

# Draft Functional Servicing Report – Pape Transit Oriented Communities

670-710 Danforth Avenue, 2-16 Eaton Avenue, 1-25 Lipton Avenue, 11-15  
Gertrude Place  
Toronto Ontario M4J 1L1

Issued for Rezoning

Contract RFS-2019-NAFC-110

PO 214244

HDR Project 10206938



Ontario Line Technical Advisor

TORONTO, ONTARIO

November 2022

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## Abbreviations

|        |  |
|--------|--|
| BMP    | Best Management Practice                             |
| DRM    | Design Requirement Manual                            |
| GFA    | Gross Floor Area                                     |
| HGL    | Hydraulic Grade Lines                                |
| HGRA   | High Volume Groundwater Recharge Areas               |
| IBC    | Initial Business Case                                |
| IDF    | Intensity-Duration-Frequency                         |
| IO     | Infrastructure Ontario                               |
| MECP   | Ministry of the Environment, Conservation, and Parks |
| OGS    | Oil and Grit Separator                               |
| OL     | Ontario Line   |
| RCD    | Reference Concept Design                             |
| SUE    | Subsurface Utility Engineering                       |
| TGS    | Toronto Green Standard                               |
| TCM681 | Toronto Municipal Code Chapter 681                   |
| TOC    | Transit Oriented Communities                         |
| TSS    | Total Suspended Solids                               |
| TRCA   | Toronto and Region Conservation Authority            |
| WWFMG  | Wet Weather Flow Management Guidelines               |

# 1 Introduction

The Province of Ontario is planning to build a new 15.5 km rapid transit line serving the City of Toronto. The development of this line is being managed jointly by Metrolinx, the Provincial Transit Agency responsible for the Greater Toronto and Hamilton Area, and Infrastructure Ontario (IO). Transit-Oriented Communities (TOC) are proposed at the Ontario Line Stations to integrate high density, mixed-use developments with the transit infrastructure.

HDR Inc. has been retained by Metrolinx to prepare a Functional Servicing Report to assess the servicing requirements related to the proposed Pape Station TOC at two separate sites in the Liberty Village neighbourhood near the future Pape Station. This Functional Servicing Report provides a conceptual study for water distribution, sanitary sewer, and storm drainage for the proposed developments.

A Stormwater Management Report outlining the proposed stormwater management strategy for this site has been prepared by OneTeam under a separate cover. In preparation of this report, OneTeam staff reviewed the available information for existing utilities and the associated Ontario Line Reference Concept Design (RCD) plans.

## 1.1 Site Description

There are two proposed developments in the Greektown area of Toronto next to the TTC Pape station.

The South Site (670 – 710 Danforth Avenue, 2 – 16 Eaton Avenue, 1 – 25 Lipton Avenue) is located at the southeastern end of Eaton Avenue and is bounded by Pape Avenue to the west, Lipton Avenue to the north and Danforth Avenue to the south. The existing site consists of a two-storey mixed-use building with a mix of restaurants and retail on Danforth Avenue. The north limit on Lipton Avenue and Eaton Avenue consists of residential town homes with parking spaces.

The North Site (11 – 15 Gertrude Place) is a smaller area and is located south of Gertrude Place and north of Lipton Avenue. This existing site consists of three residential buildings and parking stalls.



**Figure 1-1 Aerial Map of Proposed Site Locations**

## 1.2 Proposed Development

Based on the preliminary reference concept designs, the proposed development at the South Site is a mixed-use building with various levels across the site. There is a twenty-nine-storey mixed use building combined with an eleven-storey mixed used building east of Pape Avenue. This building entails of retail and transit area on the first floor and residential area above. This building is also connected to a seven-storey mixed use building west of Eaton Avenue. It is also consisting of retail space on the ground floor and residential area on the floors above. These buildings will have a multi-level underground parking garage to accommodate the expected residential, and retail vehicle parking requirements. There is a proposal of 462 bicycle parking spots available on this site.

The North Site consists of a 7-storey mixed used building with non-residential areas on the first 2 levels and residential units above. There is also a basement with bicycle parking, storage and mechanical/utility rooms. West of the 7-storey building is an emergency exit building for the station.

## 2 Site Condition

### 2.1 Existing Topography

The South Site is situated on a generally flat surface consisting of two- to three-storey buildings occupying north of the Danforth Avenue and consists of town homes west of Eaton Avenue and south of Lipton Avenue. The site is lined with a sidewalk separating the site from the adjacent property. This site has an approximate area of 0.62 Ha (6,214 m<sup>2</sup>).

The existing two-to-three storey buildings is located north of Danforth Avenue. The existing ground condition of the property currently slopes from the northwest towards southwest. Existing grade on Danforth Avenue slopes west towards Pape Avenue and east towards Eaton Avenue, with high point at approximately midblock. The proposed transit and residential building are located on the southwest and northwest corner of the site next to the existing four-storey medical center.

The townhomes located west of Eaton Avenue are situated on a generally a flat terrain which gradually slopes down from southeast towards northeast. The grade on Eaton Avenue also slopes down in the same manner. The proposed mixed-use building will be located on the southeast and northeast corner of the site (adjacent to Eaton Avenue).

The North Site has a generally flat terrain sloping south towards the north. Gertrude Place is sloping east and is generally flat towards the end of the road.

### 2.2 Existing Utility Information

The existing utility information surrounding the sites is provided on the Site Servicing Plan attached in **Appendix A**. Note that all existing utility information is based on Quality Levels B, C, and D Subsurface Utility Engineering (SUE) investigation that was carried out in 2020. Prior to detailed design and construction, it is recommended that the OneTeam and Development Co confirm the existing underground and aerial utilities and the vertical elevation information. At the time when this report is prepared, the sewer capacity information was not available.

### 2.3 Proposed Site Grading

The proposed grading developments are provided in **Appendix A**.

The proposed grading for the South Site follows the existing topography in general. A high point is proposed at midblock connection, allowing positive drainage to the north towards the proposed Woonerf Laneway and to the south towards Danforth Avenue. Water runoff (within allowable limits) will be discharged to the storm sewer on Danforth Avenue via 250 mm and 200 mm proposed storm sewer connection.

The proposed grading for the North Site also follows the existing topography of the site with the high elevations at the south side of the site. The surface water will be draining away from the building and flowing towards Gertrude Place.



## 3 Water Supply

### 3.1 Existing Condition

The existing watermain infrastructure in the vicinity of South Site includes a 300 mm watermain running along Danforth Avenue and a 150 mm watermain along Eaton Avenue.

There are numerous water service connections of unknown diameter running perpendicular to the road around the South Site.

The existing watermain infrastructure in the vicinity of North Site includes a 150 mm watermain on Gertrude Place, and a 600 mm and a 150 mm watermain along Pape Avenue.

There are multiple water service connections to the 150 mm watermain on Gertrude Place.

### 3.2 Water Supply

Under the Ontario Building Code (OBC), every dwelling unit shall be supplied with a water distribution system where drinking water is available (Section 9.31.3.1). The OBC also states that every water distribution system shall be connected to a watermain that is part of the municipal drinking water system unless otherwise stated in OBC Article 7.1.5.3.

The OBC also requires that both office space and residential space be built from non-combustible construction, and sprinklered, unless otherwise stated in Subsection 3.2.6 and 3.2.2.7 of the Code. In addition, the OBC does not require fire hydrants within a building but mandates that a hydrant is located within 90 m horizontally of any portion of a building perimeter which is required to face a street.

The watermain network will be designed and constructed to the City of Toronto's *Design Criteria for Sewers and Watermains (2021)*. A Site Servicing Plan in **Appendix A** has been prepared to show the potential locations of the watermain service connections to the developments. The water demand for the proposed sites was calculated per City of Toronto's *Design Criteria for Sewers and Watermains (2021)* and using site statistics provided by the architect. Water demand calculation summaries for West and East Building are provided in **Table 3-1** and **Table 3-2** respectively.

**Table 3-1 South Site Water Demand Calculation Summary**

| Parameter/ Items                   | Residential           | Non-residential      |
|------------------------------------|-----------------------|----------------------|
| Average Day Water Consumption Rate | 190 L/capita/day      | 190 L/capita/day     |
| Total Site Area                    | 6,214 m <sup>2</sup>  |                      |
| Total GFA                          | 35,440 m <sup>2</sup> | 1,730 m <sup>2</sup> |
| Residential units                  | 414                   | n/a                  |
| Residential/ commercial population | 1,118                 | 20                   |
| Peaking factor – peak hour         | 2.5                   | 1.2                  |
| Average Water Demand from Site     | 2.5 L/s               | 0.04 L/s             |
| Maximum Day Flow Rate              | 3.2 L/s               | 0.05 L/s             |
| Peak Water Demand from Site        | 6.1 L/s               | 0.1 L/s              |

**Table 3-2 North Site Water Demand Calculation Summary**

| Parameter/ Items                   | Residential          | Non-residential    |
|------------------------------------|----------------------|--------------------|
| Average Day Water Consumption Rate | 190 L/capita/day     | 190 L/capita/day   |
| Total Site Area                    | 856 m <sup>2</sup>   |                    |
| Total GFA                          | 1,902 m <sup>2</sup> | 420 m <sup>2</sup> |
| Residential units                  | 25                   | n/a                |
| Residential/ commercial population | 68                   | 5                  |
| Peaking factor – peak hour         | 2.5 L/s              | 1.2 L/s            |
| Average Water Demand from Site     | 0.1 L/s              | 0.01 L/s           |
| Maximum Day Flow Rate              | 0.2 L/s              | 0.01 L/s           |
| Peak Water Demand from Site        | 0.4 L/s              | 0.01 L/s           |

The estimated fire flow requirements for each site were calculated based on recommendations by the *Fire Underwriters Survey Water Supply for Public Fire Protection (1999)* as per City's Guideline. These were determined to be 33,852.0 L/min for the South Site and 8,480.9 L/min for the North Site. Detailed calculations can be found in **Appendix B**.

The South Site east block is proposed to have two separate connections to the existing 300 mm mainline watermain since the tower has a height greater than 84 m. They will both have a 250 mm watermain connection connecting to the mainline along Danforth Avenue. Each of the 250 mm connections will split into a 200 mm fire service and 200 mm domestic water service per City of Toronto standards. The servicing requirements for the west block shall be confirmed during detailed design stage.

The North Site will have a single 150 mm water service connection to the existing 150 mm mainline watermain on Gertrude Place. This connection line will split into a 150 mm fire service and a 100 mm domestic service at the development end of the connection.

## 4 Sanitary Servicing

### 4.1 Existing Condition

The existing combined sewer infrastructure for the South Site includes a 450 mm combined sewer on Danforth Avenue and a 375 mm combined sewer along Eaton Avenue. The existing combined sewer infrastructure for the North Site includes a 375 mm combined sewer on Gertrude Place and a 450 mm combined sewer along Pape Avenue. There is no information about the existing sanitary connections based on the available SUE data.

### 4.2 Proposed Sanitary Flow

Sanitary flows for the proposed developments were calculated based on design parameters from the *City of Toronto Design Criteria for Sewers and Watermains (2021)* and site statistics provided by the architect. **Table 4-1** and **Table 4-2** summarize the sanitary flow calculations for the proposed development on the South and North Sites respectively. Detailed sanitary flow calculations are included in **Appendix C**.

**Table 4-1 South Site Sanitary Demand Calculation Summary**

| Parameter/ Items                            | Residential           | Non-residential        |
|---|-----------------------|------------------------|
| Sanitary Discharge Rate                     | 450 L/capita/day      | N/a                    |
| Commercial Average Flow                     | N/a                   | 180,000 L/floor ha/day |
| Total GFA                                   | 35,440 m <sup>2</sup> | 1,730 m <sup>2</sup>   |
| Peaking Factor                              | 3.8                   | N/a                    |
| Peak Sanitary Flow                          | 5.82 L/s              | 0.36 L/s               |
| Groundwater Discharge to Sanitary Sewer     | 0.16 L/s              |                        |
| Maximum Cumulative Flow with Peaking Factor | 22.65 L/s             |                        |

**Table 4-2 North Site Sanitary Demand Calculation Summary**

| Parameter/ Items                            | Residential          | Non-residential        |
|---|----------------------|------------------------|
| Sanitary Discharge Rate                     | 450 L/capita/day     | N/a                    |
| Commercial Average Flow                     | N/a                  | 180,000 L/floor ha/day |
| Total GFA                                   | 1,902 m <sup>2</sup> | 420 m <sup>2</sup>     |
| Peaking Factor                              | 4.3                  | N/a                    |
| Peak Sanitary Flow                          | 0.35 L/s             | 0.09 L/s               |
| Groundwater Discharge to Sanitary Sewer     | 0.02 L/s             |                        |
| Maximum Cumulative Flow with Peaking Factor | 1.63 L/s             |                        |

### 4.3 Sanitary Service Connection

For the South Site a 200 mm and 300 mm sanitary connections to the existing 450 mm combined sewer on Danforth Avenue are proposed at the south side of the building. Servicing requirements for the commercial unit on the ground floor west of the Pape Station should be confirmed at the detailed design stage. For the North Site a 150 mm sanitary connection to the existing 375 mm combined sewer on Gertrude Place is proposed at the north side of the building.

# 5 Storm Drainage and Stormwater Management

## 5.1 Existing Condition

The existing conditions of the South Site are relatively flat terrain occupied by mixed use commercial-residential buildings on Danforth Avenue and Eaton Avenue, and residential buildings on Lipton Avenue. The South Site features a combination of impervious roof and pavement surfaces, and vegetated surfaces. The North Site is located on relatively flat terrain and is occupied by residential buildings along Gertrude Place. The North Site features a combination of impervious roof and pavement surfaces, and vegetated surfaces. Pape Station is located in the Don River Watershed. Pape Station is within Basement Flooding Study Area 32, which was started in 2008, and completed in 2012, according to the City of Toronto.

Existing storm sewers adjacent to the South Site include a 675 mm storm sewer along Eaton Avenue, flowing north to south and connecting into the Danforth Avenue storm sewer. A 1500 mm x 1200 mm storm sewer flows west to east along Danforth Avenue. A 300 mm combined sewer flows east to west along Lipton Avenue and connects into the 450 mm combined sewer on Pape Avenue. Existing storm sewers adjacent to the North Site include a 450 mm storm sewer flowing east to west along Gertrude Place, connecting to the 1200 mm storm sewer on Pape Avenue, flowing south to north. Refer to the attached existing conditions drainage plan in **Appendix D**. With the limited information that is currently available, assumptions for existing stormwater servicing for the proposed development area were made and are summarized in **Table 5-1**.

Major flows along Danforth Avenue flow west to east. Major flows on Eaton Avenue flow south to north. Major flows along Lipton Avenue flow east to west, onto Pape Avenue. A portion of major flows along Pape Avenue collect at a sag point at the intersection of Pape Avenue and Lipton Avenue. The remainder of major flows near the proposed development on Pape Avenue flow north to south. Major flows on Gertrude Place flow toward a sag point at the intersection of Gertrude Place and Muriel Avenue.

**Table 5-1 Assumed Pre-Development Stormwater Servicing**

| Address                             | Sub-catchment | Assumed Service                               |
|-------------------------------------|---------------|---|
| 11-15 Gertrude Pl.                  | 102           | Gertrude Place 450 mm R.C.P. Storm Sewer      |
| 1-25 Lipton Ave.                    | 101B          | Lipton Avenue 300 mm V.P. Combined Sewer      |
| 1-20 Eaton Ave<br>710 Danforth Ave. | 101C          | Eaton Avenue 375 mm Combined Sewer            |
| 670-708 Danforth Ave.               | 101A          | Danforth Avenue 1500 mm x 1200 mm Storm Sewer |

## 5.2 Stormwater Management Criteria

Stormwater management requirements are specified by the authorities having jurisdiction over the Project. These requirements apply to all locations where the proposed design will influence or be influenced by surface water runoff. The key criteria applicable to this Project are summarized in the following sections.

### 5.3.2 Quality Control

- Provide a long-term average removal of 80% of total suspended solids (TSS) from the storm runoff of additional impervious areas (Toronto and Region Conservation Authority (TRCA) Guidelines).
- Provide a long-term average removal of 80% of TSS on an annual loading basis from all the storm runoff leaving the site (Wet Weather Flow Management Guidelines (WWFMG), Toronto Green Standard (TGS)).
  - Oil Grit Separator (OGS) devices are credited with a maximum of 50% TSS removal (WWFMG, TRCA).

### 5.2.3 Quality/ Flood Control

- Protect against surface flooding from ponding on streets during the 100-year event. consult Toronto Water – Sewer Asset Planning Section for developments within the City's chronic basement flooding areas (WWFMG).
- Drainage discharged to the municipal storm sewer must be controlled to the peak release rate from the lower of:
  - the existing conditions peak flow from design event with a 2-year return period assuming a runoff coefficient of 0.5, if the existing imperviousness is greater than 50%; and,
  - the existing capacity of the storm sewer (WWFMG).
- In absence of an approved or adequate overland flow route, all flow from the 2-year up to the 100-year return storm events shall be stored on-site and released at the allowable release rate as defined above (WWFMG).
- Peak flows should be calculated using the Intensity-Duration-Frequency (IDF) information in the WWFMG.

### 5.3.4 Water Balance

- Retain all runoff from the 10 mm rainfall event on-site through infiltration, evaporation, and/or rainwater reuse (TGS - Tier 2).
- For sites located in High Groundwater Recharge Areas (HGRA, pre-development groundwater recharge rates should be maintained (TRCA).

### 5.3.5 Erosion Control

- For infill/redevelopment sites (<2 ha), where the site does not drain to a sensitive watercourse, erosion control should be provided through the retention of a small design rainfall event (typically 5 mm). This is often achieved by satisfying the water balance retention requirement (WWFMG, TRCA).
- For new large development sites (> 5 ha) discharge directly and/or in proximity (within 100 m) of natural watercourses, it is required to complete an Erosion Analysis Report to determine the erosion control criteria for the sites (WWFMG).
- For sites where it is not feasible (this condition must be reviewed and agreed by City staff) to complete an erosion analysis study report, it is typically required that runoff

from a 25 mm design storm shall be detained on-site and released over a minimum of 24 hours (WWFMG).

## 5.3 Stormwater Management Plan

As per the applicable SWM criteria summarized in **Section 5.3.1**, it is required to provide water balance, as well as quantity, quality, and erosion control for the proposed Pape Station TOC site. The stormwater best management practices (BMP) considered for the site include a green roof, underground storage and reuse tanks, and OGS units. The Proposed Conditions Drainage Plan is presented in **Appendix D**.

All building openings shall be protected from flooding. During detail design, depth of overland flow at these locations should be calculated using dual drainage models to confirm that all openings to the buildings will have sufficient freeboard above the maximum water elevation during the 100-year storm event.

The summary of required storage is presented below in **Table 5-2**.

### Quantity Control

A storage tank with orifice control can be installed in the first underground level to provide the required storage volume.

### Water Balance and Erosion Control

The total proposed green roof areas are 2,186 m<sup>2</sup> and 135 m<sup>2</sup> for the south and north sites, respectively. In concept, initial abstractions on the various surfaces will achieve a retention of 15.6 m<sup>3</sup>/event for the South Site and 1.4 m<sup>3</sup>/event for the North Site.

### Quality Control

A combination of a green roof, landscaping, water reuse, and an OGS units will provide the required quality control to the runoff leaving both South and North sites.

**Table 5-2 Summary of Required Storage**

| ID  | Site Area (ha) |       | Proposed Green Roof Area (ha) | Required Storage Volume for Quantity Control (m <sup>3</sup> ) | Required Storage Volume for Quality Control (m <sup>3</sup> ) | Required Storage Volume for Water Balance Reuse (m <sup>3</sup> ) |
|-----|----------------|-------|-------------------------------|--|---|---|
|     | Exist.         | Prop. |                               |  |   |   |
| 201 | 0.22           | 0.10  | 0.22                          | 192  | 9.4   | 15.4  |
| 202 | 0.31           | 0.16  | 0.02                          | 25   | 47.7  | 2.9   |

For details of the stormwater management requirement and design, refer to the Stormwater Management Report under a separate cover.

## 6 Site Utilities

This site will be serviced by utilities provided by Enbridge Gas, Toronto Hydro, and relevant telecommunications providers. Future utility coordination is required with each utility company to determine the feasibility, requirements, and connection locations for their respective service.

### 6.1 Electrical Service

Electrical services will be provided by Toronto Hydro. Surveys currently show existing Toronto Hydro conduits within the vicinity of all proposed developments, including an existing electrical service connection to the existing building at the South and North Site. The developer is to initiate discussions with Toronto Hydro to determine the requirements and connection locations for electrical service.

### 6.2 Gas Service

Gas service will be provided by Enbridge Gas. Available SUE surveys of the area indicate that the existing building at the South Site is currently serviced by a few gas lines connecting to the 150 mm gas main along Danforth Avenue. There are also a few connections connecting to the 50 mm gas main along Gertrude Place. The developer is to initiate discussions with Enbridge Gas to determine the connection requirements and locations of gas service to the proposed North and South Sites developments.

### 6.3 Communication

Surveys currently show cables from Rogers, Beanfield, and Bell traversing the extent of all sites. The developer is to coordinate with the relevant communication systems provider to determine connection requirements.

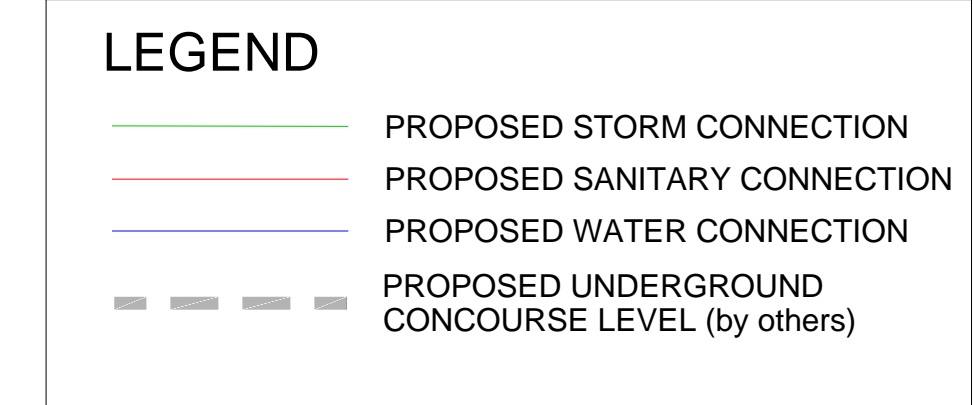
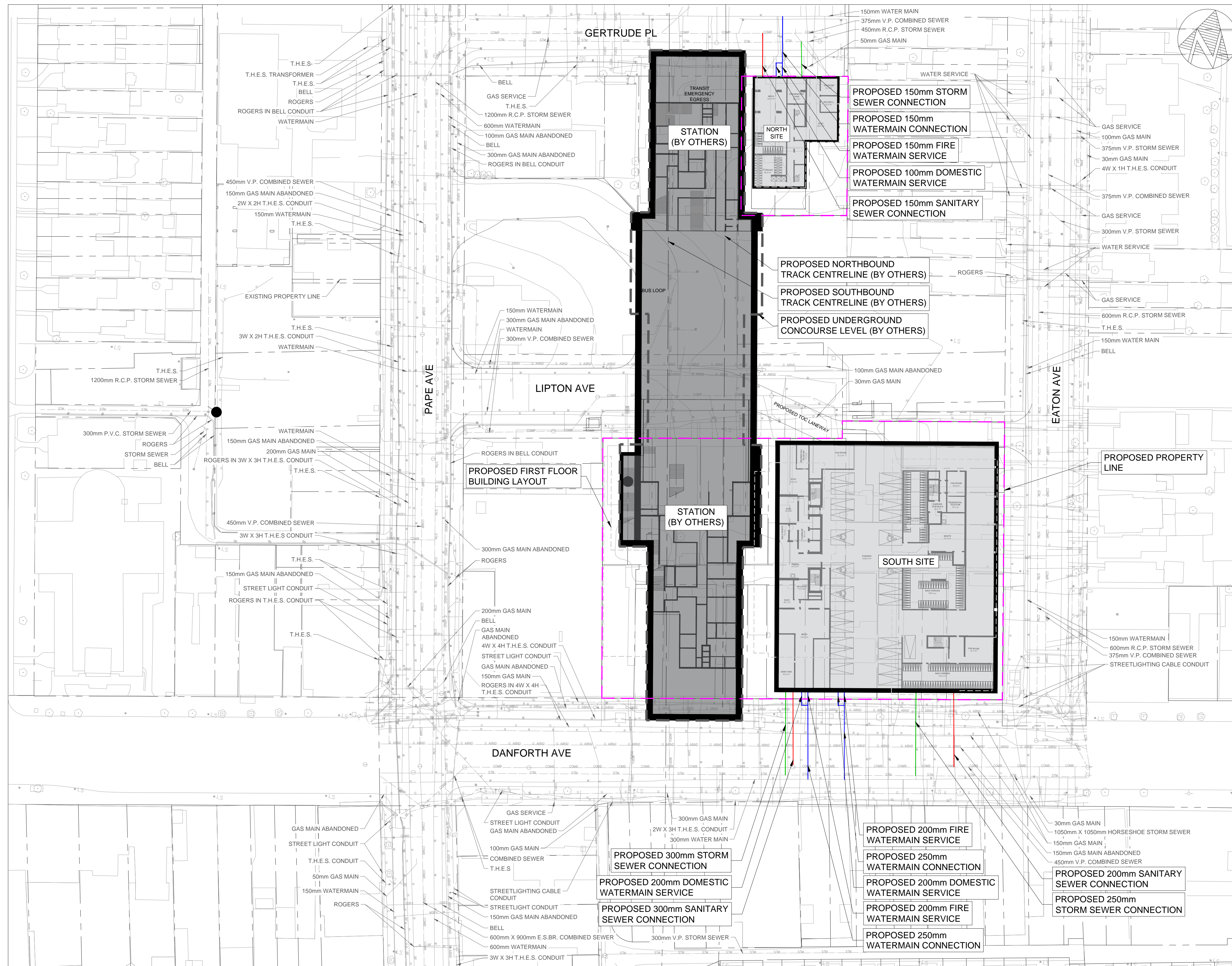
## 7 Conclusions and Summary

A Site Servicing plan has been prepared to support the preliminary rezoning submission for the proposed developments north of Danforth Avenue from Pape Avenue to Eaton Avenue and along Gertrude Place, in the City of Toronto. Due to limitations in the available existing utility information, this report focuses on the proposed developments water demand, sanitary demand, and stormwater management design requirements. To confirm the capacity of the existing water and sewer infrastructure to accommodate the proposed TOC, further studies and coordination with the City of Toronto are needed during the detailed design phase.



# Appendix A. Site Serving Plan and Grading Plan





- NOTES:**
- EXISTING UTILITY INFORMATION SHOWN IS BASED ON SUBSURFACE UTILITY ENGINEERING (SUE) QL-B, QL-C AND QL-D. ALL LOCATIONS AND DEPTH ARE TO BE CONFIRMED DURING DETAILED DESIGN STAGE.
  - NOT ALL AERIAL UTILITIES HAVE BEEN IDENTIFIED OR SHOWN ON THIS PLAN.
  - FINAL SITE SERVICING WILL BE AS PER TOC DESIGN DEVELOPMENT

FILE: 10206938-ss0500-04-sf003.dwg  
 PLOTTED BY: GARGAT, OLGA

| REVISIONS |                | REVISIONS |  |
|-----------|----------------|-----------|--|
| 1         | RCD 2022-10-26 | 4         |  |
| 2         |                | 5         |  |
| 3         |                | 6         |  |

**RCD**  
 NOT FOR CONSTRUCTION  
 DD MONTH YYYY

SCALE(S) 0 5 10 15 20m  
 1:500

STATUS



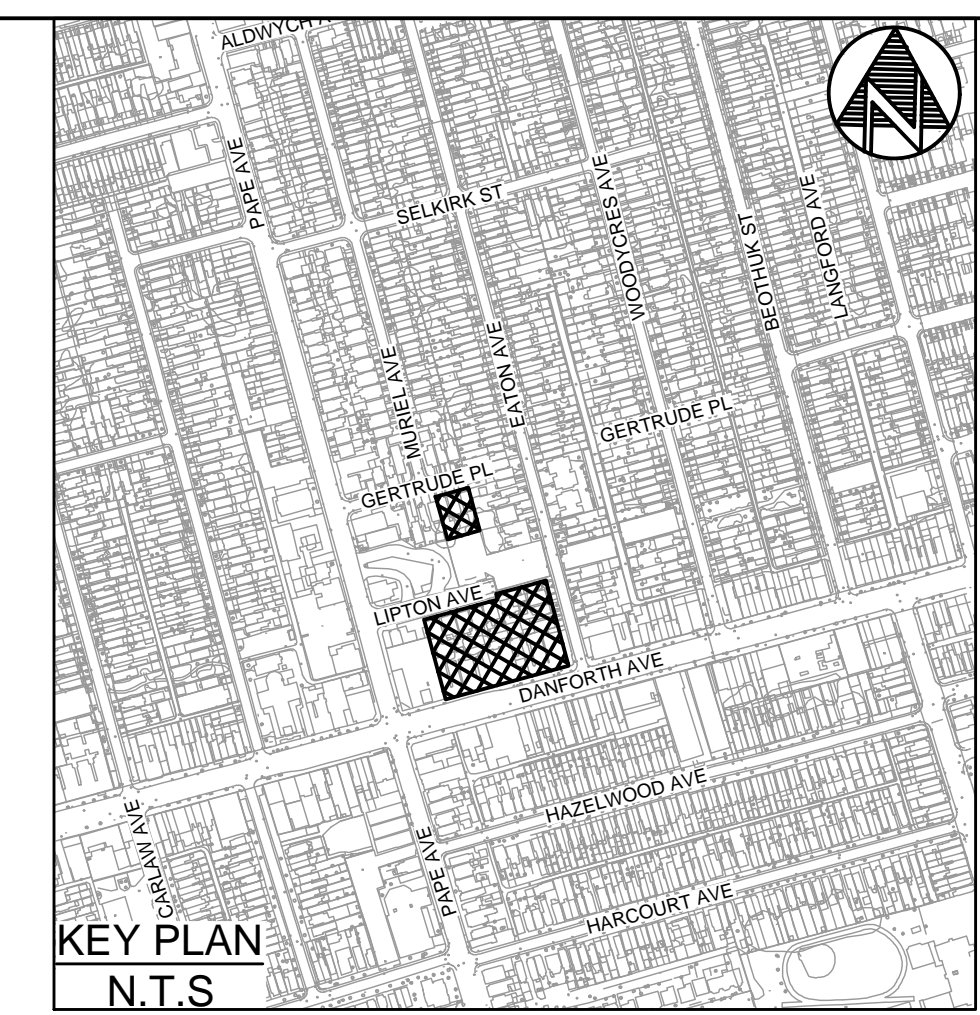
|          |               |
|----------|---------------|
| DESIGNED | L. KIM        |
| DRAWN    | H. ALKHADHALY |
| CHECKED  |               |
| APPROVED |               |

**ONTARIO LINE SUBWAY**  
**PAPE STATION TOC**  
 SERVICING PLAN

Plot Date: 16 November 2022

Dwg. No. SS0500-04-SF003 Sheet No.





**LEGEND**

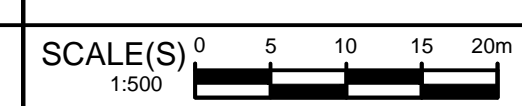
|  |                                 |
|--|---------------------------------|
| <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">90.33</span>  | EXISTING ELEVATION              |
| <span style="border: 1px dashed black; border-radius: 50%; padding: 2px;">89.62</span> | EXISTING BACK OF CURB ELEVATION |
| <span style="border: 1px solid black; padding: 2px;">89.66</span>                      | PROPOSED ELEVATION              |
| <span style="border: 1px dashed black; padding: 2px;">89.66</span>                     | PROPOSED BACK OF CURB ELEVATION |
| 2.0%   | GRADING SLOPE                   |
| <span style="color: green;">➔</span>   | OVERLAND FLOW DIRECTION         |
| <span style="color: red;">▲</span>   | BUILDING ENTRANCE               |

- NOTE**
1. ALL GRADES WITHIN THE REGULATORY FLOOD PLAIN WILL BE MAINTAINED OR MATCHED.
  2. THE EXISTING DRAINAGE PATTERN IN THE AREA OF THE SITE SHOULD BE MAINTAINED.
  3. ALL DRAINAGE TO BE COLLECTED AND APPROPRIATELY CONTROLLED, TREATED, AND DISTRIBUTED AS PER CITY OF TORONTO STANDARDS.
  4. CURRENTLY GRADING IS BASED ON LIDAR SURVEY. GRADES TO BE CONFIRMED WITH DETAIL SURVEY. GRADING TO FOLLOW CITY OF TORONTO STANDARDS.
  5. FINAL SITE GRADING WILL BE AS PER TOC DESIGN DEVELOPMENT.
  6. FIRST FLOOR ELEVATIONS (FFE) ARE SHOWN BASED ON CURRENT INFORMATION IN THE ARCHITECTURAL DRAWINGS. FFE SHOULD BE CONFIRMED DURING DETAILED DESIGN.

FILE: 10206938-gr0500-04-sf003.dwg  
PLOTTED BY: GARGAT, OLGA

| REVISIONS |  | REVISIONS |  |
|-----------|--|-----------|--|
| 1         |  | 4         |  |
| 2         |  | 5         |  |
| 3         |  | 6         |  |

**RCD**  
NOT FOR CONSTRUCTION  
DD MONTH YYYY



STATUS



DESIGNED L. KIM  
DRAWN H. ALKHADHALY  
CHECKED \_\_\_\_\_  
APPROVED \_\_\_\_\_

**ONTARIO LINE SUBWAY**  
TITLE  
**PAPE STATION**  
TOC  
GRADING PLAN

Plot Date: 17 November 2022

Infrastructure Ontario

Dwg. No. GR0500-04-SF003      Sheet No.



## Appendix B. Water Demand Calculations

**DESIGN CALCULATION**  
**Water Demand and Fire Flow Demand**

Location: Pape TOC  
North Site

| Items                                  | Water Demand Calculation |                  | Remark  |
|--|--------------------------|------------------|---|
| <b>Site Parameters</b>                 |                          |                  |   |
| Average Day Water Consumption Rate     |                          | 190 l/capita/day | Multi-unit high-rise = 190 litres / capita /day<br>(City of Toronto Design Criteria for Sewers and Watermain)   |
| Total Site Area                        |                          | 856 Sq.m         |   |
| Total GFA                              | Residential              | Non-Residential  |   |
|  | 1902                     | 420              | Sq.m  |
| Residential Units                      | 25                       | n/a              |   |
| Residential/Non-Residential Population | 68                       | 5                | Residential: 400 person/ha, Retail: 1.1 persons /100sq. m , Office: 3.3 persons/100sq.m ,<br>Commercial= Retail + Office  |
| Peaking Factor                         | Residential              | Non-Residential  |   |
| Minimum hour                           | 0.84                     | 0.84             |   |
| Peak Hour                              | 2.5                      | 1.2              |   |
| Maximum Day Factor                     | 1.3                      | 1.1              |   |
|  | Residential              | Non-Residential  |   |
| Average Consumption Rate               | 0.1L/s                   | 0.01L/s          | Population x Average consumption  |
| Maximum Day Flow Rate                  | 0.2L/s                   | 0.01L/s          | Population x Average consumption x Maximum Day Factor   |
| Peak Hour Flow Rate                    | 0.4L/s                   | 0.01L/s          | Population x Average consumption x Peak Hour Factor   |
| <b>Fire Flow Demand Calculation</b>    |                          |                  |   |
| <b>Fire Flow Requirement</b>           |                          | 8480.9 L/min     | $F=220 C *A^{0.5}$ (Fire Underwriter's Survey Guidelines)<br>F= the required fire flow in L/min<br>C= the coefficient related to the type of construction<br>A= the total floor area in square metres<br>Coefficient related to Construction=0.8 (Type II Non Combustible Construction) |
| <b>Fire Flow (F)</b>                   |                          | 8480.9 L/min     |   |

**DESIGN CALCULATION**  
**Water Demand and Fire Flow Demand**

Location: Pape TOC  
South Site

| Items                                  | Water Demand Calculation |                 | Remark   |
|--|--------------------------|-----------------|--|
| <b>Site Parameters</b>                 |                          |                 |  |
| Average Day Water Consumption Rate     | 190                      | l/capita/day    | Multi-unit high-rise = 190 litres / capita / day<br>(City of Toronto Design Criteria for Sewers and Watermain)   |
| Total Site Area                        | 6214                     | Sq.m            |  |
| Total GFA                              | Residential              | Non-Residential |  |
|  | 35440                    | 1730            | Sq.m   |
| Residential Units                      | 414                      | n/a             |  |
| Residential/Non-Residential Population | 1118                     | 20              | Occupant load from Arch stats  |
| Peaking Factor                         | Residential              | Non-Residential |  |
| Minimum hour                           | 0.84                     | 0.84            |  |
| Peak Hour                              | 2.5                      | 1.2             |  |
| Maximum Day Factor                     | 1.3                      | 1.1             |  |
|  | Residential              | Non-Residential |  |
| Average Consumption Rate               | 2.5L/s                   | 0.04L/s         | Population x Average consumption   |
| Maximum Day Flow Rate                  | 3.2L/s                   | 0.05L/s         | Population x Average consumption x Maximum Day Factor  |
| Peak Hour Flow Rate                    | 6.1L/s                   | 0.1L/s          | Population x Average consumption x Peak Hour Factor  |
| <b>Fire Flow Demand Calculation</b>    |                          |                 |  |
| <b>Fire Flow Requirement</b>           | 33932.0                  | L/min           | $F=220 C * A^{0.5}$ (Fire Underwriter's Survey Guidelines)<br>F= the required fire flow in L/min<br>C= the coefficient related to the type of construction<br>A= the total floor area in square metres<br>Coefficient related to Construction=0.8 (Type II Non Combustible Construction) |
| <b>Fire Flow (F)</b>                   | 33932.0                  | L/min           |  |

# Appendix C. Sanitary Flow Demand Calculation

**DESIGN CALCULATION  
Sanitary Flow Demand**

Location: Pape TOC  
North Site

| Items  | Sanitary Demand Calculation |                        | Remark   |
|--|-----------------------------|------------------------|--|
| <b>Site Parameters</b>                             |                             |                        |  |
| Average waste water flow                           | 450                         | l/capita/day           | Multi-unit high-rise = 450 litres / capita /day<br><i>(City of Toronto Design Criteria for Sewers and Watermain)</i>     |
| Non-Residential average flow                       | 180000                      | l/floor hectare/day    | Commercial = 180000 litres/ floor hectare / day<br><i>(City of Toronto Design Criteria for Sewers and Watermain)</i>     |
| Total Site Area                                    | 856                         | Sq.m                   |  |
| Total GFA  | Residential<br>1902         | Non-Residential<br>420 | Sq.m   |
| Residential Units                                  | 25                          | n/a                    |  |
| Residential/Non-Residential Population             | 68                          | 5                      | Residential: 400 person/ha, Retail: 1.1 persons /100sq. m , Office: 3.3 persons/100sq.m ,<br>Commercial= Retail + Office |
| <b>Peaking Factor</b>                              |                             |                        |  |
| Residential peak factor (PF=)                      | 4.3                         | n/a                    | <i>Commercial peak factor is included in average flow</i>  |
| <b>Extraneous Flow</b>                             |                             |                        |  |
| Infiltration allowance (< 10 ha)                   | 0.26                        | l/s/ha                 |  |
| Residential Flow                                   | 0.35                        | l/s                    |  |
| Non-Residential Flow                               | 0.09                        | l/s                    |  |
| Infiltration Flow                                  | 0.02                        | l/s                    |  |
| <b>Maximum Cumulative Flow with peaking factor</b> | <b>1.63</b>                 | <b>l/s</b>             |  |

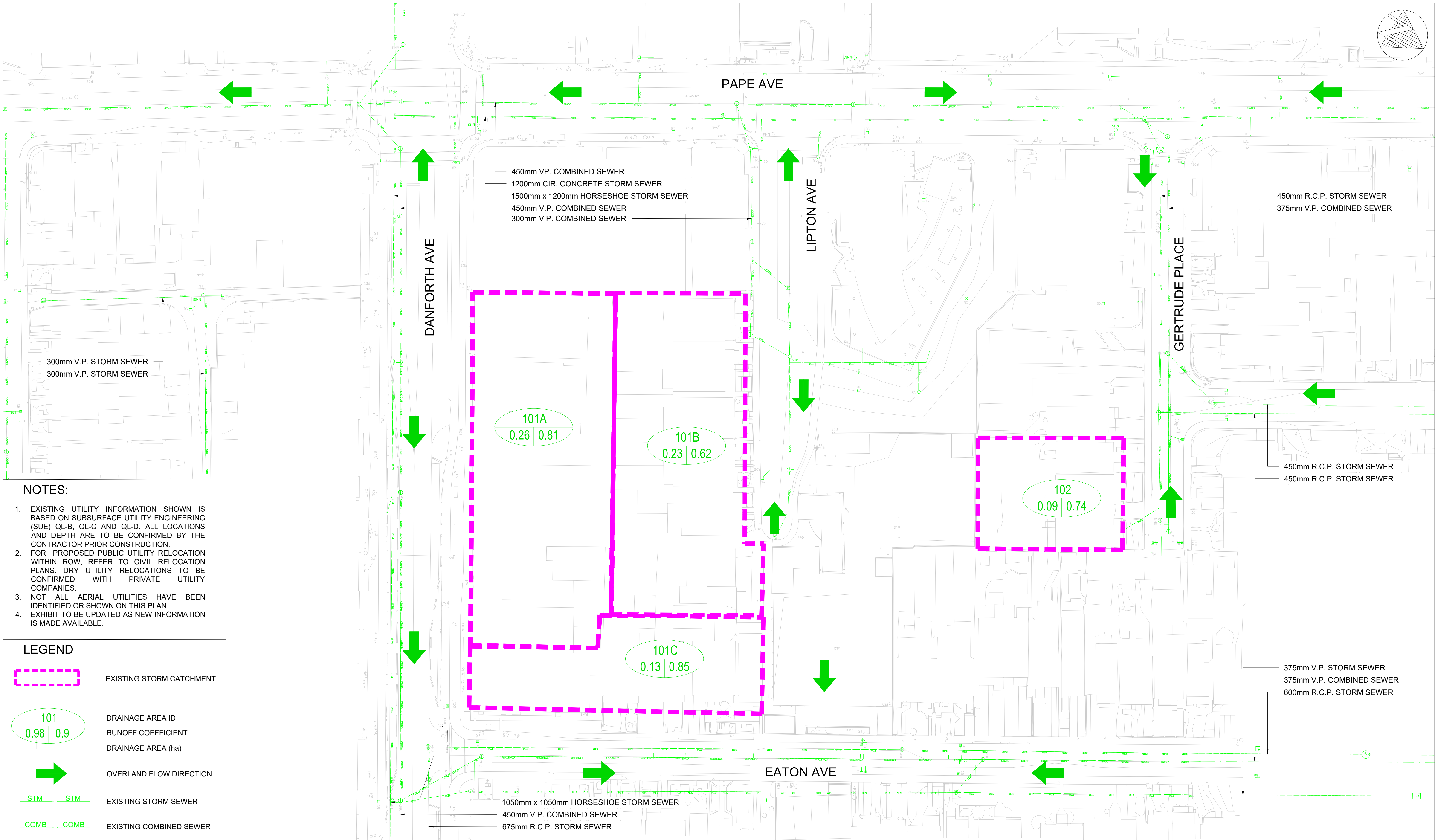
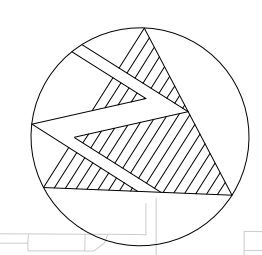


**DESIGN CALCULATION**  
**Sanitary Flow Demand**

Location: Pape TOC  
South Site

| Items  | Sanitary Demand Calculation |                         | Remark  |
|--|-----------------------------|-------------------------|---|
| <b>Site Parameters</b>                             |                             |                         |   |
| Average waste water flow                           | 450                         | l/capita/day            | Multi-unit high-rise = 450 litres / capita /day<br>(City of Toronto Design Criteria for Sewers and Watermain) |
| Non-Residential average flow                       | 180000                      | l/floor hectare/day     | Commercial = 180000 litres/ floor hectare / day<br>(City of Toronto Design Criteria for Sewers and Watermain) |
| Total Site Area                                    | 6214                        | Sq.m                    |   |
| Total GFA  | Residential<br>35440        | Non-Residential<br>1730 | Sq.m  |
| Residential Units                                  | 414                         | n/a                     |   |
| Residential/Non-Residential Population             | 1118                        | 20                      | Occupant load from Arch stats   |
| Peaking Factor                                     | Residential<br>3.8          | Non-Residential<br>n/a  | Commercial peak factor is included in average flow  |
| Extraneous Flow                                    |                             |                         |   |
| Infiltration allowance (< 10 ha)                   | 0.26                        | l/s/ha                  |   |
| Residential Flow                                   | 5.82                        | l/s                     | peak sanitary flow  |
| Non-Residential Flow                               | 0.36                        | l/s                     | peak sanitary flow  |
| Infiltration Flow                                  | 0.16                        | l/s                     | groundwater discharge to sanitary sewer   |
| <b>Maximum Cumulative Flow with peaking factor</b> | <b>22.65</b>                | <b>l/s</b>              |   |

# Appendix D. Drainage Plan



- NOTES:**
- EXISTING UTILITY INFORMATION SHOWN IS BASED ON SUBSURFACE UTILITY ENGINEERING (SUE) QL-B, QL-C AND QL-D. ALL LOCATIONS AND DEPTH ARE TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
  - FOR PROPOSED PUBLIC UTILITY RELOCATION WITHIN ROW, REFER TO CIVIL RELOCATION PLANS. DRY UTILITY RELOCATIONS TO BE CONFIRMED WITH PRIVATE UTILITY COMPANIES.
  - NOT ALL AERIAL UTILITIES HAVE BEEN IDENTIFIED OR SHOWN ON THIS PLAN. EXHIBIT TO BE UPDATED AS NEW INFORMATION IS MADE AVAILABLE.

**LEGEND**

- EXISTING STORM CATCHMENT
- DRAINAGE AREA ID  
RUNOFF COEFFICIENT  
DRAINAGE AREA (ha)
- OVERLAND FLOW DIRECTION
- EXISTING STORM SEWER
- EXISTING COMBINED SEWER

| REVISIONS | REVISIONS |
|-----------|-----------|
| 1         | 4         |
| 2         | 5         |
| 3         | 6         |

**RCD**  
NOT FOR CONSTRUCTION  
DD MONTH YYYY



DESIGNED N.FEHLINGS  
DRAWN N.FEHLINGS  
CHECKED D.NUTTALL  
APPROVED D.NUTTALL

**ONTARIO LINE SUBWAY**  
TITLE  
**PAPE STATION TOC**  
EXISTING DRAINAGE PLAN

Plot Date: 24 October 2022

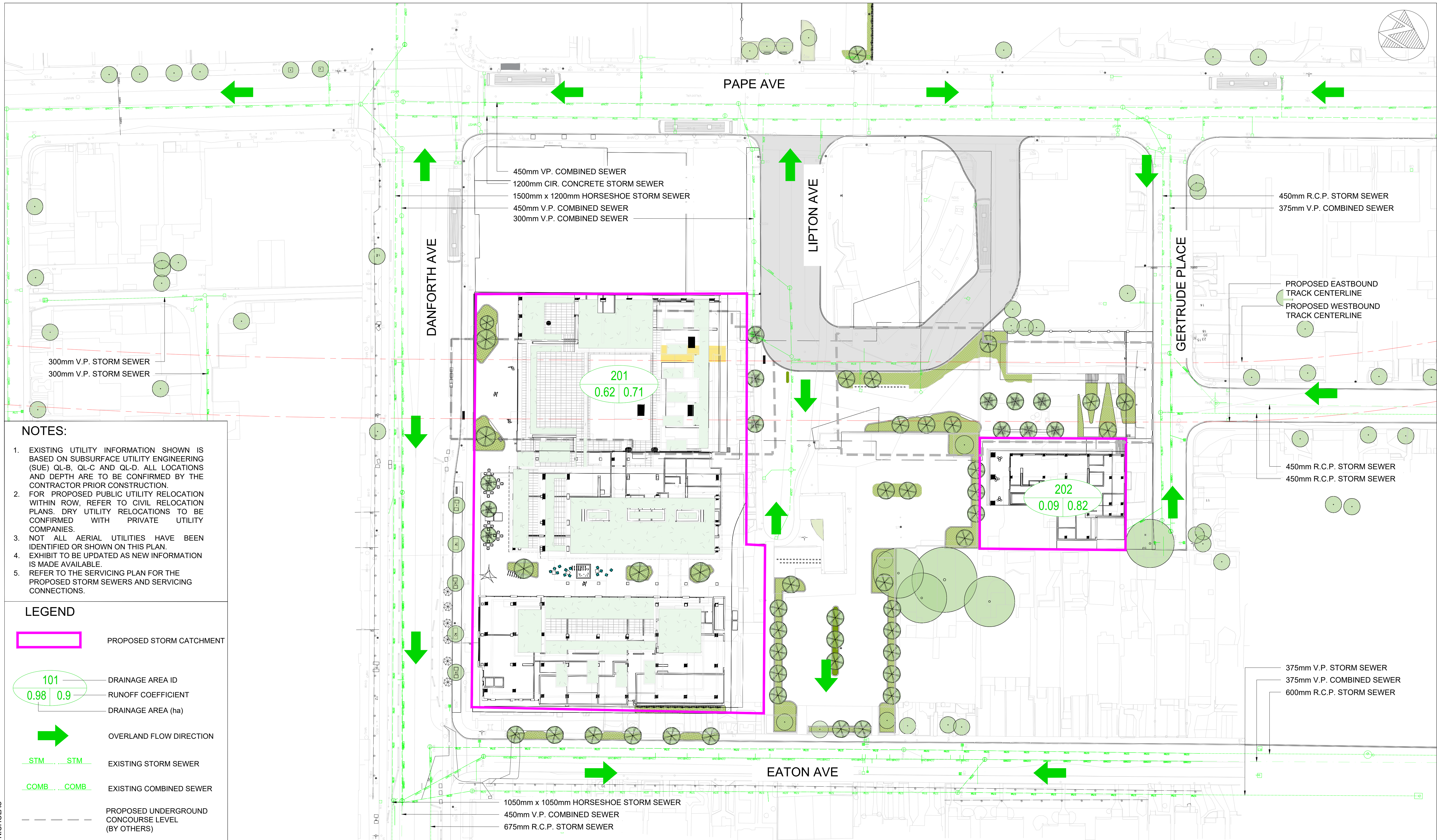
Infrastructure Ontario

Dwg. No. Sheet No.

FILE: 10206938-drc0300-04-sf001.dwg  
PLOTTED BY: FEHLINGS, NICHOLAS



FILE: 10206938-drc0300-04-sf001.dwg  
 PLOTTED BY: FEHLINGS, NICHOLAS



**NOTES:**

- EXISTING UTILITY INFORMATION SHOWN IS BASED ON SUBSURFACE UTILITY ENGINEERING (SUE) QL-B, QL-C AND QL-D. ALL LOCATIONS AND DEPTH ARE TO BE CONFIRMED BY THE CONTRACTOR PRIOR CONSTRUCTION.
- FOR PROPOSED PUBLIC UTILITY RELOCATION WITHIN ROW, REFER TO CIVIL RELOCATION PLANS. DRY UTILITY RELOCATIONS TO BE CONFIRMED WITH PRIVATE UTILITY COMPANIES.
- NOT ALL AERIAL UTILITIES HAVE BEEN IDENTIFIED OR SHOWN ON THIS PLAN.
- EXHIBIT TO BE UPDATED AS NEW INFORMATION IS MADE AVAILABLE.
- REFER TO THE SERVICING PLAN FOR THE PROPOSED STORM SEWERS AND SERVICING CONNECTIONS.

**LEGEND**

- PROPOSED STORM CATCHMENT
- 101  
0.98 | 0.9 DRAINAGE AREA ID  
RUNOFF COEFFICIENT  
DRAINAGE AREA (ha)
- ➔ OVERLAND FLOW DIRECTION
- STM . . . STM EXISTING STORM SEWER
- COMB . . . COMB EXISTING COMBINED SEWER
- - - - - PROPOSED UNDERGROUND CONCOURSE LEVEL (BY OTHERS)

| REVISIONS | REVISIONS |
|-----------|-----------|
| 1         | 4         |
| 2         | 5         |
| 3         | 6         |

**RCD**

NOT FOR CONSTRUCTION

DD MONTH YYYY

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SCALE(S) 0 2 4 6 8 10 15m STATUS

1:400

**ONE TEAM**

ONTARIO LINE TECHNICAL ADVISOR

|                     |                    |
|---------------------|--------------------|
| DESIGNED N.FEHLINGS | DRAWN N.FEHLINGS   |
| CHECKED D.NUTTALL   | APPROVED D.NUTTALL |

**ONTARIO LINE SUBWAY**

**PAPE STATION TOC**

**PROPOSED DRAINAGE PLAN**

Plot Date: 28 October 2022

**Infrastructure Ontario**

Dwg. No. \_\_\_\_\_ Sheet No. \_\_\_\_\_