P-114
P-128
P-100
P-111
P-109
P-140
P-129
P-135
P-116
P-125
P-124
P-101
P-138
P-113
P-139
P-110
P-122
P-119
P-118
P-120
P-141


Pipe Diameters
200
200
200
300
200
200
200
300
300
200
200
200
200
200
300
300
200
200
150
300
300
300
300
150
200
200
200
300
300
300
300
300

Minimum Hour

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
J-100	0.00	221.19	284.00	89.29
J-101	0.00	221.63	284.00	88.66
J-102	0.00	221.85	284.00	88.35
J-103	0.00	224.00	284.00	85.30
J-104	0.00	224.10	284.00	85.16
J-105	0.00	221.50	284.00	88.85
J-106	0.00	220.67	284.00	90.02
J-109	0.00	222.00	283.74	87.78
J-110	0.00	222.00	283.74	87.78
J-111	1.03	222.00	283.74	87.77
J-112	0.00	222.00	283.68	87.68
J-113	0.00	222.00	283.68	87.68
J-114	1.26	222.00	283.68	87.68
J-115	0.00	222.00	283.70	87.72
J-116	0.00	222.00	283.70	87.72
J-117	1.18	222.00	283.70	87.72
J-118	0.00	220.00	283.94	90.90
J-119	0.00	220.00	283.94	90.90
J-120	1.22	220.00	283.94	90.90
J-121	0.00	221.19	284.00	89.29
J-122	0.00	222.00	284.00	88.13
J-123	0.00	221.65	284.00	88.63
J-124	0.00	222.00	284.00	88.13
J-125	0.00	221.82	284.00	88.39
J-126	0.00	222.00	284.00	88.13
J-127	0.00	221.69	284.00	88.58
J-128	0.00	221.35	284.00	89.07
J-129	0.00	222.12	284.00	87.96
J-130	0.00	221.13	284.00	89.37
J-132	0.00	222.55	284.00	87.36
J-133	0.00	221.36	284.00	89.04
J-134	0.00	222.49	284.00	87.44
MIN		**220.00**		**85.16**
MAX		**224.10**		**90.90**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
P-100	J-100	J-128	32.73	300	120	-1.10	0.02
P-101	J-101	J-123	4.52	300	120	-2.36	0.03
P-102	J-102	J-134	59.86	300	120	-3.54	0.05
P-103	J-104	J-103	16.06	200	110	3.54	0.11
P-104	J-104	J-132	143.12	200	110	1.19	0.04
P-105	J-105	J-133	27.30	200	110	1.19	0.04
P-109	J-100	V8026	4.90	200	110	1.03	0.03
P-110	J-109	J-110	9.91	200	110	0.00	0.00
P-111	J-109	J-111	14.47	150	100	1.03	0.06
P-112	J-101	V8024	4.90	200	110	1.26	0.04
P-113	J-112	J-113	9.72	200	110	0.00	0.00
P-114	J-112	J-114	13.20	150	100	1.26	0.07
P-115	J-102	V8018	5.38	200	110	1.18	0.04
P-116	J-115	J-116	10.35	200	110	0.00	0.00
P-117	J-115	J-117	13.40	150	100	1.18	0.07
P-118	J-106	V8030	3.96	300	120	1.22	0.02
P-119	J-118	J-119	10.60	300	120	0.00	0.00
P-120	J-118	J-120	15.53	150	100	1.22	0.07
P-121	J-121	J-100	3.60	300	120	-0.07	0.00
P-122	J-121	V8028	4.68	200	110	0.00	0.00
P-123	J-123	J-127	15.88	300	120	-2.36	0.03
P-124	J-123	V8022	5.53	200	110	0.00	0.00
P-125	J-125	J-102	5.31	300	120	-2.36	0.03
P-126	J-125	V8020	5.59	200	110	0.00	0.00
P-127	J-127	J-125	14.21	300	120	-2.36	0.03
P-128	J-128	J-101	60.07	300	120	-1.10	0.02
P-130	J-130	J-106	93.70	300	120	1.19	0.02
P-132	J-132	J-105	96.22	200	110	1.19	0.04
P-133	J-133	J-130	46.58	200	110	1.19	0.04
P-134	J-134	J-103	140.22	300	120	-3.54	0.05
P-135	V8018	J-115	7.78	200	110	1.18	0.04
P-136	V8020	J-126	17.87	200	110	0.00	0.00
P-137	V8022	J-124	17.43	200	110	0.00	0.00
P-138	V8024	J-112	7.64	200	110	1.26	0.04
P-139	V8026	J-109	9.23	200	110	1.03	0.03
P-140	V8028	J-122	19.30	200	110	0.00	0.00
P-141	V8030	J-118	3.28	300	120	1.22	0.02

Valve Table

ID	Diameter (mm)	Elevation (m)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (L/s)	Velocity (m/s)	Headloss (m)
V8018	200	222.00	88.13	87.72	1.18	0.04	0.29
V8020	200	222.00	88.13	88.13	0.00	0.00	0.00
V8022	200	222.00	88.13	88.13	0.00	0.00	0.00
V8024	200	222.00	88.13	87.69	1.26	0.04	0.32
V8026	200	222.00	88.13	87.78	1.03	0.03	0.25
V8028	200	222.00	88.13	88.13	0.00	0.00	0.00
V8030	300	220.00	90.98	90.90	1.22	0.02	0.06

Maximum Day

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
J-100	0.00	221.19	283.65	88.80
J-101	0.00	221.63	283.65	88.17
J-102	0.00	221.85	283.66	87.87
J-103	0.00	224.00	283.70	84.87
J-104	0.00	224.10	283.72	84.76
J-105	0.00	221.50	283.67	88.38
J-106	0.00	220.67	283.65	89.53
J-109	0.00	222.00	282.24	85.64
J-110	0.00	222.00	282.24	85.64
J-111	4.10	222.00	282.23	85.63
J-112	0.00	222.00	282.08	85.41
J-113	0.00	222.00	282.08	85.41
J-114	5.03	222.00	282.07	85.39
J-115	0.00	222.00	282.10	85.43
J-116	0.00	222.00	282.10	85.43
J-117	4.73	222.00	282.08	85.41
J-118	0.00	220.00	283.59	90.40
J-119	0.00	220.00	283.59	90.40
J-120	4.89	220.00	283.57	90.38
J-121	0.00	221.19	283.65	88.80
J-122	0.00	222.00	283.65	87.64
J-123	0.00	221.65	283.65	88.14
J-124	0.00	222.00	283.65	87.65
J-125	0.00	221.82	283.66	87.90
J-126	0.00	222.00	283.66	87.65
J-127	0.00	221.69	283.66	88.10
J-128	0.00	221.35	283.65	88.58
J-129	0.00	222.12	283.65	87.47
J-130	0.00	221.13	283.65	88.88
J-132	0.00	222.55	283.69	86.93
J-133	0.00	221.36	283.67	88.57
J-134	0.00	222.49	283.67	86.97
MIN		**220.00**		**84.76**
MAX		**224.10**		**90.40**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
P-100	J-100	J-128	32.73	300	120	-4.27	0.06
P-101	J-101	J-123	4.52	300	120	-9.30	0.13
P-102	J-102	J-134	59.86	300	120	-14.03	0.20
P-103	J-104	J-103	16.06	200	110	14.03	0.45
P-104	J-104	J-132	143.12	200	110	4.72	0.15
P-105	J-105	J-133	27.30	200	110	4.72	0.15
P-109	J-100	V8026	4.90	200	110	4.10	0.13
P-110	J-109	J-110	9.91	200	110	0.00	0.00
P-111	J-109	J-111	14.47	150	100	4.10	0.23
P-112	J-101	V8024	4.90	200	110	5.03	0.16
P-113	J-112	J-113	9.72	200	110	0.00	0.00
P-114	J-112	J-114	13.20	150	100	5.03	0.28
P-115	J-102	V8018	5.38	200	110	4.73	0.15
P-116	J-115	J-116	10.35	200	110	0.00	0.00
P-117	J-115	J-117	13.40	150	100	4.73	0.27
P-118	J-106	V8030	3.96	300	120	4.89	0.07
P-119	J-118	J-119	10.60	300	120	0.00	0.00
P-120	J-118	J-120	15.53	150	100	4.89	0.28
P-121	J-121	J-100	3.60	300	120	-0.17	0.00
P-122	J-121	V8028	4.68	200	110	0.00	0.00
P-123	J-123	J-127	15.88	300	120	-9.30	0.13
P-124	J-123	V8022	5.53	200	110	0.00	0.00
P-125	J-125	J-102	5.31	300	120	-9.30	0.13
P-126	J-125	V8020	5.59	200	110	0.00	0.00
P-127	J-127	J-125	14.21	300	120	-9.30	0.13
P-128	J-128	J-101	60.07	300	120	-4.27	0.06
P-130	J-130	J-106	93.70	300	120	4.72	0.07
P-132	J-132	J-105	96.22	200	110	4.72	0.15
P-133	J-133	J-130	46.58	200	110	4.72	0.15
P-134	J-134	J-103	140.22	300	120	-14.03	0.20
P-135	V8018	J-115	7.78	200	110	4.73	0.15
P-136	V8020	J-126	17.87	200	110	0.00	0.00
P-137	V8022	J-124	17.43	200	110	0.00	0.00
P-138	V8024	J-112	7.64	200	110	5.03	0.16
P-139	V8026	J-109	9.23	200	110	4.10	0.13
P-140	V8028	J-122	19.30	200	110	0.00	0.00
P-141	V8030	J-118	3.28	300	120	4.89	0.07

Valve Table

ID	Diameter (mm)	Elevation (m)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (L/s)	Velocity (m/s)	Headloss (m)
V8018	200	222.00	87.65	85.43	4.73	0.15	1.56
V8020	200	222.00	87.65	87.65	0.00	0.00	0.00
V8022	200	222.00	87.65	87.65	0.00	0.00	0.00
V8024	200	222.00	87.65	85.41	5.03	0.16	1.57
V8026	200	222.00	87.64	85.64	4.10	0.13	1.41
V8028	200	222.00	87.64	87.64	0.00	0.00	0.00
V8030	300	220.00	90.49	90.40	4.89	0.07	0.06

Peak Hour

Node Table

ID	Demand	Elevation	Head	Pressure
	(L/s)	*(m)*	*(m)*	*(psi)*
J-100	0.00	221.19	283.22	88.18
J-101	0.00	221.63	283.22	87.56
J-102	0.00	221.85	283.23	87.26
J-103	0.00	224.00	283.32	84.32
J-104	0.00	224.10	283.37	84.26
J-105	0.00	221.50	283.26	87.80
J-106	0.00	220.67	283.22	88.92
J-109	0.00	222.00	281.60	84.73
J-110	0.00	222.00	281.60	84.73
J-111	6.15	222.00	281.58	84.69
J-112	0.00	222.00	281.54	84.65
J-113	0.00	222.00	281.54	84.65
J-114	7.54	222.00	281.51	84.60
J-115	0.00	222.00	281.57	84.69
J-116	0.00	222.00	281.57	84.69
J-117	7.10	222.00	281.54	84.64
J-118	0.00	220.00	283.15	89.78
J-119	0.00	220.00	283.15	89.78
J-120	7.33	220.00	283.12	89.73
J-121	0.00	221.19	283.22	88.18
J-122	0.00	222.00	283.22	87.03
J-123	0.00	221.65	283.22	87.53
J-124	0.00	222.00	283.22	87.04
J-125	0.00	221.82	283.23	87.30
J-126	0.00	222.00	283.23	87.04
J-127	0.00	221.69	283.23	87.49
J-128	0.00	221.35	283.22	87.96
J-129	0.00	222.12	283.22	86.85
J-130	0.00	221.13	283.22	88.27
J-132	0.00	222.55	283.31	86.38
J-133	0.00	221.36	283.25	87.97
J-134	0.00	222.49	283.26	86.38
MIN		**220.00**		**84.26**
MAX		**224.10**		**89.78**

Pipe Table

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	*(mm)*	*(C)*	*(L/s)*	*(m/s)*
P-100	J-100	J-128	32.73	300	120	-6.62	0.09
P-101	J-101	J-123	4.52	300	120	-14.16	0.20
P-102	J-102	J-134	59.86	300	120	-21.26	0.30
P-103	J-104	J-103	16.06	200	110	21.26	0.68
P-104	J-104	J-132	143.12	200	110	7.16	0.23
P-105	J-105	J-133	27.30	200	110	7.16	0.23
P-109	J-100	V8026	4.90	200	110	6.15	0.20
P-110	J-109	J-110	9.91	200	110	0.00	0.00
P-111	J-109	J-111	14.47	150	100	6.15	0.35
P-112	J-101	V8024	4.90	200	110	7.54	0.24
P-113	J-112	J-113	9.72	200	110	0.00	0.00
P-114	J-112	J-114	13.20	150	100	7.54	0.43
P-115	J-102	V8018	5.38	200	110	7.10	0.23
P-116	J-115	J-116	10.35	200	110	0.00	0.00
P-117	J-115	J-117	13.40	150	100	7.10	0.40
P-118	J-106	V8030	3.96	300	120	7.33	0.10
P-119	J-118	J-119	10.60	300	120	0.00	0.00
P-120	J-118	J-120	15.53	150	100	7.33	0.41
P-121	J-121	J-100	3.60	300	120	-0.47	0.01
P-122	J-121	V8028	4.68	200	110	0.00	0.00
P-123	J-123	J-127	15.88	300	120	-14.16	0.20
P-124	J-123	V8022	5.53	200	110	0.00	0.00
P-125	J-125	J-102	5.31	300	120	-14.16	0.20
P-126	J-125	V8020	5.59	200	110	0.00	0.00
P-127	J-127	J-125	14.21	300	120	-14.16	0.20
P-128	J-128	J-101	60.07	300	120	-6.62	0.09
P-130	J-130	J-106	93.70	300	120	7.16	0.10
P-132	J-132	J-105	96.22	200	110	7.16	0.23
P-133	J-133	J-130	46.58	200	110	7.16	0.23
P-134	J-134	J-103	140.22	300	120	-21.26	0.30
P-135	V8018	J-115	7.78	200	110	7.10	0.23
P-136	V8020	J-126	17.87	200	110	0.00	0.00
P-137	V8022	J-124	17.43	200	110	0.00	0.00
P-138	V8024	J-112	7.64	200	110	7.54	0.24
P-139	V8026	J-109	9.23	200	110	6.15	0.20
P-140	V8028	J-122	19.30	200	110	0.00	0.00
P-141	V8030	J-118	3.28	300	120	7.33	0.10

Valve Table

ID	Diameter (mm)	Elevation (m)	Upstream Pressure (psi)	Downstream Pressure (psi)	Flow (L/s)	Velocity (m/s)	Headloss (m)
V8018	200	222.00	87.04	84.69	7.10	0.23	1.65
V8020	200	222.00	87.04	87.04	0.00	0.00	0.00
V8022	200	222.00	87.04	87.04	0.00	0.00	0.00
V8024	200	222.00	87.03	84.65	7.54	0.24	1.67
V8026	200	222.00	87.03	84.73	6.15	0.20	1.61
V8028	200	222.00	87.03	87.03	0.00	0.00	0.00
V8030	300	220.00	89.87	89.78	7.33	0.10	0.06

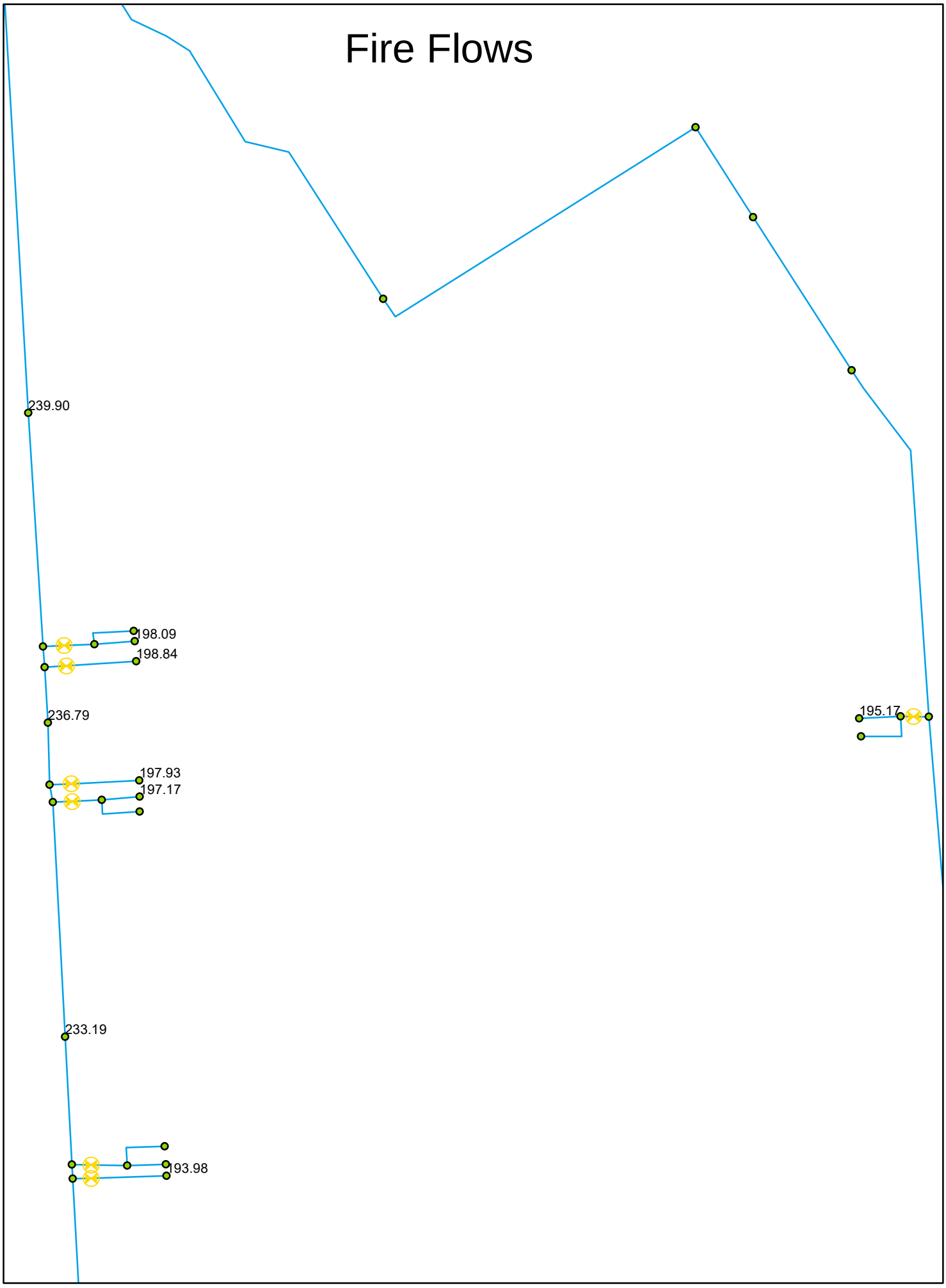
Existing Conditions
Bradford St, Barrie ON
December 17, 2019

Municipal Engineering Solutions

Fire Flow Table			
ID	Total Demand	Available Flow	**Fire Flow Met?**
	(L/s)	*(L/s)*	
J-110	189.00	193.24	**TRUE**
J-113	189.00	197.17	**TRUE**
J-116	189.00	198.09	**TRUE**
J-119	189.00	195.17	**TRUE**
J-122	189.00	193.98	**TRUE**
J-124	189.00	197.93	**TRUE**
J-126	189.00	198.84	**TRUE**
J-127	189.00	236.79	**TRUE**
J-128	189.00	233.19	**TRUE**
J-134	189.00	239.90	**TRUE**

MIN	**193.24**
MAX	**239.90**

Fire Flows



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