

Draft Functional Servicing Report – Corktown Integrated Transit Oriented Communities

383 King Street East, 39 Berkeley Street, 250-260 Front Street East
68-70 Parliament Street
265-271 Front Street East & 3-25 Berkeley Street
Toronto Ontario M5A 2W3

Preliminary Rezoning Civil Draft Report

Contract RFS-2019-NAFC-110

PO 214244

HDR Project 10206938



Ontario Line Technical Advisor

TORONTO, ONTARIO

February 16, 2021

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Abbreviations

BMP	Best Management Practice
DRM	Design Requirements Manual
HGL	Hydraulic Grade Line
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
SWM	Stormwater Management
SUE	Subsurface Utility Engineering
TGS	Toronto Green Standard
TMC681	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 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 Ontario Line Transit Oriented Communities (TOC) at the intersection of Front Street East and Parliament Street, and the intersection of King Street East and Berkeley Street in the City of Toronto. This Functional Servicing Report provides a preliminary study for water distribution, electrical service, sanitary sewage, and storm drainage for the developments of the above-mentioned site.

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 developments proposed at the intersection of Front Street East and Parliament Street. The subject site, King Site (250 Front Street East/ 64-70 Parliament Street) is at the northwest corner, and Front Site (265-271 Front Street East/ 54 Parliament Street/ 3-25 Berkeley Street) is situated at the southwest corner of the intersection of Front Street East and Parliament Street, where the Ontario Line transit station is proposed.

The existing site consists of a two two-storey commercial buildings and their associated parking lots at King Site. The westerly building facing Berkeley Street and the easterly building facing Parliament Street are both low-rise commercial buildings. King Site spans an entire block bounded by King Street East to the north, Parliament Street to the east, Berkeley Street to the west, and Front Street East to the south.

At Front Site, the existing site consists of two low-rise commercial buildings as well as accompanying parking lots, spanning south from Front Street East to Parliament Square Park where The Esplanade and Hahn Place terminate, and Berkeley Street begins. In addition to the parking lots belonging to the Nissan car dealership and carwash buildings, the existing site also features a municipal parking lot between the commercial properties and Parliament Square Park. **Figure 1** shows an aerial map of the subject sites' location.

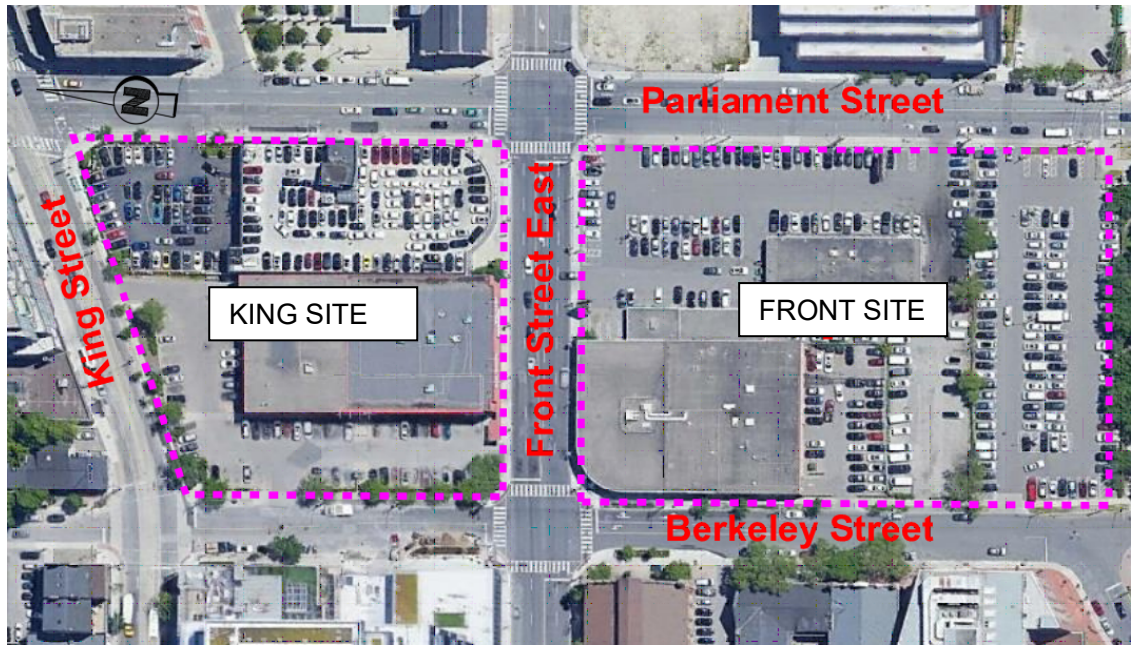


Figure 1-1. Aerial Map of Subject Site Locations

1.2 Proposed Development

Based on the preliminary reference concept designs, the proposed development at this location consists of mixed-use developments at both sites. The two buildings on King Site, with the former on the west end of King Site facing Berkeley Street and the latter on the east end facing Parliament Street. At this subject site, transit infrastructure will be exclusive to the King Site

development only.

Site B1 (King Site) will be a forty-storey mixed-use building with retail and transit space on the ground level, as well as office and residential spaces in upper floors. Site B2 (King Site) will be a forty-one-storey mixed-use residential building with retail space on the ground level and no transit infrastructure. Both buildings will share a multi-level underground parking garage that will occupy the easterly limits of the site, while the west side of the underground is slated for transit infrastructure.

Front Site will also consist of two mixed-use developments. The proposed design shows the building on the west side of the site facing Berkeley Street to be a nineteen-storey mixed-use office building with retail and library space on the ground and second level. While the building on the east side of the site facing Parliament Street will be a thirty-five-storey mixed-use residential building with retail space at the ground level. The westerly building at this site will also have a single-level underground parking garage separate from the underground parking garage for the easterly building. In addition, the building on the east will also have two upper-level parking floors.

2 Site Condition

2.1 Existing Topography

The existing site are of relatively flat terrain with a single- and two-storey commercial buildings and associated parking lots at both Front Site and King Site.

King Site has an approximate area of 0.83 Ha. Two existing two-storey buildings are currently located on the southeast corner of the property (facing Front Street and Parliament Street) while the northern and western limits of the site (facing Berkeley Street and King Street East) are lined with trees. The existing ground condition of the property is generally flat terrain in the north south direction, with a gentle slope inclined east to west. The two proposed buildings will be located on the southwest and east side of the site.

Front Site has an approximate area of 1.21 Ha. An existing two-storey building is currently situated on the southwest corner of the site, and a single-storey detached carwash building is located directly southeast of the building. Much of the property is paved asphalt with a high point at roughly the middle of the parking lot, and noticeable downslopes east towards Parliament Street and west towards Berkeley Street.

The general lay of the land at this site also features a gentle, less-pronounced slope from north to south, with a concrete sidewalk to the north and east, boulevard planting/ trees and a concrete sidewalk to the west, and an asphalt-paved municipal parking lot to the south. As per the conceptual plans provided, the two proposed buildings at Front Site will sit on the west and east side of the subject site and distinguished as separate properties by a courtyard in between.

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. to 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 site grading at King Site will maintain the existing gentle slope to the south as per the existing grading. The proposed grading at Front Site will also be a relatively gentle slope to the south upon completion, with the proposed grade anticipated to be the minimum sufficient to drain stormwater from the development site to meet the City of Toronto Toronto design guidelines. A preliminary Grading Plan is attached in **Appendix A**.

3 Water Supply and Appurtenances

3.1 Existing Condition

Based on presently available information, the two-storey commercial building (Porsche dealership) at King Site is currently serviced by a single water service connection to the existing watermain along Parliament Street. Similarly, the single-storey Staples building is currently serviced by a water service connection tapping into the existing 600 mm mainline watermain along Front Street East.

Currently, the northwest building at Front Site (Nissan/ Infiniti dealership) is serviced by two connections; one to its west tapping into the existing 150 mm watermain along Berkeley Street, and the other its north tapping into the existing 600 mm watermain along Front Street East. The southeast carwash building at Front Site is currently serviced by a single connection to the existing 300 mm watermain along Parliament Street to its east.

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*. 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 in accordance with City of Toronto's *Design Criteria for Sewers and Watermains (2019)* and using site statistics provided by the architect. Calculation summaries for King Site and Front Site are provided in **Table 3-1**, Error! Reference source not found. and **Table 3-2**, respectively, and detailed water demand calculations can be found in **Appendix B**.

Table 3-1. King Site Water Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Average Day Water Consumption Rate	191 L/capita/day	191 L/capita/day
Total Site Area	8643 m ²	
Total GFA	63365 m ²	28691 m ²
Residential units	883	n/a
Residential/ commercial population	1536	15
Peaking factor	2.5	1.2
Average Water Demand from Site	3.4 L/s	0.7 L/s
Peak Water Demand from Site	8.5 L/s	0.8 L/s

Table 3-2. Front Site Development Water Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Average Day Water Consumption Rate	191 L/capita/day	191 L/capita/day
Total Site Area	8643 m ²	
Total GFA	52812 m ²	45619 m ²
Residential units	758	n/a
Residential/ commercial population	1319	189
Peaking factor	2.5	1.2
Average Water Demand from Site	2.9 L/s	1.1 L/s
Peak Water Demand from Site	7.3 L/s	1.3 L/s

The estimated fire flow requirements were calculated based on recommendations by the *Fire Underwriters Survey Water Supply for Public Fire Protection (1999)* and the City of Toronto's Fire flow requirement. Detailed calculations can be found in **Appendix B**.

Watermain service connections for the proposed King Site development are proposed at three connection locations for future detailed design purposes. All watermain servicing laterals will service the buildings via by a 200 mm domestic watermain service and a 250 mm fire watermain service that connect connects to the watermain line within the right-of-way along Berkeley Street, Front Street East and King Street East.

The westerly half of the proposed Front Site development will be serviced by a 200 mm domestic watermain service and a 250 mm fire watermain service that connect to a proposed 300 mm watermain connection. The 300 mm watermain connection will connect to the existing 600 mm watermain trunk along Front Street East just north of the building.

The easterly half of the proposed Front Site development will be serviced by a 200 mm domestic watermain service and a 250 mm fire watermain service that connect to a proposed 300 mm watermain connection. The 300 mm watermain connection will connect to the existing 300 mm watermain trunk along Parliament Street just east of the building.

The water meters will be located in sprinkler or mechanical rooms inside the buildings. Further coordination with the City of Toronto is required to confirm the existing watermain network capacity to support the water demand of these two sites.

3.3 Hydrant Flow Test

At the time of writing this report, no watermain pressure information was available. Consequently, it is recommended to conduct a hydrant flow test during the detailed design stage to confirm the adequacy of the watermain pressure to support the proposed development.

4 Sanitary Servicing

4.1 Existing Condition

Utility information provided in the Corktown Station TOC drawings are based on Quality Levels B, C and D SUE, and need to be confirmed on site.

King Site is connected to an existing combined sewer on the east side of the site, just north of the intersection of Parliament Street and Derby Street. This connection ties back to an existing 1050 mm x 1500 mm egg-shaped brick combined sewer that runs parallel to Parliament Street.

Available SUE surveys of the area do not appear to show any existing sanitary service connections to Front Site. However, the surveys do show an existing network of mainline combined and standalone sanitary sewers on Parliament Street, Front Street, and Berkeley Street. Further investigation on site may be needed.

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 (2019) and site statistics provided by the architect. **Table 4-1**,

Table 4-2, and Error! Reference source not found. summarise the sanitary flow calculations for the proposed developments and detailed sanitary flow calculations are included in **Appendix C**.

Table 4-1. King Site Development Sanitary Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Sanitary Demand Rate	450 L/capita/day	0 L/capita/day
Commercial Average Flow	n/a	180 000 L/floor ha/day
Total GFA	63365 m ²	28691 m ²
Peaking Factor	3.7	n/a
Peak Sanitary Flow	8.00 L/s	5.98 L/s
Groundwater Discharge to Sanitary Sewer	0.22 L/s	
Maximum Cumulative Flow with Peaking Factor	35.80 L/s	

Table 4-2. Front Site Development Sanitary Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Sanitary Demand Rate	450 L/capita/day	0 L/capita/day
Commercial Average Flow	n/a	180 000 L/floor ha/day
Total GFA	52812 m ²	45619 m ²
Peaking Factor	3.7	n/a
Peak Sanitary Flow	6.87 L/s	9.50 L/s
Groundwater Discharge to Sanitary Sewer	0.22 L/s	
Maximum Cumulative Flow with Peaking Factor	35.15 L/s	

4.3 Sanitary Service Connection

Each of the proposed developments will be connected to the mainline combined storm/sanitary sewer or main sanitary sewer.

The easterly building at King Site will have two connections to two separate combined sewer lines. A 300 mm connection from the northeast corner of the building ties back to the existing 600 mm x 900 mm egg-shaped brick combined sewer along King Street East, while the southern section of the building connects to the existing 350 mm x 450 mm E.S.Br. combined sewer along Front Street via a proposed 300 mm connection.

The westerly building at King Site station building will have two connections to the main sewer lines. A proposed 300 mm sanitary connection that ties back to the existing 1425 mm circular brick sanitary sewer underneath Front Street. Another sanitary connection is proposed to connect to the existing 600 mm x 900 mm egg-shaped brick combined sewer along Berkeley Street to service the proposed Ontario Line station building. For details, refer to a separate Function Servicing Report for the Ontario Line Stations.

The two buildings at Front Site will each have three separate connections to the main sanitary sewer line. The proposed building on the west side will be connected to a 1425 mm circular brick sanitary sewer along Front Street. A second 300 mm sanitary connection from the southwest corner of the westerly building will tie back to a 375 mm vitrified pipe sanitary sewer along Berkeley Street. The proposed building on the east side of Front Site will have a single 300 mm connection to the main sanitary sewer line along Parliament Street.

A Site Servicing Plan in **Appendix A** has been prepared to show the potential locations of the sanitary servicing connections to support the developments. Future coordination with the City of Toronto is required to confirm the existing sanitary sewer network capacity to accommodate the proposed development.

5 Storm Drainage and Stormwater Management

5.1 Existing Condition

Currently, King Site is occupied by two low-rise buildings and parking lots, and Front Site is occupied by four low-rise buildings and parking lots. Corktown Station is located in the Don River Watershed and is within Basement Flooding Study Area 62 which was started in 2019 according to the City of Toronto.

The existing parking lot component of both sites are graded to contain runoff on site and direct it to catch basins located at low points at a loading bay. It is assumed that roof drains discharge to the on-site storm sewer system as downspouts discharging to grade are evident. The presence of on-site controls could not be established based on the information received at the time of the preparation of this report. Runoff in excess of the capacity of the on-site storm sewer system ponds in the parking lots and then spills to the adjacent municipal roadways.

Existing storm sewers adjacent to the sites including a 600 mm x 900 mm concrete combined sewer flowing from north to south along Berkeley Street, and a 900 mm storm sewer along Berkeley Street adjacent to King Site which is connected to a 1200 mm storm sewer adjacent to Front Site. There is also a 600 mm x 900 mm E.S Br combined sewer along King Street East, 350 mm x 450 mm E.S Br combined sewer along Front Street East, and 975 mm x 1500 mm combined sewer along Parliament Street adjacent to King Site which is connected to a 1050 mm x 1500 mm combined sewer adjacent to Front Site. Please refer to the attached existing drainage plan in **Appendix D**.

Major flows on Berkeley Street flow travel from north to south. Major flows on King Street East travel from west to east. Front Street East is relatively flat adjacent to both sites, however, runoff in excess of the minor system capacity on Front Street in this area spills south along Berkeley Street or Parliament Ave.

At this time when this report was prepared, The City is working on the InfoWorks model for this area, and will not be available before the year 2021. With limited information that is currently available, its not possible to further comment on where the existing buildings are draining.

5.2 Stormwater Management Criteria

Stormwater management requirements are specified by the authorities having jurisdiction over the Project. These requirements are applicable to all locations where the proposed design will influence or be influenced by surface water runoff. The stormwater management design criteria are described below and supplemented by the Project Specific Output Specifications (PSOS). The key criteria applicable to this Project are summarized in the following sections.

5.2.1 Quality Control

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

5.2.2 Quantity/Flood Control

- Provide protection 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 the absence of an approved or adequate overland flow route, all flows 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.

5.2.3 Water Balance

- Retain all runoff from the 5 mm rainfall event on site through infiltration, evaporation, and/or rainwater reuse (WWFMG, TGS - Tier 1).
- 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 volume groundwater recharge areas (HGRA), pre-development groundwater recharge rates should be maintained (TRCA).

5.2.4 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 stormwater management (SWM) criteria summarized in **Section 5.2**, it is required to provide water balance, as well as quantity, quality and erosion control for the proposed Corktown development sites. The stormwater best management practices (BMP) considered for the site include green roofs, underground detention/retention tanks, and oil/grit separator (OGS) units. The **Proposed Drainage Plan** is presented in **Appendix D**.

All building openings should be protected from flooding. During detailed design, the 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 a 100-year storm event. The Reference Concept Design (RCD) satisfies SWM and drainage requirements for the Proposed Corktown Sites as follows:

- **Quantity Control:**

Storage tank units with orifice control are proposed in the first underground level to provide quantity control.

- **Quality Control:**

Quality control for each site will be provided via the proposed green roof and an Oil Grit Separator unit.

- **Water Balance:**

Green roof and water reuse are proposed to satisfy the 10 mm retention requirement.

Summary of the required storage is presented in Table 5-1 below:

Table 5-1. Summary of the Required Storage

ID	Site Area (ha)		Proposed Green Roof (ha)	Required Storage Volume for Quantity Control (m ³)	Required Storage Volume for Water Balance Reuse (m ³)
	Exist.	Prop.			
King Site	0.36	0.36	0.1089	117	31.5
King Site	0.50	0.50	0.2104	162	43.1
Front Site	1.25	1.25	0.5039	403	107.2

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

6 Site Utilities

King Site and Front Site will both be serviced by utilities provided by Toronto Hydro, Enbridge Gas, and pertinent 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 and currently, the existing buildings on Front Site are serviced by hydro lines on Berkeley Street and Parliament Street. Available surveys show existing Toronto Hydro conduits along King Street East, Front Street, Berkeley Street and Parliament Street. The developer should initiate discussions with Toronto Hydro to determine the connection requirements and locations of electrical service to the proposed developments.

6.2 Gas Service

Gas service will be provided by Enbridge Gas. Available SUE surveys of the area indicate that the existing building at King Site is currently serviced by a gas line on Front Street just south of the building, and the existing buildings at Front Site by a gas line on Berkeley Street just west of the building. The existing Big Wax Car Wash building on Front Site is currently serviced by a gas line on Parliament Street, east of the building. The developer should initiate discussions with Enbridge Gas to determine the connection requirements and locations of gas service to the proposed developments.

6.3 Communication

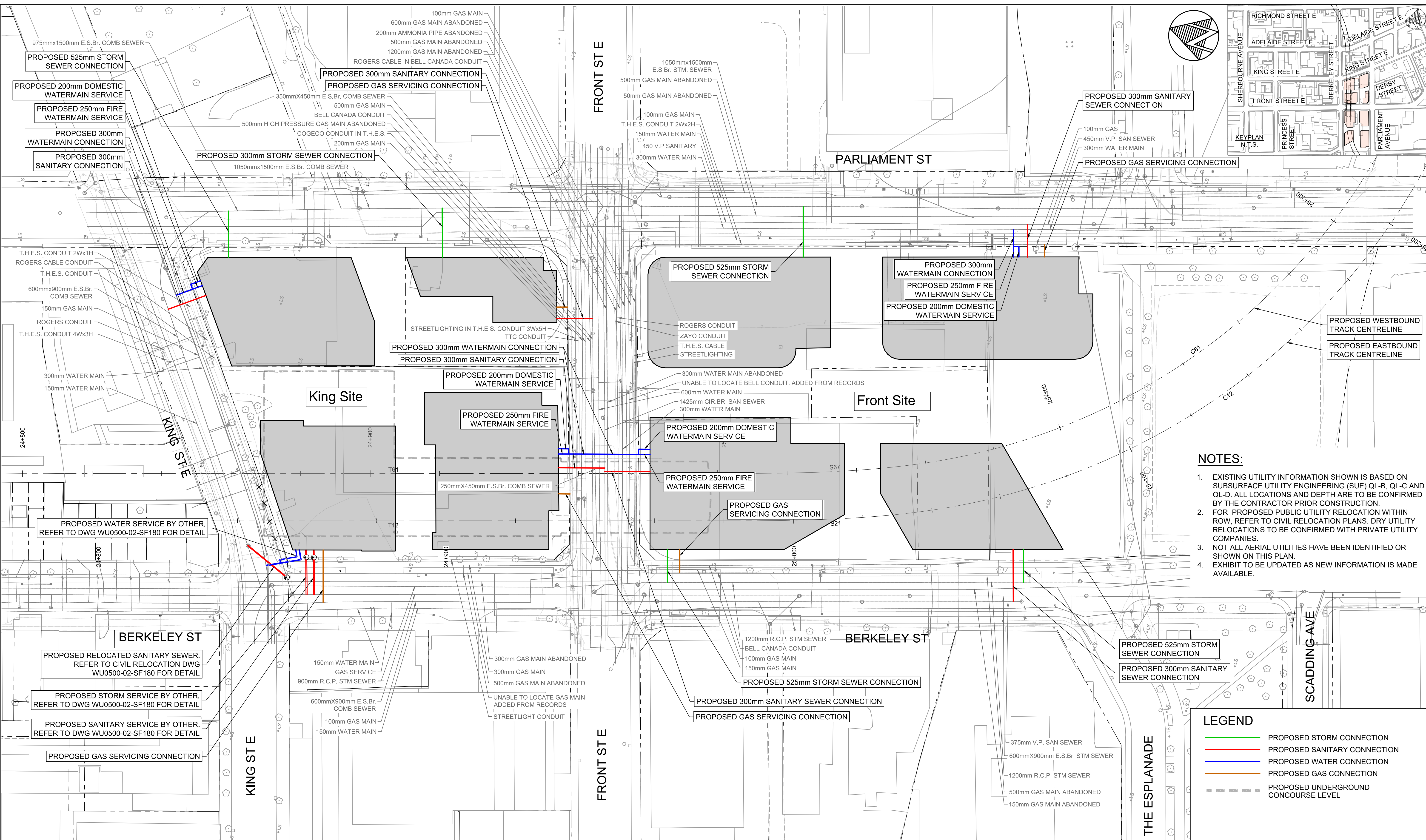
Surveys currently show cables from Rogers, Beanfield, Zayo, and Bell traversing the extent of both subject sites B and F. The developer is to coordinate with the relevant communication systems provider to determine connection requirements.

7 Conclusions and Summary

A Site Servicing plan has been prepared to support the preliminary rezoning submission for the proposed developments south of King Street East from Berkeley Street to Parliament Street, and south of Front Street East from Berkeley Street to Parliament Street, in the City of Toronto, as part of the Ontario Line Transit Oriented Communities. 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. Coordination and data collection with City of Toronto is on-going throughout this project to review the existing sewage capacity to accommodate the proposed developments. OneTeam is arranging a flow monitor program to be taken place in 2021 to review the existing sewage capacity and water pressure in the proximity of the proposed developments.

Appendix A. Site Servicing Plan and Grading Plan

FILE: 10206938-ss0500-02-sf180.dwg
 PLOTTED BY: USER



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.

LEGEND

- PROPOSED STORM CONNECTION
- PROPOSED SANITARY CONNECTION
- PROPOSED WATER CONNECTION
- PROPOSED GAS CONNECTION
- - - PROPOSED UNDERGROUND CONCOURSE LEVEL

REVISIONS	REVISIONS
1	4
2	5
3	6

RCD
NOT FOR CONSTRUCTION

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

STATUS



DESIGNED	M.LI	2020/09/09
DRAWN	H.WANG	2020/09/09
CHECKED	M.LI	2020/12/08
APPROVED	APPROVED	2020/12/08

ONTARIO LINE SUBWAY

TOC CORKTOWN STATION

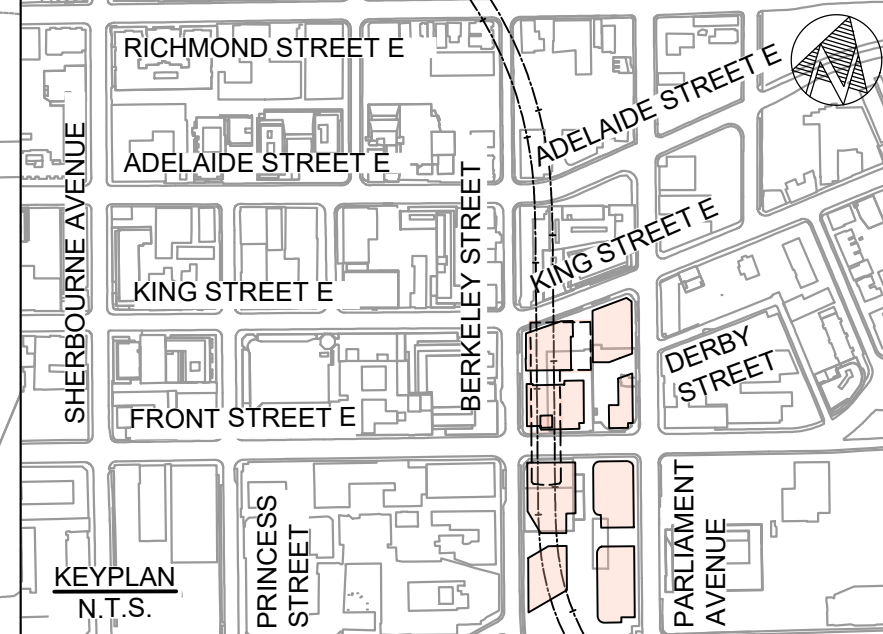
SERVICING PLAN

Plot Date:

METROLINX
Infrastructure Ontario

Dwg. No. SS0500-02-SF180

Sheet No.

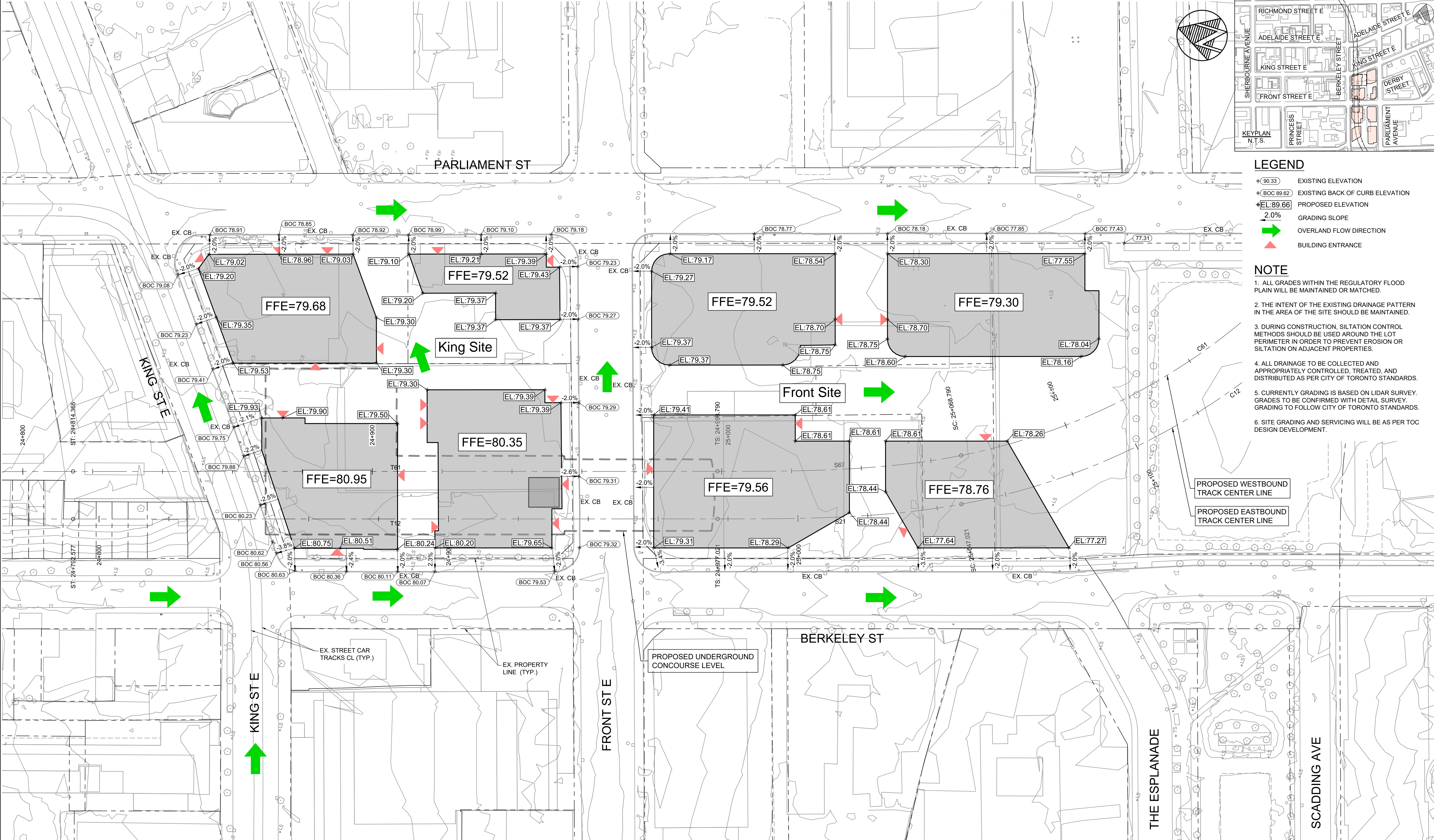


LEGEND

- ◊ 90.33 EXISTING ELEVATION
- ◊ BOC 89.62 EXISTING BACK OF CURB ELEVATION
- ◊ EL:89.66 PROPOSED ELEVATION
- 2.0% GRADING SLOPE
- ➔ OVERLAND FLOW DIRECTION
- ▲ BUILDING ENTRANCE

NOTE

1. ALL GRADES WITHIN THE REGULATORY FLOOD PLAIN WILL BE MAINTAINED OR MATCHED.
2. THE INTENT OF THE EXISTING DRAINAGE PATTERN IN THE AREA OF THE SITE SHOULD BE MAINTAINED.
3. DURING CONSTRUCTION, SILTATION CONTROL METHODS SHOULD BE USED AROUND THE LOT PERIMETER IN ORDER TO PREVENT EROSION OR SILTATION ON ADJACENT PROPERTIES.
4. ALL DRAINAGE TO BE COLLECTED AND APPROPRIATELY CONTROLLED, TREATED, AND DISTRIBUTED AS PER CITY OF TORONTO STANDARDS.
5. CURRENTLY GRADING IS BASED ON LIDAR SURVEY. GRADES TO BE CONFIRMED WITH DETAIL SURVEY. GRADING TO FOLLOW CITY OF TORONTO STANDARDS.
6. SITE GRADING AND SERVICING WILL BE AS PER TOC DESIGN DEVELOPMENT.



FILE: 10206938-gr0500-02-sf180.dwg
PLOTTED BY: USER

REVISIONS	REVISIONS
1	4
2	5
3	6

RCD
NOT FOR CONSTRUCTION

SCALE(S) 0 3 6 9 12m
1:300

STATUS



DESIGNED S. KHORSHID 2020/12/08
DRAWN H. WANG 2020/09/09
CHECKED M. LI 2020/12/08
APPROVED APPROVED 2020/12/08

ONTARIO LINE SUBWAY

TOC CORKTOWN STATION

GRADING PLAN

Plot Date:

Infrastructure Ontario

Dwg. No. GR0500-02-SF180

Sheet No.

Appendix B. Water Demand Calculation

DESIGN CALCULATION
Water Demand and Fire Flow Demand

Commercial peak factor is included in average flow

Site B1+B2 (King Site)

Items	Water Demand Calculation		Remark
Site Parameters			
Average Day Water Consumption Rate	191 l/capita/day		Multi-unit high-rise = 191 litres / capita /day (City of Toronto Design Criteria for Sewers and Watermain)
Total Site Area	8643 Sq.m		
Total GFA	Residential	Commercial	
	63365	28691	Sq.m
Residential Units	883	n/a	
Residential/Commercial Population	1536	316	Residential: 1.74 people /unit , Commercial: 1.1 people /100sq. m
Peaking Factor			
Minimum hour	Residential	Commercial	
	0.84	0.84	
Peak Hour	2.5	1.2	
Maximum Day Factor	1.3	1.1	
Friction Factors			
300mm to 600mm	120.0 'C' Factor		
	Residential	Commercial	
Average Consumption Rate	3.4L/s	0.7L/s	Population x Average consumption
Maximum Day Flow Rate	4.4L/s	0.8L/s	Population x Average consumption x Maximum Day Factor
Peak Hour Flow Rate	8.5L/s	0.8L/s	Population x Average consumption x Peak Hour Factor
Items	Fire Flow Demand Calculation		Remark
Fire Flow Requirement (City of Toronto)			
High-rise residential & Commercial over two stories	28450.0 L/min		[number of hydrants] x [5,690 l/min]
Duration	19000.0 L/min		
	5.0 hours		
Minimum number of hydrants	4.0 hydrants		(City of Toronto Design Criteria for Sewers and Watermain)
Average Spacing between hydrants	90.0 m		
Maximum distance from access point of a building or lot to a hydrant	55.0 m		
Fire Flow Requirement (Fire Underwriter's Survey Guideline)			
	66749.6 L/min		$F=220 C * A^{0.5}$ (Fire Underwriter's Survey Guidelines) F= the required fire flow in L/min C= the coefficient related to the type of construction A= the total floor area in square metres (All floors excluding Basement, under 2-Storleys) Coefficient related to Construction=1.0
	minus: 15%	10012.4 L/min	<u>Occupancy hazard reduction of surcharge</u> Non-combustible Limited combustible Combustible Free burning Rapid burning
	minus: 50%	28368.6 L/min	Apply Reduction for Automatic sprinklers designed to NFPA 13 (30%), systems with water supply (10%) and system with electronic supervision (10%)
	Fire Flow (F)		
	66749.6 L/min		Takes the largest flow between City's requirement and Fire Underwriter's Survey Guideline

DESIGN CALCULATION
Water Demand and Fire Flow Demand

Commercial peak factor is included in average flow

Site F (Front Site)

Items	Water Demand Calculation		Remark
Site Parameters			
Average Day Water Consumption Rate	191 l/capita/day		Multi-unit high-rise = 191 litres / capita /day (City of Toronto Design Criteria for Sewers and Watermain)
Total Site Area	8643 Sq.m		
Total GFA	Residential	Commercial	
	52812	45619	Sq.m
Residential Units	758	n/a	
Residential/Commercial Population	1319	502	Residential: 1.74 people /unit , Commercial: 1.1 people /100sq. m
Peaking Factor			
Minimum hour	Residential	Commercial	
	0.84	0.84	
Peak Hour	2.5	1.2	
Maximum Day Factor	1.3	1.1	
Friction Factors			
300mm to 600mm	120.0 'C' Factor		
	Residential	Commercial	
Average Consumption Rate	2.9L/s	1.1L/s	Population x Average consumption
Maximum Day Flow Rate	3.8L/s	1.2L/s	Population x Average consumption x Maximum Day Factor
Peak Hour Flow Rate	7.3L/s	1.3L/s	Population x Average consumption x Peak Hour Factor
Items	Fire Flow Demand Calculation		Remark
Fire Flow Requirement (City of Toronto)			
High-rise residential & Commercial over two stories	28450.0 L/min		[number of hydrants] x [5,690 l/min]
Duration	19000.0 L/min		
	5.0 hours		
Minimum number of hydrants	4.0 hydrants		(City of Toronto Design Criteria for Sewers and Watermain)
Average Spacing between hydrants	90.0 m		
Maximum distance from access point of a building or lot to a hydrant	55.0 m		
Fire Flow Requirement (Fire Underwriter's Survey Guideline)			
	69022.2 L/min		$F=220 C * A^{0.5}$ (Fire Underwriter's Survey Guidelines) F= the required fire flow in L/min C= the coefficient related to the type of construction A= the total floor area in square metres (All floors excluding Basement, under 2-Storleys) Coefficient related to Construction=1.0
	minus: 15%	10353.3 L/min	<u>Occupancy hazard reduction of surcharge</u> Non-combustible Limited combustible Combustible Free burning Rapid burning
	minus: 50%	29334.4 L/min	Apply Reduction for Automatic sprinklers designed to NFPA 13 (30%), systems with water supply (10%) and system with electronic supervision (10%)
	Fire Flow (F)		
	69022.2 L/min		Takes the largest flow between City's requirement and Fire Underwriter's Survey Guideline

Appendix C. Sanitary Flow Demand Calculation

**DESIGN CALCULATION
Sanitary Flow Demand**

 Location: Corktown TOC
 Site B1+B2 (King Site)

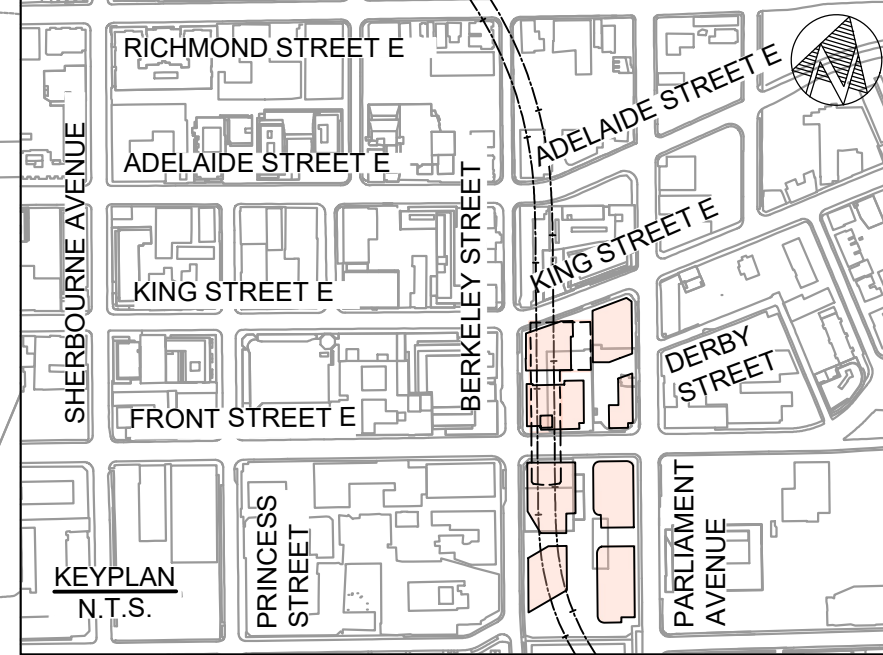
Items	Water Demand Calculation		Remark
Site Parameters			
Average waste water flow	450	l/capita/day	Multi-unit high-rise = 450 litres / capita /day <i>(City of Toronto Design Criteria for Sewers and Watermain)</i>
Commercial average flow	180000	l/floor hectare/day	Commercial = 180000 litres/ floor hectare / day <i>(City of Toronto Design Criteria for Sewers and Watermain)</i>
Total Site Area	8643	Sq.m	
Total GFA	Residential 63365	Commercial 28691	Sq.m
Residential Units	883	n/a	
Residential/Commercial Population	1536	316	Residential: 1.74 people /unit , Commercial: 1.1 people /100sq. m
Peaking Factor	Residential 3.7	Commercial n/a	<i>Commercial peak factor is included in average flow</i>
Extraneous Flow			
Infiltration allowance (< 10 ha)	0.26	l/s/ha	
Residential Flow	8.00	l/s	
Commercial Flow	5.98	l/s	
Infiltration Flow	0.22	l/s	
Maximum Cumulative Flow with peaking factor	35.80	l/s	

**DESIGN CALCULATION
Sanitary Flow Demand**

 Location: Corktown TOC
 Site F (Front Site)

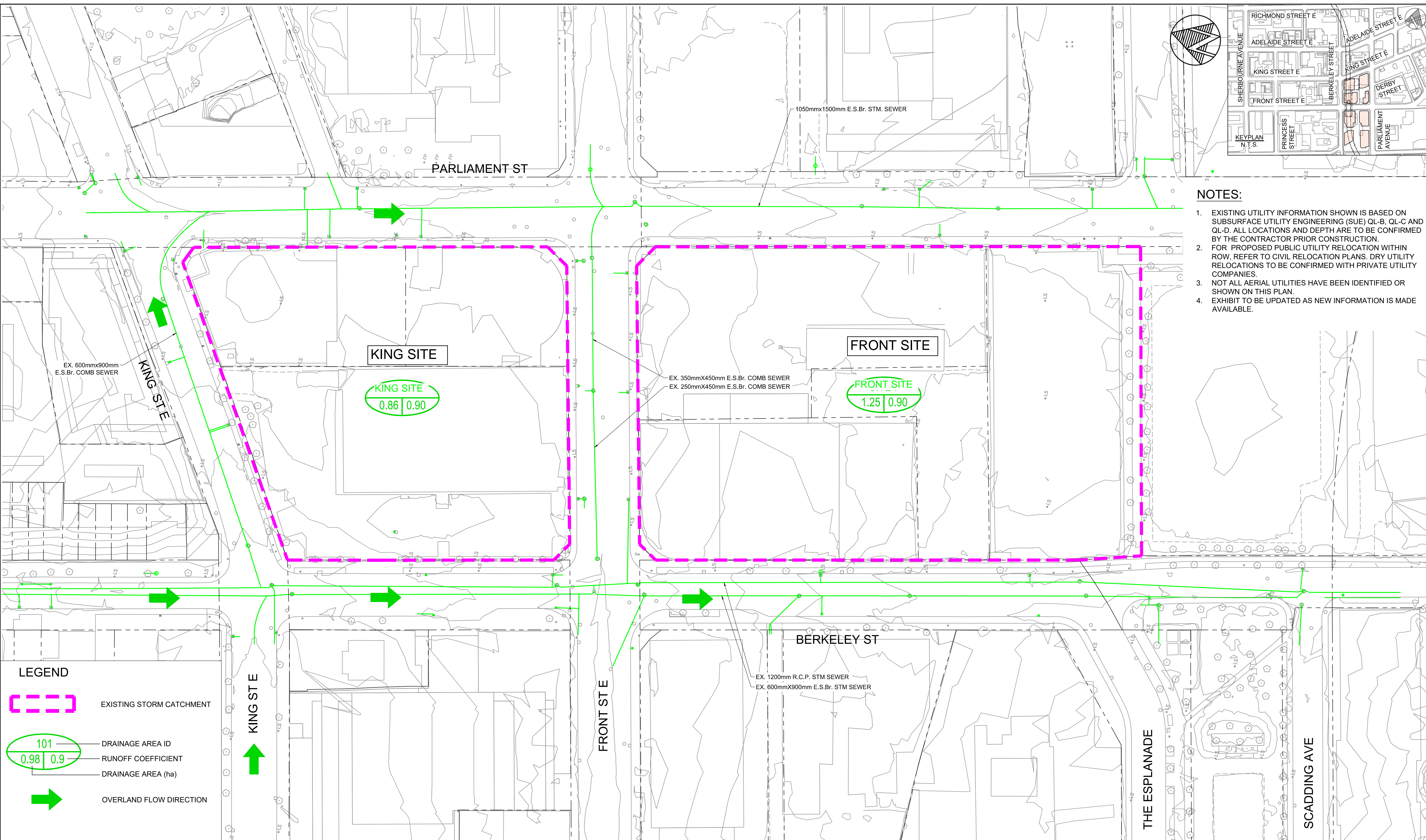
Items	Water Demand Calculation		Remark
Site Parameters			
Average waste water flow	450	l/capita/day	Multi-unit high-rise = 450 litres / capita /day <i>(City of Toronto Design Criteria for Sewers and Watermain)</i>
Commercial average flow	180000	l/floor hectare/day	Commercial = 180000 litres/ floor hectare / day <i>(City of Toronto Design Criteria for Sewers and Watermain)</i>
Total Site Area	8643	Sq.m	
Total GFA	Residential 52812	Commercial 45619	Sq.m
Residential Units	758	n/a	
Residential/Commercial Population	1319	502	Residential: 1.74 people /unit , Commercial: 1.1 people /100sq. m
Peaking Factor	Residential 3.7	Commercial n/a	<i>Commercial peak factor is included in average flow</i>
Extraneous Flow			
Infiltration allowance (< 10 ha)	0.26	l/s/ha	
Residential Flow	6.87	l/s	
Commercial Flow	9.50	l/s	
Infiltration Flow	0.22	l/s	
Maximum Cumulative Flow with peaking factor	35.15	l/s	

Appendix D. Drainage Plans



NOTES:

1. 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.
2. FOR PROPOSED PUBLIC UTILITY RELOCATION WITHIN ROW, REFER TO CIVIL RELOCATION PLANS. DRY UTILITY RELOCATIONS TO BE CONFIRMED WITH PRIVATE UTILITY COMPANIES.
3. NOT ALL AERIAL UTILITIES HAVE BEEN IDENTIFIED OR SHOWN ON THIS PLAN.
4. 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

REVISIONS		REVISIONS	
1		4	
2		5	
3		6	

RCD
NOT FOR CONSTRUCTION

SCALE(S) 0 3 6 9 12m
1:300

STATUS



DESIGNED	S. KHORSHID	2020/12/08
DRAWN	H. WANG	2020/09/09
CHECKED	M. LI	2020/12/08
APPROVED	APPROVED	2020/12/08

ONTARIO LINE SUBWAY

TOC CORKTOWN STATION

EXISTING DRAINAGE PLAN

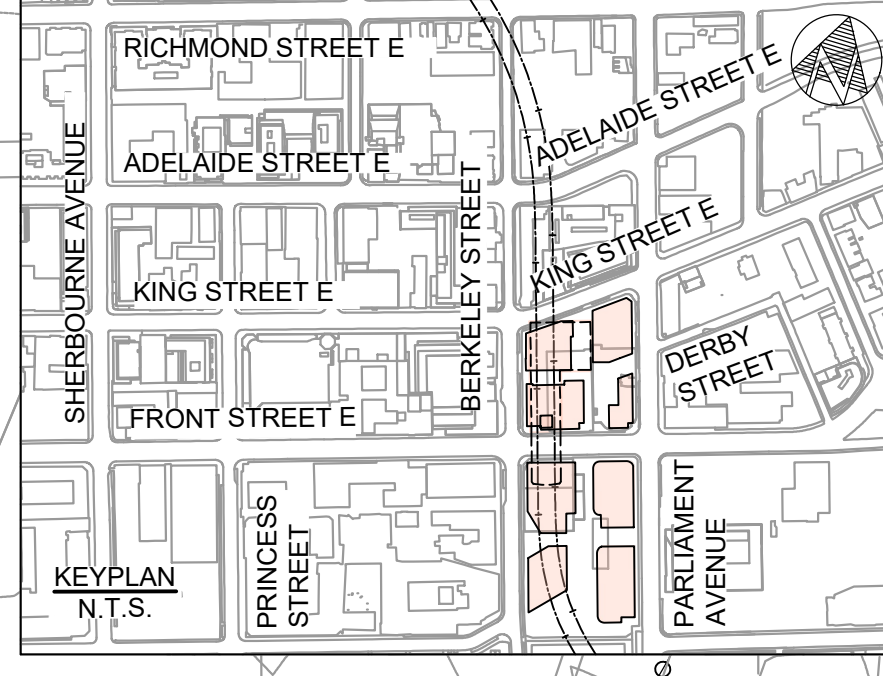
Plot Date:

METROLINX
Infrastructure Ontario

Dwg. No. DR0500-02-SF180

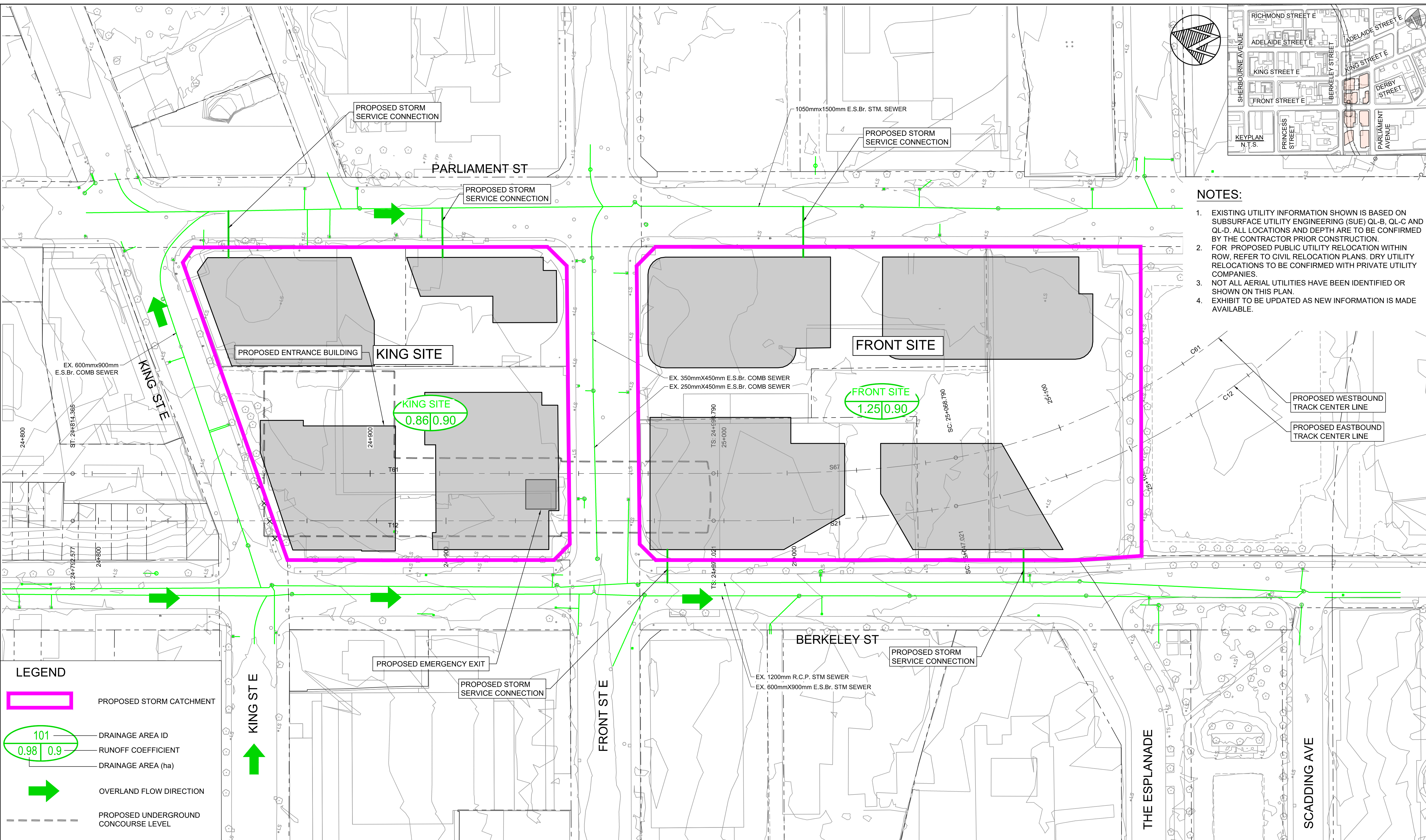
Sheet No.

FILE: 10206938-drr0500-02-sf180.dwg
PLOTTED BY: USER



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.



LEGEND

- PROPOSED STORM CATCHMENT
- DRAINAGE AREA ID
RUNOFF COEFFICIENT
DRAINAGE AREA (ha)
- OVERLAND FLOW DIRECTION
- PROPOSED UNDERGROUND CONCOURSE LEVEL

REVISIONS	REVISIONS
1	4
2	5
3	6

RCD
NOT FOR CONSTRUCTION

SCALE(S) 0 3 6 9 12m
1:300

STATUS



DESIGNED	S. KHORSHID	2020/12/08
DRAWN	H. WANG	2020/09/09
CHECKED	M. LI	2020/12/08
APPROVED	APPROVED	2020/12/08

ONTARIO LINE SUBWAY

TOC CORKTOWN STATION

PROPOSED DRAINAGE PLAN

Plot Date:

METROLINX
Infrastructure Ontario

Dwg. No. DR0500-02-SF181

Sheet No.

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