FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

Dixie Mall Redevelopment

In Support of an Official Plan and Zoning By-Law Amendment

Report Prepared For:

Slate Asset Management

Report Prepared By:

KWA Project No. 19410

April 12th, 2024

Table of Contents

1.0 Introduction 1
1.1 Proposed Architectural Site Plan and Population Density 1
2.0 Study Parameters 2
3.0 Site Grading 2
3.1 Existing Site Grading 2
3.2 Proposed Site Grading 3
4.0 Sanitary Flow 3
4.1 Existing Sanitary Servicing 3
4.2 Existing Sanitary Flow 3
4.3 Sanitary Design Flow 4
4.4 Post-Development Sanitary Flow 4
4.5 Proposed Connection and Layout 5
5.0 Water Supply 5
5.1 Existing Water Servicing 5
5.2 Post-Development Water Demand 5
5.3 Proposed Connection and Layout 6
6.0 Stormwater Management 7
6.1 Pre-Development Drainage Conditions 7
6.2 Future MTO Improvements 7
6.3 Design Criteria 7
6.4 Allowable Release Rate 7
6.5 Post-Development Conditions 9
6.5.1 Drainage Directions 9
6.5.2 Runoff Quantity Control 9
6.5.3 Storm Sewer Design 11
6.5.4 Quality Control 11
6.5.5 Water Balance 12
7.0 Conclusion 14

List of Tables

- Table 1: Land Use Summary
- Table 2: Proposed Sanitary Flows Summary
- Table 3: Water Demand
- Table 4: Summary of Modified Rational Method Calculations
- Table 5: Underground Storage Tanks
- Table 6: Orifice Plate Sizes
- Table 7: 5mm Water Balance Requirement

List of Figures

- Figure 1 - Site Location Plan
- Figure 2 - Site Plan
- Figure 3 - Site Layout
- Figure 4 - General Servicing Plan
- Figure 5 - General Grading Plan
- Figure 6 - Sanitary Servicing Plan
- Figure 7 - Water Distribution Plan
- Figure 8 - Existing Drainage Plan
- Figure 9 - Stormwater Management Plan
- Figure 10 - Post-Development Drainage Plan

List of Appendices

- Appendix A – Sanitary Demand Calculations
- Appendix B – Water Demand Calculations
- Appendix C – Stormwater Management Calculations

1.0 INTRODUCTION

KWA Site Development Consulting Inc. ("KWA") has been retained by Slate Asset Management ("Slate") to prepare this Functional Servicing & Stormwater Management Report in support of an Official Plan Amendment and Zoning By-Law Amendment (OPA/ZBA) application for the redevelopment of the north-west portion of the existing Dixie Outlet Mall located in the City of Mississauga, herein referred to as the "Site". The municipal address is 1250 South Service Road.

The Site is 2.70 ha and is bound by South Service Road and QEW to the north, Haig Boulevard and residential lots to the west, residential lots to the south, and the existing Dixie Outlet Mall to the east. Refer to **Figure 1 – Site Location Plan.** The proposed development will require property ownership limits to be revised as a portion of the existing mall will be demolished to allow for future development blocks, and private and public roads. There is an existing 2.1m x 2.85m MTO box culvert that bisects the Dixie Outlet Mall property and conveys drainage to Applewood Creek. MTO is constructing a new interchange layout at Dixie Road. As part of this work, approximately 1.0 ha (2.5 acres) has been expropriated by the MTO along the South Service Road frontage which has reduced the overall property area of Dixie Outlet Mall and the existing box culvert will be twinned in the future.

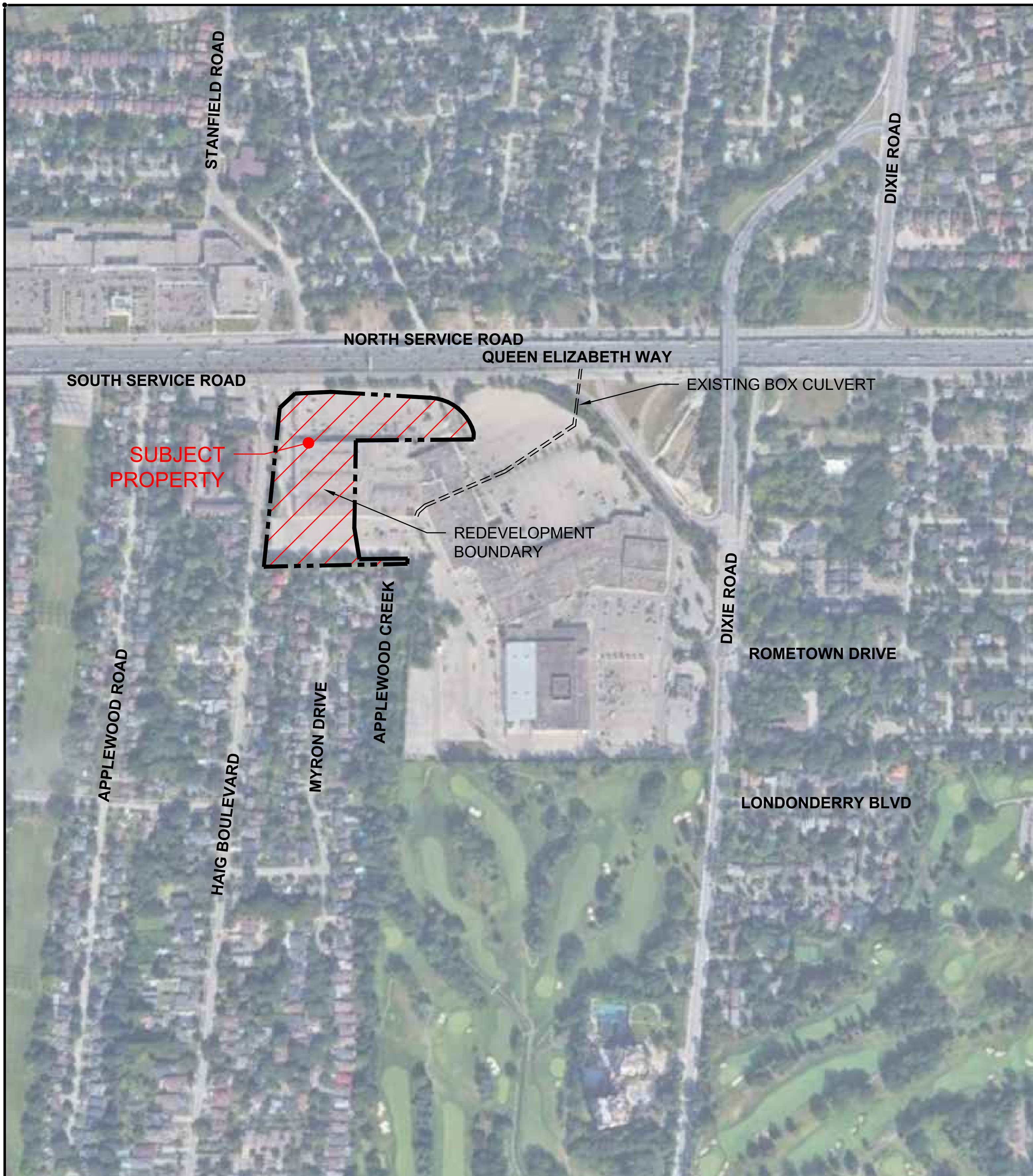
1.1 PROPOSED ARCHITECTURAL SITE PLAN AND POPULATION DENSITY

Based on the proposed Site Plan from Giannone Petricone Architects dated March 26th, 2024, the 2.70 ha redevelopment proposal contemplates a total of six (6) blocks that can be described as follows. Refer to **Figure 2 – Site Plan** and **Figure 3 – Site Layout**.

- <u>Development Blocks:</u> There are 3 residential mid-rise and tower blocks (Blocks 1 – 3).
- <u>Future Municipal ROW:</u> There will be a future municipal right-of-way (ROW) off Haig Boulevard for access to the development and the existing Dixie Outlet Mall (Block 6).
- <u>Park Block:</u> There is a community park block (Block 4) along the west perimeter, directly south of the future ROW. There is an existing hydro easement within the block that continues east to the box culvert.
- <u>Easement Block:</u> Block 5 is an identified block which while owned by the client, has been used by adjacent neighbours and is currently developed with a residential use (i.e. residential rear yards with landscaping and accessory structures). This block is being created to provide a zoning reflecting existing conditions which match zoning on the balance of the residential lots. No new residential development is proposed and no changes to these lands are being proposed. Once this application is approved and this block exists, the applicant intends to explore the potential to engage the existing neighbours and explore transactional arrangements with regards to the limits of the identified block.

Table 1: Land Use Summary

Block	Land Use	Development	Total Area (ha)	Total Apartment
1	Residential	*Mid-Rise (8 Levels)*	0.56	159
2	Residential	*Tower (18 Levels) And Podium (6 Levels)*	0.68	338
3	Residential	*Two Towers (15+19 Levels) And Podium (6 Levels)*	0.71	500
4	Park		0.46	-
5	Easement		0.14	-
6	Future Municipal ROW		0.15	-
TOTAL			**2.70**	**997**



KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

REVISION BLOCK

#	DATE	DESCRIPTION
1.	12/06/22	ISSUED FOR ZBA
2.	04/12/24	ISSUED FOR ZBA

SITE LOCATION PLAN

SLATE ASSET MANAGEMENT

DIXIE MALL REDEVELOPMENT

MISSISSAUGA, ONTARIO

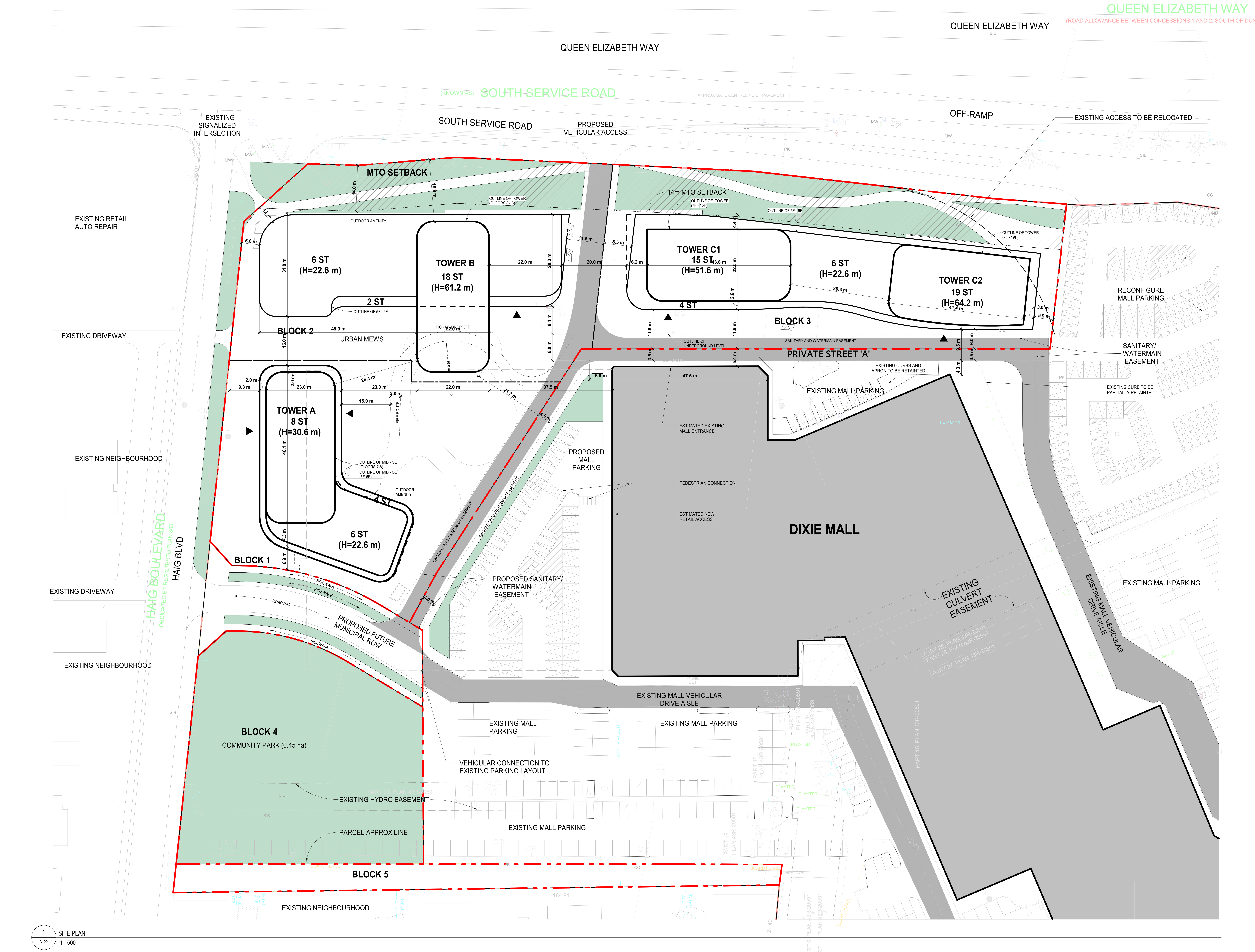
PROJECT No: 19410 | DRAWN BY:BC2 | CHECKED BY:CDB

NORTH ARROW

METRIC SCALE

N.T.S.

FIGURE 1



Revision	Date

5	ISSUE FOR ZBA/OPA RESUBMIT	2024.03.26
3	ISSUED FOR ZBA/OPA	2022.12.16
Revision		Date

giannone petricone associates

Giannone Petricone Associates Inc. Architects
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T 416.591.7788 F 416.591.1293 E mail@gpaia.com

DIXIE MALL REDEVELOPMENT
1250 South Service Road
Mississauga, ON L5E 3E5

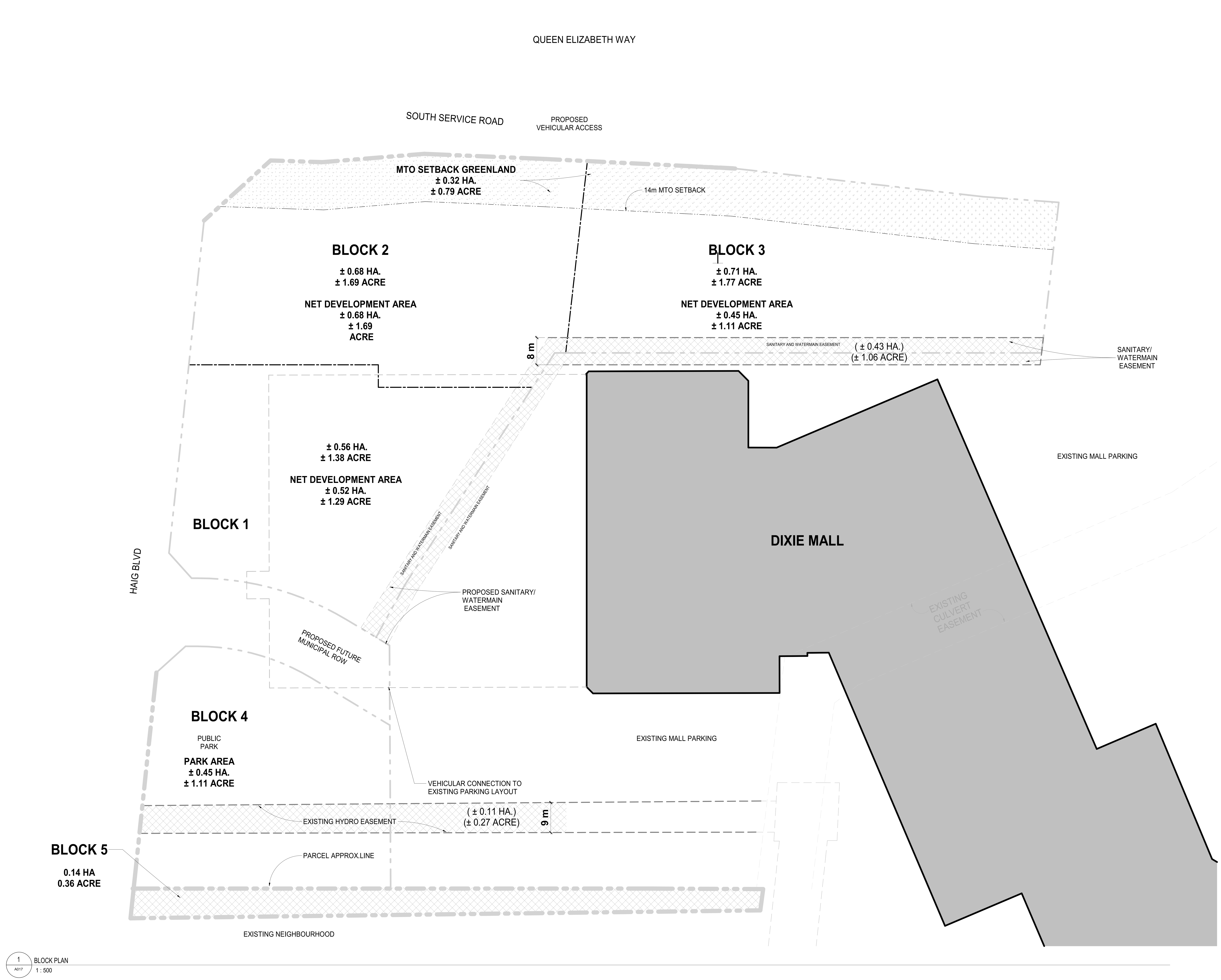
SITE PLAN

FIG 2 - SITE PLAN

DRAWN BY:	MH
CHECKED BY:	AV
PROJECT START DATE:	06/28/22
PROJECT NO.:	22138
SHEET NUMBER	

A100

PLOT DATE: 2024-04-17 1:51:43 PM



1 A017 BLOCK PLAN
1 : 500

Revision		Date
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DIXIE MALL
REDEVELOPMENT
1250 South Service Road
Mississauga, ON L5E 3E5

BLOCK PLAN

FIG 3 - SITE LAYOUT

DRAWN BY:	MH
CHECKED BY:	AV
PROJECT START DATE:	06/28/22
PROJECT NO.:	22138
SHEET NUMBER	

A017

PLOT DATE: 2024-04-17 5:22:47 PM

As per Region of Peel's criteria of 2.7 persons/ unit, the expected total population for the redevelopment of 997 apartment units is **2692 people.**

2.0 STUDY PARAMETERS

This Functional Servicing and Stormwater Management Report has been prepared in coordination and with regard to the following documents and drawings:

- Architectural Plans prepared by Giannone Petricone Associates
- Planning Reports prepared by Glen Schnarr & Associates
- Landscape Design by Janet Rosenberg & Studio
- Transportation Report by LEA Associates
- Topographic Survey by R. Avis Surveying Inc.
- Subsurface Utility Engineering Mapping Services by T2 Utility Engineers
- Geotechnical and Hydrogeological Report by Grounded Engineering
- Region of Peel Linear Wastewater Standards March 2023
- Region of Peel Public Works Design, Specifications and Procedures Manual Linear Infrastructure – Watermain Design Criteria June 2010
- Region of Peel Public Works Design, Specifications and Procedures Manual Linear Infrastructure – Functional Servicing and Storm Water Management Report Nov. 2009
- Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System Volume 3
- City of Mississauga Transportation & Works Department Section 8 – Storm Drainage Design Requirements January 2020
- City of Mississauga Transportation & Works Department Section 2 – Design Requirements Manual September 2016.
- Credit Valley Conservation Stormwater Management Criteria, August 2012
- Credit Valley Conservation and Toronto and Region Conservation Authority Low Impact Development Stormwater Management Planning and Design Guide – Version 1.0 2011
- Ministry of Environment Stormwater Management Planning and Design Manual March 2003
- Ministry of Environment's Design Guidelines for Drinking-Water Systems 2008
- Region of Peel Record Drawings of Haig Boulevard and South Service Road

3.0 SITE GRADING

3.1 EXISTING SITE GRADING

A topographical survey was completed by R. Avis Surveying Inc. in May 2019 which indicated that the Site generally slopes to the south. This can be attributed to the Applewood Creek on the east side of the Site that drains in a southerly direction towards Lakeview Golf Course. There are catch basins within the parking lot which connect to the existing 2.1 x 2.85 m box culvert at multiple locations. The box culvert conveys flows from the east tributary of the Applewood Creek from the north side of the QEW at Harvest Drive, across the highway, and southwesterly through the Mall property under the existing mall structure and eventually discharging into the open creek system. The north parking lot storm flows are captured and connect into the box culvert underneath the existing Mall. The west and south parking lot flows outlet directly into the Applewood Creek.

3.2 PROPOSED SITE GRADING

The proposed grading plan consists of grades along the Site perimeter area and along the building footprint in the development blocks. Grading is generally governed by the existing boundary conditions. The grading along Private Street A to the north of the existing mall is dictated by the grades in the existing parking lot, perimeter grades of the mall, and catch basins at low points. Access for the 20 m future municipal ROW is provided off Haig Boulevard. The MTO setback areas within Blocks 2 and 3 will drain north towards South Service Road. The proposed grading plan considers the storm outlet elevations, finished floor elevations, parking lot slopes, major overland flow paths, adequate cover over proposed services, and private street alignment. Generally, the development (except Block 3) slopes to the south-east towards a connection into the box culvert. There is a high point at the corner of Private Street A. An existing storm connection to the culvert is utilized for Block 3 and adjacent street drainage. Detailed grading design for the development blocks, future municipal ROW, and park blocks will be completed during the Site Plan Approval process.

Refer to **Figure 4 – General Servicing Plan** and **Figure 5 – General Grading Plan** for the proposed conceptual grading to support the OPA/ZBA application.

4.0 SANITARY FLOW

4.1 EXISTING SANITARY SERVICING

An existing 900mm/1050mm reinforced concrete trunk sanitary sewer draining south is located on Haig Boulevard. An existing 1200mm reinforced concrete trunk sanitary sewer draining south is located on Dixie Road. The sanitary flows from the existing Mall (including the existing No Frills grocery store to the south) are currently pumped to the Haig Boulevard sanitary trunk sewer and ultimately drain to the Region of Peel's G.E. Booth Lakeview Wastewater Treatment Plant located south of Lakeshore Road East, approximately 2.2 km south of the Site. Ongoing expansion and retrofit work at the G.E. Booth Wastewater Treatment Plant is shown in the Region's Capital Budget for the next 10+ years.

As per correspondence with the Region of Peel, sanitary sewer construction is set to begin on Haig Boulevard in Spring 2024 and to be completed in 2026. The existing 900 mm sanitary trunk sewer will be replaced by a new 900 mm trunk sewer. Also, a 450 mm sanitary sewer will be installed, which is in parallel with the newly constructed 900 mm trunk sewer near the Subject Site and ultimately connects into the new 900 mm sanitary sewer downstream. Refer to Ministry of Transp*ortation drawing # 420H (WS-20) and 421D (WS-21)* dated February 2022 in **Appendix A**, that shows the sanitary sewer connection into the Haig Boulevard trunk sewer.

4.2 EXISTING SANITARY FLOW

The Site is currently zoned commercial. Sanitary flows for the entire Mall outlet to the 900mm Haig Boulevard trunk sewer. Using the following Region of Peel's Linear Wastewater Standards (2023), the theoretical existing commercial sanitary flow draining to the Haig Boulevard sewer is determined to be **17.14 L/s**.

- Population Density: Commercial = 50 persons/ha
- Peaking Factor = Calculated using the Harmon Formula
- Design Flow = 270 Litres / capita / day (for non-residential flow)
- Infiltration Flow + Foundation Drains= 0.00028 m^3/s/ha (0.28 L/s/ha)


SOUTH SERVICE ROAD
HAIG BOULEVARD
MYRON DRIVE
18 STOREY BUILDING B FFE : 105.60
15 STOREY BUILDING C1 FFE : 104.25
19 STOREY BUILDING C2 FFE : 104.25
8 STOREY BUILDING A FFE : 105.00
PRIVATE LANEWAY
PRIVATE STREET A
FUTURE PUBLIC ROAD EXTENSION
EXISTING MALL TO REMAIN
BLOCK 4 COMMUNITY PARK
BLOCK 5
BLOCK 5 EASEMENT BOUNDARY
HYDRO EASEMENT
LIMIT OF UNDERGROUND
14m MTO SETBACK
ACCESS TO BE REMOVED
PROPOSED CONC. S/W (BY OTHERS)
TEMP. PLUG
FUT. CONN. TO EX. 200 mmØ W/M
UTILITY CORRIDOR
PARKING LOT SWM TANK STORAGE: 103m³ TANK DEPTH: 0.5m RETENTION: 17.0m³
EXISTING +/- 310m LONG +/- 2.1m x 2.85m BOX CULVERT INLET INVERT=+/-99.93
PROPOSED 16m STORM EASEMENT
EX. CULVERT OUTLET INVERT=96.96 OBVERT=99.04
NEW PROPOSED BOX CULVERT TIE-IN LOCATION PER MTO FILE RECEIVED ON MARCH 5, 2021
EXISTING PARKING TO REMAIN
SCALE 1:150
PROPOSED ROAD GRADE
DRIVE AISLE CL
R.O.W. 104.58
104.50
2.0%
1.00m
1.30m
2.15m
2.50m
300mm WM WITH 2.0m COVER
300mm SANITARY INV. 99.74
LIMIT OF UNDER GROUND
SECTION A-A SCALE 1:100
LEGEND
PROPOSED STORM SEWER
PROPOSED STORM MANHOLE
PROPOSED AREA DRAINS (BY OTHERS)
PROPOSED CATCHBASIN
EXISTING BOX CULVERT
EXISTING STORM SEWER
EXISTING STORM MANHOLE
EXISTING STORM CATCHBASIN MANHOLE
EXISTING CATCHBASIN
EXISTING DOUBLE CATCHBASIN
PROPOSED SANITARY SEWER
PROPOSED SANITARY MANHOLE
EXISTING SANITARY SEWER
EXISTING SANITARY TRUNK (> 600mm)
EXISTING SANITARY MANHOLE
PROPOSED WATERMAIN
EXISTING WATERMAIN
EXISTING HYDRANT
EXISTING VALVE AND BOX
PROPOSED UTILITY CORRIDOR ALLOWANCE
APPROXIMATE LIMITS OF FLOOD HAZARD (AS PER 2017 CVC APPLEWOOD CREEK MAPPING SHEET 3)
NOTES:
ALL DIMENSIONS AND ELEVATIONS IN METERS
REVISION BLOCK
DATE DESCRIPTION
1 12/06/22 ISSUED FOR ZBA
2 04/12/24 ISSUED FOR ZBA
KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9
NORTH ARROW
BENCHMARK NOTE:
ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA BENCH MARK NO. 72, HAVING AN ELEVATION OF 106.72m
METRIC SCALE
1:500
Metres
GENERAL SERVICING PLAN
SLATE ASSET MANAGEMENT
DIXIE MALL
MISSISSAUGA, ONTARIO
PROJECT No.19410
DRAWN BY:BC2
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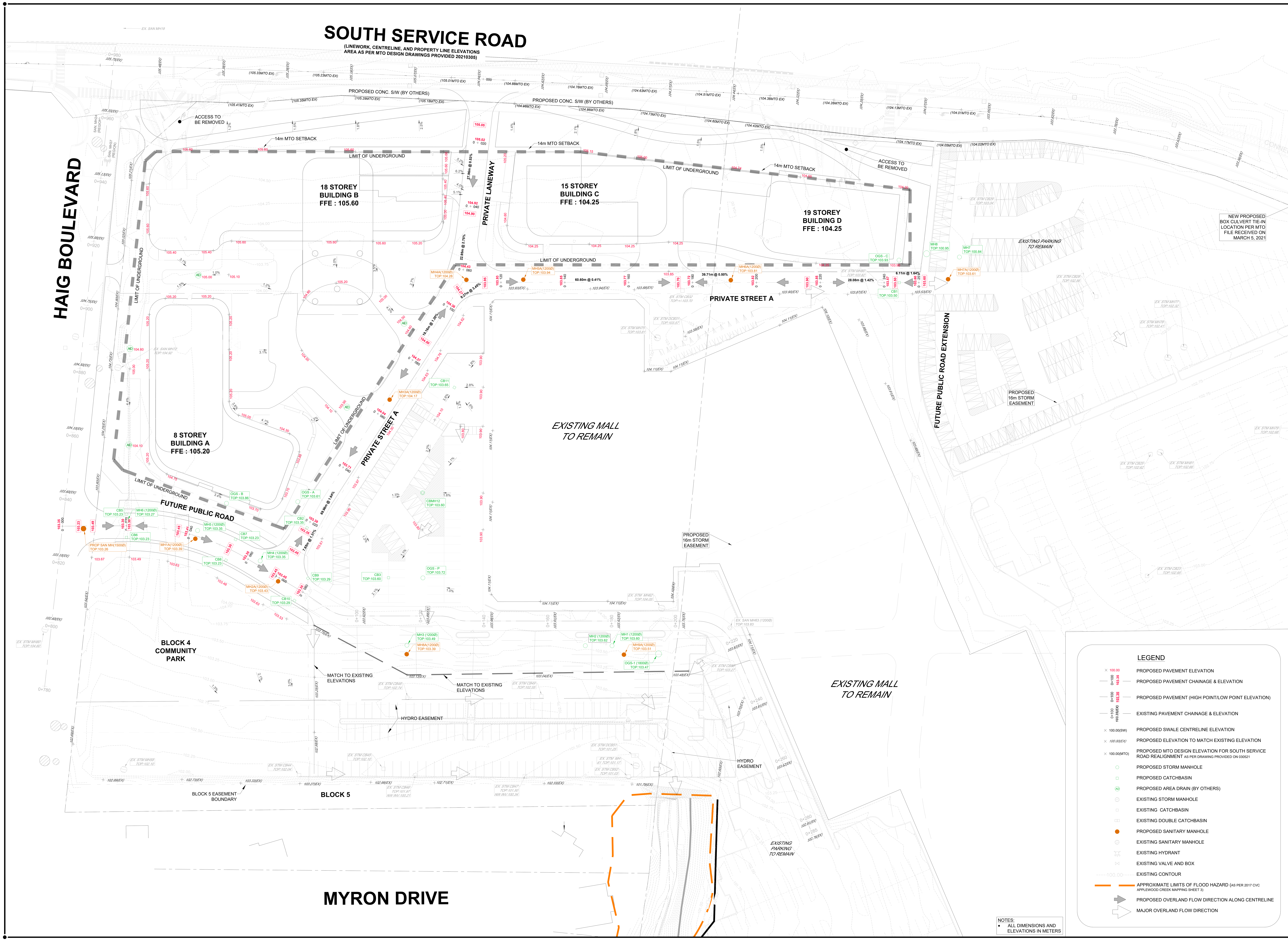
FIGURE 4



REVISION BLOCK

#	DATE	DESCRIPTION
1	12/06/22	ISSUED FOR ZBA
2	04/12/24	ISSUED FOR ZBA

REGISTERED PROFESSIONAL ENGINEER
B.JACKSON
100210382
APR. 12, 2024
PROVINCE OF ONTARIO

KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

NORTH ARROW

BENCHMARK NOTE:
ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA BENCH MARK NO. 72, HAVING AN ELEVATION OF 106.72m

METRIC SCALE
0 15 Metres
1:500

GENERAL GRADING PLAN

SLATE ASSET MANAGEMENT

DIXIE MALL

MISSISSAUGA, ONTARIO

PROJECT No:19410
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FIGURE 5

Based on correspondence with the Operations Supervisor at the Dixie Outlet Mall, the existing flow rate for the pump house near the existing No Frills is approximately 148 US Gallons/Minute = 9.3 L/s. The pumped flow connects into a gravity sanitary sewer, collecting flows from the existing Mall, and discharges into the Haig Boulevard sanitary trunk sewer.

Refer to *City of Mississauga drawing # 86042-1* dated June 1986 in **Appendix A**, that shows the sanitary sewer connection into the Haig Boulevard trunk sewer. Also, refer to **Appendix A** for Existing Commercial Sanitary Calculations.

4.3 Sanitary Design Flow

The sanitary design flows and population density for the Site have been calculated based on the Region of Peel's Linear Wastewater Standards (2023). The relevant design criteria are summarized below:

- Population Density: Apartments = 2.7 persons/unit
- Peaking Factor = Calculated using the Harmon Formula
- Design Flow = 290 Litres / capita / day (for residential flow)
- Infiltration Flow + Foundation Drains= 0.00028 m^3/s/ha (0.28 L/s/ha)R

4.4 Post-Development Sanitary Flow

The proposed development will outlet into the new 450 mm sanitary sewer on Haig Boulevard, which ultimately outlets to the 900 mm sanitary sewer on Haig Boulevard. The connection to the Haig Boulevard sewer is preferred as connecting into the Dixie Road sewer would require crossing the MTO box culvert that bisects the Site, which is not feasible given the sanitary trunk sewer elevations on Dixie Road.

Refer to Table 2 for sanitary flows summary.

Table 2: Proposed Sanitary Flows Summary

Draft Plan Blocks	Total Area (ha)	Total Population	Average Flow (L/s)	Peaking Factor	Peak Flow	Infiltration (L/s)	Total Sanitary Flow (L/s)
1, 2 & 3 (Development)	1.95	2692	9.04	3.48	31.46	0.55	32.01
4, 5, & 6 (Park, Easement & ROW)	0.75	0	0	0	0	0.21	0.21
TOTAL	**2.70**	**2692**	**9.04**	**3.48**	**31.46**	**0.76**	**32.22**

The existing 19.6 ha Dixie Outlet Mall development has sanitary flows of 17.1 L/s draining to the Haig Boulevard sewer. The 2.7 ha of the redevelopment will have sanitary flows of **32.22 L/s**, whereas the remaining 16.90 ha of the Dixie Outlet Mall development will have sanitary flows of 14.9 L/s.

The sanitary sewer flows outletting to Haig Boulevard will increase by **30 L/s** (47.1 – 17.1) over pre-development conditions. As per correspondence with the Region of Peel, sanitary flows from the development and existing Dixie Outlet Mall can connect into the new 450 mm sewer on Haig Boulevard (refer to **Appendix A**).

It is important to note that the calculated population density based on a 2.7 persons/unit is conservative, resulting in conservative estimates of sanitary flow. For the entire Site, there are approximately 65% 1-bedroom units, 20% 2-bedroom units, and 15% 3-bedroom units proposed. A large proportion of the suite type contemplated at this stage is 1-bedroom units.

4.5 Proposed Connection and Layout

Blocks 1, 2, and 3 will be serviced by 300mm sanitary sewers along Private Street A. All Site flows will outlet to the 375mm sanitary sewer along the future municipal ROW in Block 6, which will connect to the new 450 mm municipal sewer flowing at 0.155% on Haig Boulevard.

The 14.9 L/s of sanitary flows from the remaining Dixie Outlet Mall Site will be conveyed from the existing manhole MH63 (east of box culvert) to the 450 mm sewer on Haig Boulevard.

Refer to **Figure 6 – Sanitary Servicing Plan.** Refer to **Appendix A** for detailed sanitary calculations.

5.0 Water Supply

5.1 Existing Water Servicing

The existing water infrastructure adjacent to the Site consists of a 400mm watermain on Dixie and a 200mm watermain on Haig Boulevard. The 300mm watermain on South Service Road has recently been abandoned and a new 400 mm waterman has been installed and commissioned. The Site obtains treated water from Arthur P. Kennedy Water Treatment Plant located south of Lakeshore Boulevard East, approximately 3.5 km south of the Site. This plant is operated by the Ontario Clean Water Agency (OCWA) on behalf of the Region of Peel. The Region owns and operates the water distribution system. The Site is within the Region's central trunk system and Pressure Zone 1 (also denoted as CT1). Elevations in this pressure zone range from the Lake Ontario at 75.0m to 106.7m. The proposed Site elevation is approximately 102.0m to 106.0m.

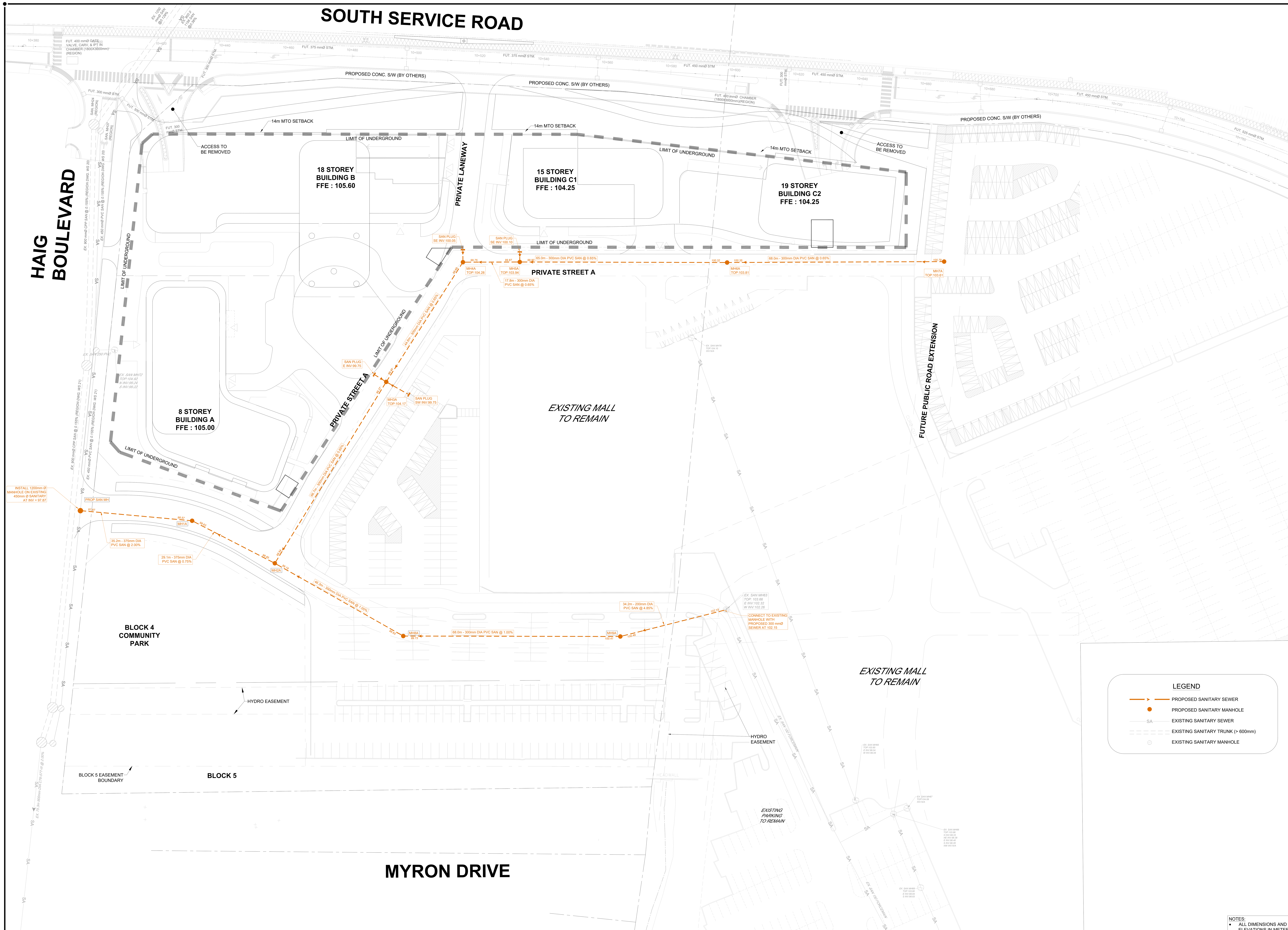
As per the Region of Peel Water and Wastewater Master Plan, there are two transmission mains within the CT1 starting from the A.P. Kennedy WTP and delivering water to the Silverthorn Reservoir: a 900-mm diameter transmission main and a 1500-mm diameter transmission main. The total theoretical Pressure Zone 1 central transmission capacity is approximately 342 ML/d. However, the actual capacity is estimated at approximately 279 ML/d. The total reservoir capacity at the A.P. Kennedy WTP is 25 ML.

Existing hydrants surrounding the Dixie Outlet Mall are located on the east and west sides of Dixie Road, south side of South Service Road and west side of Haig Boulevard. Existing hydrants are located within the Mall along the fire access route.

5.2 Post-Development Water Demand

The domestic and fire water demand for the Site was calculated based on the Region of Peel's Public Works Watermain Design Criteria. The relevant design criteria are summarized below:

- Average Daily Demand: Residential = 280 Litres / capita / day
- Max Day Factor: Residential = 2.0
- Peak Hour Factor: Residential = 3.0



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NORTH ARROW

METRIC SCALE
0 15 Metres
1:500

SANITARY SERVICING PLAN

SLATE ASSET MANAGEMENT

DIXIE MALL

MISSISSAUGA, ONTARIO

PROJECT No:19410

DRAWN BY:BC2

CHECKED BY:CDB

FIGURE 6

Fire Demand is based on MOE Design Guidelines for Drinking-Water Systems. The suggested fire flow for an equivalent population of 2692 would be **105 L/s** (interpolated using Table 8-1: Fire Flow Requirements).

The Region of Peel strives to maintain a minimum operation pressure of 275 kPa (40 psi) and maximum operating pressure of 690 kPa (100 psi).

The detailed water demand calculations can be found in **Appendix B** and are summarized in the Table below.

Table 3: Water Demand

Draft Plan Blocks	Population	Average Daily Demand (L/s)	Max Daily Demand (L/s)	Peak Hour Demand (L/s)
1	429	1.39	2.78	4.17
2	913	2.96	5.92	8.87
3	1350	4.38	8.75	13.13
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
TOTAL	**2692**	**8.72**	**17.45**	**26.17**

The post-development water demands are as follows:

- Domestic Supply Line – Peak Hour Demand = **26.17 L/s**
- Maximum Fire Flow Demand + Max Daily Demand = **122.45 L/s**

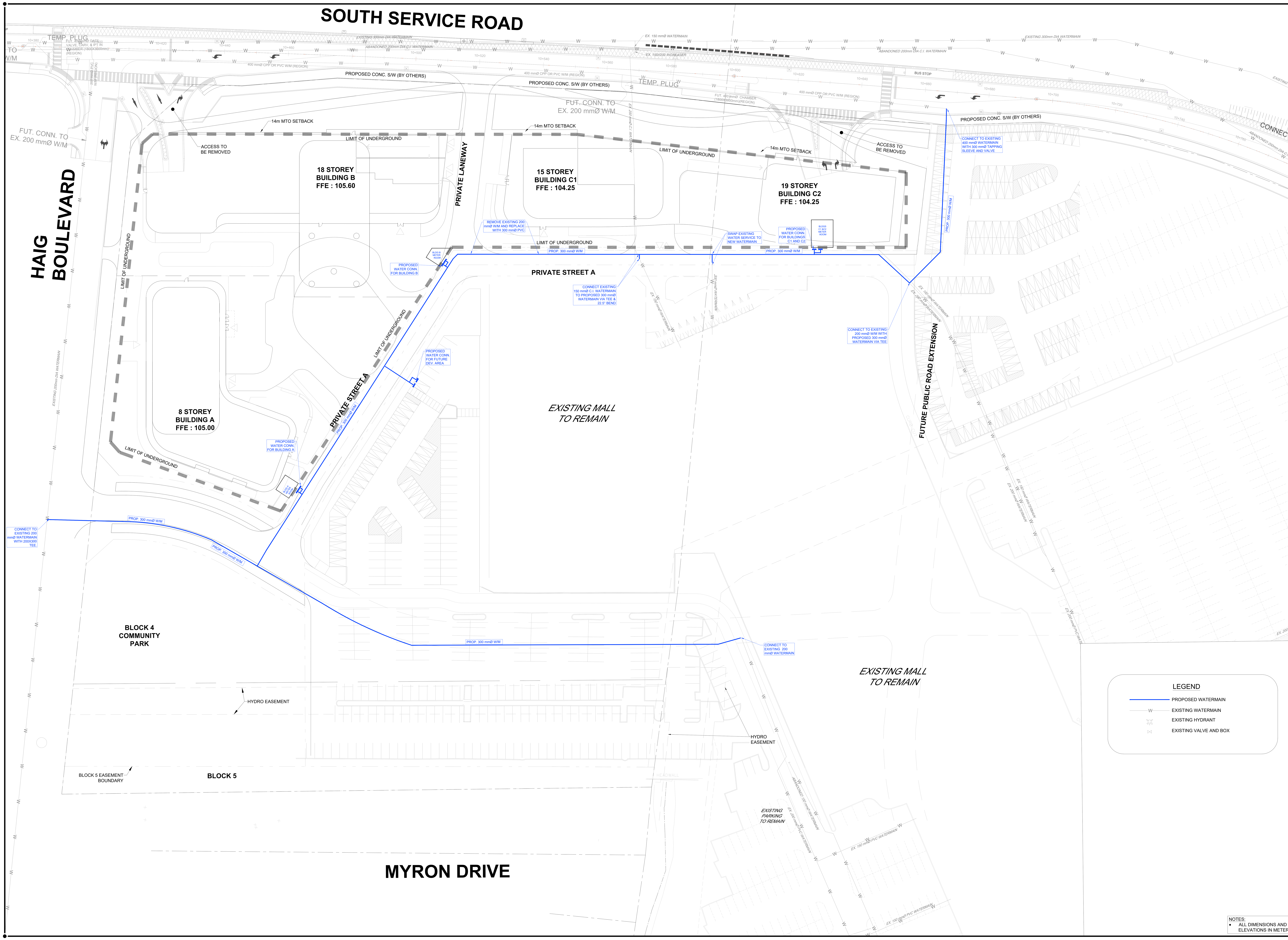
A fire hydrant test was completed in November 2022 by Troy Life & Fire Safety Ltd. The static hydrant was located at the corner of South Service Road and the north Mall entrance, and the flow hydrant was located at the corner of South Service Road and Haig Boulevard. This testing indicated a static water pressure of 64 psi and theoretical fire flow of 6746 USGPM (426 L/s) at a residual pressure of 20 psi. There is sufficient pressure and flow in the municipal system to provide the required demands of the proposed development. A fire hydrant test along Haig Boulevard has been initiated and will be competed in Spring 2024.

5.3 Proposed Connection and Layout

Blocks 1, 2, and 3 will be serviced by 300mm watermains that will connect to the new 400mm watermain on South Service Road and the existing 200mm watermain on Haig Boulevard. The connection to South Service Road will be provided adjacent to Building C and the connection to Haig Boulevard will be along the future municipal ROW. Refer to **Figure 7 – Water Distribution Plan.**

Backflow prevention valves and chambers will be required at each municipal connection and confirmed during detailed design in the Site Plan Application. Hydrants are proposed within 45m of the buildings' Fire Department Connection (FDC) and the distance will be confirmed during the individual Site Plan Applications.

A **Multi-Use Demand table** is requested by the Region to fulfil the modelling requirements and determine the proposals impact to the existing system. Refer to **Appendix B** for the completed Multi-Use Demand table.



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METRIC SCALE
0 15 Metres
1:500

NOTES:
- ALL DIMENSIONS AND ELEVATIONS IN METERS

WATER DISTRIBUTION PLAN

SLATE ASSET MANAGEMENT

DIXIE MALL
MISSISSAUGA, ONTARIO
PROJECT No:19410

DRAWN BY:BC2
CHECKED BY:CDB

FIGURE 7

6.0 Stormwater Management

6.1 Pre-Development Drainage Conditions

The Site generally slopes in the south direction. The Site is primarily impervious consisting of mall rooftop areas and associated asphalt parking lot areas. There is an existing 2.1m x 2.85m box culvert that bisects the Dixie Outlet Mall property to convey drainage from north of the QEW to Applewood Creek. This culvert also collects runoff from the on-site private storm sewers. It currently runs through the parking lot and beneath the existing mall.

6.2 Future MTO Improvements

MTO is constructing a new interchange layout at Dixie Road. The South Service Road will be realigned to accommodate the new interchange and to allow for directional access at Dixie Road and the QEW. As part of this work, MTO is proposing the existing box culvert be converted to a twinned box culvert outletting to the Applewood Creek. The twinned box culvert will be on east side of existing box culvert and will not form part of or encroach Phase 1 of the proposed development.

6.3 Design Criteria

The following guidelines have been specified in the City of Mississauga's Development Requirements Manual:

<u>Water Quantity Control:</u> For the Applewood Creek Subwatershed, 100-yr post-development flows must be controlled to the 2-yr pre-development flows. For pre-development lands, it is implied as raw land for which the runoff coefficient is equal to 0.25 but will not exceed 0.50 for a site that is already developed.

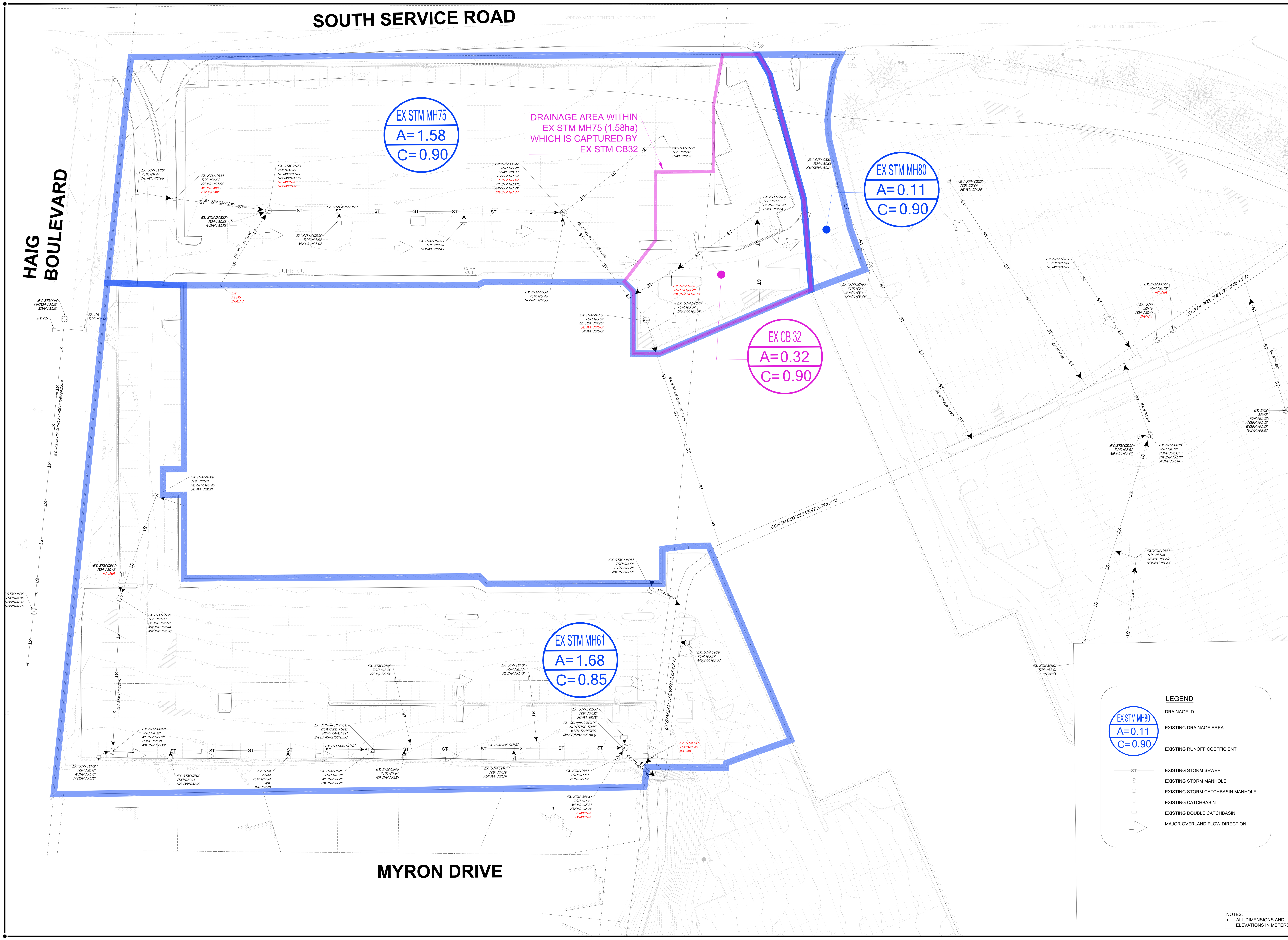
<u>Water Quality Control:</u> Enhanced (Level 1) protection through the removal of 80% of total suspended solids (TSS) is required.

<u>Water Balance:</u> The first 5mm of runoff shall be retained on-site and managed by way of infiltration, evapotranspiration, re-use or filtration.

6.4 Allowable Release Rate

The proposed development consists of 6 blocks with total area of 2.70 ha. Runoff from the blocks will be directed to the existing box culvert. The proposed drainage areas loosely align with the block boundaries but also include future anticipated development areas and exclude MTO setback lands that will drain towards South Service Road. The following four outlets (two existing and two new) will ensure that stormwater runoff is conveyed to the box culvert. Refer to the **Figure 8 – Existing Drainage Plan**, **Figure 9 – Stormwater Management Plan** and **Figure 10 – Post-Development Drainage Plan**.

<u>Existing Culvert Outlet (Outlet #1)</u>
The drainage area of 1.44 ha labelled as 'EXIST' drains to Outlet #1. This includes Block 4 (park), Block 5 (easement), and unaltered parking lot area that drains to this outlet in the existing condition. In the pre-development condition, this outlet receives drainage from a larger paved area (1.68 ha) having a higher runoff coefficient of 0.90. There are existing orifice controls within the existing storm sewers, with the downstream 150 mm orifice tube controlling the catchment area release rate to 109 L/s (refer to City of Mississauga drawing No. 86042-I). In the post-development condition, a park block is added and the existing parking lot and storm infrastructure is maintained. Since the drainage area and runoff coefficient are reduced in the proposed condition, the peak flows will decrease for every storm event.



REVISION BLOCK

#	DATE	DESCRIPTION
1	12/06/22	ISSUED FOR ZBA
2	04/12/24	ISSUED FOR ZBA

KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

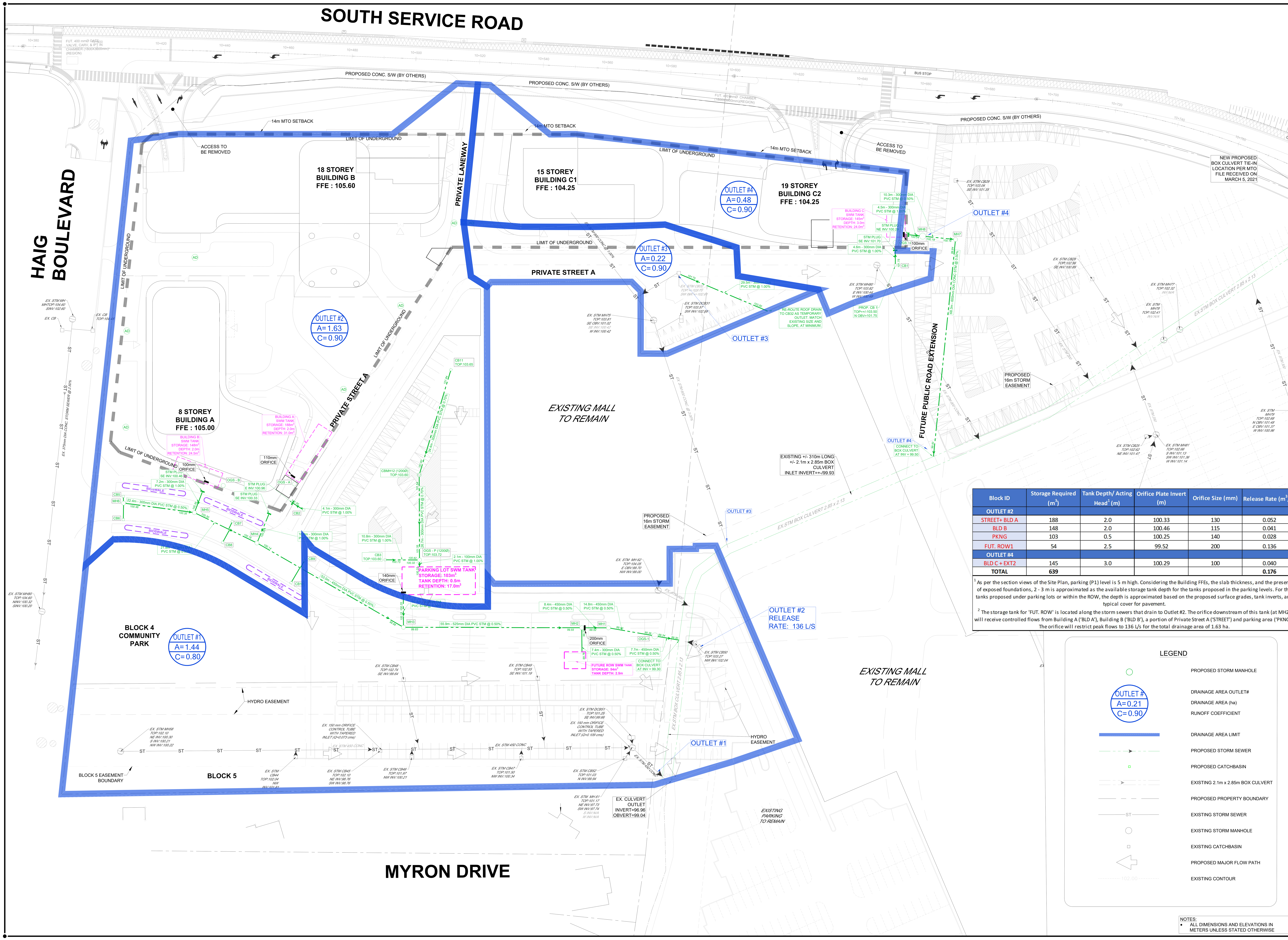
NORTH ARROW

BENCHMARK NOTE:
ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA BENCH MARK NO. 72, HAVING AN ELEVATION OF 106.72m

METRIC SCALE
0 15 Metres
1:500

EXITING DRAINAGE PLAN
SLATE ASSET MANAGEMENT
DIXIE MALL
MISSISSAUGA, ONTARIO
PROJECT No:19410
DRAWN BY:BC2
CHECKED BY:CDB

FIGURE 8



Block ID	Storage Required (m^3)	Tank Depth/ Acting Head[1] (m)	Orifice Plate Invert (m)	Orifice Size (mm)	Release Rate (m^3/s)
OUTLET #2					
STREET+ BLD A	188	2.0	100.33	130	0.052
BLD B	148	2.0	100.46	115	0.041
PKNG	103	0.5	100.25	140	0.028
FUT. ROW1	54	2.5	99.52	200	0.136
OUTLET #4					
BLD C + EXT2	145	3.0	100.29	100	0.040
TOTAL	**639**				**0.176**

[1] As per the section views of the Site Plan, parking (P1) level is 5 m high. Considering the Building FFEs, the slab thickness, and the presense of exposed foundations, 2 - 3 m is approximated as the available storage tank depth for the tanks proposed in the parking levels. For the tanks proposed under parking lots or within the ROW, the depth is approximated based on the proposed surface grades, tank inverts, and typical cover for pavement.

[2] The storage tank for 'FUT. ROW' is located along the storm sewers that drain to Outlet #2. The orifice downstream of this tank (at MH2) will receive controlled flows from Building A ('BLD A'), Building B ('BLD B'), a portion of Private Street A ('STREET') and parking area ('PKNG'). The orifice will restrict peak flows to 136 L/s for the total drainage area of 1.63 ha.

NOTES:
- ALL DIMENSIONS AND ELEVATIONS IN METERS UNLESS STATED OTHERWISE

REVISION BLOCK

#	DATE	DESCRIPTION
1	12/06/22	ISSUED FOR ZBA
2	04/12/24	ISSUED FOR ZBA

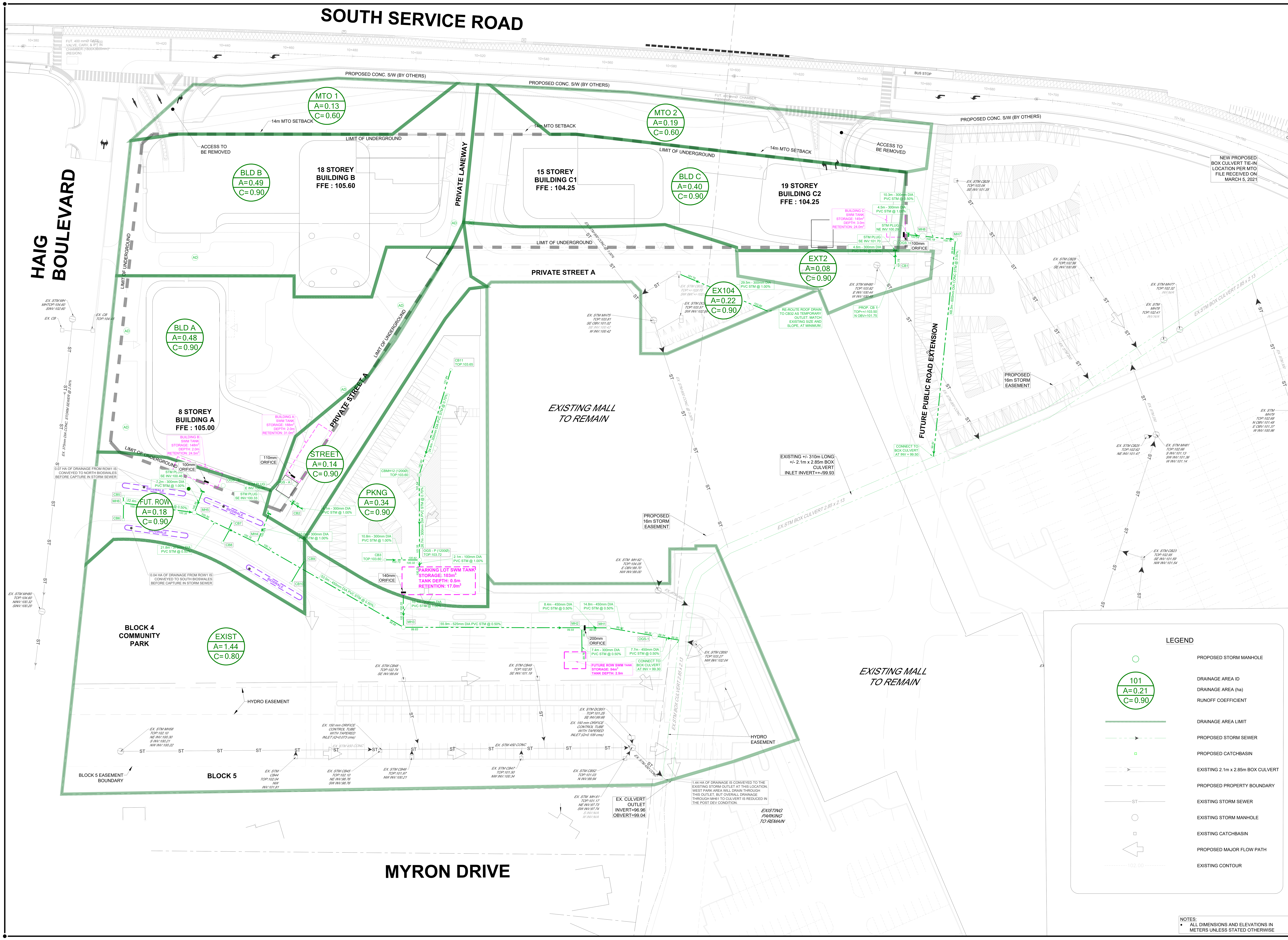
KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

BENCHMARK NOTE:
ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA BENCH MARK NO. 72, HAVING AN ELEVATION OF 106.72m

METRIC SCALE
0 15 Metres
1:500

STORMWATER MANAGEMENT PLAN
SLATE ASSET MANAGEMENT
DIXIE MALL
MISSISSAUGA, ONTARIO
PROJECT No:19410
DRAWN BY:BC2
CHECKED BY:CDB

FIGURE 9



REVISION BLOCK

#	DATE	DESCRIPTION
1	12/06/22	ISSUED FOR ZBA
2	04/12/24	ISSUED FOR ZBA

KWA SITE DEVELOPMENT CONSULTING INC.
2453 Auckland Drive
Burlington, ON L7L 7A9

NORTH ARROW

BENCHMARK NOTE:
ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA BENCH MARK NO. 72, HAVING AN ELEVATION OF 106.72m

METRIC SCALE
0 15 Metres
1:500

POST DEVELOPMENT DRAINAGE PLAN
SLATE ASSET MANAGEMENT
DIXIE MALL
MISSISSAUGA, ONTARIO
PROJECT No:19410
DRAWN BY:BC2
CHECKED BY:CDB

FIGURE 10

Refer to **Figure 8 – Existing Drainage Plan** and **Figure 9 – Stormwater Management Plan** for the changes in the drainage area to Outlet #1.

Proposed Culvert Outlet (Outlet #2)

Flows from Building A ('BLD A'), Building B ('BLD B'), a portion of Private Street A ('STREET'), Block 6 consisting of future municipal ROW ('FUT.ROW') and future development area ('PKNG') are directed to Outlet #2, resulting in a total drainage area of 1.63 ha. In the pre-development condition, this area was occupied by parking lots or existing mall rooftop.

The pre-development flow rates for the proposed area are determined using the Rational Method. The inputs area:

- Drainage Area to Culvert = 1.63 ha
- Time of Concentration: 15 minutes
- Pre-development Runoff Coefficient (C): 0.5 as per City of Mississauga's Development Requirements Manual
- Intensity (i): 60 mm/hr for a 2-yr storm event based on a = 610, b = 4.6, c = 0.78 as per City of Mississauga's Development Requirements Manual

$$Q = CiA = 0.5 * 60\ mm/hr\ * 1.63\ ha$$

$$Q = 0.136\ m^3/s$$

The 2-year pre-development flow for the area is **0.136 m^3/s.**

Quantity control is to be provided individually for each development block. Drainage for the Private Street A is combined with the flows from Building A and the storage required for both drainage areas is provided in one storage tank. The release rates are proportionally assigned for the blocks according to their areas. Given total flow of 0.136 m^3/s and drainage area of 1.63 ha, the resulting unit rate is **83.2 L/s/ha.**

Existing Culvert Outlet (Outlet #3)

The drainage area of 0.22 ha labelled as 'EX104' drains to Outlet #3. This includes a portion of Private Street A and existing parking spaces. In the pre-development condition, this outlet received drainage from a larger paved area (0.32 ha) through existing CB24, CB32, and DCB31. In the post-development condition, CB24 will be abandoned and CB32 and DCB31 will capture flows within the catchment area. Since the flows have decreased in the proposed condition for every storm event, no storage is proposed in drainage area 'EX104'. Refer to **Figure 8 – Existing Drainage Plan** and **Figure 9 – Stormwater Management Plan** for the changes in the drainage area to Outlet #3.

Proposed Culvert Outlet (Outlet #4)

Flows from Building C ('BLD C') and a portion of Private Street A ('EXT2') are directed to Outlet #4, resulting in a total drainage area of 0.48 ha. In the pre-development condition, this area was occupied by parking lots or drive aisles.

The pre-development flow rates for the proposed area are determined using the Rational Method. The inputs area:

- Drainage Area to Culvert = 0.48 ha
- Time of Concentration: 15 minutes
- Pre-development Runoff Coefficient (C): 0.5 as per City of Mississauga's Development Requirements Manual
- Intensity (i): 60 mm/hr for a 2-yr storm event based on a = 610, b = 4.6, c = 0.78 as per City of Mississauga's Development Requirements Manual

$$Q = CiA = 0.5 * 60\ mm/hr\ * 0.48\ ha$$

$$Q = 0.040\ m^3/s$$

The 2-year pre-development flow for the area is **0.040 m³/s.**

Quantity control is provided within Building C. The release rate must be less than 0.040 m³/s for the drainage area of 0.48 ha, resulting in the unit rate is **83.2 L/s/ha.**

Additionally, some areas from Blocks 2 and 3 are dedicated to the MTO setback areas labelled as 'MTO1' and 'MTO2'. Refer to **Figure 10 – Post-Development Drainage Plan**.

6.5 Post-Development Conditions

6.5.1 Drainage Directions

The proposed development contains stormwater sewers along the Private Street A and the future municipal ROW. There are also existing storm sewers along the north-east corner and along the south of the property that will be utilized. In total, there are four storm outlets into the box culvert within the subject Site. The layout of the storm sewers is depicted in **Figure 9 – Stormwater Management Plan.**

6.5.2 Runoff Quantity Control

For drainage areas 'EXIST' and 'EX104', the flows are expected to decrease in the proposed condition for every storm event; therefore, no storage is proposed to control the drainage in these areas. For Outlets #2 and #4, the 100-year post-development peak flows will be reduced to the 2-year pre-development peak flows. Using the allowable release rate of **83.2 L/s/ha**, the release rate for each block can be determined as follows:

Since 100-year flows are being considered, the runoff coefficient is multiplied by the MTO factor of 1.25, to a maximum value of 1. Applying the Modified Rational method, the storage required to maintain the prescribed release rate is found. The storage rate per area required for impervious surfaces (C=1.00) is 303 m³/ha.

Table 4: Summary of Modified Rational Method Calculations

Block ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Required (m^3)	Release Rate[1] (m^3/s)	Storage/ Area[2] (m^3/ha)
OUTLET #2						
STREET + BLD A	0.62	1.00	15	188	0.052	303
BLD B	0.49	1.00	15	148	0.041	303
PKNG	0.34	1.00	15	103	0.028	303
FUT.ROW	0.18	1.00	15	54	0.015	303
OUTLET #4						
BLD C + EXT2	0.48	1.00	15	145	0.040	303
TOTAL	**2.11**			**639**	**0.176**	

[1] Release Rate is based on 83.2 L/s/ha (allowable release rate based on pre-development conditions)

[2] Storage/ Area is calculated by taking the Storage Required and dividing by block area

The Modified Rational Method calculations can be found in **Appendix C**.

For the proposed development, stormwater management strategies will be individually chosen and designed for each of the blocks during detailed design. Subsequent Site Plan Applications will be submitted once the process is further advanced. One feasible option for quantity control is to direct runoff into underground storage tanks. Storage requirement for the future municipal ROW is also provided in an underground storage tank, whereas an oversized pipe may be more feasible and will be further contemplated in future design stages. The tank layouts are shown in **Figure 9 – Stormwater Management Plan** and **Figure 10 – Post-Development Drainage Plan**.

The approximate dimensions of underground storage tanks are provided in Table 5 below.

Table 5: Underground Storage Tanks

Block ID	Storage Required (m^3)	Tank Depth[1] (m)	Tank Footprint (m^2)
OUTLET #2			
STREET + BLD A	188	2.0	94
BLD B	148	2.0	74
PKNG	103	0.5	206
FUT.ROW	54	2.5	22
OUTLET #4			
BLD C + EXT2	145	3.0	48
TOTAL	**639**		

[1] As per the section views of the Site Plan, parking (P1) level is 5 m high. Considering the Building FFEs, the slab thickness, and the presense of exposed foundations, 2 - 3 m is approximated as the available storage tank depth for the tanks proposed in the parking levels. For the tanks proposed under parking lots or within the ROW, the depth is approximated based on the proposed surface grades, tank inverts, and typical cover for pavement.

Flows from each of these blocks will be controlled by an orifice. The total allowable release rate for Outlets #2 and #4 is 176 L/s.

Table 6: Orifice Plate Sizes

Block ID	Release Rate (m^3/s)	Orifice Plate Invert (m)	Acting Head (m)	Orifice Size (mm)
OUTLET #2				
STREET + BLD A	0.052	100.33	2.0	130
BLD B	0.041	100.46	2.0	115
PKNG	0.028	100.25	0.5	140
FUT.ROW[1]	0.136	99.52	2.5	200
OUTLET #4				
BLD C + EXT2	0.040	100.29	3.0	100
	0.176			

[1] The storage tank for 'FUT.ROW' is located along the storm sewers that drain to Outlet #2. The orifice downstream of this tank (at MH2) will receive controlled flows from Building A ('BLD A'), Building B ('BLD B'), a portion of Private Street A ('STREET') and future parking area ('PKNG'). The orifice will restrict peak flows to 136 L/s for the total drainage area of 1.63 ha.

6.5.3 Storm Sewer Design

The minor storm sewer system will be designed to convey the 10-yr storm flows. The storm sewer layout includes servicing stubs for the expected development blocks.

6.5.4 Quality Control

The City of Mississauga's objective of 80% TSS removal applies to the Site. Most of the development blocks consist of "clean" surfaces that will not impair stormwater quality downstream of the Site such as roof and pedestrian/landscaped courtyard, i.e., there is little opportunity for these surfaces to be "dirty". Sediment generation is not expected to be significant for pedestrian at-grade hardscape areas. The community park block is also considered "clean" as it will mostly consist of grassed areas. Quality control would be required for impervious surfaces that generate pollutants such as parking lots and streets.

Residential Development Blocks

Drainage from the development blocks will receive 80% TSS removal through a combination of LIDs prior to discharging to the private streets or future municipal ROW. The location and composition of the LIDs within the development blocks will be finalized during the Site Plan approval stage. The following are some feasible LID strategies:

- **Bioretention:** Bioretention is a stormwater infiltration practice that treats runoff from paved areas by using the natural properties of soil and vegetation to remove contaminants. Most are designed as swales or islands and are constructed adjacent to roads, parking lots or other paved areas. Runoff from these impervious surfaces are directed into the bioretention area, where it ponds and slowly infiltrates. According to LID Treatment Train Tool by created by STEP, bioretention may provide **75% TSS removal.**
- **Grassed swales:** Grass swales are shallow sloped, densely vegetated channels designed to treat stormwater runoff. As water flows through the channel, vegetation slows the water and allows for sedimentation and filtering of pollutants through the subsoil. According to LID Treatment Train Tool created by STEP, enhanced swales may provide **40% TSS removal.**
- **Permeable pavement:** Permeable pavement help to restore natural infiltration functions to the landscape and reduce impacts to watercourses by allowing rainwater to slowly infiltrate into the ground. Contaminants are removed from the stormwater as it infiltrates slowly through the gravel sub-base and into the native soil. According to LID Treatment Train Tool created by STEP, permeable pavements may provide **75% TSS removal.**
- **Green roofs:** Green roofs are contained areas of vegetation, such as grasses or shrubs, that can be planted on top of buildings. Although green roofs are not credited any TSS removal as of now, they provide many benefits beyond stormwater quality control.
- **Oil Grit Separators (OGS):** OGS units are devices that collect debris, sediment and hydrocarbons from runoff and capture these pollutants in the device's sump rather than conveying these downstream. An OGS will be provided for each development block prior to runoff entering the storage tanks. Refer to **Figure 4 – General Servicing Plan** for placement of the OGS units. The sizing of the OGS units will be specified in the detailed design stage accordingly. Generally, OGS units are credited **50% TSS removal.**

Future Municipal ROW

In Block 6, four bioswales are proposed. Bioswales can be used to filter and retain stormwater runoff. They have a filter media bed that encourages treatment and infiltration of stormwater runoff. During detailed design, these bioswales will be sized with appropriate footprint and depth in order to retain 5 mm of runoff from the ROW. According to LID Treatment Train Tool created by STEP, bioswales may provide **75% TSS removal.**

Additionally, an OGS is proposed downstream of MH1 that will treat runoff from the future municipal ROW. Refer to **Figure 4 – General Servicing Plan** for placement of the OGS unit. The sizing of the OGS unit will be specified in the detailed design stage accordingly. Generally, OGS units are credited **50% TSS removal.**

Infiltration Considerations

A geotechnical and hydrogeological report was prepared by Grounded Engineering Inc. in February 2024. The hydraulic conductivity across the Site ranges from 1.5 x 10^{-9} m/s (clayey silt, some sand) up to 1.7 x 10^{-5} m/s (gravelly sand). As per Appendix C - Site Evaluation and Soil Testing Protocol for Stormwater Infiltration provided by the Toronto and Region Conservation Authority Stormwater Management Criteria Guidelines (August 2012), hydraulic conductivity can be converted to infiltration rates, resulting in rates between 8 mm/hr to 98 mm/hr. The groundwater depth was observed in December 2020 and January 2023, and ranged from 1.9 m to 3.5 mbgs. Infiltration opportunities are limited in the development blocks given the extent of the underground parking. However, infiltration-based techniques for individual blocks will be contemplated in future design stages, provided there is available footprint and depth to accommodate these facilities.

6.5.5 Water Balance

Each block is required to retain 5mm of rainfall for the purpose of water balance. Given that the pre-development condition mostly consists of impervious surfaces, there will not be an infiltration deficit in the post-development condition. Rather, the water balance criteria will help to reduce runoff volume in the storm sewer system downstream.

This can be achieved through a combination of LID strategies, such as bioretention, grassed swales, and permeable pavements. While this will be discussed in detail in individual Site Plan Applications, it is important to note that high surface imperviousness, underground parking requirements, and low hydraulic conductivity of the underlying soil might make it difficult for the development blocks to achieve this target. One feasible option to achieve water balance within the development blocks is to harvest rainwater for reuse for irrigation purposes, potentially for the landscaped areas or green roofs on site. Where stormwater storage tanks are proposed, the required water balance volume can be located beneath the storm outlet invert as part of the sump to allow for reuse. Within the future municipal ROW, bioswales are proposed to capture and infiltrate stormwater runoff. For the community park, natural surface depressions and topsoil amendments can encourage infiltration of runoff, particularly for the common low-intensity storms.

The water balance requirement for each drainage area is provided in Table 7.

Table 7: 5mm Water Balance Requirement

Block ID	Area (ha)	Retention Requirement (m^3)
OUTLET #2		
STREET + BLD A	0.62	31.0
BLD B	0.49	24.5
PKNG	0.34	17.0
FUT.ROW	0.18	9.0
OUTLET #4		
BLD C + EXT2	0.48	24.0
TOTAL	**2.11**	**105.5**

Water balance measures are not proposed in drainage areas 'EXT104', 'MTO1' and 'MTO2'.

7.0 DEWATERING ASSESSMENT

A hydrogeological report by Grounded Engineering (February 15, 2024) summarizes the groundwater water quality and dewatering options.

Water Quality

A groundwater sample was collected on January 30, 2023. The groundwater sample met the Limits for Sanitary and Combined Sewer Discharge for all parameters analyzed; however, the Region of Peel does not allow permanent groundwater to discharge into the sanitary sewer. The groundwater sample exceeded the Limits for Storm Sewer Discharge for Total Suspended Solids, Total Kjeldahl Nitrogen, and some metals.

Private Water Drainage System (PWDS)

If the proposed development consists of drained foundations, then a private water drainage system will be required. If the proposed development is designed as a watertight structure, then a private water drainage system will not be required; however, the structure must then be designed to resist hydrostatic pressure and uplift forces. There will be no permanent groundwater dewatering discharge from the development.

8.0 CONCLUSION

We trust that this report sufficiently addresses the Site servicing requirements and that the proposed development is feasible from municipal servicing and stormwater management perspectives. In summary:

Sanitary Servicing:

- The proposed development will outlet to the new 450 mm sanitary sewer on Haig Boulevard.
- The sanitary sewer flows outletting to Haig Boulevard will increase by 30 L/s (47.1 – 17.1) over the pre-development conditions.

Water Servicing:

- The proposed development will connect to the 300mm watermain on South Service Road and the 200mm watermain on Haig Boulevard.
- Peak hour demand = 26.17 L/s
- Fire flow is calculated based on MOE Design Guidelines for Drinking-Water Systems. Maximum Fire Flow Demand + Peak Daily Demand = 122.45 L/s

Stormwater Servicing:

- The proposed development contains storm sewers, with four outlets (two new connections) to the existing box culvert, which discharges to Applewood Creek.

Runoff Quantity Control:

- No quantity control is proposed for Outlets #1 and #3 drainage areas.
- For Outlets #2 and #4, the 100-year post-development peak flows are reduced to the 2-year pre-development flows of 0.136 m^3/s and 0.040 m^3/s, respectively.
- Quantity control for the development blocks and streets will be individually chosen and designed at the SPA stage. Approximately 493 m^3 and 145 m^3 of storage is proposed in underground storage tanks for the drainage areas of Outlets #2 and #4, respectively.

Post Development Quality Control:

- Quality control for the blocks can be provided through a variety of LID measures, where the combination equates 80% TSS removal.
- A combination of LIDs, which will be finalized for each Site plan block during the Site Plan approval stage, can be used. Some feasible options include bioretention, grassed swales, permeable pavements, and green roofs. An OGS is proposed for each development block prior to runoff entering the storage tanks.
- Bioswales and an OGS unit are proposed in the future municipal ROW.
- Quality control is not required for the “clean” surfaces that will not impair stormwater quality.

Water Balance:

- Within the development blocks, water balance will be achieved by harvesting rainwater for reuse for irrigation purposes, potentially for the landscaped areas or green roofs on Site.
- In the future municipal ROW, bioswales can be utilized to meet the water balance requirements.

Please do not hesitate to contact the undersigned if you have any questions or concerns.

Yours very truly,

KWA Site Development Consulting Inc.

Per:

Pavneet Brar, P.Eng., MASc

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Carlo Del Buono, P. Eng., LEED AP

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APPENDIX A

SANITARY DEMAND CALCULATIONS

Sanitary Demands - Existing

Project Name: Dixie Outlet Mall
Project Number: 19410
Location: Mississauga, Ontario
Date: 10-Apr-24
Prepared by: PB

Infiltration Allowance + Foundation Drain Allowance 0.000280 m3/sec/ha

Flow Data		
Type of Development	Equivalent Population (ppl / ha)	Rate (Litres / cap / day)
Single family (greater than 10m frontage)	50	290
Single family (less than 10m frontage)	70	290
Semi-detached	70	290
Row dwellings	175	290
Apartments	475	290
Commercial	50	270
Light Industrial	70	270

Description	Outlet	Commercial Land Area for Equiv Pop (ha)	Total Land Area (ha)	Commercial Population	Total Population *	Average Flow (L/s)
Commercial	Haig	19.60	19.60	980	980	3.06
Total		**19.60**	**19.60**	**980**	**980**	**3.06**

Flows to Haig Blvd

Total Average Flow =	**3.06**	**L/s**
Peaking Factor =	**3.81**	
Peak Flow =	**11.65**	**L/s**
Infiltration =	**5.49**	**L/s**
Total Sanitary Flow =	**17.14**	**L/s**

Existing Capacity Check: Sewer on Haig Blvd

Existing 900 mm Pipe Capacity @ 0.6% =	**1463.00**	**L/s**
Required/ Available =	**1%**	

Sanitary Demands - Remaining Dixie Outlet Mall Flows

Project Name:	Dixie Outlet Mall
Project Number:	19410
Location:	Mississauga, Ontario
Date:	10-Apr-24
Prepared by:	PB

Infiltration Allowance + Foundation Drain Allowance 0.000280 m3/sec/ha

Flow Data		
Type of Development	Equivalent Population (ppl / ha)	Rate (Litres / cap / day)
Single family (greater than 10m frontage)	50	290
Single family (less than 10m frontage)	70	290
Semi-detached	70	290
Row dwellings	175	290
Apartments	475	290
Commercial	50	270
Light Industrial	70	270

Description	Outlet	Commercial Land Area for Equiv Pop (ha)	Total Land Area (ha)	Commercial Population	Total Population *	Average Flow (L/s)
Commercial	Haig	16.90	16.90	845	845	2.64
Total		**16.90**	**16.90**	**845**	**845**	**2.64**

Flows to Haig Blvd

Total Average Flow =	**2.64**	**L/s**
Peaking Factor =	**3.85**	
Peak Flow =	**10.16**	**L/s**
Infiltration =	**4.73**	**L/s**
Total Sanitary Flow =	**14.89**	**L/s**

Sanitary Demands - Phase 1

Project Name: Dixie Outlet Mall
Project Number: 19410
Location: Mississauga, Ontario
Date: 10-Apr-24
Prepared by: CDB/ PB

Infiltration Allowance + Foundation Drain Allowance 0.000280 m3/sec/ha

Flow Data		
Type of Development	Equivalent Population (ppl / ha)	Rate (Litres / cap / day)
Single family (greater than 10m frontage)	50	290
Single family (less than 10m frontage)	70	290
Semi-detached	70	290
Row dwellings	175	290
Apartments	475	290
Commercial	50	270
Light Industrial	70	270

Description	Outlet	Total Land Area (ha)	# Apartment (1 Bedroom)	# Apartment (2 Bedroom)	# Apartment (3 Bedroom)	Total Apartment Units	Total Population *	Average Flow (L/s)
1	Haig	0.56	103	32	24	159	429	1.44
2	Haig	0.68	220	68	51	338	913	3.06
3	Haig	0.71	325	100	75	500	1350	4.53
4	Park	0.46				0	0	0.00
5	Easement	0.14				0	0	0.00
6	ROW	0.15				0	0	0.00
Total		2.70	648	199	150	997	2692	9.04

* Townhouse and Apartment populations calculated based on 2.7 people / unit

Flows to Haig

Total Average Flow =	9.04	L/s
Peaking Factor =	3.48	
Peak Flow =	31.46	L/s
Infiltration =	0.76	L/s
Total Sanitary Flow =	32.22	L/s

Capacity Check: Sewer on Haig Blvd

Flow required =	47.1	L/s
450 Pipe Capacity @ 0.155%	111	L/s
Required/ Available =	42%	

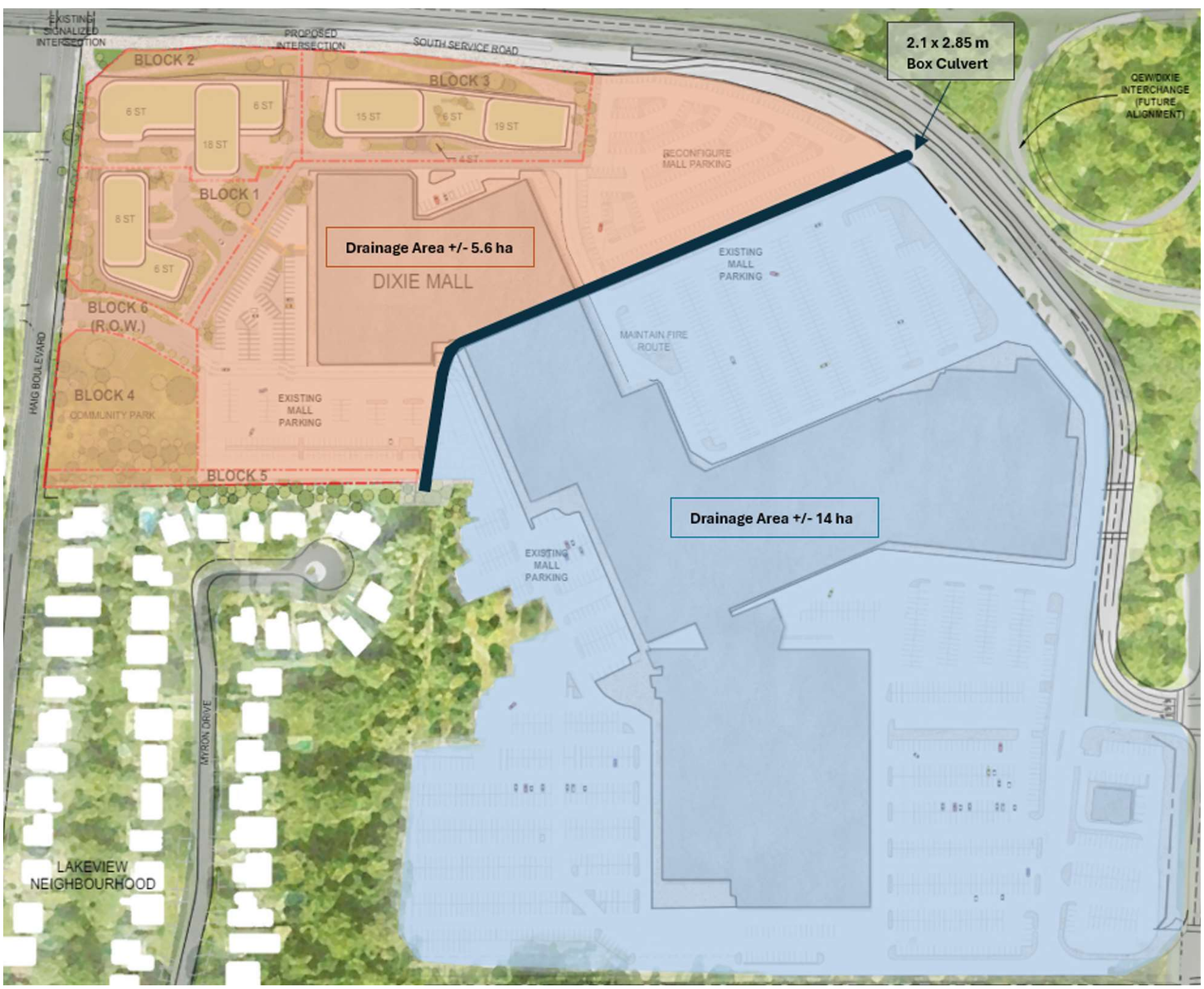
Pavneet Brar

Subject: FW: 1250 South Service Road - G.E. Booth Wastewater Treatment Plant Capacity

From: Carlo Del Buono <carlo.delbuono@kwasitedev.com>
Sent: Thursday, April 4, 2024 4:40 PM
To: Frandsen, Iwona <iwona.frandsen@peelregion.ca>; Pavneet Brar <Pavneet.Brar@kwasitedev.com>
Cc: Simms, Joy <joy.simms@peelregion.ca>; Budathoki, Rosha <rosha.budathoki@peelregion.ca>
Subject: RE: 1250 South Service Road - G.E. Booth Wastewater Treatment Plant Capacity

Hi Iwona,
Thanks for the reply and great to hear that we can connect into the new 450mm sewer on Haig.

As you noted crossing the existing storm box culvert to outlet sanitary flows to Dixie is the issue for this site. This is why we need the entire northwest site area sanitary flows to drain to Haig. Any future development southeast of the box culvert is envisioned to outlet to the Dixie trunk sewer. See below image showing the delineation of future development areas. Future development area shown in orange to outlet to Haig. Future development area shown in blue to outlet to Dixie.



You are correct, the existing mall is all being pumped to Haig. We envision this outlet location being maintained in the future development of the northwest block shown in orange. Once future development phases unfold within the southeast block and more of the existing mall is removed, at this time is when a new sanitary connection to Dixie will be made and this area will outlet to the Dixie trunk sewer.

Can you quantify the downstream capacity constraint in the Haig Sewer? How much flows from the northwest block are allowed to drain to the Haig Sewer?

Thanks Iwona

Carlo Del Buono, P. Eng., LEED AP
KWA Site Development Consulting Inc.
(416) 821-5625
carlo.delbuono@kwasitedev.com
www.kwasitedev.com

From: Frandsen, Iwona <iwona.frandsen@peelregion.ca>
Sent: Thursday, April 4, 2024 10:58 AM
To: Carlo Del Buono <carlo.delbuono@kwasitedev.com>; Pavneet Brar <Pavneet.Brar@kwasitedev.com>
Cc: Simms, Joy <joy.simms@peelregion.ca>; Budathoki, Rosha <rosha.budathoki@peelregion.ca>
Subject: RE: 1250 South Service Road - G.E. Booth Wastewater Treatment Plant Capacity

Hi Bruno,

Your initial proposal was to connect to the 900mm on Haig so connection to 450 is ok too, I will ask about the new MH installation on the 450, there maybe associated cost is that ok? and plan provide drawing WS-14 , if available, and get back to you.

Can you divert phase 2 to Dixie sani sewers? I know that there are capacity constraints beyond Phase 1 downstream on Haig Sewer. Plus there is the storm culvert. I think the mall effluent is being pumped to Haig, can those flows be diverted to Dixie sewer as well?

Thank you,

Iwona Frandsen

Project Manager – Servicing Connections
Planning & Development Services,
Public Works,
Region of Peel

10 Peel Centre Drive, Suite B, 4th Floor (currenly working off site) Brampton, On L6T 4B9
e-mail: iwona.frandsen@peelregion.ca
phone: 905-791-7800 ext 7920

In response to the emergence of the novel coronavirus, the Region of Peel is implementing various measures to protect our customers, employees and workplaces. Development Services will endeavour to maintain the continuity of our business operations, however delays in service may still be experienced. We appreciate your patience during this time.

From: Carlo Del Buono <carlo.delbuono@kwasitedev.com>
Sent: Monday, April 1, 2024 4:31 PM
To: Frandsen, Iwona <iwona.frandsen@peelregion.ca>; Pavneet Brar <Pavneet.Brar@kwasitedev.com>
Cc: Simms, Joy <joy.simms@peelregion.ca>; Budathoki, Rosha <rosha.budathoki@peelregion.ca>
Subject: RE: 1250 South Service Road - G.E. Booth Wastewater Treatment Plant Capacity

Hi Iwona,
Thanks for sharing the additional information on Haig Boulevard. This is the first we are seeing the 450mm sanitary sewer running parallel to the new 900mm trunk sewer along Haig.

Attached is our current servicing layout we are contemplating for Phase 1. We are updating our base file to show the new 450mm and 900mm sanitary sewer on Haig Boulevard based on WS-20/WS-21 provided. Our current design does not contemplate the sanitary sewer extension on South Service Road any longer. Based on the alignment of MH37, this will be a challenge. We are going back to the original layout proposing a watermain/sanitary easement within the private road.

Based on the future access public right of way contemplated off Haig Boulevard, would it be possible to add a new MH approximately **50m south** of SAN MHB1 from drawing WS-21. This to ensure we have a connection point to the 450mm sanitary sewer on Haig Boulevard.

We see that the 450mm sanitary sewer connects to the 900mm trunk sewer downstream. For Phase 1, the applicant is proposing approximately +/- 1000 units. Although future build out of Phase 2 in this area has not been confirmed, we have assumed another +/-1000 units would be contemplated to outlet to the Haig sanitary sewer.

Can the Region confirm if the 450mm/900mm sanitary trunk sewer on Haig has the capacity to support the following sanitary flows:

- Phase 1 + Existing Mall = 35 L/s + 15 L/s = **50 L/s**
- Phase 2 = **30 L/s**
    - Total Sanitary Flows to Haig Boulevard = **80 L/s**

Also, would the Region be able to provide drawing WS-14 so we show the proper alignment of the new 400mm watermain on South Service Road.

Thanks Iwona.

Carlo Del Buono, P. Eng., LEED AP
KWA Site Development Consulting Inc.
(416) 821-5625
carlo.delbuono@kwasitedev.com
www.kwasitedev.com

GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL CONFORM TO CITY OF MISSISSAUGA AND REGION OF PEEL STANDARDS.
2. WATERMAINS AND/OR WATER SERVICE MATERIAL 100mm AND LARGER MUST BE P.V.C. CLASS 150 MANUFACTURED TO AWWA SPEC. C-900-75 COMPLETE WITH TRACER WIRE. SIZES 50mm AND SMALLER ARE TO BE POLYETHYLENE AWWA C901-78 IN SIZES 25 TO 50mm.
3. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7m WITH A MINIMUM HORIZONTAL SPACING OF 1.2m FROM THEMSELVES AND ALL OTHER UTILITIES.
4. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.15m OVER/0.30m UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
5. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC, MUST BE PROVIDED WITH AT LEAST A 50mm OUTLET ON 100mm AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE ENDS THE SAME SIZE AS THE LINE. THEY MUST BE HOSED OR PIPED TO ALLOW WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES FLUSHING OUTLET TO BE 100mm DIAMETER MIN. OR A FIRE HYDRANT.
6. ALL CURB STOPS TO BE 1.5m OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
7. HYDRANT & VALVE SET TO REGION STANDARD 2057A (S-5). DIMENSIONS A & B, 0.7 & 0.9m
8. ALL HYDRANTS TO HAVE PUMPER NOZZLE OUTLET.
9. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHEN REQUESTED BY INSPECTOR.
10. CONC. STORM SEWER UP TO AND INCLUDING 375mm SHALL MEET CSA SPEC. A257.1 E.S.
11. 450mm TO 600mm CONCRETE SEWER PIPE SHALL MEET CSA SPEC. A257.2 CLASS III
12. ALL STORM AND SANITARY SEWER MAINS, MANHOLES, AND CATCHBASINS, SHALL BE FITTED WITH APPROVED RUBBER GASKET JOINTS.
13. STORM MANHOLES TO BE BENCHED TO THE CROWN OF ALL PIPES ON A VERTICAL PROJECTION FROM THE SPRING LINE.
14. THRUST BLOCKS CONFORMING TO REGION OF PEEL SPECIFICATIONS SHALL BE INSTALLED ON THE WATERMAIN AT ALL BENDS, TEES, REDUCERS, AND ENDS.
15. P.V.C. SANITARY SEWER TO CONFORM TO CSA STANDARD B137.3, ASTM D2729, ASTM 3034.
16. SINGLE CB LEADS - 250mm, DOUBLE CB LEADS - 300mm, MINIMUM SLOPE 1.00% UNLESS OTHERWISE NOTED
17. WATERMETER TO BE SET TO REGION STANDARD 1-4-7

STORMWATER MANAGEMENT

LOT AREA = 4.28 HA. (SENTRY REALTY)
PROPOSED ROOF AREA = 1.25 HA

A RUNOFF PRIOR TO DEVELOPMENT – 5 YEAR STORM

$Q = \frac{CIA}{360}$ $= 0.24$ cms

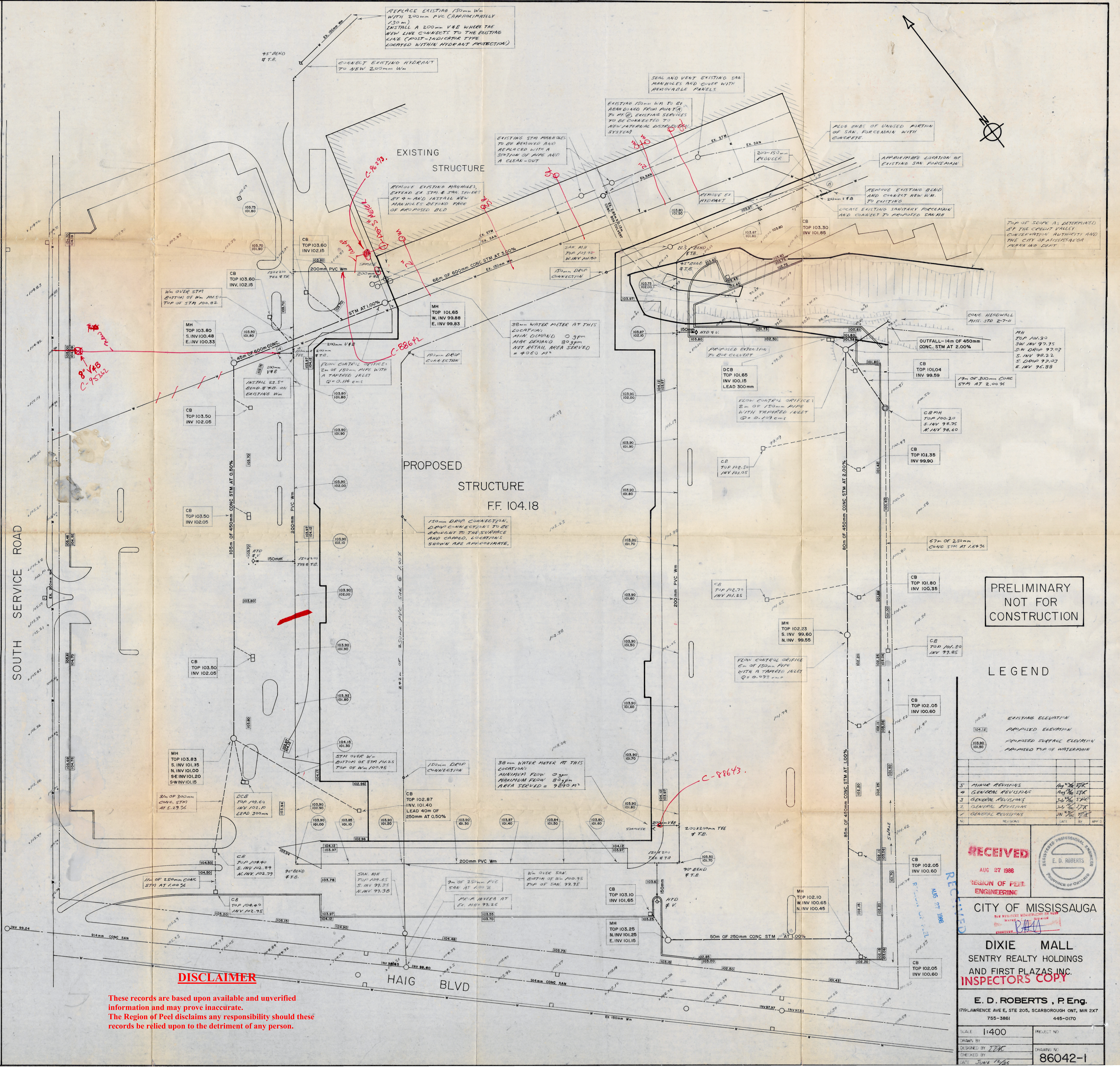
$T_c = 20$ min.
$I = 67$ mm/hr.
$A = 4.28$
$C = 0.30$

B DISCHARGE FROM 20 CONTROLLED FLOW ROOF DRAINS AT 0.00095 cms EACH
= 0.019 cms

C DISCHARGE FROM FLOW CONTROL ORIFICE - EAST PARKING LOT:
LENGTH = 2m
DIAMETER = 150mm
HEAD = 3.3m
INLET - TAPERED
Q = 0.109 cms

D DISCHARGE FROM FLOW CONTROL ORIFICE - WEST PARKING LOT:
LENGTH = 2m
DIAMETER = 150mm
HEAD = 3.6m
INLET - TAPERED
Q = 0.114 cms

E FLOW FROM SITE AFTER DEVELOPMENT
$Q = 0.019 + 0.109 + 0.114$
$Q = 0.242$ cms



LEGEND

102.38 EXISTING ELEVATION
104.12 PROPOSED ELEVATION
103.90 / 101.50 PROPOSED SURFACE ELEVATION / PROPOSED TOP OF WATERMAIN

NO	REVISIONS	DATE	BY	APP'D
5	MINOR REVISIONS	Aug 22/86	EDR	
4	GENERAL REVISIONS	Aug 13/86	EDR	
3	GENERAL REVISIONS	July 25/86	EDR	
2	GENERAL REVISIONS	July 16/86	EDR	
1	GENERAL REVISIONS	JN 24/86	EDR	

RECEIVED AUG 27 1986 REGION OF PEEL ENGINEERING

REGISTERED PROFESSIONAL ENGINEER E. D. ROBERTS PROVINCE OF ONTARIO

RECEIVED AUG 27 1986

CITY OF MISSISSAUGA

THE REGIONAL MUNICIPALITY OF PEEL WATER DIVISION APPROVED

DIXIE MALL
SENTRY REALTY HOLDINGS AND FIRST PLAZAS INC.
INSPECTORS COPY

E. D. ROBERTS, P.Eng.
1719 LAWRENCE AVE E, STE 205, SCARBOROUGH ONT, M1R 2X7
755-3861 445-0170

SCALE 1:400	PROJECT NO
DRAWN BY	
DESIGNED BY EDR	DRAWING NO
CHECKED BY	86042-1
DATE JUNE 12/86	

DISCLAIMER

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The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

SCALE
5m 0 10m Horizontal
0.5m 0 1m Vertical

Ontario Ministry of Transportation

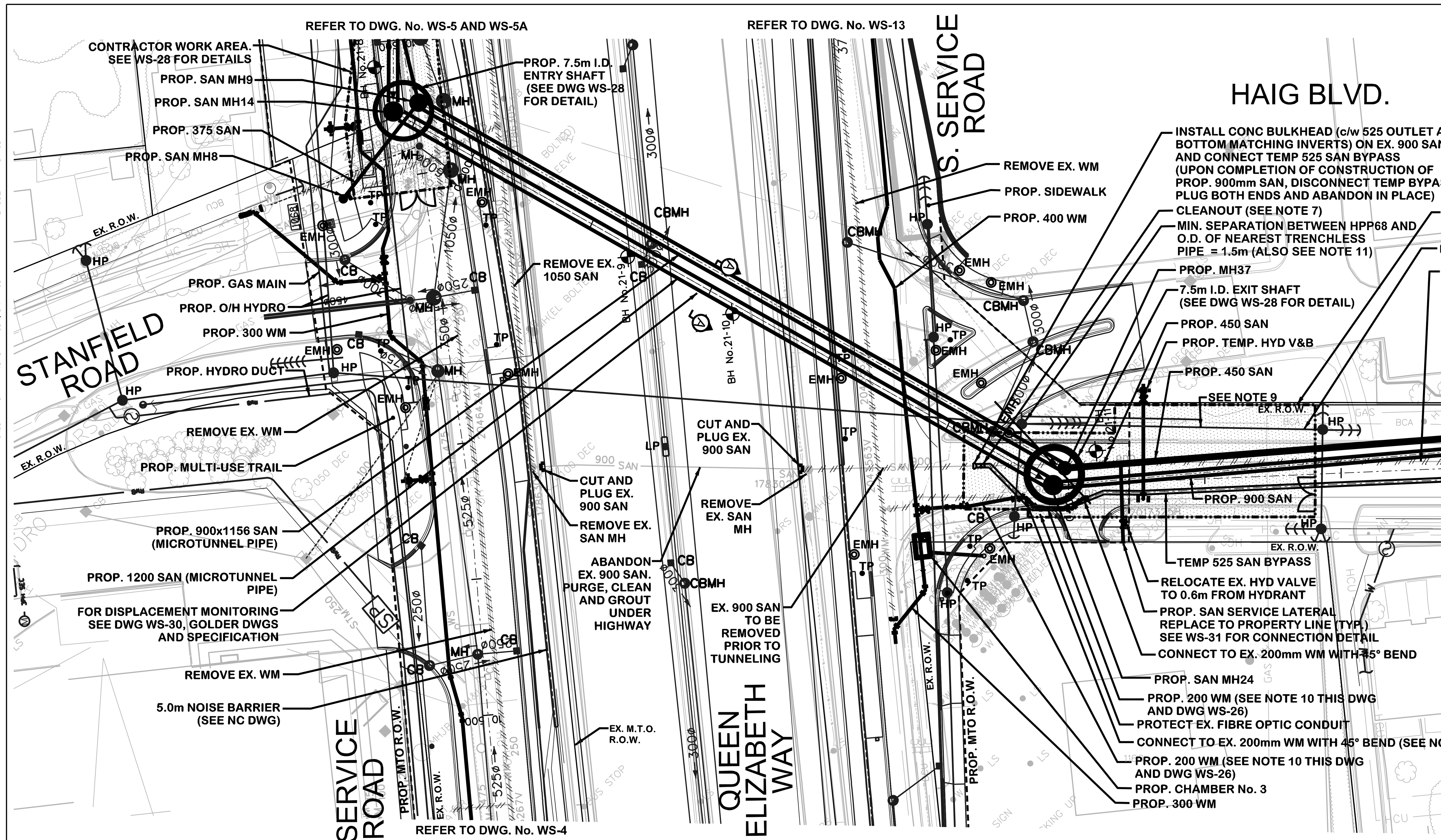
CONT No 2021-2127
GWP No 2102-13-00

SANITARY
STA 0+000 TO STA 0+155
Survey Revised

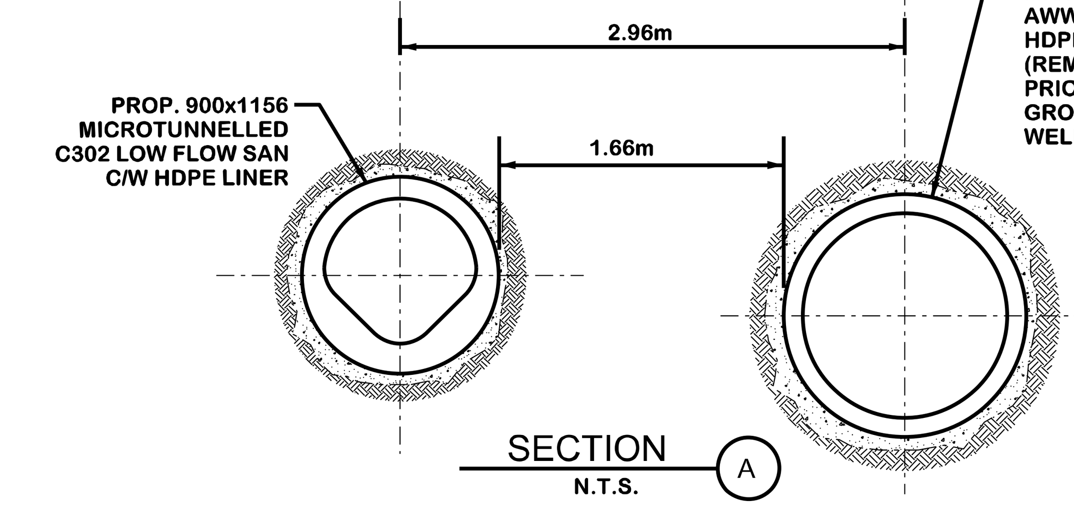
SHEET 420H (WS-20)

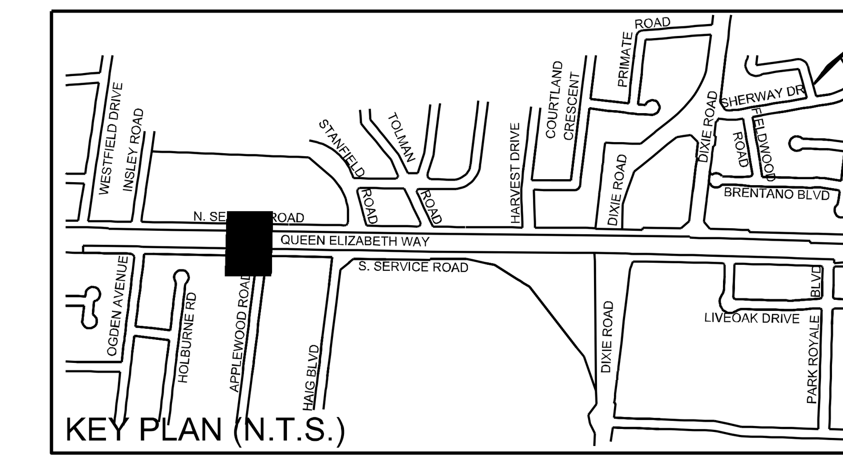
AECOM

PLEASE NOTE:
THIS DRAWING IS NOT MARKED 'AS-CONSTRUCTED'



AWWA C301 PIPE SHALL NOT BE PERMITTED AS A PRIMARY LINER TO BE JACKED BY MICROTUNNEL





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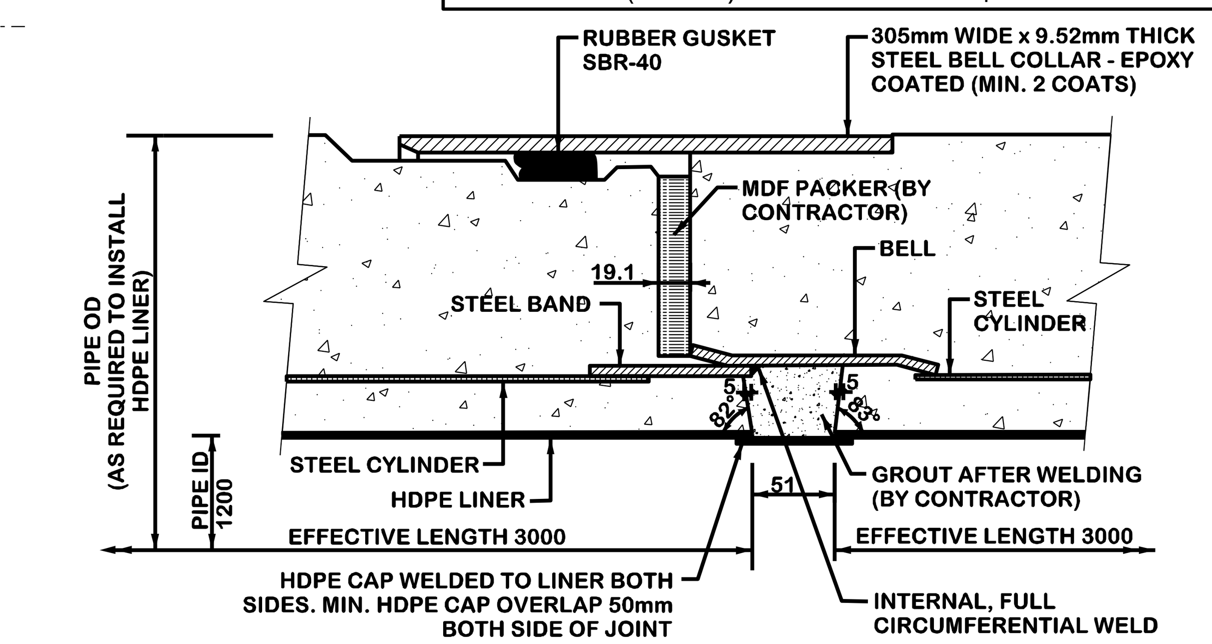
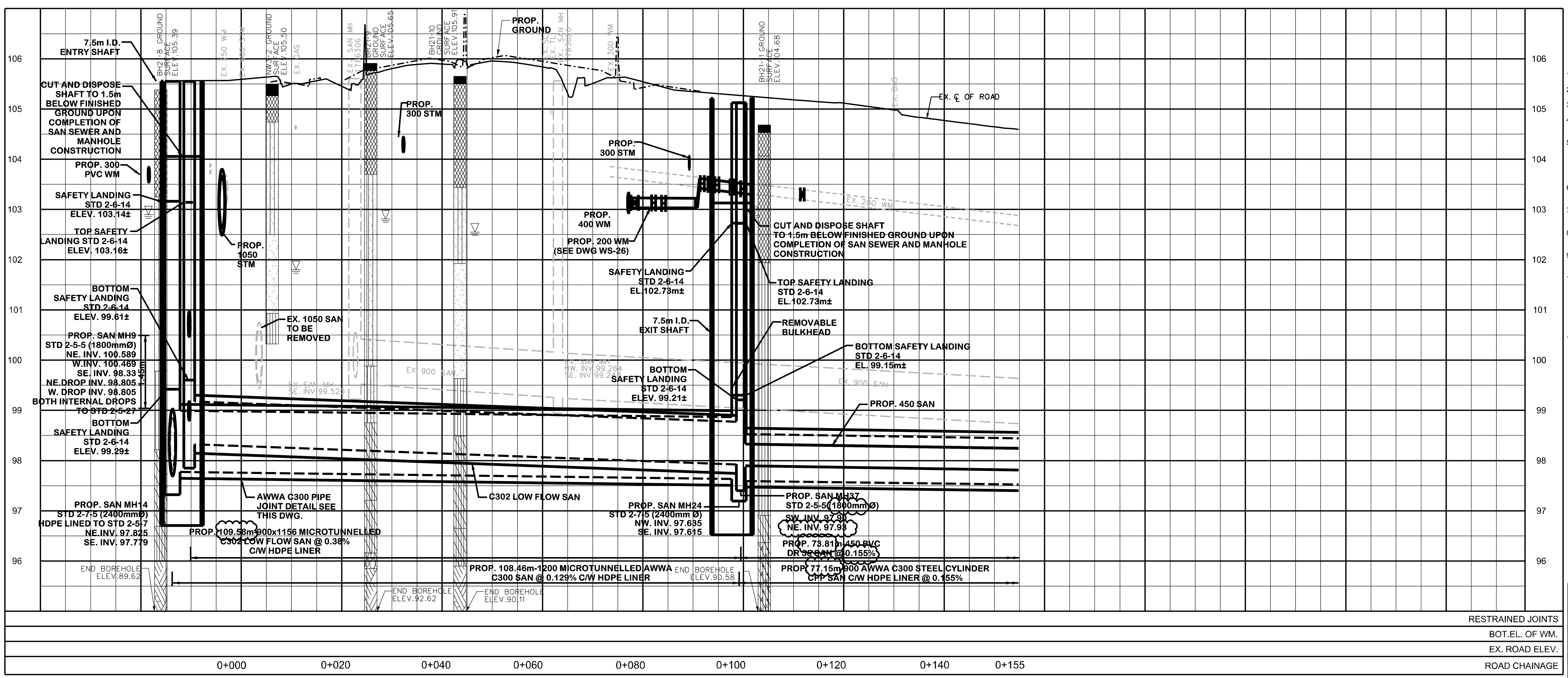


SCHEMATIC OF HDPE LINED AWWA C300 CPP WELDED JOINT DETAIL

N.T.S.



NOTES:

1. FOR TUNNEL PIPE LINER DETAIL SHOWN ON SECTION A-A REFER TO DWG WS-30.
2. FOR SHAFT PLAN AND SECTION DETAILS REFER TO DWG. WS-28.
3. FOR STORM DESIGN SEE NC DRAWINGS.
4. CONTRACTOR TO RECONNECT EXISTING SANITARY SERVICES TO NEW 900mm SANITARY SEWER.
5. CONTRACTOR TO EXPOSE EXISTING SANITARY LATERALS AND DETERMINE EXACT LOCATION, ALIGNMENT AND SIZE PRIOR TO FABRICATION OF THE 900mm DIA. SANITARY TRUNK SEWER. SUBMIT SHOP DRAWINGS FOR REVIEW SHOWING EXACT LOCATION AND ELEVATION OF SANITARY LATERALS. TYPICAL FOR ALL SANITARY LATERALS ALONG HAIG TO BE RECONNECTED.
6. UNSHRINKABLE FILL USE IS PROHIBITED IN THE CONSTRUCTION OF THE TRENCH PLUG.
7. CONTRACTOR TO FLUSH TEMP 525 SAN BYPASS AS REQUIRED. AT A MINIMUM BYPASS IS TO BE FLUSHED ON A WEEKLY BASIS.
8. TEMPORARILY CONNECT EX. SAN LATERAL TO TEMP 525 SAN BYPASS DURING CONSTRUCTION. SEE DETAIL ON DWG WS-21 FOR DETAILS.
9. CONTRACTOR SHALL INSTALL VISUAL MARKERS INDICATING CLEARLY THE 6.0m CLEARANCE FROM THE OVERHEAD CONDUCTORS.
10. INSTALL PERMANENT 200mm WATERMAIN BYPASS FOR SHAFT CONSTRUCTION. CONNECT TO EXISTING 200mm WATERMAIN USING 45 DEG BENDS/FITTINGS AS NECESSARY. EXPOSE EX. WATERMAIN AND RESTRAIN A MIN. OF 3 JOINTS ON EX. WATERMAIN ON EITHER SIDE OF CONNECTIONS. UPON COMPLETION OF PROPOSED WATERMAIN CONSTRUCTION ON SOUTH SERVICE ROAD, REMOVE EXISTING WATERMAIN ON HAIG BLVD AS SHOWN AND CONNECT BYPASS WATERMAIN TO PRPOSED 400mm WATERMAIN ON SOURTH SERVICE ROAD.
11. CONTRACTOR SHALL MONITOR THE HYDROPOLE P68 FOR SETTLEMENT AND TILT. OBTAIN BASELINE READINGS PRIOR TO CONSTRUCTION. OBTAIN DAILY SETTLEMENT AND TILT READINGS TWICE DAILY DURING THE TRENCHLESS PIPES DRIVES UNTIL CONTACT GROUTING IS COMPLETE FOR BOTH PIPES. POST GROUTING MONITORING SHALL INCLUDE READINGS:
    - ONCE DAILY FOR ONE WEEK.
    - ONE READING WEEKLY FOR TWO MONTHS, AND
    - ONE READING AT THE END OF THE THIRD MONTH FOLLOWING CONTACT GROUTING COMPLETION.

    TABULATE AND COMPARE ALL READINGS TO THE BASELINE READINGS SHOWING ANY SETTLEMENT AND TILT AND PROVIDE ALL READINGS AND COMPARISONS TO THE C.A. AND AECOM WITHIN 24 HOURS OF HAVING OBTAINED THE READINGS.

    TILT OF 5mm AT THE FULL HEIGHT OF THE HP P68 PROCEED WITH CAUTION. TILT OF 10mm AT THE FULL HEIGHT OF HP P68 CEASE ALL MICROTUNNELLING OPERATIONS. OBTAIN RECOMMENDATIONS FROM CONTRACTOR RETAINED PROFESSIONAL GEOTECHNICAL ENGINEER REGARDING MITIGATION MEASURES TO BE IMPLEMENTED TO ARREST FURTHER TILT.

    SETTLEMENT OF 2.0mm PROCEED WITH CAUTION. SETTLEMENT OF 4.0mm CEASE ALL MICROTUNNELLING OPERATIONS. OBTAIN RECOMMENDATIONS FROM CONTRACTOR RETAINED PROFESSIONAL GEOTECHNICAL ENGINEER REGARDING MITIGATION MEASURES TO BE IMPLEMENTED TO ARREST FURTHER SETTLEMENT.

LICENSED PROFESSIONAL ENGINEER
A. S. HUNDAL
2023-04-05
PROVINCE OF ONTARIO

REVISIONS

DATE	BY	DESCRIPTION
2023-04-05	A.H.	REALIGNED SAN SEWER
2022-10-24	A.H.	MH37 SIZE CHANGED TO 1800mm
2022-10-20	A.H.	ENTRY SHAFT MH'S AND TUNNEL PIPE UPDATED
2022-07-12	A.H.	EXIT SHAFT RELOCATED
2022-06-13	A.H.	EXIT SHAFT RELOCATED
2022-03-03	A.H.	PIPE DETAIL MODIFIED AND PIPE TYPE CLARIFIED
2022-02-25	A.H.	AWWA C300 PIPE JOINT DETAIL ADDED
2022-02-04	A.H.	SAFETY LANDINGS, PIPE MATERIAL, TEMP SAN BYPASS

CREATED: MODIFIED: OCTOBER, 2019

MINISTRY OF TRANSPORTATION, ONTARIO PH-D-382 89-10

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

SCALE
5m 0 10m Horizontal
0.5m 0 1m Vertical

Ontario Ministry of Transportation

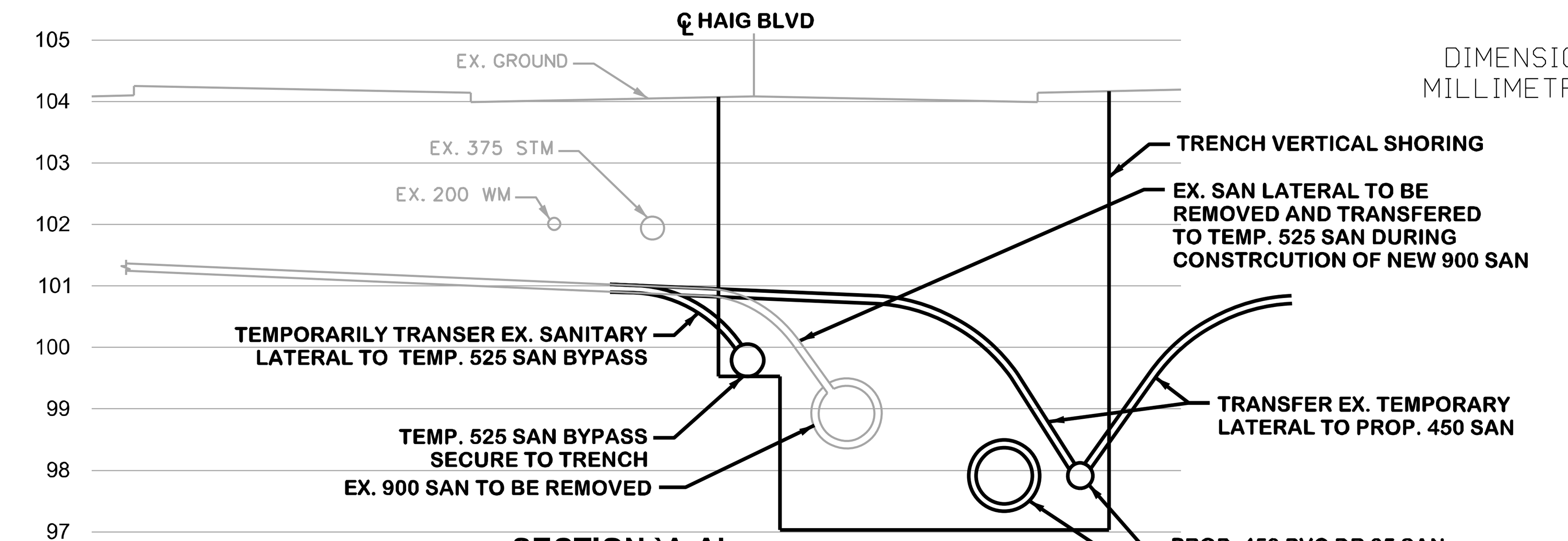
CONT No	2021-2127
GWP No	2102-13-00

SANITARY
STA 0+155 TO STA 0+260

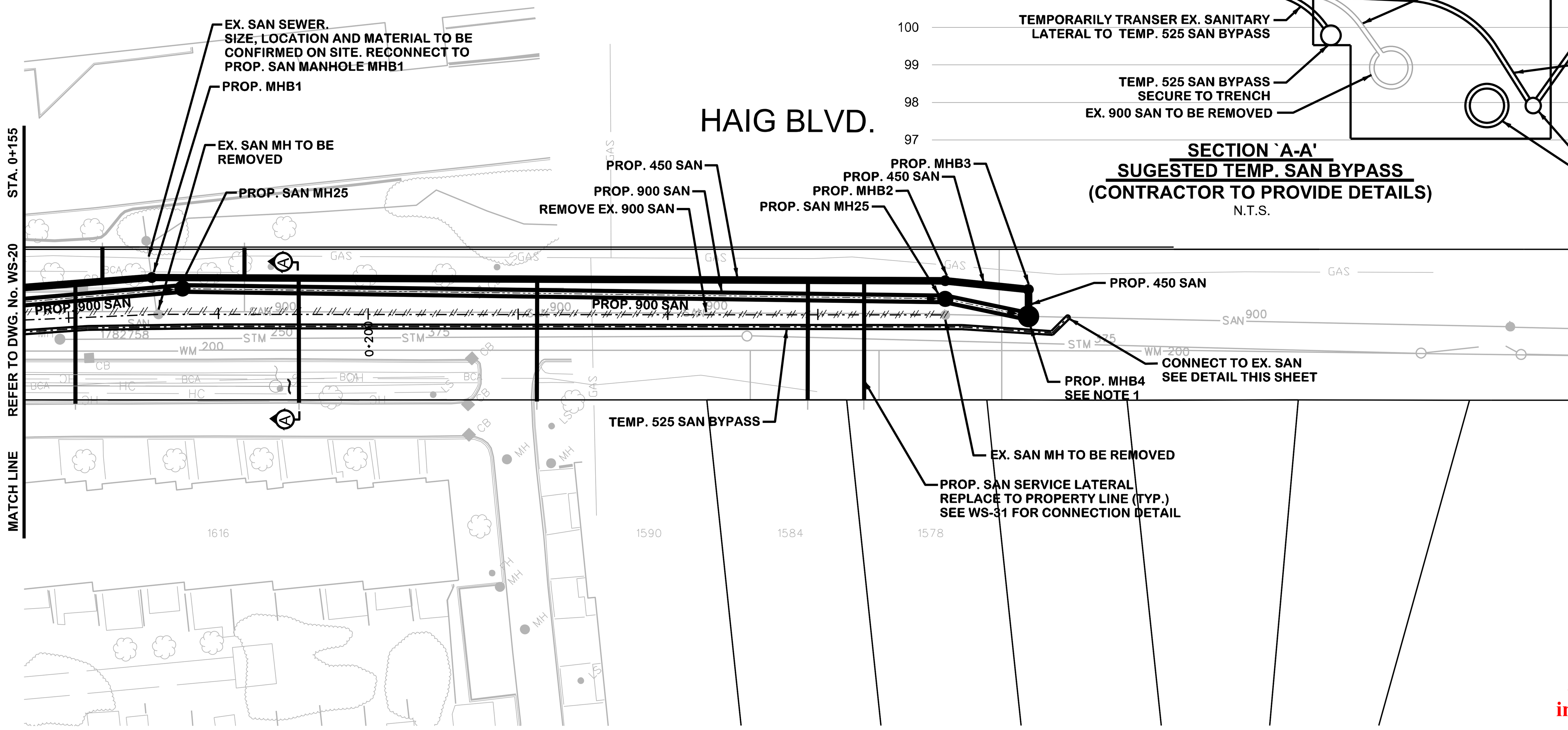
SHEET 421D (WS-21)

AECOM

PLEASE NOTE:
THIS DRAWING IS NOT MARKED 'AS-CONSTRUCTED'



SECTION 'A-A'
SUGESTED TEMP. SAN BYPASS
(CONTRACTOR TO PROVIDE DETAILS)
N.T.S.



NOTES:

1. CONTRACTOR TO PROVIDE DETAILS FOR BULKHEADS FOR INCOMING AND OUTGOING PIPES FOR PRESSURE TESTING AND TRANSITIONS FOR CONNECTION UPSTREAM AND DOWNSTREAM PIPES.
2. ALL EXISTING SANITARY LATERALS TO BE RECONNECTED TO NEW 450mm SANITARY SEWER.
3. CONTRACTOR TO EXPOSE EXISTING SANITARY LATERALS AND DETERMINE EXACT LOCATION, ALIGNMENT AND SIZE PRIOR TO FABRICATION OF THE 900mm DIA. SANITARY TRUNK SEWER. SUBMIT SHOP DRAWINGS FOR REVIEW SHOWING EXACT LOCATION AND ELEVATION OF SANITARY LATERALS. TYPICAL FOR ALL SANITARY LATERALS ALONG HAIG TO BE RECONNECTED.
4. UNSHRINKABLE FILL USE IS PROHIBITED IN THE CONSTRUCTION OF THE TRENCH PLUG.
5. BACKFILL AROUND MANHOLES IN ROCK SHALL BE GRANUALR 'B' TYPE 2.
6. UNSHRINKABLE FILL USE IS PROHIBITED IN THE CONSTRUCTION OF THE TRENCH PLUG.

DISCLAIMER

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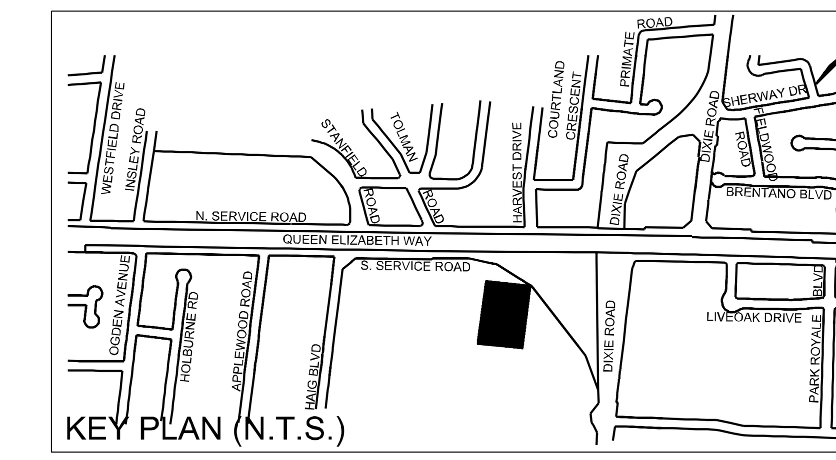
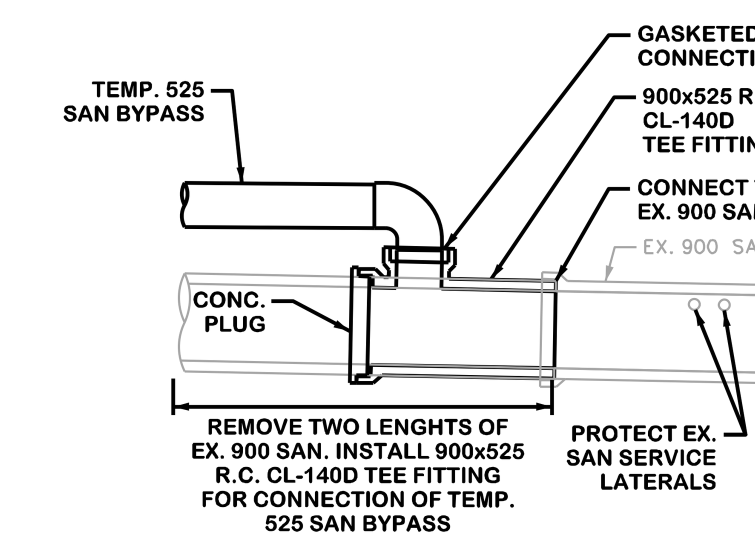
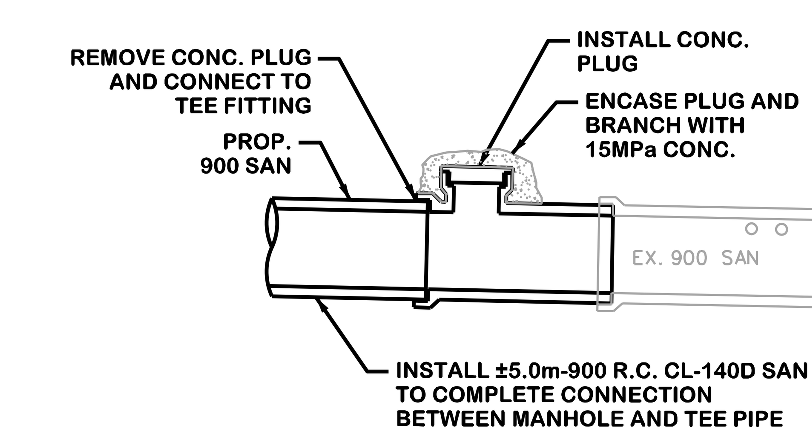


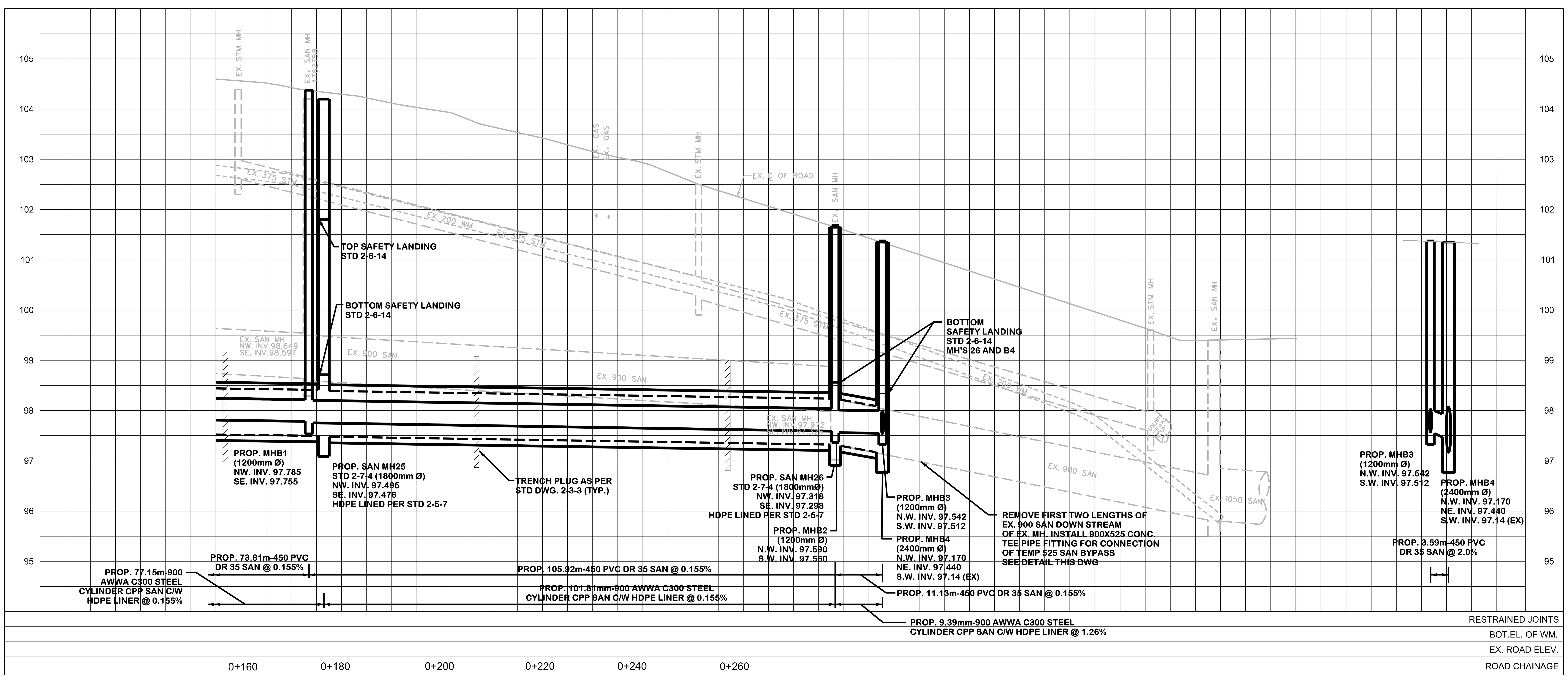


STAGE 1
(DURING CONSTRCUTION OF PROP. 900 SAN AND MH'S)



STAGE 2
(AFTER CONSTRCUTION AND PRESSURE TESTING OF PROP. 900 SAN AND MH'S AND REMOVAL OF TEMP. SAN BYPASS)

SUGESTED TEMP. SAN BYPASS CONNECTION
(CONTRACTOR TO PROVIDE DETAILS)
N.T.S.



LICENSED PROFESSIONAL ENGINEER A. S. HUNDAL 2023-04-05 PROVINCE OF ONTARIO

REVISIONS

DATE	BY	DESCRIPTION
2023-04-05	A.H.	REALIGNED SAN SEWER
2022-07-12	A.H.	REALIGNED SAN SEWER
2022-06-13	A.H.	REALIGNED SAN SEWER
2022-02-04	A.H.	PIPE CLASS REVISED, SAFETY LANDING, TEMP. SAN BYPASS

MINISTRY OF TRANSPORTATION, ONTARIO PH-D-382 89-10

CREATED: MODIFIED: OCTOBER, 2019

APPENDIX B

WATER DEMAND CALCULATIONS

Water Demands - Phase 1

Project Name:	Dixie Outlet Mall
Project Number:	19410
Location:	Mississauga, Ontario
Date:	12-Apr-24
Prepared by:	PB

Flow Data				
Type of Development	Equivalent Population (ppl / ha)	Units	Max Day Factor	Peak Hour Factor
Single family (greater than 10m frontage)	50	L / cap / day	2	3
Single family (less than 10m frontage)	70	L / cap / day	2	3
Semi-detached	70	L / cap / day	2	3
Row dwellings	175	L / cap / day	2	3
Apartments	475	L / cap / day	2	3
Commercial	50	L / employee / day	1.4	3
Light Industrial	70	L / employee / day	1.4	3

Description	Commercial GFA for Equiv Pop (ha)	Total Land Area (ha)	# Apartment (1 Bedroom)	# Apartment (2 Bedroom)	# Apartment (3 Bedroom)	Total Apartment Units	Total Units (Apartment + Townhouses)	Apartment Flows: Apartment Population *	Apartment Average Flow (L/s)	Apartment Max Day (L/s)	Apartment Peak Hour (L/s)
1	Haig	0.56	103	32	24	159	159	429	1.39	2.78	4.17
2	Haig	0.68	220	68	51	338	338	913	2.96	5.92	8.87
3	Haig	0.71	325	100	75	500	500	1350	4.38	8.75	13.13
4	Park	0.46				0	0	0	0.00	0.00	0.00
5	Easement	0.14				0	0	0	0.00	0.00	0.00
6	ROW	0.15				0	0	0	0.00	0.00	0.00
Total		**2.70**	**648**	**199**	**150**	**997**	**997**	**2692**	**8.72**	**17.45**	**26.17**

* Townhouse and Apartment populations calculated based on 2.7 people / unit

Fire Flow Demand

Project Name: Dixie Outlet Mall
Project Numbe 19410
Location: Mississauga, Ontario
Date: 28-Mar-24
Prepared by: PB

From MOE's Design Guidelines for Drinking-Water Systems

Table 8-1: Fire Flow Requirements

EQUIVALENT POPULATION[1]	SUGGESTED FIRE FLOW (L/s)	DURATION (HOURS)
500 – 1 000	38 (10 ft/s)	2
1 000	64 (17 ft/s)	2
1 500	79 (21 ft/s)	2
2 000	95 (25 ft/s)	2
3 000	110 (29 ft/s)	2
4 000	125 (33 ft/s)	2
5 000	144 (38 ft/s)	2
6 000	159 (42 ft/s)	3
10 000	189 (50 ft/s)	3
13 000	220 (58 ft/s)	3
17 000	250 (66 ft/s)	4
27 000	318 (84 ft/s)	5
33 000	348 (92 ft/s)	5
40 000	378 (100 ft/s)	6

Note [1]: When determining the fire flow allowance for commercial or industrial areas, it is recommended that the area occupied by the commercial/industrial complex be considered at an equivalent population density to the surrounding residential lands.

Excerpt from Table 8-1

Pop	Fire Flow (L/s)	Duration (hrs)
2000	95	2
3000	110	2

Interpolation for equivalent population

2692	105	2.00

Region of Peel Multi-Use Demand Table

WATER CONNECTION

Connection Point:	400 mm watermain on South Service Road and 200 mm watermain on Haig Boulevard	
Pressure zone of connection point	Pressure Zone 1 (CT1)	
	Residential	**Total**
Total equivalent poulation to be serviced	2692	2692
Total lands to be serviced	2.70	2.70

Hydrant Flow Test
Hydrant Flow Test Location 1
1250 South Service Rd, Mississauga, ON (along South Service Road)

	Pressure (psi)	**Flow (L/s)**	**Time**
Minimum water pressure	61	100	8:30 AM
Maximum water pressure	64	0	8:30 AM

No.		**Water demands**	
	Demand Type	**Residential**	**Total**
1	Average day flow (L/s)	8.72	8.72
2	Maximum day flow (L/s)	17.45	17.45
3	Peak hour flow (L/s)	26.17	26.17
4	Fire flow (L/s)	105	105
	Analysis		
5	Maximum day plus fire flow (L/s)	122.45	122.45
6	Peak hour flow (L/s)	26.17	26.17
7	Maximum demand flow (L/s)	122.45	122.45

WASTEWATER CONNECTION

	Connection Point	450 mm sanitary sewer on Haig Blvd flowing at 0.155%	
	Total Lands to be serviced (ha):	2.70 (new development) + 16.90 (existing mall) = 19.60 ha	
	Total equivalent population to be serviced:	**Residential**	845
		Non-Residential	2692
		Total	3537
8	Wastewater Sewer Effluent (m3 /s):	**Total**	0.0471

APPENDIX C

STORMWATER MANAGEMENT CALCULATIONS

Rational Method (Pre-Development Condition) - Outlet #2

Project No:		19410	
Project Name:		Dixie Mall	
Storm Event:		2	years
ABC's:	a	610	
	b	4.6	
	c	0.78	
Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.5	
Site Area	A	**1.63**	ha
Intensity [i=a/(t+b)c] or [i=a*tb] if B=0	i	59.89	mm/hr
Flow [Q=CiA/360]	Q	0.14	m^3/s
		136	L/s

Proposed Area (draining to box culvert) **1.63** ha
Flow Rate per hectare **83.2** L/s/ha

Rational Method (Pre-Development Condition) - Outlet #4

Project No:		19410	
Project Name:		Dixie Mall	
Storm Event:		2	years
ABC's:	a	610	
	b	4.6	
	c	0.78	
Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.5	
Site Area	A	**0.48**	ha
Intensity [i=a/(t+b)c] or [i=a*tb] if B=0	i	59.89	mm/hr
Flow [Q=CiA/360]	Q	0.04	m^3/s
		40	L/s

Proposed Area (draining to box culvert) **0.48** ha
Flow Rate per hectare **83.2** L/s/ha

Modified Rational Calculation

Project Name: Dixie Mall
Project Number: 19410

Rainfall Data			
Location:	Mississauga	a	1450.00
Event	100	b	4.90
		c	0.78

Block ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Required (m^3)	Release Rate[1] (m^3/s)	Storage/ Area[2] (m^3/ha)
OUTLET #2						
STREET + BLD A	0.62	1.00	15	188	0.052	303
BLD B	0.49	1.00	15	148	0.041	303
PKNG	0.34	1.00	15	103	0.028	303
FUT.ROW	0.18	1.00	15	54	0.015	303
OUTLET #4						
BLD C + EXT2	0.48	1.00	15	145	0.040	303
TOTAL	**2.11**			**639**	**0.176**	

[1] Release Rate is based on 83.2 L/s/ha (allowable release rate based on pre-development conditions)
[2] Storage/ Area is calculated by taking the Storage Required and dividing by block area

Flow Rate per hectare **83.2** L/s/ha

Modified Rational **Area:** **STREET + BLD A**

Project Name: Dixie Mall
Project Number: 19410

Rainfall Data			
Location:	Mississauga	a	1450.000
Event	100	b	4.900
		c	0.780

Site Data		
Area	0.62	ha
Runoff Coefficient	1.00	
AC	0.62	
Tc	15	
Time Increment	10	
Release Rate	52	l/s
Storage Required	188	m^3

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (m3/s)	Runoff Volume (m3)	Released Volume (m3)	Storage Volume (m3)	
15	141	0.24	218	46	172	
25	102	0.18	265	77	187	
35	82	0.14	296	108	188	********
45	69	0.12	320	139	180	
55	60	0.10	339	170	169	
65	53	0.09	355	201	154	
75	48	0.08	369	232	137	
85	43	0.07	381	263	118	
95	40	0.07	393	294	99	
105	37	0.06	403	325	78	
115	35	0.06	412	356	56	
125	33	0.06	421	387	34	
135	31	0.05	429	418	11	
145	29	0.05	437	449	-12	
155	28	0.05	444	480	-36	
165	26	0.05	451	511	-60	
175	25	0.04	457	542	-84	
185	24	0.04	463	572	-109	
195	23	0.04	469	603	-134	
205	22	0.04	475	634	-160	
215	22	0.04	480	665	-185	

Modified Rational **Area:** **BLD B**

Project Name: Dixie Mall
Project Number: 19410

Rainfall Data			
Location:	Mississauga	a	1450.000
Event	100	b	4.900
		c	0.780

Site Data		
Area	0.49	ha
Runoff Coefficient	1.00	
AC	0.49	
Tc	15	
Time Increment	10	
Release Rate	41	l/s
Storage Required	148	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m3/s)	(m3)	(m3)	(m3)	
15	141	0.19	172	37	136	
25	102	0.14	209	61	148	
35	82	0.11	234	86	148	********
45	69	0.09	253	110	143	
55	60	0.08	268	135	133	
65	53	0.07	281	159	122	
75	48	0.06	292	183	108	
85	43	0.06	301	208	94	
95	40	0.05	310	232	78	
105	37	0.05	318	257	62	
115	35	0.05	326	281	45	
125	33	0.04	333	306	27	
135	31	0.04	339	330	9	
145	29	0.04	345	355	-9	
155	28	0.04	351	379	-28	
165	26	0.04	356	404	-47	
175	25	0.03	361	428	-67	
185	24	0.03	366	452	-86	
195	23	0.03	371	477	-106	
205	22	0.03	375	501	-126	
215	22	0.03	380	526	-146	

Modified Rational **Area:** **PKNG**

Project Name: Dixie Mall
Project Number: 19410

Rainfall Data			
Location:	Mississauga	a	1450.000
Event	100	b	4.900
		c	0.780

Site Data		
Area	0.34	ha
Runoff Coefficient	1.00	
AC	0.34	
Tc	15	
Time Increment	10	
Release Rate	28	l/s
Storage Required	103	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m3/s)	(m3)	(m3)	(m3)	
15	141	0.13	120	25	94	
25	102	0.10	145	42	103	
35	82	0.08	162	59	103	********
45	69	0.06	175	76	99	
55	60	0.06	186	93	92	
65	53	0.05	195	110	84	
75	48	0.04	202	127	75	
85	43	0.04	209	144	65	
95	40	0.04	215	161	54	
105	37	0.04	221	178	43	
115	35	0.03	226	195	31	
125	33	0.03	231	212	19	
135	31	0.03	235	229	6	
145	29	0.03	239	246	-7	
155	28	0.03	243	263	-20	
165	26	0.02	247	280	-33	
175	25	0.02	251	297	-46	
185	24	0.02	254	314	-60	
195	23	0.02	257	331	-74	
205	22	0.02	260	348	-87	
215	22	0.02	263	365	-101	

Modified Rational **Area:** FUT.ROW

Project Name: Dixie Mall
Project Number: 19410

Rainfall Data			
Location:	Mississauga	a	1450.000
Event	100	b	4.900
		c	0.780

Site Data		
Area	0.18	ha
Runoff Coefficient	1.00	
AC	0.18	
Tc	15	
Time Increment	10	
Release Rate	15	l/s
Storage Required	54	m^3

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (m3/s)	Runoff Volume (m3)	Released Volume (m3)	Storage Volume (m3)	
15	141	0.07	63	13	50	
25	102	0.05	77	22	54	
35	82	0.04	86	31	54	********
45	69	0.03	93	40	52	
55	60	0.03	98	49	49	
65	53	0.03	103	58	45	
75	48	0.02	107	67	40	
85	43	0.02	111	76	34	
95	40	0.02	114	85	29	
105	37	0.02	117	94	23	
115	35	0.02	120	103	16	
125	33	0.02	122	112	10	
135	31	0.02	125	121	3	
145	29	0.01	127	130	-3	
155	28	0.01	129	139	-10	
165	26	0.01	131	148	-17	
175	25	0.01	133	157	-24	
185	24	0.01	135	166	-32	
195	23	0.01	136	175	-39	
205	22	0.01	138	184	-46	
215	22	0.01	139	193	-54	

Modified Rational **Area:** **BLD C + EXT2**

Project Name: Dixie Mall
Project Number: 19410

Rainfall Data			
Location:	Mississauga	a	1450.000
Event	100	b	4.900
		c	0.780

Site Data		
Area	0.48	ha
Runoff Coefficient	1.00	
AC	0.48	
Tc	15	
Time Increment	10	
Release Rate	40	l/s
Storage Required	145	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m3/s)	(m3)	(m3)	(m3)	
15	141	0.19	169	36	133	
25	102	0.14	205	60	145	
35	82	0.11	229	84	145	********
45	69	0.09	247	108	140	
55	60	0.08	262	132	131	
65	53	0.07	275	156	119	
75	48	0.06	286	180	106	
85	43	0.06	295	204	92	
95	40	0.05	304	228	76	
105	37	0.05	312	252	60	
115	35	0.05	319	276	44	
125	33	0.04	326	299	26	
135	31	0.04	332	323	9	
145	29	0.04	338	347	-9	
155	28	0.04	344	371	-28	
165	26	0.04	349	395	-46	
175	25	0.03	354	419	-65	
185	24	0.03	359	443	-85	
195	23	0.03	363	467	-104	
205	22	0.03	368	491	-124	
215	22	0.03	372	515	-143	

Orifice Control & Detention Storage ***Area*** ***STREET + BLD A***

Orifice Equation $Q = C_dA(2gh)^{1/2}$

Orifice Diameter	130	mm
Area:	0.013	m^2
g =	9.81	m/s^2
C_d =	0.62	

	Stage	Head (m)	Discharge (m3/s)
Invert E.L.	100.33	0.00	0.00
year Ponding E.L.	102.33	1.94	**0.051**

Orifice Control & Detention Storage ***Area*** ***BLD B***

Orifice Equation $Q = C_dA(2gh)^{1/2}$

Orifice Diameter	115	mm
Area:	0.010	m^2
g =	9.81	m/s^2
C_d =	0.62	

	Stage	Head (m)	Discharge (m3/s)
Invert E.L.	100.46	0.00	0.00
100 year Ponding E.L.	102.46	1.94	**0.040**

Orifice Control & Detention Storage ***Area*** ***PKNG***

Orifice Equation $Q = C_dA(2gh)^{1/2}$

Orifice Diameter	140	mm
Area:	0.015	m^2
g =	9.81	m/s^2
C_d =	0.62	

	Stage	Head (m)	Discharge (m3/s)
Invert E.L.	100.25	0.00	0.00
year Ponding E.L.	100.75	0.43	**0.028**

Orifice Control & Detention Storage ***Area*** ***ROW1 + FUTROW***

Orifice Equation $Q = C_dA(2gh)^{1/2}$

Orifice Diameter	200	mm
Area:	0.031	m^2
g =	9.81	m/s^2
C_d =	0.62	

	Stage	Head (m)	Discharge (m3/s)
Invert E.L.	99.52	0.00	0.00
100 year Ponding E.L.	102.02	2.40	**0.134**

Orifice Control & Detention Storage ***Area*** ***BLD C + EXT2***

Orifice Equation $Q = C_dA(2gh)^{1/2}$

Orifice Diameter	100	mm
Area:	0.008	m^2
g =	9.81	m/s^2
C_d =	0.62	

	Stage	Head (m)	Discharge (m3/s)
Invert E.L.	100.29	0.00	0.00
year Ponding E.L.	103.29	2.95	**0.037**

-The head is calculated as the difference between ponding elevation and center line of the orifice plate