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PROPOSED REDEVELOPMENT
1755 & 1805 Pickering Parkway,
City of Pickering, Ontario

MASTER SERVICING AND STORM WATER MANAGEMENT REPORT

Prepared For:

Pickering Ridge Lands Inc.
&
Bayfield Realty Advisors

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REVISED: April 10, 2024 (for Submission)

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1. INTRODUCTION

Site Description

The subject development has a total area of 9.484 ha and is bound by Pickering Parkway to the north, Highway 401 to the south, Notion Road and Saint Francis De Sales Cemetery to the east and Brock Road to the west. Currently, the site is developed with multi-tenant, “big box” and smaller commercial retail establishments with associated asphalt parking lots. The topography of the site is relatively flat sloping northeast. The subject site known as First Pickering Place (FPP) is currently designated as “Mixed Use Areas – Specialty Retailing Node” in the Pickering Official Plan; the lands with this designation are intended to have the widest variety of uses and highest levels of activities. An aerial view of the site can be found in Appendix A showing surrounding uses. Refer to Exhibit 1 below for the site location. Exhibit 2 shows the plan of the redeveloped site and location of Phase 1 within the site.

Background

The objective of this report is to define a feasible servicing plan focusing on the Full Development Build out in order to allow Phase 1 of the development to proceed, which includes Towers A1 and A2. This report will evaluate servicing schemes for the proposed redevelopment at the full build out with respect to sanitary, water and storm servicing and also evaluate the stormwater management (SWM) strategy to meet the SWM requirements set out by regulatory agencies.

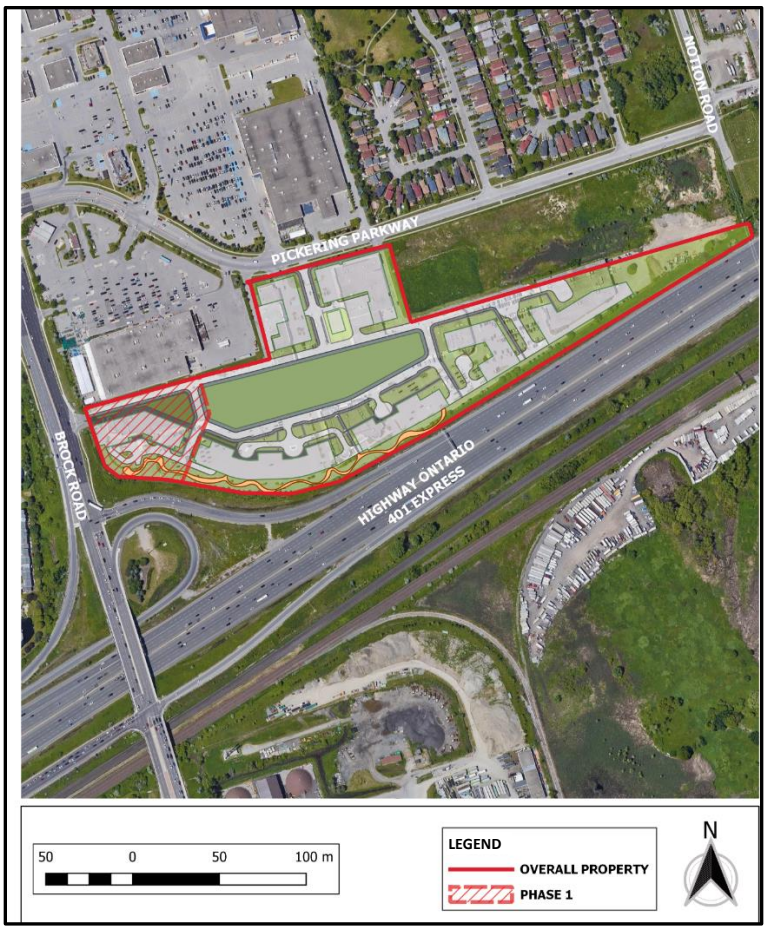


Exhibit 1 Location of the project site

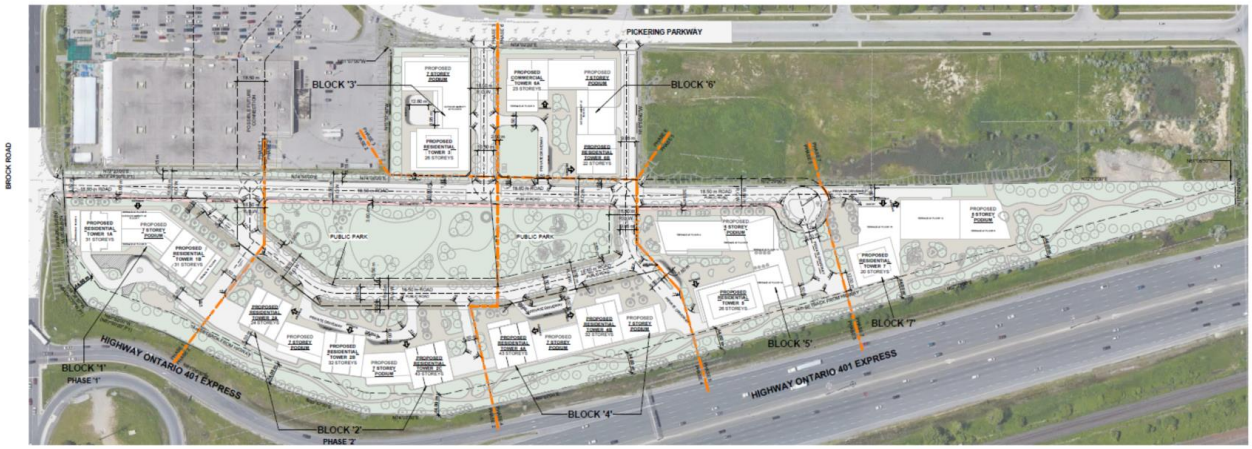


Exhibit 2 Full build out layout and location of Phase 1

2. SCOPE OF WORK

The Odan/Detech Group Inc. was retained by the owners, **Pickering Ridge Lands Inc. & Bayfield Realty Advisors** to propose a servicing scheme(s) for the Redevelopment of 1755 & 1805 Pickering Parkway (Pickering Design Centre). The scope of work in brief involves the following:

a) Gather information on the existing services for the Site and surrounding the Site.

b) Work with or assemble a team of Consultants and Vendors to perform specialized tasks required for the global servicing assessment.

c) Meetings/conversations with consulting team and land owners in order to coordinate developments.

d) Produce Servicing Schemes that will allow for the development of the intensified site at full build out with focus on the development of Phase 1. The servicing analysis entails a review for sanitary waste water, water distribution, storm water management and grading.

Currently, the proposed development area is divided into 7 blocks (Block ‘1’ to Block ’7’), of which Phase one corresponds to Block ‘1’. The proposed redevelopment in Phase 1 will consist of a mixed-use development with two towers of 31 storeys. The proposed building will have retail at grade, 678 apartment dwelling units, 4 level of underground parking and surface parking, and 1,538 m2 of indoor. Refer to site plan prepared by Turner Fleischer Architects Inc. in Appendix A for additional information.

3. SANITARY SERVICING

Existing Sanitary Sewer Infrastructure

As-constructed and design drawings obtained from the Region of Durham and the Town of Pickering show that an existing 250 mm diameter sanitary sewer in Pickering Parkway are located as the main sanitary outlet of the subject site.

There are two existing sanitary sewer connections to the site, a 250mm sanitary outlet toward Pickering Parkway at the north of the site and a 150 mm sanitary outlet toward Notion Road at the east of the site.

Refer to Exhibit 3 for the location of the Site and the layout of the existing sanitary sewers in the area.

The majority of sanitary flow from the existing commercial site is conveyed through an existing 250 mm diameter sanitary sewer west to east along Pickering Parkway. Then connected to a 250 mm diameter sanitary sewer at the intersection with Marshcourt Dr, which conveys the sanitary flow to the north. The 250 mm diameter sanitary sewer on Marshcourt Dr then increases to a 375 mm diameter sewer at the Region's easement and the sanitary sewer conveys the collected sanitary flow to a 375 mm diameter sanitary sewer on Notion Road. The 375 mm diameter sanitary sewer on Notion Road is connected to a 750 mm sanitary sewer on Orchard Road that conveys the collected flow to the east. The 750mm pipe is the outlet for the subject site.

The sanitary analysis will be conducted considering the flow from all sites that presently flow to Orchard Road and the future flow from the redevelopment of 1899 Brock Road and surrounding tributary areas which have been provided by the Region. Refer to Region sanitary maps and correspondence in Appendix B for additional information.

In completing the analysis, the following information will be used or relied upon:

- Drawings from City of Pickering.
- Drawings from The Regional Municipality of Durham.
- Sanitary system Maps from The Regional Municipality of Durham
- Design guidelines for sanitary sewers systems from The Regional Municipality of Durham
- Master Servicing & Stormwater Management Report -1899 Brock Road, SCHAEFFERS Consulting Engineers, May 2021
- Functional Servicing & Stormwater Management Report Residential Townhouse Development - 1856 Notion Road, GHD, Jan 2018

EXISTING SYSTEM REVIEW

Based on review of the existing sanitary sewer sheets in Appendix B, the redeveloped site cannot be routed through the existing sewer system along Pickering Pkwy, Marshcourt Drive, easement between homes to Notion Road to Orchard Drive. Due to limitations of the existing sanitary sewer capacity, it would mean replacing a relatively deep sewer between two existing homes. The recommended and preferred routing would be along Pickering Pkwy to Notion Road to Orchard Drive.

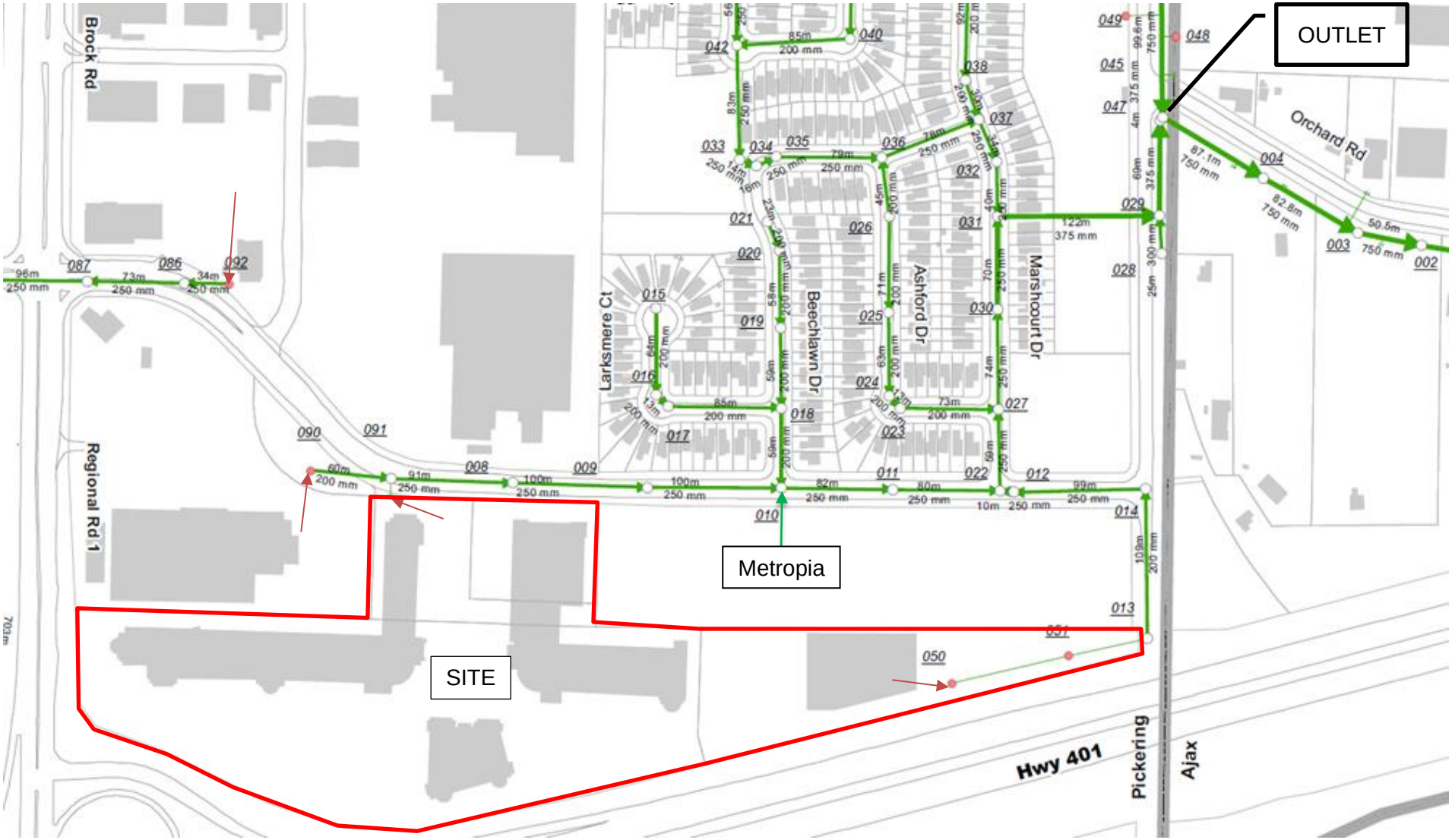


Exhibit 3 Durham Region layout of existing sanitary sewers

REGION OF DURHAM PREFERRED SYSTEM

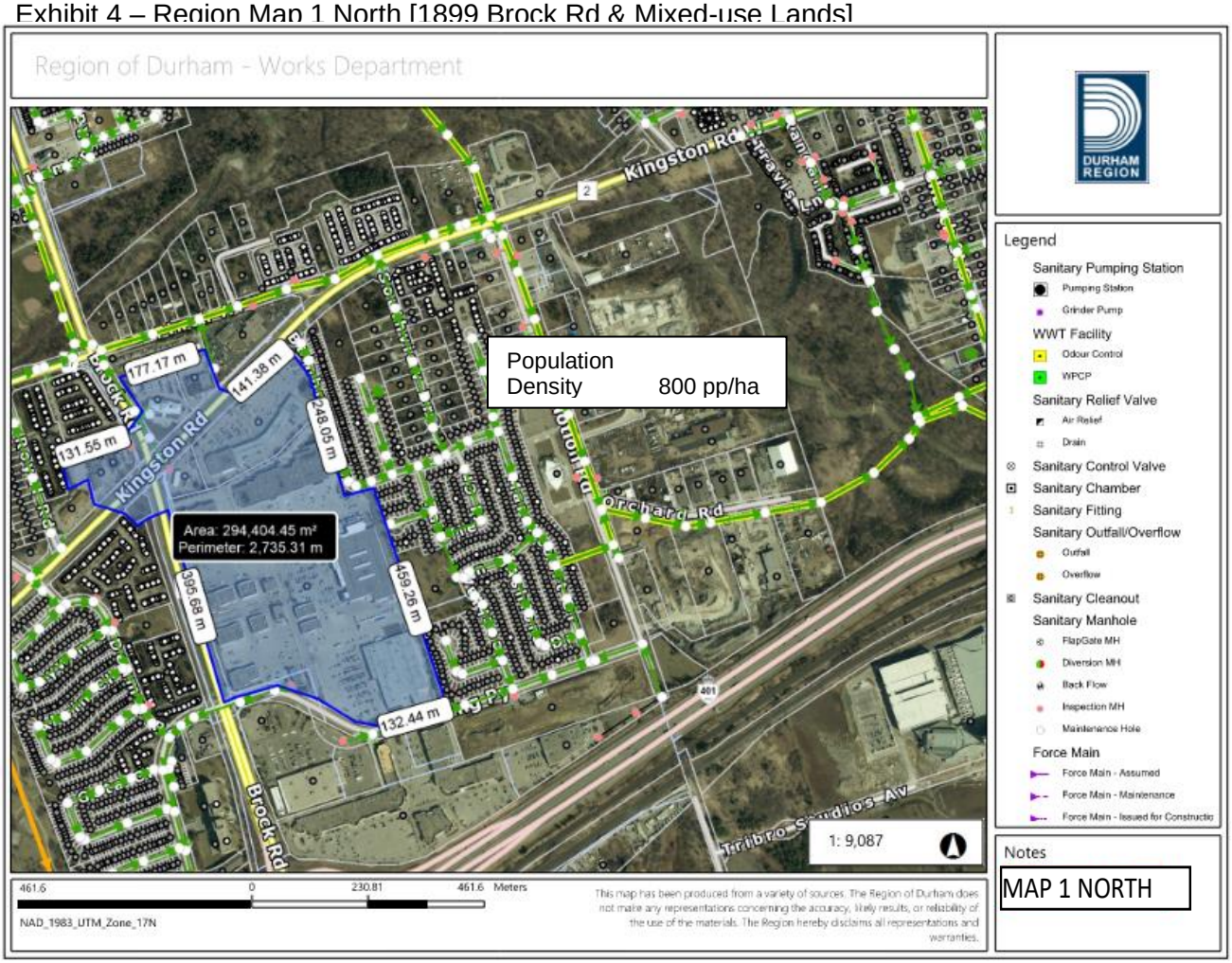
Discussion with the Region of Durham (Aaron Christie), regarding redevelopment of the subject site and intensification of future development lands, can be summarized as follows:

1) The Region solution for the intensification is to provide a sewage pump station (SP) on the south side of HWY 401. From this SP a large trunk sewer will be extended North under HWY 401 to Notion Road, then continue North on Notion Road. These two sanitary sewer pumping stations are outlined within the current Region's Capital Budget and 9-year forecast; however, they will be subject to further study as part of a Class Environmental Assessment. The applicant shall note that the timing for these two future projects cannot be determined at this time as indicated by the Region.

2) Sanitary mapping has been provided by the Region which indicates proposed future development lands and the associated tributary areas which will ultimately discharge to the SP on the south side of HWY 401 via Pickering Parkway and the Notion Road trunk sewer. Population densities for these proposed development lands were provided by the Region. Refer to Exhibits 4, 5 & 6 below for the Region's sanitary mapping and related population densities.

Region of Durham Sanitary Maps & Correspondence indicating population densities

Exhibit 4 – Region Map 1 North [1899 Brock Rd & Mixed-use Lands]



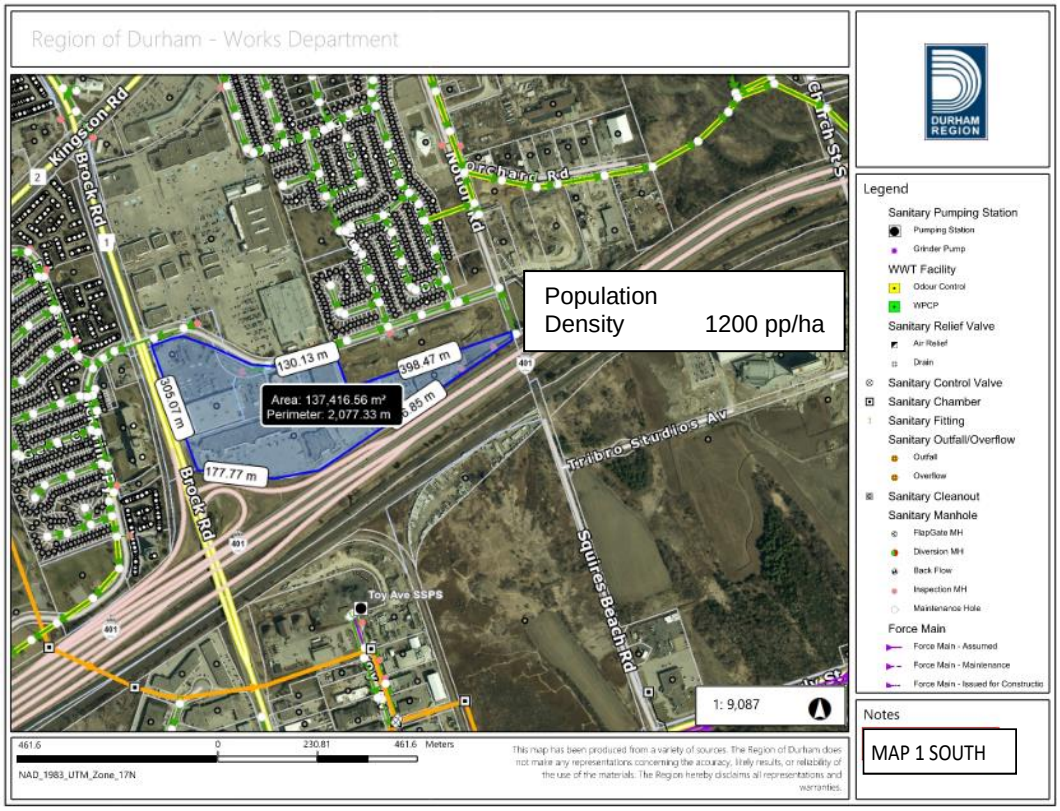


Exhibit 5 – Region Map 1 South [Subject site and 1731/1735 Pickering Pkwy]

Exhibit 6 – Region Map 2 South [Metropia Lands]

3) The Region has allowed for the Phase 1 of 1899 Brock Road to be discharged west ward to Brock Road and will therefore not be included in our Phase 1 downstream sanitary analysis.

4) The Phase 1 for the subject site will be allowed to discharge to Orchard Drive North on Notion Road, for the interim condition. Phase 1 will be serviced via local sanitary sewers along Notion Road from Pickering Parkway to the existing 750mm dia. Sanitary sewer on Orchard Road. Based upon flow monitoring, the remaining capacity within Orchard Road 750mm diameter sanitary sewer is estimated to be 150 l/sec as provided by the Region.

5) In the full build out condition the temporary sewers on Notion Road will be replaced by the Region with a trunk sewer. Thus, all the sewage from the existing and redeveloped sites will flow south in the Notion Road trunk, under HWY 401 to the new Region SP.

6) The Region prefers that the Sewer to Notion Road along Pickering Parkway be installed to accommodate the fully built out sites and the existing sites along the way.

7) The Region will allow a smaller sewer diameter pipe on Notion Road than on Pickering Parkway for the interim condition since the trunk sewer will replace this to flow South under the HWY 401.

8) The Region did not offer a real timetable for the SP and Notion Road trunk sewer, however stated that it would be available for the Phase 2 of either development.

9) Sanitary Capacity is assigned upon execution of a development agreement with the Region of Durham.

The Region has also given us the approximate reserve capacity of the Orchard Drive sewer from where we show it on Exhibit 3 eastward. See the following e-mail from Aaron Christie.

Hello Mark,

At this time base your study on the assumption that there could be up to a capacity of 150 l/s available within the 750mm sanitary sewer at Orchard Road. This is based on preliminary input received from the Region of Durham and is subject to change as your application and development of the surrounding lands moves forward.

Based on my interpretation of the mapping, the 600mm watermain on Brock Road has a 300mm dia. tee to the west and then there is a 300mm x 300mm dia. tee and 90 degree bend providing the 300mm dia. watermain to the east across Brock Road to Pickering Parkway.

Thanks,

Aaron Christie, P.Eng. | Manager, Engineering Planning & Studies
Works Department
The Regional Municipality of Durham
Aaron.Christie@durham.ca | 905-668-7711 extension 3608 | durham.ca
My pronouns are he/his

The analysis will proceed to:

- Provide an existing sewer system analysis to show that the Marshcourt Drive route cannot be used.
- Provide a redeveloped site Phase 1 sanitary sewer design sheet (with Required pipe sizes for context only as this sewer would not be sufficient for future developments and full build out)
- Provide a redeveloped site Phase 1 sanitary sewer design sheet (with Proposed pipe sizes)
- Provide a redeveloped sites (subject, 1899 Brock Road and future tributaries) fully developed sanitary sewer design sheet to Notion Road.

Design Criteria

Sanitary flows for the subject site are calculated based on the Regional Municipality of Durham design specifications for sanitary sewers. The summary is as follows:

Residential

- Average flow: 364 L/person/day
- Infiltration: 22.5 m^3 gross ha/day (0.26 l/s/ha/day) – when foundation drains are not connected to the sanitary sewer.
- Peaking Factor:

$$\mathrm{K} = 1 + \frac{14}{4 + P^{1/2}}$$

Where K=Harmon Peaking Factor, P = Population in thousands.
K-Maximum= 3.8m, K-Minimum= 1.5

- When the number and type of housing units within a proposed development are known, the calculation of population for the proposed development shall be based on the following:

Type of Housing	**Persons/ha**
Single Family Dwelling,	60
Semi-detached & Duplex	100
Townhouses	125
Apartment(s)	
- Low density (62 u/ha)	150
- Medium to low density (86 u/ha)	210
- Medium density (124 u/ha)	300
- High Density (274 u/ha)	600
u/ha = units per hectare	

Type of Housing	**Persons/Unit**
Single Family Dwelling, Semi-Detached and Links	3.5
Townhouses/Stacked Townhouses	3.0
Apartment(s)	
- 1 Bedroom or smaller (Bachelor)	1.5
- 1 Bedroom and Den	2.5
- 2 Bedroom	2.5
- 3 Bedroom	3.5
- 4 Bedroom or larger	4.5

Commercial

Design Flow: 180 m^3/gross floor area ha/day (2.08 l/s/day) including infiltration and peaking effect.

EXISTING SANITARY SEWER CAPACITY CALCULATION

The capacity of the existing sanitary sewer system located from the subject site to Orchard Rd was evaluated using a sanitary sewer design sheet based on the above parameters. The design sheet for the existing conditions has been completed based on the drainage areas and existing sewer information provided by the Region of Durham and the City of Pickering. Refer to Appendix B for the existing conditions sewer spread sheet and further details. The existing sanitary tributary areas are found in Appendix E.

PROPOSED SANITARY SEWER DESIGN CONSIDERATION

Based on our discussion with the Region of Durham (Aaron Christie), that they (the Region) want the redeveloped flow from 1899 Brock Road and the updated tributary areas, provided by the Region, to flow from their Site east on Pickering Parkway to Notion Road.

Metropia is planning to develop a new townhouse development at 1856 Notion Road known as the Metropia Site. The details are contained within the "Functional Servicing and Stormwater Management Report", by GHD, Jan 2018. The sanitary flow (6.78 L/s) from the development will be routed to the existing manhole (MH35-6) on Pickering Parkway.

Since four existing retail buildings will remain operational within the site for Phase 1 construction. The construction of new sewers will need to be phased to ensure drainage is maintained to the existing buildings.

Table 1 is a summary of the flows generated by the Site during Phase 1.

Table 1 – Proposed population and sanitary peak flow estimate (Phase 1)

Unit Type /Land Use	Number of Units /Gross floor Area	Persons/ Unit	Population	Peaking Factor	Infiltration (L/sec)	Sanitary Flow (L/sec)
North Sanitary Outlet to Pickering Parkway						
Commercial (Ex.)	0.79 ha	-	-	1	-	1.65
Commercial (Prop.)	0.17 ha	-	-	1		0.35
Apartments (Prop.)	678 Units 126- 1 Bedroom 337- 2 Bedroom 207-3 Bedroom 8 -4 Bedroom	1.5 2.5 3.5 4.5	1793	3.62	0.31	27.28
Total	-	-	-	-		29.28
East Sanitary Outlet to Notion Road						
Commercial (Ex.)	0.425 ha	-	0.425 ha	1		0.88
Total	-	-	-	-		0.88

Table 2 – Proposed population and sanitary peak flow estimate (Full Build out)

Unit Type /Land Use	Number of Units /Gross floor Area	Persons/ Unit	Population	Peaking Factor	Infiltration (L/sec)	Sanitary Flow (L/sec)
North Sanitary Outlet to Pickering Parkway						
Commercial (Prop.)	2.67 ha	-	-	1		5.55
Apartments (Prop.)	5274 Units	2.5	13,283	2.83	2.46	157.96
Total						165.97

The total flow to the Pickering Parkway sanitary sewer at full build out of the subject site is 165.97 L/sec.

We will show **3 Scenarios** to evaluate the improvements required to accommodate the redevelopment. The scenarios are as follows:

1. Existing conditions
2. Phase 1 of subject site
3. Full development of subject site and full development of 1899 Brock Road and future tributaries

Find enclosed in **Appendix B**, spread sheets for each scenario. Sanitary tributary plan maps are included in **Appendix E** for reference.

The purpose of **Scenario 1** (existing conditions) is to establish the base rate into MH 17 at Orchard Road. Durham Region has suggested that the excess capacity in the Orchard Road sewer system is approximately 150 L/sec. The reason for the existing condition is to establish the flow into existing MH 17 from the south side. MH 17 is located at the south side intersection of Orchard Road and Notion Road. If the **Scenario 2** flow into the south side of MH 17 is less than **Scenario 1** plus 150 L/sec, then Phase 1 of First Pickering Place can be accommodated.

The purpose for **Scenario 2** is to establish the flow rate to size the pipes from Pickering Parkway to Orchard Road along Notion Road. These pipes along Notion Road are interim for Phase 1 until the Region replaces them with a trunk sewer along Notion Road. Essentially these pipes will be a throw away along Notion Road.

The purpose for **Scenario 3** is to establish the flow rate to size the pipes from 1899 Brock Road along Pickering Parkway to Notion Road. These pipes will be sized to handle the existing flows and the full future build out of the development sites proposed in the Region’s sanitary mapping provided and included in Appendix B for reference.

SUMMARY AND RECOMMENDATION

Based on the above review and analysis we offer the following summary and recommendations:

1) Phase 1 of First Pickering Place cannot be accommodated by the existing sanitary sewer system and present routing path. Refer to spread sheet for existing conditions.

2) The present path would require the replacement of a sewer between two existing homes. This is not recommended.

3) The 750 mm sanitary sewer on Orchard Road has sufficient capacity to accommodate Phase 1 of First Pickering Place and the existing uses.

4) We recommend that the owners of First Pickering Place build the sanitary sewer on Pickering Parkway from 1899 Brock Road site to Notion Road to accommodate the full build out of all future development sites and the existing flows. This section of sanitary sewer will be subject to development charges as discussed with the Region of Durham.

5) The sanitary pipe on Notion Road (from Pickering Parkway to Orchard Rd) will be sized to convey existing flows and flows from Phase 1 (First Pickering Place) to the existing Orchard Road sanitary sewer. The Region will allow this interim condition at limited capacity until such time that the Ultimate Trunk Sewer is constructed in the future to convey flows to the South SP. The interim pipe will be downsized from that on Pickering Parkway, the Region will allow this, since it is a temporary measure until the Region replaces it with a trunk sewer on Notion Road.

Table 3 – Offsite sewer improvements

Sewer location	Upstream MH	Downstream MH	Sewer size, length and slope	Comments
Pickering Parkway	1899 Brock Road	EX MH 34-82	525mm – 116m @ 1.0%	New pipe
Pickering Parkway	EX MH 34-82	Prop MH9A	675mm – 49.4m @ 0.45%	Replacement pipe
Pickering Parkway	Prop MH9A	EX MH 34-83	675mm – 41.8m @ 0.45%	Replacement pipe
Pickering Parkway	EX MH 34-83	EX MH 35-5	675mm – 100m @ 0.45%	Replacement pipe
Pickering Parkway	EX MH 35-5	EX MH 35-6	675mm – 100m @ 0.45%	Replacement pipe
Pickering Parkway	EX MH 36-6	EX MH 36-7	675mm – 83m @ 0.45%	Replacement pipe
Pickering Parkway	EX MH 36-7	EX MH 36-8	675mm – 80m @ 0.45%	Replacement pipe
Pickering Parkway	EX MH 35-8	EX MH 35-28	675mm – 110m @ 0.45%	Replacement pipe
Pickering Parkway	EX MH 35-28	Prop MH 13A	450mm – 15m @ 0.22%	Interim Pipe Phase 1
Notion Road	Prop MH 13A	Prop MH 14A	450mm – 100m @ 0.22%	Interim Pipe Phase 1
Notion Road	Prop MH 14A	SAN MH 35-29	450mm – 102m @ 0.22%	Interim Pipe Phase 1
Notion Road	Prop MH 35-29	Prop MH 35-30	450mm – 72m @ 0.22%	Replacement pipe
Notion Road	Prop MH 35-30	Prop MH 17	450mm – 4m @ 0.23%	Replacement pipe

Note: Notion Road pipes are temporary and will be replaced by the Ultimate Regional Trunk sewer that will be directed South on Notion Road to the downstream SP.

CONCLUSION

Based on the above findings the sanitary pipe along Pickering Parkway will be replaced and constructed to accommodate the full build out of all future development sites and the existing flows.

The sanitary pipe on Notion Road (from Pickering Parkway to Orchard Rd) will be sized and constructed to temporarily convey existing flows and flows from Phase 1 (First Pickering Place) to the existing Orchard Road sanitary sewer.

Notion Road pipes will be removed when the Region constructs their SP and Trunk Sewer.

4. WATER SUPPLY AND DISTRIBUTION

EXISTING SYSTEM:

First Pickering Place (FPP) existing water service is fed from a 300 mm Ø City main on Pickering Parkway. The Plaza has a 300mm Ø service main off of Pickering Parkway with a series of hydrants and lateral services inside the Plaza to feed the multiple buildings. Refer to Exhibit 7 for the Regions existing water system.

The purpose of this report is not to evaluate the existing water distribution system, but to evaluate if the existing system can accommodate the proposed intensification. The rest of this section will deal with the intensified site.

REDEVELOPED SITE:

The unit rate and peaking factors of water consumption, minimum pipe size and allowable pressure in line were established from the Durham Region Criteria. Refer to table 4 for the domestic at demand nodes. The fire demand for First Pickering Place is unknown at this stage, since the building designs are not advanced enough. KYPIPE has a unique algorithm to calculate the available fire flows at all hydrants or selected nodes. We will report the available fire flow + maximum day demand at all hydrants and at the block nodes. The demand from Beechlawn Drive and Marshcourt Drive was taken from the homes from the intersection of Beechlawn Drive and Marshcourt Drive to Pickering Parkway.

Table 4 – Demand Calculations at Select Nodes.

NODE	DESCRIPTION OF DEVELOPMENT	NUMBER OF UNITS	Shopping (m2)	POPULATION	Average Day (RESIDENTIAL + ICI) (L/sec)	Peak Day (L/sec)	Peak Hour (L/sec)	Assummed Fire flow required (L/sec)	Total Flow required (Fire + max day) (L/sec)
A-100	BLOCK 1	678	1669	1695	7.24	13.75	20.63	190	203.8
B-200	BLOCK 2	1090	1006	2725	11.54	21.92	32.88	190	211.9
C-300	BLOCK 3	446	920	1115	4.75	9.03	13.54	190	199.0
D-400	BLOCK 4	1022	696	2555	10.80	20.53	30.79	190	210.5
E-500	BLOCK 5	617	665	1543	6.54	12.42	18.63	190	202.4
F-600	BLOCK 6	762	21737	1905	9.28	17.64	26.46	190	207.6
G-700	BLOCK 7	659	0	1648	6.94	13.19	19.78	190	203.2
1899 Brock Rd	Mix use		49522	3366	17.05	32.39	48.58	n/a	n/a
Metropia	Residential		0	672	2.83	5.38	8.07	n/a	n/a
Beechlawn Dr	ex residential	104	0	364	1.53	2.91	4.37	n/a	n/a
Marshcourt Dr	ex residential	120	0	420	1.77	3.36	5.04	n/a	n/a
CTC	ex Canadian Tire		7900	0	0.46	0.87	1.30	n/a	n/a
GAS	ex Gas Bar		600	0	0.03	0.07	0.10	n/a	n/a
TOTALS		**5498**	**84715**	**18007**	**80.77**	**153.45**	**230.18**	-	-

PEAK DAY FACTOR	1.9	APARTMENT UNITS (average 2 Bedroom)	2.5 ppu
PEAK HOUR FACTOR	2.85	SINGLE FAMILY HOMES	3.5 ppu
		TOWNHOME UNITS	3.0 ppu
		Shopping DEMAND IS	5000 L/Day/1000m2
AVERAGE DAY (364 L/CAP/DAY)			

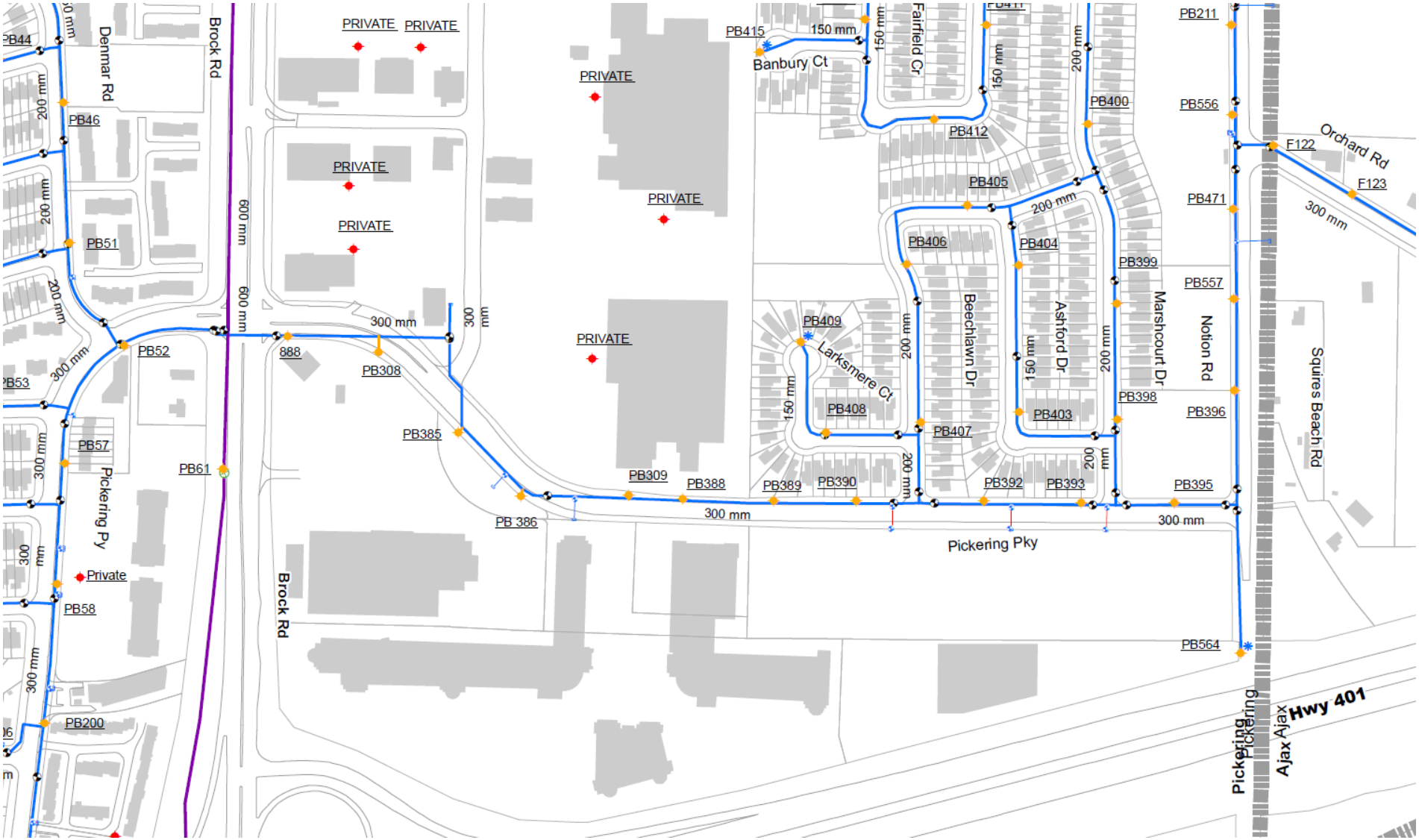


Exhibit 7 Durham Region layout of existing water system

PRESSURE CRITERIA:

The pressures and volumes must be sufficient for Peak hour conditions and under fire conditions as established by the Ontario Building Code. The MOE minimal residual pressure under fire conditions is 140 kPa (20.3 psi). According to the Durham Region, Design Criteria for Water mains the allowable pressures are as per table 5.

Table 5 – Allowable pressures

SCENERIO	DURHAM REGION CRITERIA Allowable Pressure (kPa)		MOE Allowable Pressure (kPa)	
	min	max	max	max
Min. Hour	275	700	275	700
Average Day	275	700	275	700
Max Day	275	700	275	700
Max Hour	275	700	275	700
Maximum Day + Fire	140	700	140	700

Note, the subject development will have development blocks that will require booster pumps to deliver domestic supply to upper levels. Where the pressure is greater than 550 kPa at the development blocks, a pressure reducing valve shall be installed to limit the maximum static pressure to not more than 550 kPa as per The Ontario Building Code.

The maximum allowable velocity in the pipes will be limited to 5.0 m/sec for all flow conditions.

First Pickering Place is located Durham Region pressure district A1. The supply points were derived by data from hydrant flow tests. Refer to Appendix C.

The existing First Pickering Place water supply will be kept intact with minor variation. The existing ring main will be moved out of the future ROW and future park and town easements for the sewers.

SYSTEM MODEL:

The hydraulic model KYPIPE was used to analyze the water distribution system for the redeveloped Site. See below the KYPIPE model with explanation. The Elevation information within the redeveloped Site is provided by the Odan/Detech Group Inc. Pressure district A1 will continue to provide service to the mall. In addition, a new 300 mm main will be introduced to service the new development contemplated within First Pickering Place. See model in Exhibit 8.

1.0 Friction Factors

The water mains have been designed using a Hazen-Williams C-factor as follows:

Pipe size (mm)	Hazen-Williams C-factor
150 or smaller	100
200 and 300	110
>300 to 600	120
Over 600	130

2.0 Pipe Diameters

The diameter of the proposed water main is 300 mm which is at and above the minimum diameter for water mains that provide fire protection and that are required under the Regions criteria. The 300mm diameter water mains are also capable of providing a flushing velocity of 0.8 m/s during cleaning and flushing procedures.

3.0 Pipe System Design and Minimum Pipe Cover

Fire hydrants have been located at dead end location to provide a means for adequate flushing. The minimum cover over the water main shall be 1.8 m which provides for adequate frost protection. The junction elevations were taken from finished grade elevations at the centerline of the road.

4.0 Service Pipes

Suitable Water services will be provided for domestic and for fire at the detailed design stage. The material provided will be acceptable material under Part 7, Division B of the Building Code (O. Reg. 350/13) and AWWA Standards. Water services were not modelled.

5.0 Source node

Water supply for the site is based on the hydrant flow tests as given in Appendix C. The KYPIPE model will use a Variable pressure supply node at the pipe elevation. The input data is summarized in table 6.

Table 6 – Supply Pressure/flow table

Supply (Notion Road) VP-1		Supply (Brock Road) VP-2		Supply (Brock Road) VP-3	
Pressure (kPa)	Flow (L/s)	Pressure (kPa)	Flow (L/s)	Pressure (kPa)	Flow (L/s)
621	0	552	0	552	0
517	121.9	510	109.0	510	109.0
310	219.7	310	269.0	310	269.0
138	285.3	138	358.8	138	358.8

The above data will be entered into KYPIPE variable pressure supply node. KYPIPE will take the above data points. The raw data is shown in Appendix C. In addition, the Region in the e-mail below has stated that the VP-2 and VP-3 will have similar supply curves.

From: Aaron Christie <Aaron.Christie@durham.ca>
Sent: Tuesday, April 2, 2024 1:31 PM
To: Mark Harris - Odan Detech Group <mark@odandetech.com>
Cc: Peter Castellan <Peter.Castellan@Durham.ca>; Amy Nugent <Amy.Nugent@durham.ca>
Subject: RE: Bayfield - Pickering Parkway - URGENT - Water Flows & Pressures -

Hello Mark,

The Top Water Level for Pressure Zone 1 in Pickering is 144.5m.

The existing 300m dia. watermain on Pickering Parkway is also connected to the 600mm dia. watermain on Brock Road.

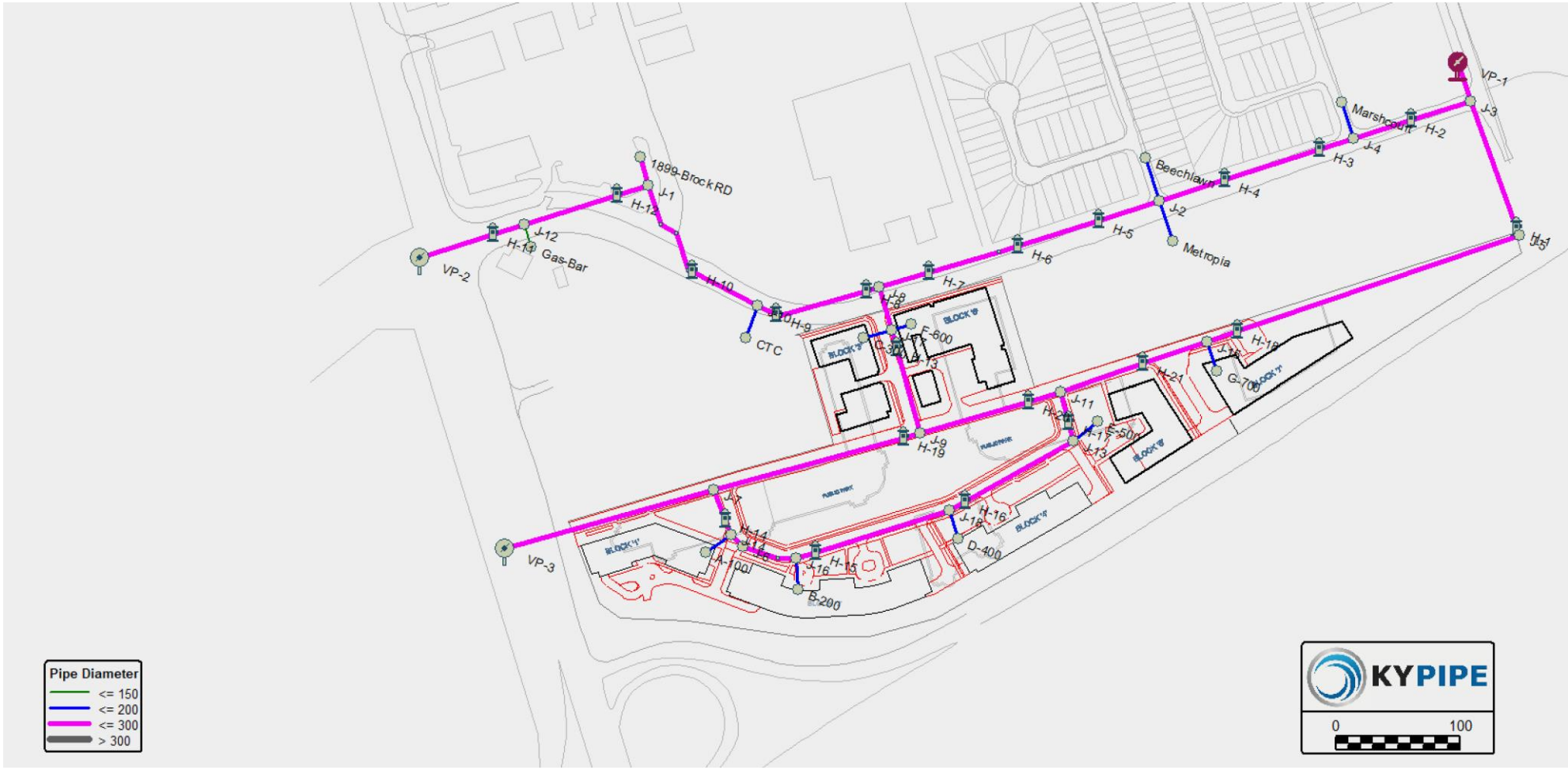
Flow tests along the existing 300mm dia. main between the Walmart driveway and Brock Road should give you similar results as the proposed 300mm dia.

If not, the instructions for ordering a fire flow test can be found here: https://www.durham.ca/en/living-here/fire-flow-test.aspxhydrant

Aaron Christie, P.Eng.| Senior Project Engineer
Water & Wastewater Infrastructure Planning |Works Department
The Regional Municipality of Durham | **Celebrating 50 years!**
Aaron.Christie@durham.ca| 905-668-4113 extension 3608 | durham.ca
My pronouns are he/him. | durham.ca/50years

Exhibit 8 shows the KYPIPE node numbering and hydrant numbering used in the output tables.

Exhibit 8 - KYPIPE MODEL**:** node number and hydrants numbers



INPUT INFORMATION

U N I T S S P E C I F I E D

FLOWRATE ..... = liters/second
HEAD (HGL) ..... = meters
PRESSURE ..... = kpa

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

P I P E N A M E	NODE NAMES #1	#2	LENGTH (m)	DIAMETER (mm)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	VP-2	J-12	88.18	300.00	110.0000	0.00
P-2	VP-1	J-3	32.86	300.00	110.0000	0.00
P-3	J-1	J-10	140.53	300.00	110.0000	0.00
P-4	J-2	J-4	163.07	300.00	110.0000	0.00
P-5	J-4	J-3	99.18	300.00	110.0000	0.00
P-6	J-2	Metropia	33.89	200.00	110.0000	0.00
P-7	J-2	Beechlawn	36.42	200.00	110.0000	0.00
P-8	J-4	Marshcourt	30.17	200.00	110.0000	0.00
P-9	J-8	J-2	234.78	300.00	110.0000	0.00
P-10	J-8	J-17	36.36	250.00	110.0000	0.00
P-11	J-10	J-8	101.91	300.00	110.0000	0.00
P-12	J-10	CTC	27.23	200.00	110.0000	0.00
P-13	J-12	J-1	103.93	300.00	110.0000	0.00
P-14	J-12	Gas-Bar	18.48	100.00	100.0000	0.00
P-15	J-11	899-Brock	23.64	300.00	110.0000	0.00
P-16	J-3	J-5	113.84	300.00	110.0000	0.00
P-17	J-9	J-7	171.04	300.00	110.0000	0.00
P-18	J-7	J-14	38.49	300.00	110.0000	0.00
P-19	J-6	J-16	44.21	300.00	110.0000	0.00
P-20	J-13	J-11	40.11	300.00	110.0000	0.00
P-21	J-11	J-9	117.10	300.00	110.0000	0.00
P-22	J-11	J-15	124.65	300.00	110.0000	0.00
P-23	J-14	J-6	13.13	300.00	110.0000	0.00
P-24	J-14	A-100	24.49	200.00	110.0000	0.00
P-25	J-16	J-18	128.74	300.00	110.0000	0.00
P-26	J-16	B-200	24.98	200.00	110.0000	0.00
P-27	J-18	J-13	113.76	300.00	110.0000	0.00
P-28	J-18	D-400	23.46	200.00	110.0000	0.00
P-29	J-13	E-500	24.93	200.00	110.0000	0.00
P-30	J-15	J-5	263.98	300.00	110.0000	0.00
P-31	J-15	G-700	24.80	200.00	110.0000	0.00
P-32	J-17	J-9	84.95	250.00	110.0000	0.00
P-33	J-17	C-300	23.33	200.00	110.0000	0.00
P-34	J-17	F-600	16.55	200.00	110.0000	0.00
P-35	VP-3	J-7	174.28	300.00	110.0000	0.00

P U M P/L O S S E L E M E N T D A T A

THERE IS A DEVICE AT NODE VP-1 DESCRIBED BY THE FOLLOWING DATA: (ID= 1)

HEAD (m)	FLOWRATE (l/s)	EFFICIENCY (%)
63.32	0.00	75.00 (Default)
52.72	122.00	75.00 (Default)
31.61	220.00	75.00 (Default)
14.07	285.00	75.00 (Default)

THERE IS A DEVICE AT NODE VP-2 DESCRIBED BY THE FOLLOWING DATA: (ID= 2)

HEAD (m)	FLOWRATE (l/s)	EFFICIENCY (%)
56.29	0.00	75.00 (Default)
52.00	109.00	75.00 (Default)
31.61	269.00	75.00 (Default)

14.07	359.00	75.00 (Default)

THERE IS A DEVICE AT NODE VP-3 DESCRIBED BY THE FOLLOWING DATA: (ID= 3)

HEAD (m)	FLOWRATE (l/s)	EFFICIENCY (%)
56.29	0.00	75.00 (Default)
52.00	109.00	75.00 (Default)
31.61	269.00	75.00 (Default)
14.07	359.00	75.00 (Default)

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (l/s)	JUNCTION ELEVATION (m)	EXTERNAL GRADE (m)
Beechlawn		1.53	84.40	
CTC		0.46	85.90	
Marshcourt		1.77	83.30	
Metropia		2.83	84.40	
1899-Brock		17.05	86.40	
A-100		7.24	89.50	
B-200		11.54	88.90	
C-300		4.75	85.80	
D-400		10.80	87.50	
E-500		6.54	86.50	
F-600		9.28	85.80	
G-700		6.94	86.20	
Gas-Bar		0.03	88.80	
J-1		0.00	86.30	
J-2		0.00	84.10	
J-3		0.00	83.40	
J-4		0.00	83.30	
J-5		0.00	87.00	
J-6		0.00	89.20	
J-7		0.00	88.50	
J-8		0.00	85.50	
J-9		0.00	86.00	
J-10		0.00	85.90	
J-11		0.00	86.00	
J-12		0.00	88.70	
J-13		0.00	86.20	
J-14		0.00	89.00	
J-15		0.00	85.80	
J-16		0.00	88.50	
J-17		0.00	85.70	
J-18		0.00	87.10	
VP-1		----	83.40	83.40
VP-2		----	88.50	88.50
VP-3		----	88.50	88.50

SYSTEM ANALYSIS AND RESULTS

SIMULATION RESULTS: Fully connected

Table 7- Average Day

Table 8- Maximum Day

Table 9- Peak Hour

Table 10- Maximum Day + Fire Flow

Table 7 – Average Day: At Select Nodes

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND lps	HYDRAULIC GRADE m	NODE ELEVATION m	PRESSURE HEAD m	NODE PRESSURE kPa
Beechlawn		1.53	144.71	84.40	60.31	591.41
CTC		0.46	144.62	85.90	58.72	575.89
Marshcourt		1.77	144.79	83.30	61.49	603.04
Metropia		2.83	144.71	84.40	60.31	591.39
1899-Brock		17.05	144.62	86.40	58.22	570.91
A-100		7.24	144.57	89.50	55.07	540.04
B-200		11.54	144.54	88.90	55.64	545.65
C-300		4.75	144.59	85.80	58.79	576.57
D-400		10.80	144.55	87.50	57.05	559.43
E-500		6.54	144.57	86.50	58.07	569.52
F-600		9.28	144.59	85.80	58.79	576.49
G-700		6.94	144.62	86.20	58.42	572.94
Gas-Bar		0.03	144.66	88.80	55.86	547.75
J-1		0.00	144.62	86.30	58.32	571.97
J-2		0.00	144.71	84.10	60.61	594.36
J-3		0.00	144.86	83.40	61.46	602.67
J-4		0.00	144.79	83.30	61.49	603.06
J-5		0.00	144.79	87.00	57.79	566.72
J-6		0.00	144.58	89.20	55.38	543.07
J-7		0.00	144.60	88.50	56.10	550.12
J-8		0.00	144.63	85.50	59.13	579.82
J-9		0.00	144.60	86.00	58.60	574.64
J-10		0.00	144.62	85.90	58.72	575.90
J-11		0.00	144.60	86.00	58.60	574.64
J-12		0.00	144.66	88.70	55.96	548.74
J-13		0.00	144.58	86.20	58.38	572.56
J-14		0.00	144.58	89.00	55.58	545.06
J-15		0.00	144.63	85.80	58.83	576.97
J-16		0.00	144.57	88.50	56.07	549.86
J-17		0.00	144.60	85.70	58.90	577.60
J-18		0.00	144.57	87.10	57.47	563.59
VP-1		----	144.93	83.40	61.53	603.37
VP-2		----	144.68	88.50	56.18	550.95
VP-3		----	144.66	88.50	56.16	550.73

Table 8 – Maximum Day: At Select Nodes

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND lps	HYDRAULIC GRADE m	NODE ELEVATION m	PRESSURE HEAD m	NODE PRESSURE kPa
Beechlawn		2.91(1.90)	143.64	84.40	59.24	580.90
CTC		0.87(1.90)	143.57	85.90	57.67	565.59
Marshcourt		3.36(1.90)	143.75	83.30	60.45	592.84
Metropia		5.38(1.90)	143.63	84.40	59.23	580.84
1899-Brock		32.40(1.90)	143.58	86.40	57.18	560.72
A-100		13.76(1.90)	143.39	89.50	53.89	528.45
B-200		21.93(1.90)	143.29	88.90	54.39	533.38
C-300		9.02(1.90)	143.46	85.80	57.66	565.42
D-400		20.52(1.90)	143.30	87.50	55.80	547.23
E-500		12.43(1.90)	143.38	86.50	56.88	557.83
F-600		17.63(1.90)	143.43	85.80	57.63	565.18
G-700		13.19(1.90)	143.45	86.20	57.25	561.47
Gas-Bar		0.06(1.90)	143.82	88.80	55.02	539.52
J-1		0.00	143.60	86.30	57.30	561.96
J-2		0.00	143.64	84.10	59.54	583.88
J-3		0.00	143.85	83.40	60.45	592.77
J-4		0.00	143.76	83.30	60.46	592.87
J-5		0.00	143.74	87.00	56.74	556.41
J-6		0.00	143.42	89.20	54.22	531.68
J-7		0.00	143.49	88.50	54.99	539.24
J-8		0.00	143.56	85.50	58.06	569.34
J-9		0.00	143.47	86.00	57.47	563.60
J-10		0.00	143.57	85.90	57.67	565.60
J-11		0.00	143.45	86.00	57.45	563.40
J-12		0.00	143.82	88.70	55.12	540.50
J-13		0.00	143.42	86.20	57.22	561.09
J-14		0.00	143.43	89.00	54.43	533.74
J-15		0.00	143.49	85.80	57.69	565.75
J-16		0.00	143.38	88.50	54.88	538.23
J-17		0.00	143.47	85.70	57.77	566.57
J-18		0.00	143.38	87.10	56.28	551.93
VP-1		----	143.95	83.40	60.55	593.84
VP-2		----	144.00	88.50	55.50	544.23
VP-3		----	143.89	88.50	55.39	543.19

Table 9 – Peak Hour: At Select Nodes

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND lps	HYDRAULIC GRADE m	NODE ELEVATION m	PRESSURE HEAD m	NODE PRESSURE kPa
Beechlawn		4.36(2.85)	141.72	84.40	57.32	562.10
CTC		1.31(2.85)	141.69	85.90	55.79	547.07
Marshcourt		5.04(2.85)	141.89	83.30	58.59	574.60
Metropia		8.07(2.85)	141.70	84.40	57.30	561.97
1899-Brock		48.59(2.85)	141.73	86.40	55.33	542.61
A-100		20.63(2.85)	141.28	89.50	51.78	507.82
B-200		32.89(2.85)	141.07	88.90	52.17	511.60
C-300		13.54(2.85)	141.42	85.80	55.62	545.41
D-400		30.78(2.85)	141.09	87.50	53.59	525.55
E-500		18.64(2.85)	141.25	86.50	54.75	536.92
F-600		26.45(2.85)	141.36	85.80	55.56	544.89
G-700		19.78(2.85)	141.37	86.20	55.17	540.99
Gas-Bar		0.09(2.85)	142.31	88.80	53.51	524.74
J-1		0.00	141.78	86.30	55.48	544.12
J-2		0.00	141.72	84.10	57.62	565.11
J-3		0.00	142.04	83.40	58.64	575.07
J-4		0.00	141.90	83.30	58.60	574.68
J-5		0.00	141.86	87.00	54.86	538.00
J-6		0.00	141.34	89.20	52.14	511.36
J-7		0.00	141.50	88.50	53.00	519.80
J-8		0.00	141.62	85.50	56.12	550.37
J-9		0.00	141.45	86.00	55.45	543.75
J-10		0.00	141.69	85.90	55.79	547.08
J-11		0.00	141.39	86.00	55.39	543.18
J-12		0.00	142.31	88.70	53.61	525.72
J-13		0.00	141.32	86.20	55.12	540.55
J-14		0.00	141.37	89.00	52.37	513.54
J-15		0.00	141.44	85.80	55.64	545.68
J-16		0.00	141.27	88.50	52.77	517.49
J-17		0.00	141.45	85.70	55.75	546.74
J-18		0.00	141.26	87.10	54.16	531.11
VP-1		----	142.22	83.40	58.82	576.81
VP-2		----	142.75	88.50	54.25	532.04
VP-3		----	142.49	88.50	53.99	529.48

Table 10 – Maximum Day + Fire: At Hydrants

```
================================================================================

          Fireflow/Hydrant Report:
         _________________________

Scenario: No Title
Global Demand Factor for this Scenario: 1.900

Specified Minimum Pressure(kPa):  140.0
Minimum Static Pressure(kPa)   :  140.0

 Flow-1: Flowrate to maintain the specified
         pressure at (hydrant) node
 Node-2: Node that has a lower pressure than
         specified value at Flow-1
 Flow-2: Flowrate to maintain the specified
         pressure at Node-2

 Hose Constant =    0.00
```

Hydrant Node	Hydrant Constant	Elevation	Static Pressure	Flow-1 lps	Flow-2 lps	Node-2 lps	Flow Capacity	NFPA Color
H-11	0.0	88.7	541.0	548.9			548.9	ORANGE
H-10	0.0	86.1	563.8	555.8			555.8	ORANGE
H-4	0.0	83.8	587.2	543.7			543.7	ORANGE
H-3	0.0	83.5	590.7	558.5			558.5	ORANGE
H-2	0.0	83.3	593.3	587.2			587.2	ORANGE
H-7	0.0	85.3	571.4	574.7			574.7	ORANGE
H-6	0.0	84.8	576.6	550.6			550.6	ORANGE
H-5	0.0	84.4	580.8	541.0			541.0	ORANGE
H-9	0.0	85.9	565.6	569.5			569.5	ORANGE
H-8	0.0	85.6	568.4	593.2			593.2	ORANGE
H-12	0.0	86.4	561.5	550.3			550.3	ORANGE
H-1	0.0	87.0	556.5	534.0			534.0	ORANGE
H-19	0.0	86.1	562.6	578.4			578.4	ORANGE
H-14	0.0	88.9	534.9	537.7	533.4	A-100	533.4	ORANGE
H-17	0.0	86.2	561.2	545.4			545.4	ORANGE
H-20	0.0	86.0	563.4	562.9			562.9	ORANGE
H-21	0.0	85.9	564.6	536.7			536.7	ORANGE
H-15	0.0	88.5	538.2	501.1			501.1	ORANGE
H-16	0.0	87.1	552.0	502.7			502.7	ORANGE
H-18	0.0	85.8	566.0	521.5			521.5	ORANGE
H-13	0.0	85.7	566.6	561.8			561.8	ORANGE

At development blocks:

```
================================================================================
FireFlow/Hydrant Report
          Fireflow/Hydrant Report:
         ____________________________

Scenario: No Title
Global Demand Factor for this Scenario: 1.900

Specified Minimum Pressure(kPa):  140.0
Minimum Static Pressure(kPa)   :  140.0

 Flow-1: Flowrate to maintain the specified
         pressure at (hydrant) node
 Node-2: Node that has a lower pressure than
         specified value at Flow-1
 Flow-2: Flowrate to maintain the specified
         pressure at Node-2

 Hose Constant =    0.00

   Hydrant    Hydrant  Elevation  Demand    Static       Flow-1    Flow-2    Node-2    Flow
NFPA
    Node     Constant             lps      Pressure      lps       lps      lps     Capacity
Color

_____________________________________________________________________________________________
____
     A-100       0.0      89.5      13.8     528.4       374.4
     B-200       0.0      88.9      21.9     533.4       370.3
     C-300       0.0      85.8       9.0     565.4       401.3
     D-400       0.0      87.5      20.5     547.2       377.0
     E-500       0.0      86.5      12.4     557.8       383.2
     F-600       0.0      85.8      17.6     565.2       440.9
     G-700       0.0      86.2      13.2     561.5       381.0
```

The following table 11 provides a summary of the flows:

Table 11 – Summary of required flows and available flows at Select Nodes.

NODE	Description of development	Total Flow Assumed required (L/sec) (Fire + max day)	Available Flow from KYPIPE (L/sec) (Fire + max day)
A-100	BLOCK 1	203.8	374
B-200	BLOCK 2	211.9	370
C-300	BLOCK 3	199.0	401
D-400	BLOCK 4	210.5	377
E-500	BLOCK 5	202.4	383
F-600	BLOCK 6	207.6	440
G-700	BLOCK 7	203.2	381

Note, fire flows to building blocks are based on a 200mm service pipe to the building. A bigger pipe would allow larger flows.

DISCUSSION OF RESULTS:

- The pipe sizes shown are required for the fire flows and to ensure velocities are below 5.0 m/sec for fire flows.
- First Pickering Place will require new mains and hydrants. Some will be relocated to suit the development.
- Pressures for normal operation (average, maximum and peak day) have been achieved in the fully connected scenario.
- The pipe sizes chosen are adequate.
- Where pressures are greater than 80 psi (550 kPa) buildings will require pressure reducing valves prior to meter connection. Hydrant tests prior to permit stage will confirm this.
- Looping to Notion Road or Brock Road is required to provide redundancy to the development since many buildings are taller than 84 m. The OBC requires a second connection to a public system when buildings are greater than 84 m.

DESIGN CRITERIA: The following data was used in the design of the system:

1.0 ***Transient Pressures***

The proposed water main will be designed to withstand pressures up to 1034 kPa (150 psi) which is sufficient to withstand the maximum operating pressure of 150 psi, plus any transient pressure it may be subjected to.

The pipes and joints have also been designed to withstand the maximum operating pressure plus the surge pressure that would be created by stopping a water column moving at 0.6 m/s.

The transient pressure surge in a PVC Class 150 DR 18 pipe is 0.6m/s water column is 35 psi.

2.0 ***Pipe Strength***

The proposed water main pipe material is PVC Class 150 DR18 conforming to CSA B137.3 and AWWA C900.

Loading calculations for pipe strength are based on the internal pressures of the system. The pipe stiffness values for the specified pipe class are relatively high; therefore, deflection from static and/or live loads is not a critical design factor.

For water main pipe material consisting of PVC Class 150 DR18 conforming to CSA B137.3 and AWWA C900, the maximum internal pressure is 150 psi with a long-term FS of 2.5 and 4 for short term surge pressures.

*3.0 **Fire Hydrants***

All hydrants shall be 3-way hydrants and shall be spaced as detailed on the engineering drawings. All hydrants shall

- Be in accordance with the approved water main materials list
- Be dry-barrel type in accordance with AWWA C502: Dry-Barrel Fire Hydrants
- Be 3-way, two nozzles which are 180˚ to each other and parallel to the street and a 100mm pumper “STORZ” connection facing the street
- Open as per Region Standard.
- Have a 25mm top operating nut size
- Be painted as per Region Standard
- Be controlled by a secondary valve close-coupled to the hydrant
- Have a hydrant lead of 150mm from the water main to the hydrant
- Be installed plumb and in accordance with the Region Standard drawing which provides adequate thrust blocking to prevent movement caused by thrust forces.

The water table is not expected to rise above the hydrant drain ports.

*4.0 **Valves***

The water main will be designed such that there are a minimum of 3 gate valves at each T-intersection and 4 at cross intersections.

All gate valves shall be in accordance with the Regions approved water main materials list which conforms to AWWA standards.

*5.0. **Air Release and Vacuum Release Valves***

Not applicable

*6.0 **Valve, Meter and Blow-off Chambers***

Not applicable

*7.0 **Separation Distances from Contamination Sources***

The water main has been located such that there is a minimum of 2.5m horizontal separation from the nearest sewer. Crossing of sewers as per MOE criteria.

*8.0 **Restraints***

Mechanical joint restraints are to be installed on bell and spigot joints for all water mains constructed in fill material and at all tees, horizontal bends, vertical bends, hydrants, end of mains and valves. Concrete thrust blocks are not permitted unless expressly approved by the Region. All mechanical restraint systems shall be installed with cathodic protection.

*9.0 **Additional Design Considerations***

The water mains within the proposed site shall be installed in accordance with the current Region specifications and requirements.

If there is a crossing of the water main and a sewer, the water main shall cross above the sewer with sufficient vertical separation to allow for proper bedding and structural support of the water main, (0.5m minimum).

In cases where there is a conflict with the elevation of the sewer and the water main such that the water main cannot cross above the sewer, the water main has been designed to cross below the sewer subject to the following conditions.

a) There shall be a minimum vertical separation of 0.5m between the bottom of the sewer pipe and the top of the water main,
b) The water main shall be lowered below the sewer using vertical thrust blocks and restraining joints,
c) The length of the water main pipe shall be centered at the point of crossing so that the joints are equidistant and as far as possible from the sewer, and
d) The sewer shall be adequately supported to prevent joint deflection and settling.

DEVELOPMENT PHASING:

The Site will be developed in phases. Refer to Appendix A. The above analysis assumes a completed development of the First Pickering Place. The waterman around the Mall is looped and will remain that way.

The Developer has indicated that the new development will proceed with Block 1 first. The following is the watermain staging.

Phase	Block	Install
Phase 1	Block 1	New 300mm to Brock Road feeder line and new 300 mm redundant line from Pickering Parkway rear of existing plaza for Phase 1 with valve on Pickering Parkway main line. Refer to Figure S-1b for details
Phase 2	Block 2	New 300mm to Pickering Parkway and new 300 mm redundant line from Pickering Parkway with valve on Pickering Parkway main line. Refer to Figure S-1b for details
Phase 3 to 7	Block 3 to 7	As per final layout. 300mm to Pickering Parkway looped and redundant new 300mm line from Notion Road. Refer to Figure S-1a for details.

Refer to Figure S-1b in Appendix E for the proposed water service system for Phase 1 and 2. Refer to Figure S-1a in Appendix E for the proposed water service system for Phase 3 to 7. Based on the recent KYPIPE model results, the system can deliver the above noted service.

5. STORMWATER MANAGEMENT & FOUNDATION WATERPROOFING

Design Criteria

Stormwater management for the proposed development will follow the stormwater management criteria set out by the City of Pickering, Toronto and Region Conservation Authority and the Ontario Ministry of the Environment, Conservation and Parks.

A summary of the stormwater management criteria applicable to the site are as follows:

Quantity Control:

The City of Pickering requires quantity control of Blocks 1 to 7 to a post development allowable flow based on a 5 year Design Storm to a runoff coefficient of C=0.50 during this event. All storms up to and including the 100 Year Design storm must be controlled to this criterion.

Quality Control:

Quality control measures are to be designed to provide Enhanced Protection - long term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis from all runoff leaving the proposed development site based on the post-development level of imperviousness.

This can be achieved via filtration many methods and Low Impact Development Techniques (LID). To ensure that 80% TSS removal is achieved the use of a Jellyfish Filtration Oil Grit Separator (JFOGS) or similar approved equivalent would accomplish this.

Water Balance:

Retention of the runoff from up to a 5mm storm event on site for reuse, evaporation or infiltration.

- Rain Harvesting
- Green Roofs
- Downspout Disconnection
- Soakaway Pits, Infiltration Trenches (Galleries) and Chambers
- Bioretention Facilities
- Vegetated Filter Strips
- Permeable Pavers
- Enhanced Grass Swales
- Dry Swales
- Perforated Pipe Systems

These techniques help to promote water quality and quantity and water reuse as it relates to stormwater management techniques. At the Stie Plan development stage these techniques will be reviewed in detailed to determine the ideal strategy for each development Block.

Existing Storm Servicing and Drainage Patterns

As-constructed and design plans and profiles drawings obtained from the Region of Durham and the City of Pickering show that the following storm sewers are located within and around the site.

Refer to Exhibit 9 for the existing storm sewer system in and around the Site.

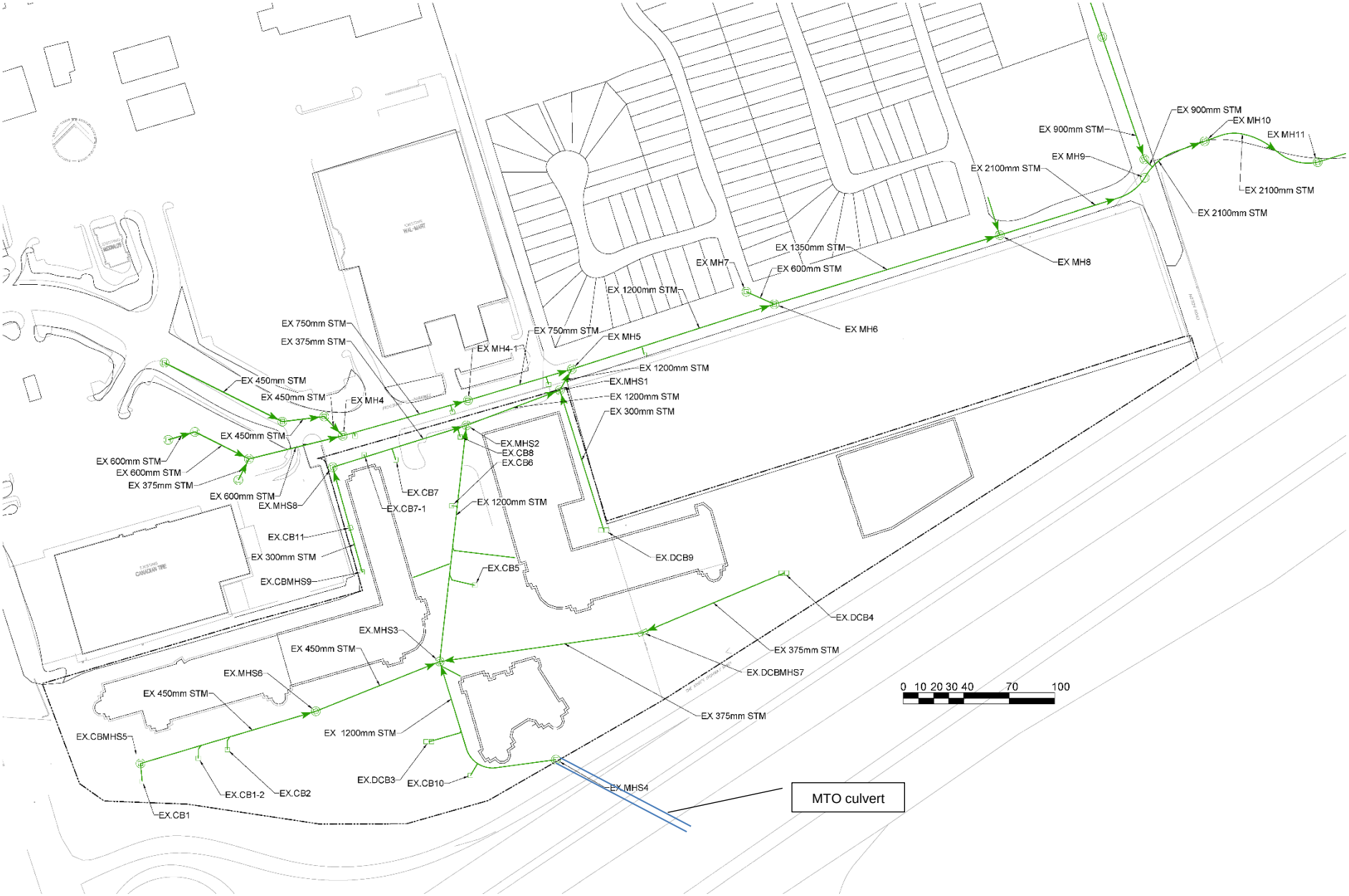


Exhibit 9 - City layout of existing Storm sewers and Site sewers

Exhibit 10 - City layout of existing Storm sewers and Site sewers

The subject site is located within the Duffin's Creek watershed. Refer to Exhibits 9 and 10 for the existing storm drainage infrastructure for the subject site and surrounding area. Note Exhibit 10 is from the AECOM Class EA environmental report for the Notion Road overpass of Hwy 401.

The drainage from the subject site can be summarized as follow:

1. MTO box culvert discharges flow from Hwy # 401 to a short ditch on the south side of the subject site. The flow is captured by an inlet structure attached to an existing 1200mmø storm sewer system which is routed north to Pickering Parkway where it discharges to a 1200mmø existing storm on Pickering Parkway. The pipe continues east on Pickering parkway, changes pipe sizes as shown on Exhibit 10, crosses Notion Road, continues east and discharges via a head wall to a drainage channel which empties into Duffin's Creek.

2. The subject site drains via a series of catch basins and sewers which connect to the 1200mmø storm from the 401 to Pickering Parkway as described in 1 above. Ultimately discharging to the same location.

3. The overland flow from the site is conveyed via 2 locations, from the south through the lands onto the Pickering Parkway and ultimately conveyed via Pipes and existing channel, east of the Notion Road, to the Duffin's Creek and via overflow to the east within the MTO drainage ditch.

4. Currently, there is no stormwater quantity, quality control measures implemented within the existing site.

A pre-development tributary plan has been prepared based on a drainage pattern analysis of the site's digital terrain model created from existing topographic survey and information obtained from the Region, City and MTO records. The pre-development storm tributary plan is included in Appendix E.

5.1 PREDEVELOPMENT ALLOWABLE FLOW ASSESSMENT

Pre-development/Allowable Flow Rates

The post-development flows from the site will be limited to the 5-year design storm event at an allowable rate based on a runoff coefficient of C=0.50 up to the 100-year design storm event. Please note that the actual runoff coefficient for the existing site condition is much higher than C=0.5. The flows were calculated using both rational method. The City of Pickering's Intensity Duration Frequency (IDF) curve values were used for rational method calculation.

The allowable flows for the site are presented in Table 13.

Table 12 – Summary Table of Allowable Flows

Block #	Area	$Q_{5yr\ Pre}$
Block 1	0.936	0.110
Block 2	1.288	0.151
Block 3	0.473	0.056
Block 4	0.893	0.105
Block 5	0.984	0.116
Block 6	0.819	0.096
Block 7	1.416	0.167

The Parkland and City Right of Ways are not included in the above as they will remain uncontrolled and have been included within the storm sewer design sheets.

The post-development flows from the site will be limited to the pre-development flows for the 5-year design storm event. The pre-development flows were calculated based on pre-development tributary areas with runoff coefficient of 0.5. Please note that the actual runoff coefficient for the existing site condition is much higher than 0.5. The flows were calculated using the rational method. The City of Pickering's Intensity Duration Frequency (IDF) curve values were used for rational method calculation.

5.2 POST DEVELPOMENT

1. The SWM for the redeveloped First Pickering Place will establish/analyse the following:
2. Flows to the Pickering Parkway storm sewer based on the criteria established above.
3. Establish SWM criteria for the redeveloped First Pickering Place in order to limit the flows.
4. Evaluate the flows entering the down-stream sewer system.
5. Evaluate the water quality requirements.
6. Evaluate the water balance for the Site.
7. Make recommendations as to the implementation of the SWM.
8. Evaluate the staging of construction.

City of Pickering Storm water management criteria for this development has been outlined as follows:

Stormwater Management Criteria that must be included in the FSSR are as follows:

- Control of post-development peak flow rates from the 100 year design storm to 5 Year Design Storm Event at a runoff coefficient equal to C=0.50 for development Blocks.
- A maximum runoff coefficient of 0.5 should be used to represent pre-development conditions for Blocks 1 to 7.
- Follow Stormwater Management Design Guidelines, prepared by City of Pickering. Runoff Conveyance will be as follows, the minor system is to be designed to accommodate the 5-year storm, while the major overland system is to be designed for the 100-year storm event. Where there is no suitable overland flow route, the minor system must convey the 100-year storm after on site attenuation.

The following Table establishes the allowable flows from each of the proposed Blocks based on a runoff coefficient of C=0.50 for the 5 year design storm event and provides for the required storage volumes of each block. In order to establish required storage volumes a conservative approach was taken at this stage using a runoff coefficient of C=0.90 for post development.

In general a C=0.85 is used for apartment type developments. It is therefore likely that the runoff coefficient will be reduced further from C=0.90 through implementation of various Low Impact Design Techniques and Water Reuse at the time of Detailed Design.

Table 13 – Summary Table of SWMM Quantity Pre Development Allowable Flows and Storage

Block #	Area	$Q_{5yr\ Pre}$	Volume $Q_{100\ Post}$
Block 1	0.936	0.110	216
Block 2	1.288	0.151	298
Block 3	0.473	0.056	109
Block 4	0.893	0.105	207
Block 5	0.984	0.116	227
Block 6	0.819	0.096	190
Block 7	1.416	0.167	327

Refer to Appendix D for detailed calculations related to storage volumes and orifice sizes based on the Rationale Method related to the above Table values.

The Tank Size and related storage techniques including locations will be finalized for each development at the detailed design stage during Site Plan approval based on the finalized build form.

SUMMMARY OF SWM Quantity Control Features:

Refer to table 16 for the SWM used for quantity control on the redeveloped Site.

Table 14 – Summary Table of SWMM Quantity Features for Redeveloped Site

BLOCK OR DESCRIPTION AND FLOW AREA TO TANK (ha)	SWMM FEATURE DESCRIPTION & FOOTPRINT (m2)	VOLUME REQUIRED 100-year flow (m3) max of 4 hr Chicago or AES	ORIFICE CONTROL C=0.80	ORIFICE max head (m)	Maximum 100-year flow (L/sec)
BLOCK 1 (0.936 ha)	1-Storage Tank (225)	* TANK 1 – 325	175 mm	1.52	105
BLOCK 2 (1.288 ha)	1-Storage Tank (270)	*TANK 1 – 447	200 mm	1.67	144
BLOCK 3 (0.473 ha)	1-Storage Tank (110)	*TANK 1 – 163	125 mm	1.59	54
BLOCK 4 (0.893 ha)	1-Storage Tank (210)	*TANK 1 – 310	175 mm	1.49	104
BLOCK 5 (0.984 ha)	1-Storage Tank (230)	*TANK 1 – 341	175 mm	1.48	104
BLOCK 6 (0.819 ha)	1-Storage Tank (240)	*TANK 1 – 285	175 mm	1.19	93
BLOCK 7 (1.416 ha)	1-Storage Tank (440)	*TANK 1 – 510	250 mm	1.13	149

All Maximum Volumes created by 4-hour Chicago storm.

Max volumes calculated using the modified rational method and City of Pickering IDF parameters.

*Note – Tank Sizes have been provided with a safety factor of 1.5x and will be adjusted during the Site Plan approval stage based on detailed design. The safety factor has been applied to account for maximizing tank volumes should the system require pumping in order to minimize the footprint of the tank within the proposed building and underground parking.

Table 17 summarizes the allowable flows for each Block.

Table 15 – Target Release rates from development Blocks to Pickering Parkway sewer

Block #	**Area (ha)**	**Allowable Release Rate** (m^3/s) 5 year Storm	**Post-development Flows** (m^3/s) 100 Year Storm
Block 1	0.936	0.110	0.105
Block 2	1.288	0.151	0.144
Block 3	0.473	0.056	0.054
Block 4	0.893	0.105	0.104
Block 5	0.984	0.116	0.104
Block 6	0.819	0.096	0.093
Block 7	1.416	0.167	0.149
Total Site (Excluding Park & Private Roads)	6.809	0.801	0.753

Rational method uses C = 0.5 for 5 year event, Tc = 15 min (conservative)

As per City criteria for; 100-year storm - Ca = 1.25

FOUNDATION WATERPROOFING STRATEGY

Dewatering discharge during construction and long term will be as follows:

At the Pre-consultation for 1755 & 1805 Pickering Parkway the City of Pickering made the following statement:

Please note that the City will not accept discharge of foundation drainage to the storm system due to the potential for adverse impacts.

Please note that Region of Durham will not accept discharge of foundation drainage to the sanitary sewers. This statement is part of their sewer bylaw.

Based on the above we recommend the Architect, Structural Engineer, Geotechnical Engineer and Mechanical Engineer devise a waterproofing system with the shoring and foundation design.

Based on the above we have not incorporated any allowance for foundation drainage in the SWM for the site.

6. WATER QUALITY

Based on the type of developments proposed for Block 1 to 7 and the limitations within these developments it is anticipated that the use of a Jellyfish Filtration OGS will be necessary to achieve 80% TSS removal as there is limited opportunity to implement LID Techniques where the majority above grade features are located over an underground parking structure.

During the Site Plan approval stage and upon such time that the build form is finalized the use of LID techniques will be reviewed to determine if water quality can also be achieved via a train treatment approach in which a standard OGS unit without filtration would be provided with a TSS removal efficiency of 50% with the remaining 30% being achieved through train treatment using LID techniques if determined to be achievable.

As the exact type of development is not finalized a standard approach has been applied to all sites at this time to be conservative and use of Jellyfish Filtration system is currently proposed to achieve water quality.

Adjustment to the strategy and OGS Jellyfish sizing will be finalized during the Site Plan Approval development stage. The provided sizing of the proposed OGS Jellyfish Units is provided for reference only at this time to show that water quality can be achieved.

The use of a Jellyfish Filtration OGS and the use of a Train Treatment approach where achieved during detailed design. During the Site Plan approval stage the above assumptions will be adjusted and OGS unit sizes modified to meet the exact parameters of the final Site Plan properties.

7. WATER BALANCE

The City Pickering and TRCA will require that the first 5mm of any storm be captured and reused or returned to the environment. Water balance can be addressed by various methods including, infiltration by use of soak-away pit or permeable pavers, irrigation, vegetative cover and water reuse for toilet flushing of commercial uses. It is recommended that a separate cistern be installed for storm water reuse adjacent to the SWM tank with an overflow baffle to the SWM tank for when the site has reached its reuse potential.

LIDS:

- Imbrium Filterra Bioretention System
- Silva Cells
- Soak away pits
- Bio swales
- others

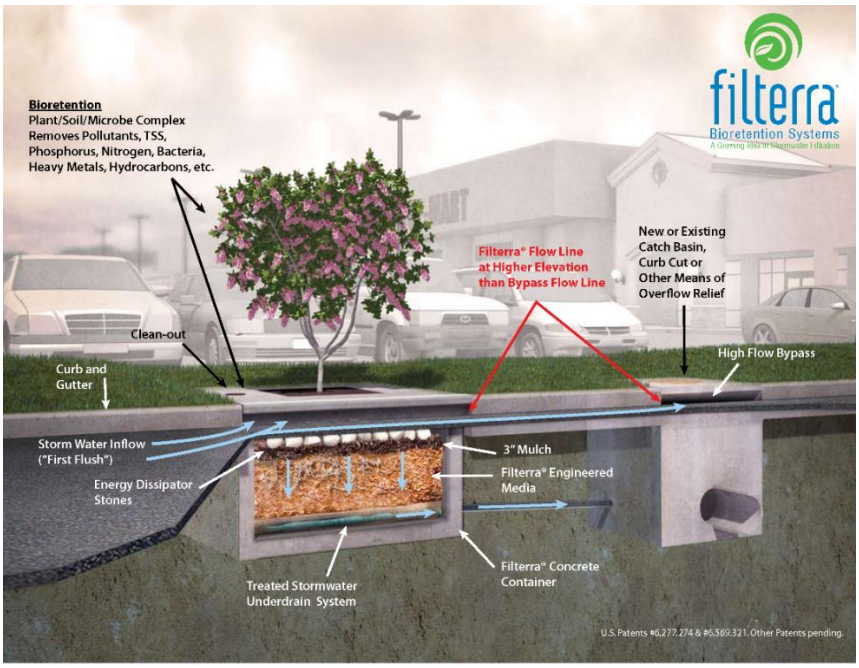
Infiltration gallery footprints are to be designed considering in-situ percolation rates.

A drain-down time of 48 hours should be applied to any infiltration gallery calculations.

Other Options:

1. Imbrium Filterra Bio retention System

This is an appropriate method for water quality treatment in a train treatment environment. Storm water runoff enters the Filterra system through a curb-inlet opening and flows through a specially designed filter media mixture contained in a landscaped modular container. The following photos show the installed Filterra unit and a section through the unit.



2. Silva Cells

The Silva Cell is a modular suspended pavement system that uses soil volumes to support large tree growth and provide powerful on-site storm water management through absorption, evapotranspiration, and interception. The system is typically installed under pavement applications and can be configured in several different ways:

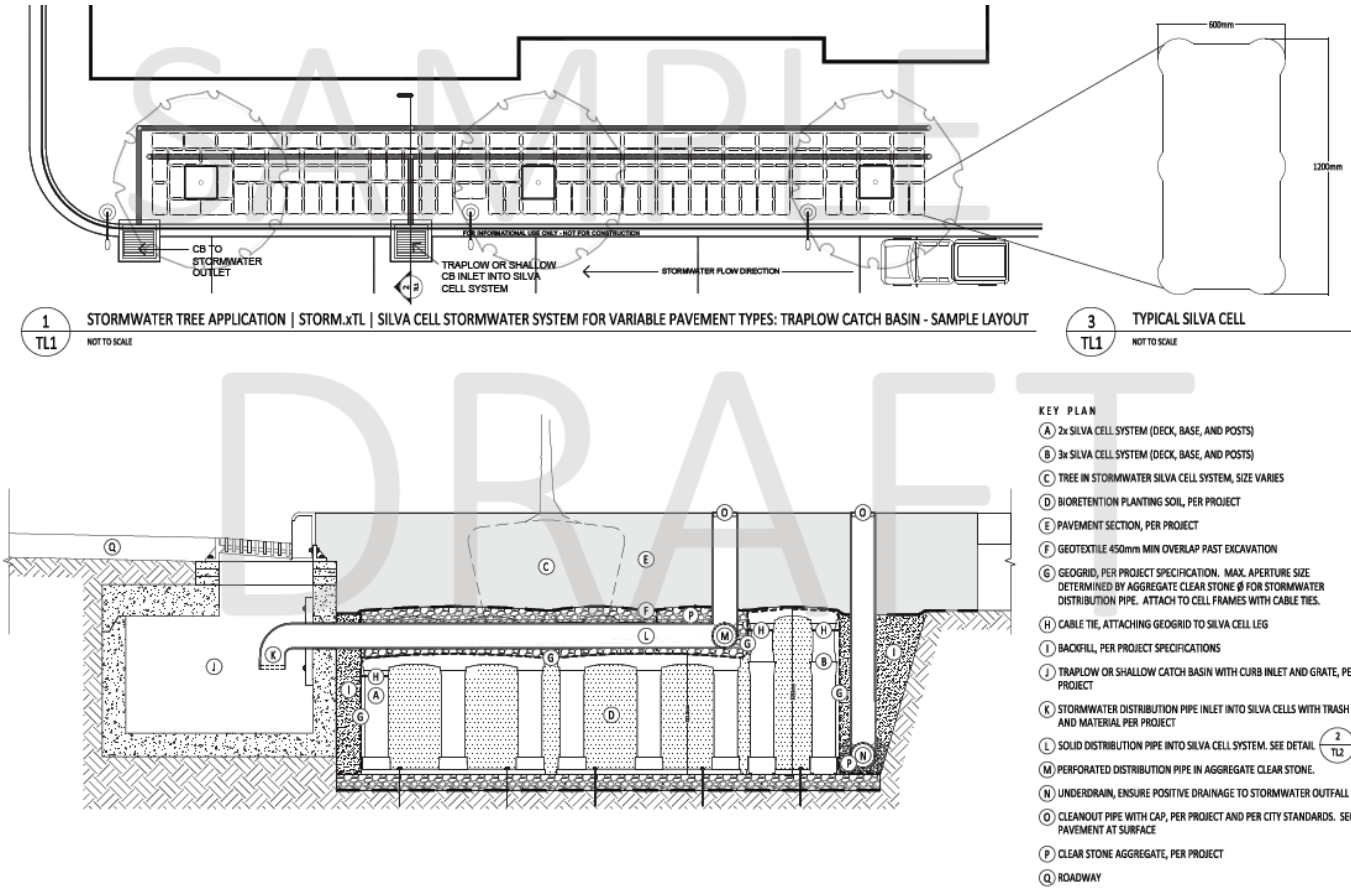
Streetscapes
Adjacent to or under sidewalks
Between buildings and streets.

Parking Areas
Under parking stalls adjacent
to medians or islands.

Public Spaces
Under plazas, promenades, courtyards, or other public spaces at office buildings, museums, schools, and transit centers

The Region of York is using Silva Cells on the widening and reconstruction of Yonge Street.

The following detail is a typical Silva Cell application.



3. Bio swales

We have reviewed the possibility of bio swales. The use of boulevard bio swales was dismissed due to lack of room. The opportunity to deploy bios swales in the blocks is a possibility but based on our past experience not practical. The Park area could have soak away pits rather than bio swales.

The individual quality control and water balance methods can be determined at the site plan stage.

Water Balance Targets

The primary objective of the Water Balance Targets/Criteria is to capture and manage annual rainfall on the development site itself to preserve the pre-development hydrology (or "water balance", which typically consists of three components: runoff, infiltration, and evapotranspiration) through a combination of infiltration, evapotranspiration, landscaping, rainwater reuse and/or other low impact development practices.

The City of Pickering Stormwater Management Design Guidelines' target for water balance is to provide runoff reduction from the site through infiltration, evapotranspiration and reuse of a minimum of 5mm of rainfall depth across all impervious surfaces.

The site area and 5mm rainfall depth will be used to calculate the water balance target. The water balance targets for each block are as follows.

Table 16 – Summary Table of Water Balance Targets 5mm Retention

BLOCK OR DESCRIPTION	AREA (m2)	Water Balance Volume (m3) Area x 5mm	Initial Abstraction Volume (m) Area x 1.5mm	Stormwater Re-use / Retention Required (m3)
BLOCK 1	9,360	46.8	-14.0	**32.8**
BLOCK 2	12,880	64.4	-19.3	**45.1**
BLOCK 3	4,730	23.7	-7.1	**16.6**
BLOCK 4	8,930	44.7	-13.4	**31.3**
BLOCK 5	9,840	49.2	-14.8	**34.4**
BLOCK 6	8,190	41.0	-12.3	**28.7**
BLOCK 7	14,160	70.8	-21.2	**49.6**

*Initial abstraction based on 1.5mm depth for Urban Residential

The above water balance requirements will be adjusted and reviewed at the Site Plan approval stage based on the finalized site plan and surface features.

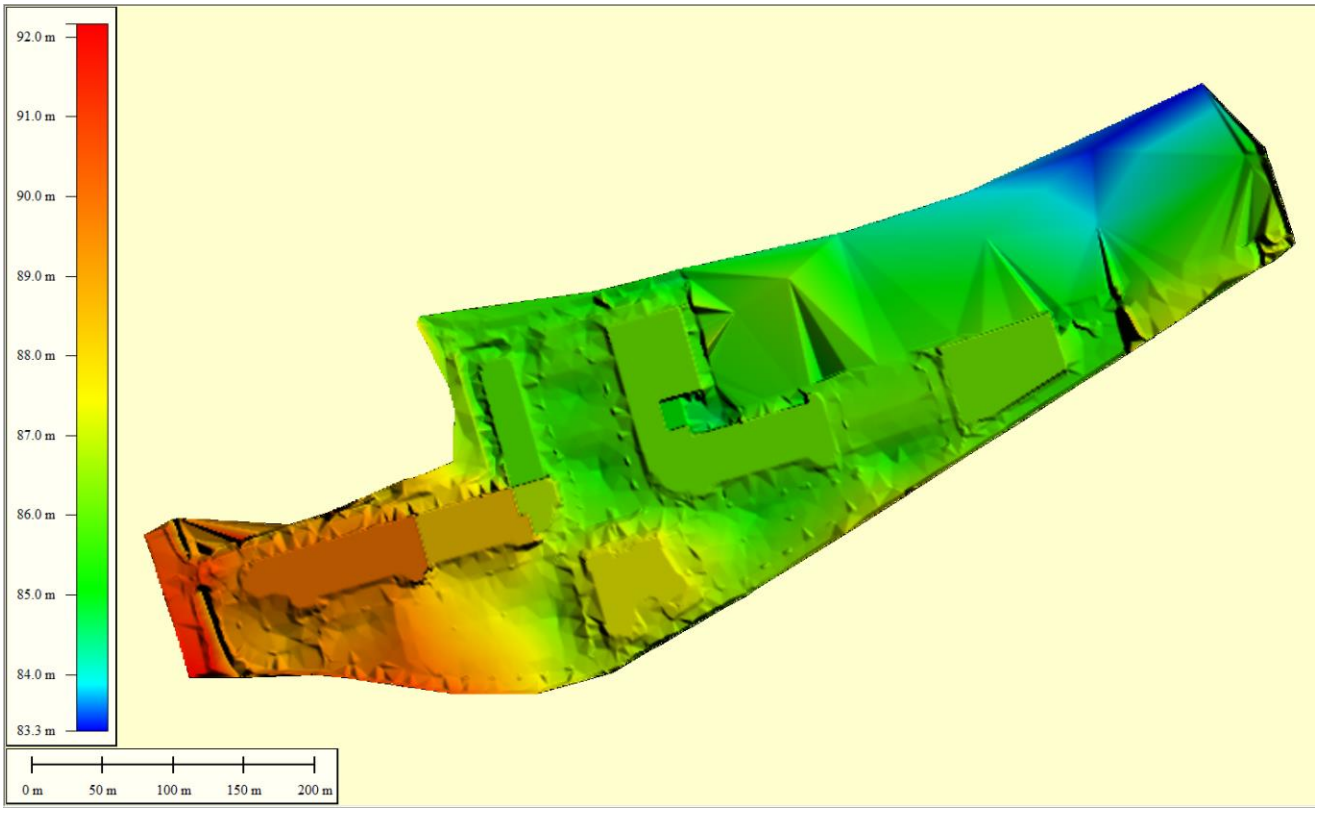
8. GRADING CONSIDERATIONS

The existing topography of the site generally slopes from west to northeast towards the low point of the site located on the east side of the Site. Under the new development and existing adjacent developments there will be several grading constraints for this development to match. The constraints are the existing commercial buildings, Metropia new residential, Pickering Parkway and Notion Road right of ways.

Refer to Exhibit 11 for the color-coded existing topography for the Site.

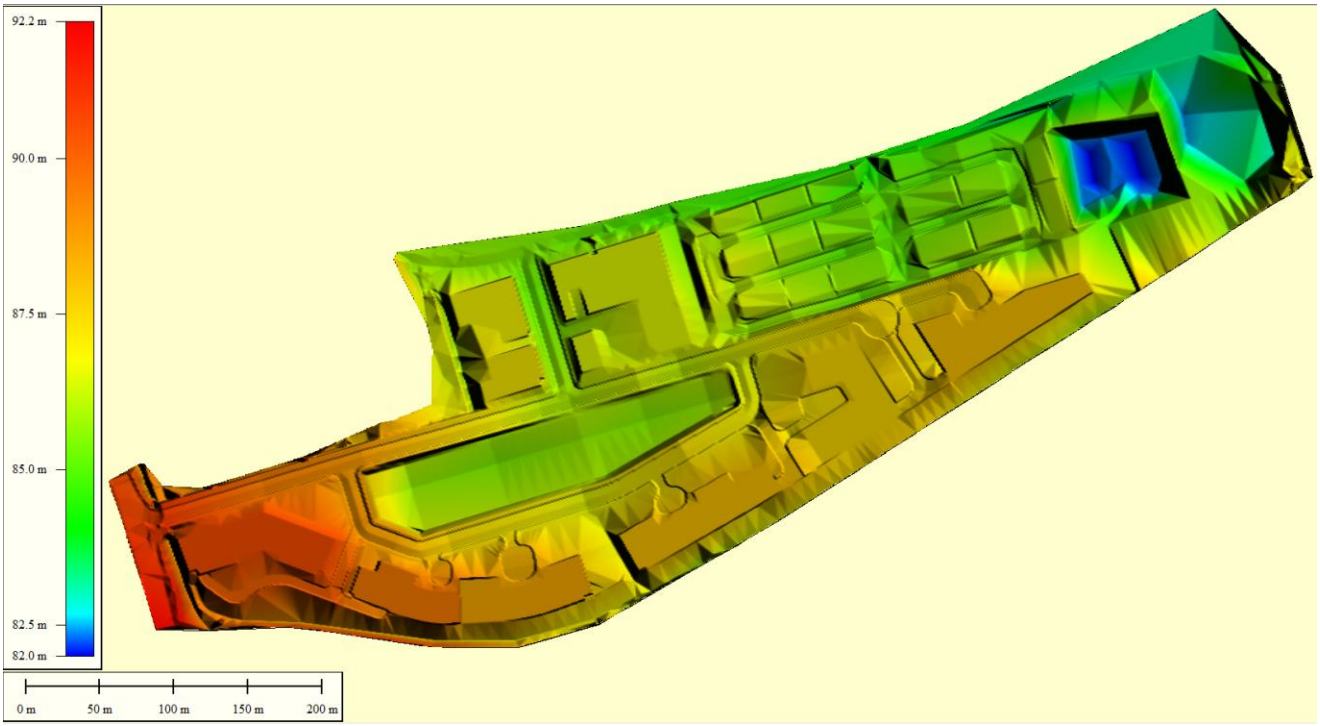
Refer to the concept grading plan in Appendix E for details of the proposed grades for the fully developed site. The proposed grading of the redeveloped site will follow the general lay of the land as shown in Exhibit 11.

Exhibit 11 – Colour coded existing Site topography



Refer to Exhibit 11 for the colour coded proposed Site topography.

Exhibit 12 – Colour coded Proposed Site topography



Refer to the Conceptual Grading Plan included in Appendix E for additional detail.

Grading for each parcel will be detailed at the Site Plan stage of development.

9. EROSION AND SEDIMENT CONTROL

Erosion and sediment controls for the site will be implemented according to the Golden Horseshoe Area Conservation Authorities' Erosion and Sediment Control Guidelines for Urban Construction. A detailed erosion control plan will be prepared upon final design and each Site Plan Stage.

10. SOILS REPORT AND HYDROGEOLOGY:

A preliminary Geotechnical investigation has been completed for the site. The purpose of the study is to characterize hydrogeological conditions and determine permitting requirements for the proposed development at the First Pickering Place. The study was completed by Terraprobe dated May 27, 2021 for Pickering Ridge Lands Inc. & Bayfield Realty Advisors.

Native clayey silt glacial till, underlying dense to very dense matrix of sandy silt to silty sand till is the typical soil underlying the site. The soils have some infiltration capacity. The water table underneath varies from 4 to 6 m below grade. Based on the grading it may be possible to provide infiltration galleries. The water table should be monitored further in order to get a wide range of potential water table levels. Monitoring will provide better confidence in the potential maximum ground water levels.

11. RECOMMENDATIONS:

1) We recommend that the owners of First Pickering Place build the sanitary sewer on Pickering Parkway from 1899 Brock Road site to Notion Road to accommodate the full build out of all future development sites and the existing flows. This section of sanitary sewer will be subject to development charges as discussed with the Region of Durham.

2) The sanitary pipe on Notion Road (from Pickering Parkway to Orchard Rd) will be sized to convey existing flows and flows from Phase 1 (First Pickering Place) to the existing Orchard Road sanitary sewer. The Region will allow this interim condition at limited capacity until such time that the Ultimate Trunk Sewer is constructed in the future to convey flows to the South SP. The interim pipe will be downsized from that on Pickering Parkway, the Region will allow this, since it is a temporary measure until the Region replaces it with a trunk sewer on Notion Road.

3) We recommend looping the watermain to Notion Road, Pickering Parkway and Brock Road to provide redundancy to the development since many buildings are taller than 84 m. The OBC requires a second connection to a public system when buildings are greater than 84 m.

12. CONCLUSIONS

The findings of our investigation and analysis can be concluded as follows:

The proposed site is serviceable with the added density with respect to sanitary, water and storm by connecting to the existing infrastructure surrounding the site as outlined in this report.

13. REFERENCES

1. City of Pickering (September 18, 2020**). Summary of Comments**, Pre-consultation for 1755 & 1805 Pickering Parkway. City of Pickering, Ontario.
2. City of Pickering (July 2019). **Stormwater Management Design Guidelines**. City of Pickering, Ontario.
3. TRCA (August 2012). **Stormwater Management Criteria**, Version 1.0. Toronto and Region Conservation Authority, Ontario.
4. GGHA CAs (December, 2006). **Erosion and Sediment Control Guideline for Urban Construction**, Greater Golden Horseshoe Area Conservation Authorities, Ontario.
5. Ontario Ministry of the Environment (March, 2003). **Stormwater Management Planning and Design** Manual. Ministry of the Environment, Ontario. ISBN 0-7794-2969-9.
6. Ontario Ministry of the Environment (2008). **Design Guidelines for Drinking-Water Systems**. Ministry of Environment, Ontario. ISBN 978-1-4249-8517-3.
7. Ontario Ministry of the Environment (2008). **Design Guidelines for Sewage Works**. Ministry of Environment, Ontario. ISBN 978-1-4249-8438-1.
8. Fire Underwriter Survey (1999). **Water Supply for Public Fire Protection**, Ontario.
9. **NEW JERSEY STORM WATER BEST MANAGEMENT PRACTICES MANUAL**, April 2004.
10. **MNR Technical Guide – River and Streams Systems: Flooding Hazard Limits**, 2002.
11. **FEMA Chapter 4 - Flood Risk Assessment**.
12. **ROAD AND BRIDGE DECK DRAINAGE SYSTEMS** by MTO, November 1982.
13. **XPSWMM users Guide** by INNOVYZE 2021.
14. **EPA SWMM 5**, Build 5.1.012, Manual.
15. **LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT MANUAL**, 2008, by Credit Valley Conservation Authority and Toronto Town Conservation Authority.
16. **Master Servicing and Stormwater Management Report**, for 1899 Brock Road, City of Pickering, May 2021 by SCHAEFFERS.
17. **Functional Servicing & Stormwater Management Report Residential Townhouse Development – 1856 Notion Road Durham Region – City of Pickering**, January 19, 2018, by GHD.
18. City of Pickering and Pickering Developments Inc. – **New Highway 401 Road Crossing (from Notion Road to Squires Beach Road) Schedule "C' Municipal Class Environmental Assessment**, October 2019, by AECOM.

Respectfully Submitted:
The Odan Detech Group Inc.

April 10 2024

Paul Hecimovic, P.Eng.

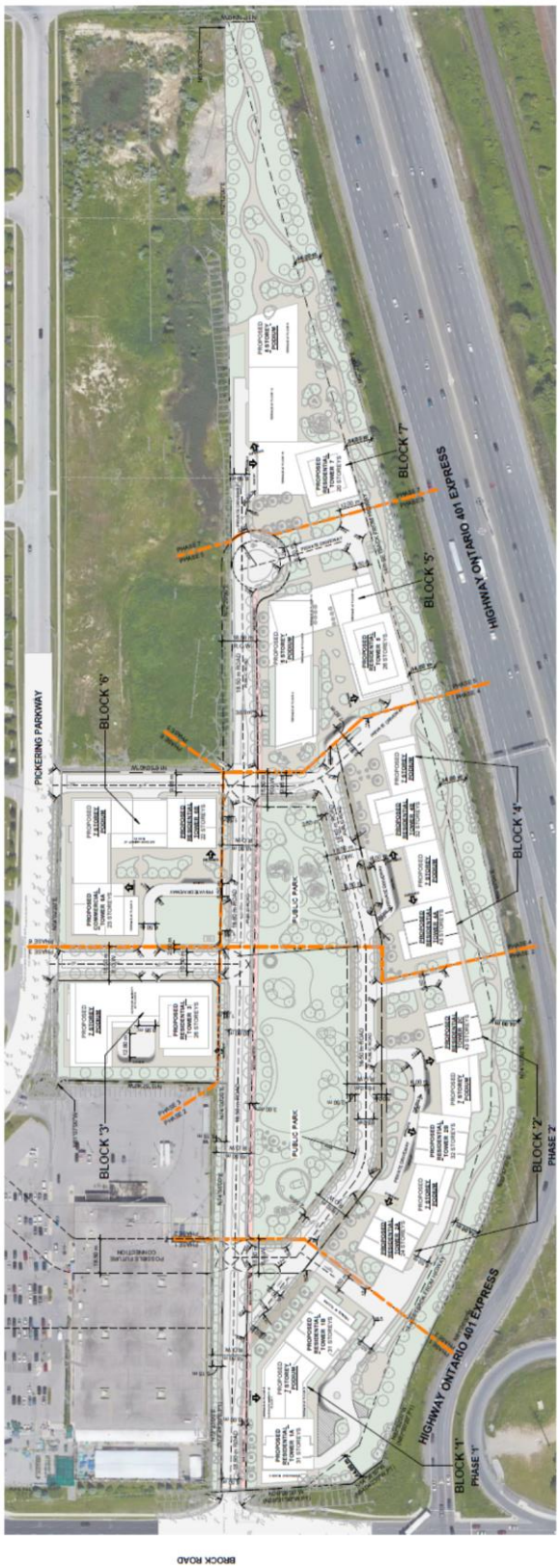
Mark Harris, Dipl. Tech.

APPENDIX A

Aerial Photo of Existing Site
Site Plan of the Proposed Development (reduced)

Aerial Photo of Existing Site

Site Plan of the Proposed Development (reduced)



APPENDIX B

Existing condition sanitary sewer design sheet

Redeveloped site Phase 1 sanitary sewer design sheet - REQUIRED SIZES

Redeveloped site Phase 1 sanitary sewer design sheet - PROPOSED SIZES

Redeveloped sites (subject, 1899 Brock Road and surrounding tributaries) sanitary sewer design sheet

Region of Durham Tributary Maps & Correspondence indicating population densities

SCENARIO 1: EXISTING CONDITIONS
1755 and 1805 Pickering Parkway Existing Conditions Sanitary Flow Calculation

DESIGNED BY: S. Ahonen
CHECKED BY: M. Al-Awad

DATE: 2022-01-14

FIGURE S-3

STREET	TRIB ID	UPSTREAM MH	DOWNSTREAM MH	RESIDENTIAL							COMMERCIAL				FLOW (L/s)				EXISTING SEWER					PRESENT CONDITION	NOTES
				LOT AREA		POP. DENSITY (Persons/ha)	POP. DENSITY (Persons/ Unit)	# OF UNITS	POP.	PEAK FLOW FACTOR, K_H	LOT AREA (Ha)	FLOOR SPACE INDEX	GROSS FLOOR AREA		RESIDENTIAL FLOW		COMM. 2.08 l/s	TOTAL FLOW l/s	Length	Size	Slope	Full Flow Capacity	Full Flow Velocity	% Full	
				UNIT (ha)	ACCUM. (ha)								GFA (ha)	ACCUM. (ha)	INFIL. 0.26 (L/s)	SEWAGE 0.0042 (L/s)			L (m)	D (mm)	S (%)	Qcap (L/s)	V (m/s)	Q(d)/Qcap	
Canadian Tire Site	4	EX.MH090	EX MH 34-82										0.79	0.79			1.65	1.65	59.8	200	0.30	17.96	0.57	9.2	
Subject Site	1	CAP-3	EX.MH4A										0.28	0.28			0.59	0.59	12.0	150	1.00	15.23	0.86	3.9	
Subject Site		EX.MH4A	EX.MH3A											0.28			0.59	0.59	53.9	150	0.96	14.92	0.84	3.9	
Subject Site	2	EX.MH5A	EX.MH3A										0.92	0.92			1.91	1.91	51.8	150	0.97	15.00	0.85	12.8	
Subject Site	3	CAP-1	EX.MH3A										0.94	0.94			1.96	1.96	13.0	150	0.92	14.61	0.83	13.4	
Subject Site		EX.MH3A	EX.MH2A											2.15			4.46	4.46	85.0	250	0.53	43.29	0.88	10.3	
Subject Site		EX.MH2A	EX.MH1A											2.15			4.46	4.46	38.1	250	0.45	39.89	0.81	11.2	
Subject Site		EX.MH1A	EX MH 34-82											2.15			4.46	4.46	14.0	250	0.50	42.05	0.86	10.6	
Pickering Parkway	13	EX MH 34-82	EX MH 34-83	0.25	0.25									2.94	0.07		6.11	6.17	91.2	250	0.35	35.18	0.72	17.5	
Pickering Parkway	14	EX MH 34-83	EX MH 35-5	0.24	0.49									2.94	0.13		6.11	6.23	100.0	250	0.49	41.63	0.85	15.0	
Pickering Parkway	15	EX MH 35-5	EX MH 35-6	0.28	0.77									2.94	0.20		6.11	6.31	99.8	250	0.48	41.20	0.84	15.3	
BEECHLAWN DR	7	EX MH018	EX MH 35-6	2.89	2.89	60			173	3.80					0.75	2.77		3.52	59.0	200	0.95	31.97	1.02	11.0	
METROPIA	6	EX MH3A	EX MH 35-6	2.14	2.14				390	3.80					0.56	6.22		6.78	38.2	200	1.00	32.80	1.04	20.7	
Pickering Parkway	16	EX MH 35-6	EX MH 35-7	0.22	6.02				563	3.80				2.94	1.57	8.99	6.11	16.66	82.5	250	0.36	35.68	0.73	46.7	
Pickering Parkway	17	EX MH 35-7	EX MH 35-8	0.24	6.26				563	3.80				2.94	1.63	8.99	6.11	16.73	80.1	250	0.46	40.33	0.82	41.5	
Subject Site	5	EX MH 35-34	EX MH 35-33										0.42	0.42			0.88	0.88	84.7	150	1.00	15.23	0.86	5.8	
Notion Road	20	EX MH 35-33	EX MH 35-28	0.20	0.20									0.42	0.05		0.88	0.93	109.4	200	1.82	44.25	1.41	2.1	
Pickering Parkway	19	EX MH 35-28	EX MH 35-9	0.22	0.42									0.42	0.11		0.88	0.99	99.7	250	0.58	45.29	0.92	2.2	
Pickering Parkway	18	EX MH 35-9	EX MH 35-8	0.01	0.43									0.42	0.11		0.88	0.99	10.4	250	1.12	62.93	1.28	1.6	
MARSHCOURT DR		EX MH 35-8	EX MH 35-25	0.00	6.69				563	3.80				3.36	1.74	8.99	6.99	17.72	58.7	250	0.41	38.08	0.78	46.5	
ASHFORD DR	8	EX.MH023	EX MH 35-25	1.93	1.93	60			116	3.80					0.50	1.85		2.35	73.0	200	0.10	10.37	0.33	22.7	
MARSHCOURT DR	9	SAN MH 35-25	EX MH 35-26	0.29	8.91	60			697	3.80				3.36	2.32	11.12	6.99	20.43	72.8	250	0.54	43.70	0.89	46.7	
MARSHCOURT DR	10	SAN MH 35-26	EX MH 35-27	0.60	9.51	60			732	3.80				3.36	2.47	11.69	6.99	21.15	70.3	250	0.55	44.10	0.90	48.0	
MARSHCOURT DR	11, 12	EX MH 032	EX MH 35-27	17.39	17.39	60			1043	3.79			0.67	0.67	4.52	16.60	1.39	22.52	40.5	250	0.27	30.90	0.63	72.9	
EASEMENT		SAN MH 35-27	SAN MH 35-29		26.90				1776	3.63				4.03	6.99	27.04	8.38	42.42	124.0	375	0.16	70.13	0.63	60.5	
NOTION ROAD		SAN MH 35-29	SAN MH 35-30															42.42	71.8	375	0.22	82.24	0.74	51.6	
NOTION ROAD		SAN MH 35-30	SAN MH 17															42.42	4.0	375	0.23	84.09	0.76	50.4	
ORCHARD ROAD																		**42.42**		750					Available capacity at Orchard Rd 750mm dia. pipe is see note below about capacity* 150 L/s. Total flow calculated here does not include the existing sanitary flows conveyed south on Notion Rd to Orchard Rd.

Design Criteria as per The Regional Municipality of Durham '*Design Specifications for Sanitary Sewers*'
Average daily per capita flow = 364 L/cap/day (Residential)
Average daily per capita flow = 180,000 L/GFA hectares/day (commercial&industrial)
I = Unit of peak extraneous flow when foundation drains are NOT connected to the storm sewer = 0.26 L/s/Ha
Q(p) = peak population flow (L/s) Q(I) = peak extraneous flow (L/s)
Q(d) = peak design flow (L/s)
PEAKING FACTOR (Harmon; Residential) M =1 + 14/(4+(P/1000^0.5))
PEAK POPULATION FLOW, Q (p) = q*P*M / 86400 L / Sec.
PEAK EXTRANEOUS FLOW, Q(i) = I*A L / Sec.
PEAK DESIGN FLOW, Q(d) = Q(p) + Q(i) L / Sec.
PIPE ROUGHGNESS, n = 0.013 For Manning's Equation

NOTES:
1) MINIMUM VELOCITY = 0.60 m/s
2) MAXIMUM VELOCITY = 3.65 m/s
3) INFILTRATION 0.26 l/s = 22.5 m3/Ha/DAY
INFILTRATION 0.52 l/s = 45.0 m3/Ha/DAY (Foundation DraIn Connections)
4) COMMERCIAL 2.08 l/s (local sewers) 1.04 l/s (trunk sewers)
5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
6) USE ACTUAL METRIC I.D. PIPE SIZE IN mm
7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN

Population Density by Land Use

Housing Type	Density
Single & Semi Detached	3.5 P/u
Townhouse	3.0 P/u
Apartment-2Bdrm	2.5 P/u

Housing Type	Density
Single Family	60 persons/ha
Semi Detached & Duplex	100 persons/ha

* ASSUMED 150 L/s AVAILABLE EXCESS FLOW CAPACITY AT ORCHARD ROAD as per correspondence with Durham Region

ODAN·DETECH CONSULTING ENGINEERS

FIGURE S4

NOTE: THIS DESIGN IS PROVIDED FOR REFERENCE ONLY, AND INTENDED TO PROVIDE CONTEXT OF REQUIRED PHASE 1 PIPE SIZES WITHOUT NO FUTURE BUILD OUT

SCENARIO 2: PHASE 1 CONDITIONS
Redeveloped subject site Phase 1 sanitary sewer design sheet **REQUIRED PIPE SIZES**

DESIGNED BY: S. Ahonen
CHECKED BY: M. Al-Awad
DATE: 2023-03-06

STREET	TRIB ID	UPSTREAM MH	DOWNSTREAM MH	RESIDENTIAL						COMMERCIAL				INDUST.	IND GROSS	FLOW (L/s)						EXISTING SEWER					PRESENT CONDITION	NOTES
				LOT AREA		POP. DENSITY (Persons/ha)	POP. DENSITY (Persons/Unit)	# OF UNITS	POP.	PEAK FLOW FACTOR, K_H	LOT AREA (Ha)	FLOOR SPACE INDEX	GROSS FLOOR AREA		GROSS FLOOR AREA		RESIDENTIAL FLOW		COMM. 2.08 l/s	INDUS. 2.08 l/s see note 4	INSTIT. 1.30 l/s	TOTAL FLOW l/s	Length	Size	Slope	Full Flow Capacity	Full Flow Velocity	% Full	
				UNIT (ha)	ACCUM. (ha)								GFA (ha)	ACCUM. (ha)	UNIT (ha)	ACRES	INFIL. 0.26 (L/s)	SEWAGE 0.0042 (L/s)					L (m)	D (mm)	S (%)	Qcap (L/s)	V (m/s)	Q(d)/Qcap	
Canadian Tire Site	4	EX.MH090	SAN MH 34-82										0.79	0.79					1.65			1.65	59.8	200	0.30	17.96	0.57	9.2	
Pickering Parkway		SAN MH 34-82	Prop MH9A	0.52	0.52									0.79			0.14	0.00	1.65			1.78	49.0	250	0.37	36.17	0.74	4.9	required pipe see following sheet
Subject Site	P1	Prop MH1A	Prop MH2A	1.18	1.18		1.5	126	1793	3.62			0.17	0.17			0.31	27.28	0.35			27.94	20.7	300	0.87	90.20	1.28	31.0	required pipe see following sheet
							2.5	337																				
							3.5	207																				
							4.5	8																				
Subject Site		Prop MH2A	Prop MH3A		1.18				1793	3.62				0.17			0.31	27.28	0.35			27.94	60.8	300	0.70	80.91	1.14	34.5	required pipe see following sheet
Subject Site	P2	Prop MH3A	Prop MH4A		1.18				1793	3.62			0.28	0.45			0.31	27.28	0.93			28.52	90.0	300	0.72	82.05	1.16	34.8	required pipe see following sheet
Subject Site		Prop MH4A	Prop MH1A-1		1.18				1793	3.62				0.45			0.31	27.28	0.93			28.52	96.4	300	0.55	71.72	1.01	39.8	Interim pipe Phase 1
Subject Site	P3,2	Prop MH1A-1	Prop MH7A		1.18				1793	3.62			1.50	1.95			0.31	27.28	4.05			31.64	45.4	300	0.31	53.84	0.76	58.8	Interim pipe Phase 1
Subject Site		Prop MH7A	Prop MH8A		1.18				1793	3.62				1.95			0.31	27.28	4.05			31.64	29.9	300	0.52	69.73	0.99	45.4	required pipe see following sheet
Subject Site		Prop MH8A	Prop MH9A		1.18				1793	3.62				1.95			0.31	27.28	4.05			31.64	14.3	300	0.72	82.05	1.16	38.6	required pipe see following sheet
Pickering Parkway	13	Prop MH9A	SAN MH 34-83	0.25	1.95				1793	3.62				2.74			0.51	27.28	5.70			33.48	42.0	300	0.42	62.67	0.89	53.4	required pipe see following sheet
Pickering Parkway	14	SAN MH 34-83	SAN MH 35-5	0.24	2.19				1793	3.62				2.74			0.57	27.28	5.70			33.55	100.0	300	0.47	66.29	0.94	50.6	required pipe see following sheet
Pickering Parkway	15	SAN MH 35-5	SAN MH 35-6	0.28	2.47				1793	3.62				2.74			0.64	27.28	5.70			33.62	99.8	300	0.48	67.00	0.95	50.2	required pipe see following sheet
BEECHLAWN DR		EX MH018	SAN MH 35-6	2.89	2.89	60			173	3.80							0.75	2.77				3.52	59.0	200	0.95	31.97	1.02	11.0	
METROPIA	6	EX MH3A	SAN MH 35-6	2.14	2.14				390	3.80							0.56	6.22				6.78	38.2	200	1.00	32.80	1.04	20.7	
Pickering Parkway	16	SANMH 35-6	SAN MH 35-7	0.22	7.72				2356	3.53				2.74			2.01	34.93	5.70			42.64	82.5	300	0.38	59.61	0.84	71.5	required pipe see following sheet
Pickering Parkway	17	SAN MH 35-7	SAN MH 35-8	0.24	7.96				2356	3.53				2.74			2.07	34.93	5.70			42.70	80.0	300	0.46	65.59	0.93	65.1	required pipe see following sheet
Pickering Parkway	18	SAN MH 35-8	SAN MH 35-28	0.22	8.18				2356	3.53				2.74			2.13	34.93	5.70			42.76	110.1	300	0.57	73.01	1.03	58.6	required pipe see following sheet
Subject Site	5	SAN MH 35-34	SAN MH 35-33										0.42	0.42			0.00		0.88			0.88	145.7	150	1.00	15.23	0.86	5.8	
Notion Road	20	SAN MH 35-33	SAN MH 35-28	0.50	0.50									0.42			0.13		0.88			1.01	109.4	200	1.82	44.25	1.41	2.3	
~~MARSHCOURT DR~~		~~EX MH 35-8~~	~~EX MH 35-25~~		~~0.00~~					~~0.00~~							~~0.00~~	~~0.00~~	~~0.00~~			~~0.00~~	~~58.9~~	~~250~~	~~0.41~~	~~38.08~~	~~0.78~~	~~0.0~~	pipe to remain as cleanout access
ASHFORD DR	8	EX.MH023	SAN MH 35-25	1.93	1.93	60			116	3.80							0.50	1.85				2.35	73.0	200	0.10	10.37	0.33	22.7	
MARSHCOURT DR	9	SAN MH 35-25	SAN MH 35-26	0.29	2.22	60			133	3.80							0.58	2.13	0.00			2.70	72.8	250	0.54	43.70	0.89	6.2	
MARSHCOURT DR	10	SAN MH 35-26	SAN MH 35-27	0.60	2.82	60			169	3.80							0.73	2.70	0.00			3.43	70.3	250	0.55	44.10	0.90	7.8	
MARSHCOURT DR	11, 12	EX MH 032	SAN MH 35-27	17.39	17.39	60			1043	3.79			0.67	0.67			4.52	16.60	1.39			22.52	40.5	250	0.27	30.90	0.63	72.9	
EASEMENT		SAN MH 35-27	SAN MH 35-29	0.00	20.21				1212	3.74				0.67			5.25	19.07	1.39			25.71	124.0	375	0.16	70.13	0.63	36.7	
NOTION ROAD		SAN MH 35-28	Prop MH 13A	0.01	8.69				2356	3.53				3.16			2.26	34.93	6.58			43.77	14.5	450	0.22	133.73	0.84	32.7	Interim pipe Phase 1
NOTION ROAD		Prop MH 13A	Prop MH 14A	0.25	8.94				2356	3.53				3.16			2.32	34.93	6.58			43.84	100.0	450	0.22	133.73	0.84	32.8	Interim pipe Phase 1
NOTION ROAD		Prop MH 14A	SAN MH 35-29	0.25	9.19				2356	3.53				3.16			2.39	34.93	6.58			43.90	101.8	450	0.22	133.73	0.84	32.8	Interim pipe Phase 1
NOTION ROAD	21	SAN MH 35-29	SAN MH 35-30	0.25	29.65				3569	3.38				3.83	0.66		7.71	50.62	7.98	1.3728		67.68	71.8	450	0.20	127.50	0.80	53.1	Interim pipe Phase 1
NOTION ROAD		SAN MH 35-30	SAN MH 17	0.25	29.90				3569	3.38				3.83	0.66		7.77	50.62	7.98	1.3728		67.74	4.0	450	0.20	127.50	0.80	53.1	Interim pipe Phase 1
ORCHARD ROAD		SAN MH 17	SAN MH 18		29.90																	**67.74**		750	Available capacity at Orchard Rd 750mm dia. pipe is 150 L/s. Total flow calculated here does not include the existing sanitary flows conveyed south on Notion Rd to Orchard Rd.				see note below about capacity*

Design Criteria as per The Regional Municipality of Durham *'Design Specifications for Sanitary Sewers'*
Average daily per capita flow = 364 L/cap/day (Residential)
Average daily per capita flow = 180,000 L/GFA hectares/day (commercial&industrial)
I = Unit of peak extraneous flow when foundation drains are NOT connected to the storm sewer = 0.26 L/s/Ha
Q(p) = peak population flow (L/s) Q(I) = peak extraneous flow (L/s)
Q(d) = peak design flow (L/s)
PEAKING FACTOR (Harmon; Residential) M =1 + 14/(4+(P/1000^0.5))
PEAK POPULATION FLOW, Q (p) = q*P*M / 86400 L / Sec.
PEAK EXTRANEOUS FLOW, Q(i) = I*A L / Sec.
PEAK DESIGN FLOW, Q(d) = Q(p) + Q(i) L / Sec.
PIPE ROUGHGNESS, n = 0.013 For Manning's Equation

NOTES:
1) MINIMUM VELOCITY = 0.60 m/s
2) MAXIMUM VELOCITY = 3.65 m/s
3) INFILTRATION 0.26 l/s = 22.5 m3/Ha/DAY
INFILTRATION 0.52 l/s = 45.0 m3/Ha/DAY (Foundation Draln Connections)
4) COMMERCIAL 2.08 l/s (local sewers) 1.04 l/s (trunk sewers)
5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
6) USE ACTUAL METRIC I.D. PIPE SIZE IN mm
7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN

Population Density by Land Use

Housing Type	Density
Single & Semi Detached	3.5 P/u
Townhouse	3.0 P/u
1 Bedroom	1.5 P/u
2 Bedroon and 1 Bedroom+Den	2.5 P/u
3 Bedroom	3.5 P/u
4 Bedroom	4.5 P/u

Housing Type	Density
Single Family	60 persons/ha
Semi Detached & Duplex	100 persons/ha

* ASSUMED 150 L/s AVAILABLE EXCESS FLOW CAPACITY AT ORCHARD ROAD as per correspondence with Durham Region

ODAN·DETECH CONSULTING ENGINEERS

MUNICIPALITY: REGIONAL MUNICIPALITY OF DURHAM
PROJECT: 20266

20266 - Phase 1 - FSR - Sanitary Design Sheets April 2024.xlsx
ODAN DETECH GROUP INC.

SCENARIO 2: PHASE 1 CONDITIONS
Redeveloped subject site Phase 1 sanitary sewer design sheet **PROPOSED PIPE SIZES**

DESIGNED BY: S. Ahonen
CHECKED BY: M. Al-Awad

FIGURE S-4

DATE: 2023-03-06

STREET	TRIB ID	UPSTREAM MH	DOWNSTREAM MH	RESIDENTIAL						COMMERCIAL				INDUST.		FLOW (L/s)						EXISTING SEWER					PRESENT CONDITION	NOTES
				LOT AREA		POP. DENSITY (Persons/ha)	POP. DENSITY (Persons/ Unit)	# OF UNITS	POP.	PEAK FLOW FACTOR, K_H	LOT AREA (Ha)	FLOOR SPACE INDEX	GROSS FLOOR AREA		GROSS FLOOR AREA		RESIDENTIAL FLOW		COMM. 2.08 l/s	INDUS. 2.08 l/s see note 4	INSTIT. 1.30 l/s	TOTAL FLOW l/s	Length	Size	Slope	Full Flow Capacity	Full Flow Velocity	% Full	
				UNIT (ha)	ACCUM. (ha)								GFA (ha)	ACCUM. (ha)	UNIT (ha)	ACCUM. (ha)	INFIL. 0.26 (L/s)	SEWAGE 0.0042 (L/s)					L (m)	D (mm)	S (%)	Qcap (L/s)	V (m/s)	Q(d)/Qcap	
Canadian Tire Site	4	EX.MH090	SAN MH 34-82										0.79	0.79					1.65			1.65	59.8	200	0.30	17.96	0.57	9.2	
Pickering Parkway		SAN MH 34-82	Prop MH9A	0.52	0.52									0.79			0.14	0.00	1.65			1.78	49.0	675	0.45	563.88	1.58	0.3	pipe sized for full build-out
Subject Site	P1	Prop MH1A	Prop MH2A	1.18	1.18			678	1793	3.62			0.17	0.17			0.31	27.28	0.35			27.94	11.3	300	1.60	122.32	1.73	22.8	pipe sized for full build-out
Subject Site		Prop MH2A	Prop MH3A		1.18				1793	3.62				0.17			0.31	27.28	0.35			27.94	60.8	300	0.70	80.91	1.14	34.5	pipe sized for full build-out
Subject Site	P2	Prop MH3A	Prop MH4A		1.18				1793	3.62			0.28	0.45			0.31	27.28	0.93			28.52	90.0	300	0.72	82.05	1.16	34.8	pipe sized for full build-out
Subject Site		Prop MH4A	Prop MH1A-1		1.18				1793	3.62				0.45			0.31	27.28	0.93			28.52	96.4	300	0.55	71.72	1.01	39.8	Interim pipe Phase 1
Subject Site	P3,2	Prop MH1A-1	Prop MH7A		1.18				1793	3.62			1.50	1.95			0.31	27.28	4.05			31.64	45.4	450	0.31	158.74	1.00	19.9	Interim pipe Phase 1
Subject Site		Prop MH7A	Prop MH8A		1.18				1793	3.62				1.95			0.31	27.28	4.05			31.64	29.9	450	0.52	205.59	1.29	15.4	pipe sized for full build-out
Subject Site		Prop MH8A	Prop MH9A		1.18				1793	3.62				1.95			0.31	27.28	4.05			31.64	14.3	450	0.72	241.92	1.52	13.1	pipe sized for full build-out
Pickering Parkway	13	Prop MH9A	SAN MH 34-83	0.25	1.95				1793	3.62				2.74			0.51	27.28	5.70			33.48	42.0	675	0.45	563.88	1.58	5.9	pipe sized for full build-out
Pickering Parkway	14	SAN MH 34-83	SAN MH 35-5	0.24	2.19				1793	3.62				2.74			0.57	27.28	5.70			33.55	100.0	675	0.45	563.88	1.58	5.9	pipe sized for full build-out
Pickering Parkway	15	SAN MH 35-5	SAN MH 35-6	0.28	2.47				1793	3.62				2.74			0.64	27.28	5.70			33.62	99.8	675	0.45	563.88	1.58	6.0	pipe sized for full build-out
BEECHLAWN DR		EX MH018	EX MH 35-6	2.89	2.89	60			173	3.80							0.75	2.77				3.52	59.0	200	0.95	31.97	1.02	11.0	
METROPIA	6	EX MH3A	EX MH 35-6	2.14	2.14				390	3.80							0.56	6.22				6.78	38.2	200	1.00	32.80	1.04	20.7	
Pickering Parkway	16	SAN MH 35-6	SAN MH 35-7	0.22	7.72				2356	3.53				2.74			2.01	34.93	5.70			42.64	82.5	675	0.45	563.88	1.58	7.6	pipe sized for full build-out
Pickering Parkway	17	SAN MH 35-7	SAN MH 35-8	0.24	7.96				2356	3.53				2.74			2.07	34.93	5.70			42.70	80.0	675	0.45	563.88	1.58	7.6	pipe sized for full build-out
Pickering Parkway	18	SAN MH 35-8	SAN MH 35-28	0.22	8.18				**2356**	3.53				2.74			2.13	34.93	5.70			42.76	110.1	675	0.45	563.88	1.58	7.6	pipe sized for full build-out
Subject Site	5	SAN MH 35-34	SAN MH 35-33										0.42	0.42			0.00		0.88			0.88	145.7	150	1.00	15.23	0.86	5.8	
Notion Road	20	SAN MH 35-33	SAN MH 35-28	0.50	0.50									0.42			0.13		0.88			1.01	109.4	200	1.82	44.25	1.41	2.3	
~~MARSHCOURT DR~~		~~EX. MH 35-8~~	~~EX. MH 35-25~~		~~0.00~~					~~0.00~~							~~0.00~~	~~0.00~~	~~0.00~~			~~0.00~~	~~58.9~~	~~250~~	~~0.41~~	~~38.08~~	~~0.78~~	~~0.0~~	pipe to remain as cleanout access
ASHFORD DR	8	EX.MH023	SAN MH 35-25	1.93	1.93	60			116	3.80							0.50	1.85				2.35	73.0	200	0.10	10.37	0.33	22.7	
MARSHCOURT DR	9	SAN MH 35-25	SAN MH 35-26	0.29	2.22	60			133	3.80							0.58	2.13	0.00			2.70	72.8	250	0.54	43.70	0.89	6.2	
MARSHCOURT DR	10	SAN MH 35-26	SAN MH 35-27	0.60	2.82	60			169	3.80							0.73	2.70	0.00			3.43	70.3	250	0.55	44.10	0.90	7.8	
MARSHCOURT DR	11, 12	EX MH 032	SAN MH 35-27	17.39	17.39	60			1043	3.79			0.67	0.67			4.52	16.60	1.39			22.52	40.5	250	0.27	30.90	0.63	72.9	
EASEMENT		SAN MH 35-27	SAN MH 35-29	0.00	20.21				1212	3.74				0.67			5.25	19.07	1.39			25.71	124.0	375	0.16	70.13	0.63	36.7	
NOTION ROAD		SAN MH 35-28	Prop MH 13A	0.01	8.69				2356	3.53				3.16			2.26	34.93	6.58			43.77	14.5	450	0.22	133.73	0.84	32.7	**Interim pipe Phase 1**
NOTION ROAD		Prop MH 13A	Prop MH 14A	0.25	8.94				2356	3.53				3.16			2.32	34.93	6.58			43.84	100.0	450	0.22	133.73	0.84	32.8	**Interim pipe Phase 1**
NOTION ROAD		Prop MH 14A	SAN MH 35-29	0.25	9.19				2356	3.53				3.16			2.39	34.93	6.58			43.90	101.8	450	0.22	133.73	0.84	32.8	**Interim pipe Phase 1**
NOTION ROAD	21	SAN MH 35-29	SAN MH 35-30	0.25	29.65				3569	3.38				3.83	0.66		7.71	50.62	7.98	1.3728		67.68	71.8	450	0.20	127.50	0.80	53.1	Interim pipe Phase 1
NOTION ROAD		SAN MH 35-30	SAN MH 17	0.25	29.90				3569	3.38				3.83	0.66		7.77	50.62	7.98	1.3728		67.74	4.0	450	0.20	127.50	0.80	53.1	Interim pipe Phase 1
ORCHARD ROAD		SAN MH 17	SAN MH 18		29.90																	**67.74**		750	Available capacity at Orchard Rd 750mm dia. pipe is 150 L/s. Total flow calculated here does not include the existing sanitary flows conveyed south on Notion Rd to Orchard Rd.				see note below about capacity

Design Criteria as per The Regional Municipality of Durham '*Design Specifications for Sanitary Sewers*'
Average daily per capita flow = 364 L/cap/day (Residential)
Average daily per capita flow = 180,000 L/GFA hectares/day (commercial&industrial)
I = Unit of peak extraneous flow when foundation drains are NOT connected to the storm sewer = 0.26 L/s/Ha
Q(p) = peak population flow (L/s) Q(I) = peak extraneous flow (L/s)
Q(d) = peak design flow (L/s)
PEAKING FACTOR (Harmon; Residential) M =1 + 14/(4+(P/1000^0.5))
PEAK POPULATION FLOW, Q (p) = q*P*M / 86400 L / Sec.
PEAK EXTRANEOUS FLOW, Q(i) = I*A L / Sec.
PEAK DESIGN FLOW, Q(d) = Q(p) + Q(i) L / Sec.
PIPE ROUGHGNESS, n = 0.013 For Manning's Equation

NOTES:
1) MINIMUM VELOCITY = 0.60 m/s
2) MAXIMUM VELOCITY = 3.65 m/s
3) INFILTRATION 0.26 l/s = 22.5 m3/Ha/DAY
INFILTRATION 0.52 l/s = 45.0 m3/Ha/DAY (Foundation Drain Connections)
4) COMMERCIAL 2.08 l/s (local sewers) 1.04 l/s (trunk sewers)
5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
6) USE ACTUAL METRIC I.D. PIPE SIZE IN mm
7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN

Population Density by Land Use

Housing Type	Density
Single & Semi Detached	3.5 P/u
Townhouse	3.0 P/u
1 Bedroom	1.5 P/u
2 Bedroon and 1 Bedroom+Den	2.5 P/u
3 Bedroom	3.5 P/u
4 Bedroom	4.5 P/u

Housing Type	Density
Single Family	60 persons/ha
Semi Detached & Duplex	100 persons/ha

* ASSUMED 150 L/s AVAILABLE EXCESS FLOW CAPACITY AT ORCHARD ROAD as per correspondence with Durham Region

ODAN·DETECH
CONSULTING ENGINEERS

SCENARIO 3: CONCEPTUAL FULL BUILDOUT CONDITIONS
Full development of subject site and future tributary sanitary design sheet

DESIGNED BY: S. Ahone 0.013
CHECKED BY: M. Al-Awa 09/09/2021

DATE: 2023-03-06

FIGURE S-5

STREET	TRIB ID	UPSTREAM MH	DOWNSTREAM MH	RESIDENTIAL							COMMERCIAL				INDUST.		FLOW (L/s)				EXISTING SEWER					PRESENT CONDITION	NOTES
				LOT AREA		POP. DENSITY (Persons/ha)	POP. DENSITY (Persons/Unit)	# OF UNITS	POP.	PEAK FLOW FACTOR, K_H	LOT AREA (Ha)	FLOOR SPACE INDEX	GROSS FLOOR AREA		GROSS FLOOR AREA		RESIDENTIAL FLOW		COMM. 2.08 l/s	TOTAL FLOW l/s	Length	Size	Slope	Full Flow Capacity	Full Flow Velocity	% Full	
				UNIT (ha)	ACCUM. (ha)								GFA (ha)	ACCUM. (ha)	UNIT (ha)	ACCUM. (ha)	INFIL. 0.26 (L/s)	SEWAGE 0.0042 (L/s)			L (m)	D (mm)	S (%)	Qcap (L/s)	V (m/s)	Q(d)/Qcap	
1899 Brock Road	P9	Prop MH16A	SAN MH 34-82	29.50	29.50	800			23600	2.58							7.67	255.78	0.00	263.45	116.0	525	1.00	430.06	1.99	61.3	FUTURE PROPOSED
Canadian Tire Lands	P10	EX.MH090	SAN MH 34-82	4.10	4.10	1200			4920	3.25							1.07	67.19	0.00	68.25	59.8	450	0.30	156.16	0.98	43.7	EX PIPE OUTSIDE SCOPE OF WORK
Pickering Parkway	13	SAN MH 34-82	Prop MH9A	0.25	33.85				28520	2.50				0.00			8.80	299.32	0.00	308.12	49.0	675	0.45	563.88	1.58	54.6	PROPOSED
Subject Site	P1	Prop MH1A	Prop MH2A	1.18	1.18			678	1793	3.62			0.17	0.17			0.31	27.28	0.35	27.94	20.7	300	0.87	90.20	1.28	31.0	PROPOSED
Subject Site		Prop MH2A	Prop MH3A		1.18				1793	3.62				0.17			0.31	27.28	0.35	27.94	44.7	300	0.95	94.25	1.33	29.6	PROPOSED
Subject Site	P2	Prop MH3A	Prop MH4A	1.28	2.46		2.5	1090	4518	3.29			0.10	0.27			0.64	62.34	0.56	63.54	83.5	300	0.78	85.40	1.21	74.4	PROPOSED
Subject Site		Prop MH4A	Prop MH5A		2.46				4518	3.29				0.27			0.64	62.34	0.56	63.54	47.2	300	1.31	110.68	1.57	57.4	PROPOSED
Subject Site	P3,P4	Prop MH5A	Prop MH6A	3.01	5.47		2.5	1022	7073	3.10			0.07	0.34			1.42	92.16	0.71	94.28	37.6	300	1.46	116.84	1.65	80.7	PROPOSED
Subject Site	P5,P6	Prop MH6A	Prop MH7A	2.63	8.10		2.5	1300	10323	2.94			0.07	0.41			2.11	127.51	0.85	130.47	19.0	450	0.77	250.18	1.57	52.1	PROPOSED
Subject Site	P7,P8	Prop MH7A	Prop MH8A	1.45	9.55		2.5	1208	13343	2.83			2.26	2.67			2.48	158.56	5.55	166.60	29.9	450	0.52	205.59	1.29	81.0	PROPOSED
Subject Site		Prop MH8A	Prop MH9A		9.55				13343	2.83				2.67			2.48	158.56	5.55	166.60	14.3	450	0.72	241.92	1.52	68.9	PROPOSED
Pickering Parkway	13	Prop MH9A	SAN MH 34-83	0.25	43.65				41863	2.34				2.67			11.35	410.93	5.55	427.83	42.0	675	0.45	563.88	1.58	75.9	PROPOSED
Pickering Parkway	14	SAN MH 34-83	SAN MH 35-5	0.24	43.89				41863	2.34				2.67			11.41	410.93	5.55	427.89	100.0	675	0.45	563.88	1.58	75.9	PROPOSED
Pickering Parkway	15	SAN MH 35-5	SAN MH 35-6	0.28	44.17				41863	2.34				2.67			11.48	410.93	5.55	427.96	99.8	675	0.45	563.88	1.58	75.9	PROPOSED
BEECHLAWN DR	7	SAN MH018	SAN MH 35-6	2.89	2.89	60			173	3.80							0.75	2.77		3.52	59.0	200	0.95	31.97	1.02	11.0	EX
METROPIA	20	SAN MH3A	SAN MH 35-6	2.14	2.14				390	3.80							0.56	6.22		6.78	38.2	200	1.00	32.80	1.04	20.7	EX
~~MARSHCOURT DR~~		~~EX. MH 35-8~~	~~EX. MH 35-25~~							~~0.00~~							~~0.00~~	~~0.00~~	~~0.00~~	~~0.00~~	~~58.9~~	~~250~~	~~0.41~~	~~38.08~~	~~0.78~~	~~0.0~~	pipe to remain as cleanout access
ASHFORD DR	8	EX.MH023	SAN MH 35-25	1.93	1.93	60			116	3.80							0.50	1.85		2.35	73.0	200	0.10	10.37	0.33	22.7	EX
MARSHCOURT DR	9	SAN MH 35-25	SAN MH 35-26	0.29	2.22	60			133	3.80							0.58	2.13	0.00	2.70	72.8	250	0.54	43.70	0.89	6.2	EX
MARSHCOURT DR	10	SAN MH 35-26	SAN MH 35-27	0.60	2.82	60			169	3.80							0.73	2.70	0.00	3.43	70.3	250	0.55	44.10	0.90	7.8	EX
MARSHCOURT DR	11	EX MH 032	SAN MH 35-27	17.39	17.39	60			1044	3.79							4.52	16.61	0.00	21.13	40.5	250	0.27	30.90	0.63	68.4	EX
EASEMENT		SAN MH 35-27	SAN MH 35-29		20.21				1213	3.74							5.25	19.08	0.00	24.33	124.0	375	0.16	70.13	0.63	34.7	outlet to Region Trunk on Notion Rd*
Pickering Parkway	16	SAN MH 35-6	SAN MH 35-7	0.22	49.42				42426	2.33				2.67			12.85	415.47	5.55	433.87	82.5	675	0.40	531.63	1.49	81.6	PROPOSED
Pickering Parkway	17	SAN MH 35-7	SAN MH 35-8	0.24	49.66				42426	2.33				2.67			12.91	415.47	5.55	433.94	80.0	675	0.40	531.63	1.49	81.6	PROPOSED
Pickering Parkway	18	SAN MH 35-8	SAN MH 35-28	0.22	49.88				42426	2.33				2.67			12.97	415.47	5.55	433.99	110.1	675	0.40	531.63	1.49	81.6	PROPOSED
Notion Road		SAN MH 35-28	MH 13A																	433.99	14.5	750	0.50	787.21	1.78	55.1	outlet to Region Trunk on Notion Rd

Design Criteria as per The Regional Municipality of Durham '*Design Specifications for Sanitary Sewers*'
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Average daily per capita flow = 180,000 L/GFA hectares/day (commercial&industrial)
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Q(d) = peak design flow (L/s)
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PEAK EXTRANEOUS FLOW, Q(i) = I*A L / Sec.
PEAK DESIGN FLOW, Q(d) = Q(p) + Q(i) L / Sec.
PIPE ROUGHGNESS, n = 0.013 For Manning's Equation

NOTES:
1) MINIMUM VELOCITY = 0.60 m/s
2) MAXIMUM VELOCITY = 3.65 m/s
3) INFILTRATION 0.26 l/s = 22.5 m3/Ha/DAY
INFILTRATION 0.52 l/s = 45.0 m3/Ha/DAY (Foundation DraIn Connections)
4) COMMERCIAL 2.08 l/s (local sewers) 1.04 l/s (trunk sewers)
5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
6) USE ACTUAL METRIC I.D. PIPE SIZE IN mm
7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN

Population Density by Land Use

Housing Type	Density
Single & Semi Detached	3.5 P/u
Townhouse	3.0 P/u
1 Bedroom	1.5 P/u
2 Bedroon and 1 Bedroom+Den	2.5 P/u
3 Bedroom	3.5 P/u
4 Bedroom	4.5 P/u

Housing Type	Density
Single Family	60 persons/ha
Semi Detached & Duplex	100 persons/ha

ODAN·DETECH CONSULTING ENGINEERS

*ASSUMED FLOW FROM EASEMENT SEWER AND PICKERING PARKWAY WILL OUTLET TO REGION TRUNK ON NOTION RD

Region of Durham Tributary Maps & Correspondence indicating population densities

Hello Mark,

I have attached some maps showing the approximate areas. If you can get more precise areas from your base, please use them, otherwise just use the numbers below:

- Map 1 North +/- 30 ha @ 800 people/ha = 24,000
- Map 1 South +/- 14 ha @ 1200 people/ha = 16,800
- Map 2 South – approved application for 130 units x 3 people per unit = population of 390 (connection at Beachlawn)

Be sure that the pipe on Pickering Parkway is sized to be at no more than 80% capacity based on these populations.

Let me know if you have any questions.

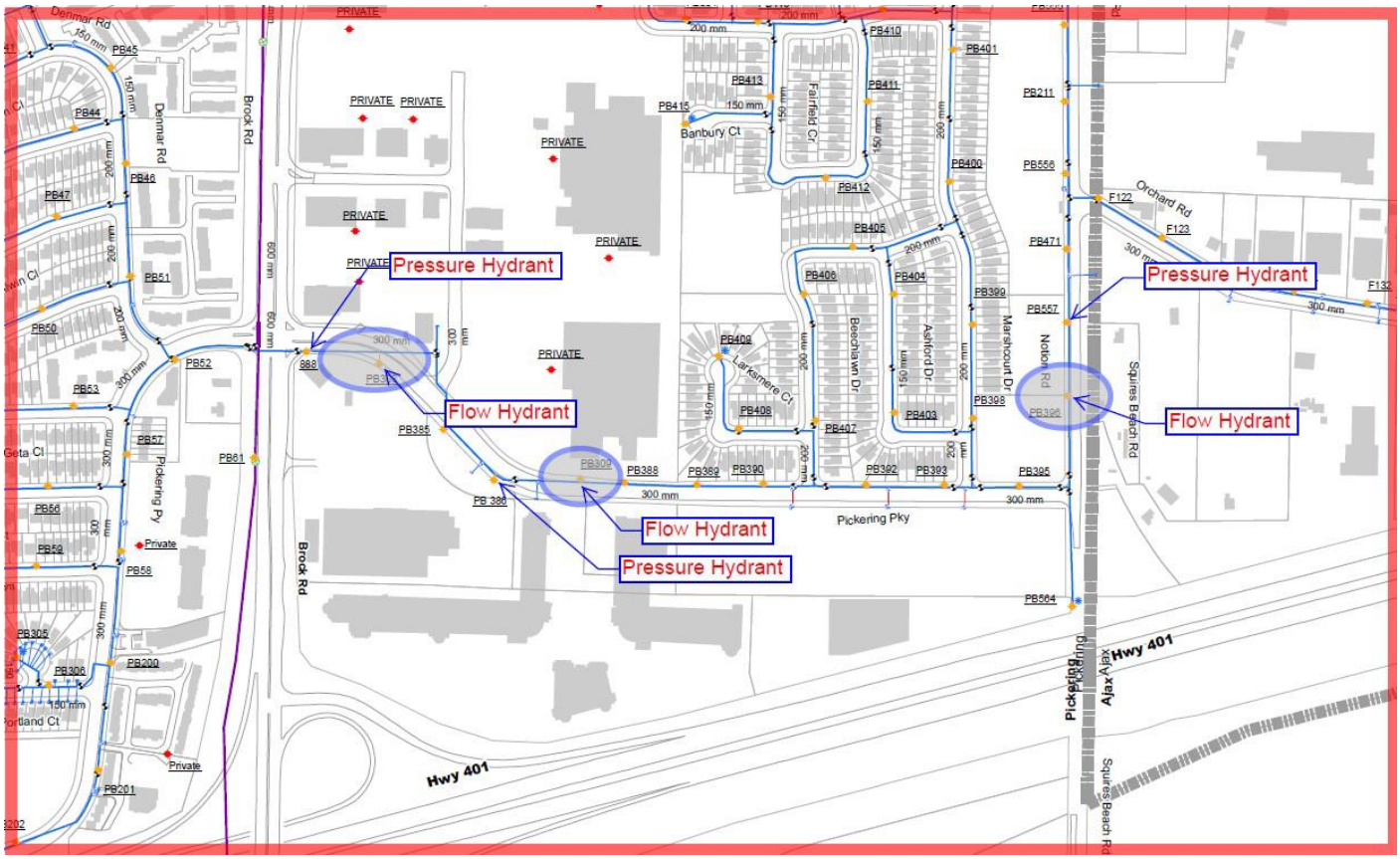
Thanks,

Aaron Christie, P.Eng.| Manager, Engineering Planning & Studies
Works Department
The Regional Municipality of Durham
Aaron.Christie@durham.ca | 905-668-7711 extension 3608 | durham.ca
My pronouns are he/his

APPENDIX C

Location of hydrant flow tests
Hydrant flow tests

Location of hydrant flow tests



FLOWMETRIX
INDU-TECH
PROCESS
WESTCAN

Fire Flow Testing Report

Residual Hydrant # **PB557**
NFPA Colour Code **BLUE**

DATE	September 8, 2021
TIME	10:30 AM
ADDRESS	1972 Notion Rd
	Pickering, ON
SIZE-inches/mm	12 300
MATERIAL	PVC
CONTACT INFO	The Odan/Detech Group Inc.
	Mark Harris
	C: (905) 632-3811 ext.122
	E: mark@odandetech.com

RESIDUAL HYDRANT INFO.

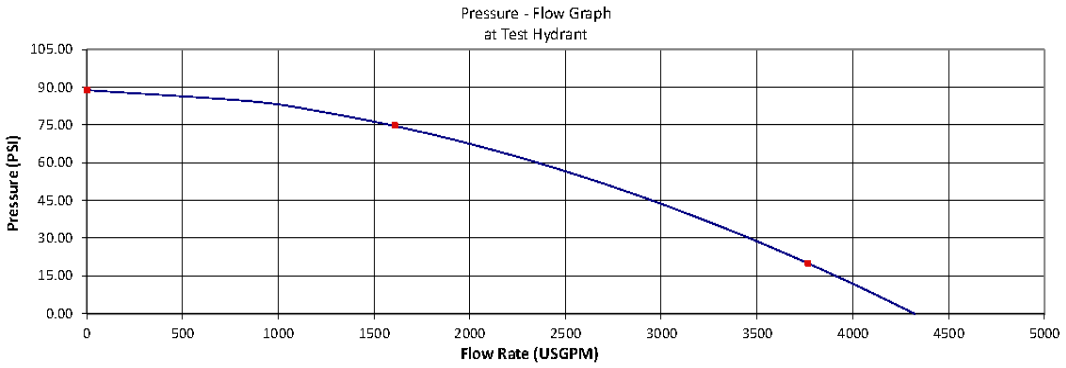
HYDRANT #	PB557	
N.F.P.A. COLOUR CODE	BLUE	
STATIC PRESSURE	88.9	psi
RESIDUAL PRESSURE	74.6	psi
PRESSURE DROP	14.3	psi
% PRESSURE DROP	16.0	% psi

Flow on Water Main At Test Hydrant - 20 psi 3766 USGPM

FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)	FLOW METER (USGPM)
PB396	2	2.5	Round	LPD250	0.90	**28.4**	804	0
		2.5	Round	LPD250	0.90	**28.4**	804	0
				Total Flow (USGPM)			1609	0
				Total Flow (USGPM)			1609	

FIRE FLOW CHART



COMMENTS

OPERATOR	FMX	Jordan Whitlock
OPERATOR	FMX	Denis Kriventsev
OPERATOR		Region of Durham

FLOWMETRIX
INDU-TECH
PROCESS
WESTCAN

Fire Flow Testing Report

Residual Hydrant # **PB386**
NFPA Colour Code **BLUE**

DATE	September 8, 2021
TIME	10:45 AM
ADDRESS	1735 Pickering Pkwy
	Pickering, ON
SIZE-Inches/mm	12 300
MATERIAL	PVC
CONTACT INFO	The Odan/Detech Group Inc.
	Mark Harris
	C: (905) 632-3811 ext.122
	E: mark@odandetech.com

RESIDUAL HYDRANT INFO.

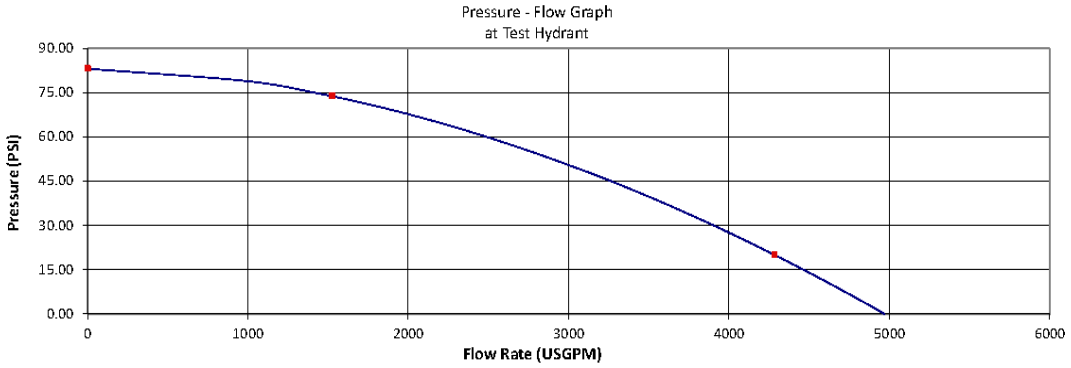
HYDRANT #	PB386	
N.F.P.A. COLOUR CODE	BLUE	
STATIC PRESSURE	83.2	psi
RESIDUAL PRESSURE	73.8	psi
PRESSURE DROP	9.3	psi
% PRESSURE DROP	11.2	% psi

Flow on Water Main At Test Hydrant - 20 psi 4283 USGPM

FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)	FLOW METER (USGPM)
PB309	2	2.5	Round	LPD250	0.90	**25.5**	762	0
		2.5	Round	LPD250	0.90	**25.5**	762	0
					Total Flow (USGPM)		1525	0
					Total Flow (USGPM)		1525	

FIRE FLOW CHART



COMMENTS

OPERATOR	FMX	Jordan Whitlock
OPERATOR	FMX	Denis Kriventsev
OPERATOR		Region of Durham

FLOWMETRIX
INDU-TECH
PROCESS
WESTCAN

Fire Flow Testing Report

Residual Hydrant #	**PB888**
NFPA Colour Code	**BLUE**

DATE	September 8, 2021
TIME	11:00 AM
ADDRESS	1785 Pickering Pkwy
	Pickering, ON
SIZE-inches/mm	12 300
MATERIAL	PVC
CONTACT INFO	The Odan/Detech Group Inc.
	Mark Harris
	C: (905) 632-3811 ext.122
	E: mark@odandetech.com

RESIDUAL HYDRANT INFO.

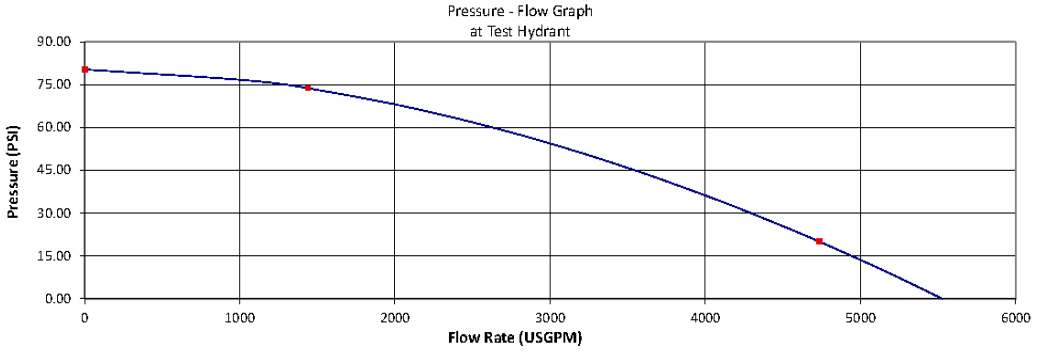
HYDRANT #	PB888	
N.F.P.A. COLOUR CODE	BLUE	
STATIC PRESSURE	80.3	psi
RESIDUAL PRESSURE	73.7	psi
PRESSURE DROP	6.7	psi
% PRESSURE DROP	8.3	% psi

Flow on Water Main At Test Hydrant - 20 psi 4735 USGPM

FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)	FLOW METER (USGPM)
PB308	2	2.5	Round	LPD250	0.90	**22.7**	720	0
		2.5	Round	LPD250	0.90	**22.7**	720	0
					Total Flow (USGPM)		1439	0
					Total Flow (USGPM)		1439	

FIRE FLOW CHART



COMMENTS

OPERATOR	FMX	Jordan Whitlock
OPERATOR	FMX	Denis Kriventsev
OPERATOR		Region of Durham

ODG_FireFlowTestingReport_Pickering

"If we don't measure it, how do you manage it?"

APPENDIX D

Storm Sewer Design Sheets
Rational Formula Stormwater Calculations
Low Impact Development Strategies
Jellyfish Filter ETV Certification

STORM SEWER DESIGN

Catchment 7

ODAN·DETECH CONSULTING ENGINEERS

5YEAR Mount Hope Storm i = 1082.901/ (Tc+6.007)^0.837

100 YEAR Mount Hope Storm i = 2096.425/ (Tc+6.485)^0.863

DESIGN BY: P.T.
CHECKED BY: M.H.
DATE: April 4, 2024

TC= 10 Vmin = 0.80m/s Vmax = 5.0m/s
n = 0.013
SEWER DESIGN: PIPE ROUGHNESS: n = 0.013 For Manning's Equation
% of Full Flow: Peak Flow / Full Flow Capacity

20266-PROPOSED MIXED-USE DEVELOPMENT
1755 & 1805 PICKERING PARKWAY
PICKERING, ON

LOCATION			STORMWATER ANALYSIS								STORM SEWER DATA					
Tributary ID No.	From Manhole	To Manhole	A Area (ha)	C Runoff Coeff.	A*C	Accumulated A*C	Time of Concentration (min)	Flow Time (min)	5-yr-Rainfall Intensity (mm/hr)	5-yr-Peak Flow (l/s)	Pipe Length (m)	Pipe Size (mm)	Pipe Slope (%)	Pipe Full Flow Capacity (l/s)	Pipe Full Flow Velocity (m/s)	5-yr.-Percent of Full Flow Capacity (%)
1	1	2	0.170	0.75	0.128	0.128	15.00	0.77	84.68	30	62.8	300	0.98	96	1.35	31%
2	2	3	0.050	0.70	0.035	0.163	15.77	0.29	82.15	37	33.1	375	1.43	210	1.90	18%
3	Block 1	5	0.936	0.50	0.468	0.468	15.00		84.68	110						
4	3	5	0.120	0.83	0.100	0.730	16.06	0.56	81.25	165	61.4	525	0.85	396	1.83	42%
5	Block 2	7	1.288	0.50	0.644	0.644	15.00	-	84.68	152						
6	5	7	0.180	0.83	0.149	0.880	16.62	0.45	79.56	195	70.9	600	1.47	744	2.63	26%
A1	EX.S4	6	41.900	0.10	4.190	4.190	30.00	0.17	53.94	628	41.0	1200	1.37	4563	4.03	14%
-	6	7	0.000	0.00	0.000	4.190	30.17	0.21	53.73	626	48.2	1200	1.23	4324	3.82	14%
9	Block 4	7	0.893	0.50	0.447	0.447	15.00	-	84.68	105						
7	4	7	0.140	0.83	0.116	0.563	15.00	0.11	84.68	132	13.5	375	1.54	218	1.97	61%
-	7	14	0.000	0.00	0.000	5.714	30.17	0.30	53.73	853	68.6	1200	1.19	4253	3.76	20%
18	13	14	0.240	0.75	0.180	0.180	15.00	0.68	84.68	42	68.7	300	1.5	118	1.68	36%
11A	Trib 11A	11	0.400	0.25	0.100	0.100	15.00	-	84.68	24	-	-	-	-	-	-
11	Block 7	11	1.020	0.50	0.510	0.610	15.00	-	84.68	144	-	-	-	-	-	-
13	Block 5	12	0.984	0.50	0.492	0.492	15.00	-	84.68	116	-	-	-	-	-	-
12	B7	11	0.170	0.90	0.153	0.763	15.00	1.06	84.68	180	89.7	525	0.5	304	1.40	59%
14	11	12	0.060	0.90	0.054	1.255	16.06	0.50	81.25	283	48.3	600	0.56	459	1.63	62%
8	8	9	0.060	0.83	0.050	0.813	15.00	0.39	84.68	191	40.6	525	0.78	380	1.75	50%
10	9	12	0.100	0.83	0.083	0.896	15.39	0.50	83.40	208	46.4	600	0.5	434	1.54	48%
15	12	14	0.170	0.85	0.145	2.295	16.06	0.74	81.25	518	95.9	750	0.74	958	2.17	54%
16	Trib 16	14	0.400	0.25	0.100	0.100	15.00	-	84.68	24	-	-	-	-	-	-
17	Trib 17	14	0.650	0.25	0.163	0.163	15.00	-	84.68	38	-	-	-	-	-	-
18	13	14	0.240	0.75	0.180	0.180	15.00	0.68	84.68	42	68.7	300	1.5	118	1.68	36%
-	14	15	0.000	0.00	0.000	8.631	30.47	0.26	53.35	1280	57.2	1200	1.14	4163	3.68	31%
21	Block 6	16	0.819	0.50	0.410	0.410	15.00	-	84.68	96	-	-	-	-	-	-
19	Block 3	16	0.473	0.50	0.237	0.237	15.00	-	84.68	56	-	-	-	-	-	-

20	15	16	0.170	0.90	0.153	9.430	30.73	0.17	53.04	1390	40.5	1200	1.26	4376	3.87	32%
-	16	17	0.000	0.00	0.000	9.430	30.73	0.17	53.04	1390	-	-	-	-	-	-
EX-ROAD	17	4	0.891	0.75	0.668	0.668	15.00		84.68	157	-	-	-	-	-	-
EX-LOT	17	4	4.412	0.75	3.309	3.309	15.00		84.68	779	-	-	-	-	-	-
-	17	4	0.000	0.00	0.000	13.408	30.91	0.16	52.83	1969	28.4	1200	0.78	3443	3.04	57%
-	4	5	0.000	0.00	0.000	13.408	31.06	0.39	52.64	1962	71.8	1200	0.78	3443	3.04	57%
-	5	6	0.000	0.00	0.000	13.408	31.45	0.96	52.18	1945	140.7	1200	0.5	2757	2.44	71%
-																
-																

Modified Rational Method

Project:	1755 & 1805 Pickering PKWY	Date:	4/2/2024
Project No.:	20266		
Municipality:	Pickering		
Catchment No.	Block 1		

Area (ha):	0.936		100-year Rainfall	
Runoff Coefficient:	0.500		Intensity (I) :	A/(T+B)^C
100-Yr Runoff Coefficient:		0.900	A:	2096.43
*Target Flow (m3/s):	0.110	(5-yr Allowable)	B:	6.485
			C:	0.863

Initial Time:	15 min
Increment:	5 min

Time	I	Peak Flow	Runoff Vol.	Discharge Vol.	Storage
min	mm/hr	m3/s	m3	m3	m3
15	148.5	0.348	313.1	99	214.1
20	124.0	0.290	348.5	132	216.5
25	106.8	0.250	375.2	165	210.2
30	94.1	0.220	396.5	198	198.5
35	84.2	0.197	414.0	231	183.0
40	76.3	0.179	428.9	264	164.9
45	69.9	0.164	441.8	297	144.8
50	64.5	0.151	453.2	330	123.2
60	56.0	0.131	472.4	396	76.4
65	52.6	0.123	480.8	429	51.8
70	49.7	0.116	488.4	462	26.4
75	47.0	0.110	495.4	495	0.4
80	44.7	0.105	502.0	528	-26.0
85	42.5	0.100	508.1	561	-52.9
90	40.6	0.095	513.9	594	-80.1

* Target Flow is calculated based on 5-year storm event-Rational Method

I5= 1082.901/(T+6.007)^0.837
Tc= 15 min
I5=84.68 mm/hr.

ORIFICE DISCHARGE CALCULATOR - SWM TANK - BLK 1

This program calculates the discharge from a circular orifice when given elevations and orifice diameters by the user.

Discharge based on orifice equ.: Q = CA x sqrt(2gh)

Tank Area
145 m2

Q-allowable
110 l/s

Orifice Diameter = 0.1750 m
Orifice Area = 0.0241 m2
Discharge Coeff. = 0.8000

	Head (m)	Discharge(m3/s)	Discharge (L/s)	Vol (m3)
	0	0.0000	0	0
	0.20	0.0381	38	29
	0.40	0.0539	54	58
	0.80	0.0762	76	116
	1.00	0.0852	85	145
100-year	1.52	0.1051	105	220
Top of Tank (free board)	1.80	0.1144	114	261

Modified Rational Method

Project:	1755 & 1805 Pickering PKWY	Date:	4/2/2024
Project No.:	20266		
Municipality:	Pickering		
Catchment No.	Block 2		

Area (ha):	1.288		100-year Rainfall	
Runoff Coefficient:	0.500		Intensity (I) :	A/(T+B)^C
100-Yr Runoff Coefficient:		0.900	A:	2096.43
*Target Flow (m3/s):	0.151	(5-yr Allowable)	B:	6.485
			C:	0.863

Initial Time:	15 min
Increment:	5 min

Time	I	Peak Flow	Runoff Vol.	Discharge Vol.	Storage
min	mm/hr	m3/s	m3	m3	m3
15	148.5	0.479	430.8	135.9	294.9
20	124.0	0.400	479.5	181.2	298.3
25	106.8	0.344	516.3	226.5	289.8
30	94.1	0.303	545.6	271.8	273.8
35	84.2	0.271	569.7	317.1	252.6
40	76.3	0.246	590.2	362.4	227.8
45	69.9	0.225	607.9	407.7	200.2
50	64.5	0.208	623.6	453	170.6
60	56.0	0.181	650.1	543.6	106.5
65	52.6	0.170	661.5	588.9	72.6
70	49.7	0.160	672.1	634.2	37.9
75	47.0	0.152	681.8	679.5	2.3
80	44.7	0.144	690.8	724.8	-34.0
85	42.5	0.137	699.2	770.1	-70.9
90	40.6	0.131	707.1	815.4	-108.3

* Target Flow is calculated based on 5-year storm event-Rational Method

I5= 1082.901/(T+6.007)^0.837
Tc= 15 min
I5=84.68 mm/hr.

ORIFICE DISCHARGE CALCULATOR - SWM TANK - BLK 2

This program calculates the discharge from a circular orifice when given elevations and orifice diameters by the user.

Discharge based on orifice equ.: Q = CA x sqrt(2gh)

Tank Area
180 m2

Q-allowable
151 l/s

Orifice Diameter = 0.2000 m
Orifice Area = 0.0314 m2
Discharge Coeff. = 0.8000

	Head (m)	Discharge(m3/s)	Discharge (L/s)	Vol (m3)
	0	0.0000	0	0
	0.20	0.0498	50	36
	0.40	0.0704	70	72
	0.80	0.0996	100	144
	1.00	0.1113	111	180
100-year	1.67	0.1439	144	301
Top of Tank (free board)	2.00	**0.1574**	157	360

Modified Rational Method

Project:	1755 & 1805 Pickering PKWY	Date:	4/2/2024
Project No.:	20266		
Municipality:	Pickering		
Catchment No.	Block 3		

Area (ha):	0.473		100-year Rainfall	
Runoff Coefficient:	0.500		Intensity (I) :	A/(T+B)^C
100-Yr Runoff Coefficient:		0.900	A:	2096.43
*Target Flow (m3/s):	0.056	(5-yr Allowable)	B:	6.485
			C:	0.863

Initial Time:	15 min
Increment:	5 min

Time	I	Peak Flow	Runoff Vol.	Discharge Vol.	Storage
min	mm/hr	m3/s	m3	m3	m3
15	148.5	0.176	158.2	50.4	107.8
20	124.0	0.147	176.1	67.2	108.9
25	106.8	0.126	189.6	84	105.6
30	94.1	0.111	200.4	100.8	99.6
35	84.2	0.100	209.2	117.6	91.6
40	76.3	0.090	216.7	134.4	82.3
45	69.9	0.083	223.3	151.2	72.1
50	64.5	0.076	229.0	168	61.0
60	56.0	0.066	238.7	201.6	37.1
65	52.6	0.062	242.9	218.4	24.5
70	49.7	0.059	246.8	235.2	11.6
75	47.0	0.056	250.4	252	-1.6
80	44.7	0.053	253.7	268.8	-15.1
85	42.5	0.050	256.8	285.6	-28.8
90	40.6	0.048	259.7	302.4	-42.7

* Target Flow is calculated based on 5-year storm event-Rational Method

I5= 1082.901/(T+6.007)^0.837
Tc= 15 min
I5=84.68 mm/hr.

ORIFICE DISCHARGE CALCULATOR - SWM TANK - BLK 3

This program calculates the discharge from a circular orifice when given elevations and orifice diameters by the user.

Discharge based on orifice equ.: Q = CA x sqrt(2gh)

Tank Area
70 m2

Q-allowable
59

Orifice Diameter = 0.1250 m
Orifice Area = 0.0123 m2
Discharge Coeff. = 0.8000

	Head (m)	Discharge(m3/s)	Discharge (L/s)	Vol (m3)
	0	0.0000	0	0
	0.20	0.0194	19	14
	0.40	0.0275	28	28
	0.80	0.0389	39	56
	1.00	0.0435	43	70
	1.20	0.0476	48	84
100-year	1.59	0.0548	55	111
Top of Tank (free board)	1.90	**0.0599**	60	133

Modified Rational Method

Project:	1755 & 1805 Pickering PKWY	Date:	4/2/2024
Project No.:	20266		
Municipality:	Pickering		
Catchment No.	Block 4		

Area (ha):	0.893		100-year Rainfall	
Runoff Coefficient:	0.500		Intensity (I) :	A/(T+B)^C
100-Yr Runoff Coefficient:		0.900	A:	2096.43
*Target Flow (m3/s):	0.105	(5-yr Allowable)	B:	6.485
			C:	0.863

Initial Time: 15 min
Increment: 5 min

Time	I	Peak Flow	Runoff Vol.	Discharge Vol.	Storage
min	mm/hr	m3/s	m3	m3	m3
15	148.5	0.332	298.8	94.5	204.3
20	124.0	0.277	332.6	126	206.6
25	106.8	0.239	358.1	157.5	200.6
30	94.1	0.210	378.4	189	189.4
35	84.2	0.188	395.1	220.5	174.6
40	76.3	0.171	409.3	252	157.3
45	69.9	0.156	421.6	283.5	138.1
50	64.5	0.144	432.5	315	117.5
60	56.0	0.125	450.9	378	72.9
65	52.6	0.118	458.8	409.5	49.3
70	49.7	0.111	466.1	441	25.1
75	47.0	0.105	472.8	472.5	0.3
80	44.7	0.100	479.1	504	-24.9
85	42.5	0.095	484.9	535.5	-50.6
90	40.6	0.091	490.4	567	-76.6

* Target Flow is calculated based on 5-year storm event-Rational Method

I5= 1082.901/(T+6.007)^0.837
Tc= 15 min
I5=84.68 mm/hr.

ORIFICE DISCHARGE CALCULATOR - SWM TANK - BLK 4

This program calculates the discharge from a circular orifice when given elevations and orifice diameters by the user.

Discharge based on orifice equ.: Q = CA x sqrt(2gh)

Tank Area
140 m2

Q-allowable
105 l/s

Orifice Diameter = 0.1750 m
Orifice Area = 0.0241 m2
Discharge Coeff. = 0.8000

	Head (m)	Discharge(m3/s)	Discharge (L/s)	Vol (m3)
	0	0.0000	0	0
	0.20	0.0381	38	28
	0.40	0.0539	54	56
	0.80	0.0762	76	112
	1.00	0.0852	85	140
	1.20	0.0934	93	168
100-year	1.49	0.1040	104	209
Top of Tank (free board)	1.80	0.1144	114	252

Modified Rational Method

Project:	1755 & 1805 Pickering PKWY	Date:	4/2/2024
Project No.:	20266		
Municipality:	Pickering		
Catchment No.	Block 5		

Area (ha):	0.984		100-year Rainfall	
Runoff Coefficient:	0.500		Intensity (I) :	A/(T+B)^C
100-Yr Runoff Coefficient:		0.900	A:	2096.43
*Target Flow (m3/s):	0.116	(5-yr Allowable)	B:	6.485
			C:	0.863

Initial Time:	15 min
Increment:	5 min

Time	I	Peak Flow	Runoff Vol.	Discharge Vol.	Storage
min	mm/hr	m3/s	m3	m3	m3
15	148.5	0.366	329.2	104.4	224.8
20	124.0	0.305	366.4	139.2	227.2
25	106.8	0.263	394.5	174	220.5
30	94.1	0.232	416.9	208.8	208.1
35	84.2	0.207	435.3	243.6	191.7
40	76.3	0.188	451.0	278.4	172.6
45	69.9	0.172	464.6	313.2	151.4
50	64.5	0.159	476.5	348	128.5
60	56.0	0.138	496.8	417.6	79.2
65	52.6	0.130	505.5	452.4	53.1
70	49.7	0.122	513.5	487.2	26.3
75	47.0	0.116	521.0	522	-1.0
80	44.7	0.110	527.9	556.8	-28.9
85	42.5	0.105	534.3	591.6	-57.3
90	40.6	0.100	540.3	626.4	-86.1

* Target Flow is calculated based on 5-year storm event-Rational Method

I5= 1082.901/(T+6.007)^0.837
Tc= 15 min
I5=84.68 mm/hr.

ORIFICE DISCHARGE CALCULATOR - SWM TANK - BLK 5

This program calculates the discharge from a circular orifice when given elevations and orifice diameters by the user.

Discharge based on orifice equ.: Q = CA x sqrt(2gh)

Tank Area
162 m2

Q-allowable
116 l/s

Orifice Diameter = 0.1750 m
Orifice Area = 0.0241 m2
Discharge Coeff. = 0.8000

	Head (m)	Discharge(m3/s)	Discharge (L/s)	Vol (m3)
	0	0.0000	0	0
	0.20	0.0381	38	32
	0.40	0.0539	54	65
	0.80	0.0762	76	130
	1.00	0.0852	85	162
100-year	1.48	0.1035	104	239
Top of Tank (free board)	1.80	0.1144	114	292

Modified Rational Method

Project:	1755 & 1805 Pickering PKWY	Date:	4/2/2024
Project No.:	20266		
Municipality:	Pickering		
Catchment No.	Block 6		

Area (ha):	0.819		100-year Rainfall	
Runoff Coefficient:	0.500		Intensity (I) :	A/(T+B)^C
100-Yr Runoff Coefficient:		0.900	A:	2096.43
*Target Flow (m3/s):	0.096	(5-yr Allowable)	B:	6.485
			C:	0.863

Initial Time:	15 min
Increment:	5 min

Time	I	Peak Flow	Runoff Vol.	Discharge Vol.	Storage
min	mm/hr	m3/s	m3	m3	m3
15	148.5	0.304	273.9	86.4	187.5
20	124.0	0.254	304.9	115.2	189.7
25	106.8	0.219	328.3	144	184.3
30	94.1	0.193	346.9	172.8	174.1
35	84.2	0.173	362.3	201.6	160.7
40	76.3	0.156	375.3	230.4	144.9
45	69.9	0.143	386.6	259.2	127.4
50	64.5	0.132	396.5	288	108.5
60	56.0	0.115	413.4	345.6	67.8
65	52.6	0.108	420.7	374.4	46.3
70	49.7	0.102	427.3	403.2	24.1
75	47.0	0.096	433.5	432	1.5
80	44.7	0.092	439.3	460.8	-21.5
85	42.5	0.087	444.6	489.6	-45.0
90	40.6	0.083	449.6	518.4	-68.8

* Target Flow is calculated based on 5-year storm event-Rational Method

I5= 1082.901/(T+6.007)^0.837
Tc= 15 min
I5=84.68 mm/hr.

ORIFICE DISCHARGE CALCULATOR - SWM TANK - BLK 6

This program calculates the discharge from a circular orifice when given elevations and orifice diameters by the user.

Discharge based on orifice equ.: Q = CA x sqrt(2gh)

Tank Area
160 m2

Q-allowable
96 l/s

Orifice Diameter = 0.1750 m
Orifice Area = 0.0241 m2
Discharge Coeff. = 0.8000

	Head (m)	Discharge(m3/s)	Discharge (L/s)	Vol (m3)
	0	0.0000	0	0
	0.20	0.0381	38	32
	0.40	0.0539	54	64
	0.80	0.0762	76	128
	1.00	0.0852	85	160
100-year	1.19	0.0930	93	190
Top of Tank (free board)	1.50	0.1044	104	240

Modified Rational Method

Project:	1755 & 1805 Pickering PKWY	Date:	4/2/2024
Project No.:	20266		
Municipality:	Pickering		
Catchment No.	Block 7		

Area (ha):	1.416		100-year Rainfall	
Runoff Coefficient:	0.500		Intensity (I) :	A/(T+B)^C
100-Yr Runoff Coefficient:		0.900	A:	2096.43
*Target Flow (m3/s):	0.167	(5-yr Allowable)	B:	6.485
			C:	0.863

Initial Time: 15 min
Increment: 5 min

Time	I	Peak Flow	Runoff Vol.	Discharge Vol.	Storage
min	mm/hr	m3/s	m3	m3	m3
15	148.5	0.526	473.6	150.3	323.3
20	124.0	0.439	527.2	200.4	326.8
25	106.8	0.378	567.6	250.5	317.1
30	94.1	0.333	599.8	300.6	299.2
35	84.2	0.298	626.3	350.7	275.6
40	76.3	0.270	648.9	400.8	248.1
45	69.9	0.248	668.4	450.9	217.5
50	64.5	0.229	685.5	501	184.5
60	56.0	0.199	714.7	601.2	113.5
65	52.6	0.186	727.3	651.3	76.0
70	49.7	0.176	738.8	701.4	37.4
75	47.0	0.167	749.5	751.5	-2.0
80	44.7	0.158	759.4	801.6	-42.2
85	42.5	0.151	768.7	851.7	-83.0
90	40.6	0.144	777.4	901.8	-124.4

* Target Flow is calculated based on 5-year storm event-Rational Method

I5= 1082.901/(T+6.007)^0.837
Tc= 15 min
I5=84.68 mm/hr.

ORIFICE DISCHARGE CALCULATOR - SWM TANK - BLK 7

This program calculates the discharge from a circular orifice when given elevations and orifice diameters by the user.

Discharge based on orifice equ.: Q = CA x sqrt(2gh)

Tank Area
300 m2

Q-allowable
167 l/s

Orifice Diameter = 0.2250 m
Orifice Area = 0.0398 m2
Discharge Coeff. = 0.8000

	Head (m)	Discharge(m3/s)	Discharge (L/s)	Vol (m3)
	0	0.0000	0	0
	0.20	0.0630	63	60
	0.40	0.0891	89	120
	0.80	0.1260	126	240
	1.00	0.1409	141	300
100-year	1.13	0.1494	149	338
Top of Tank (free board)	1.43	0.1685	168	429

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Jellyfish® Filter

Developed by Imbrium Systems, Inc.,
Whitby, Ontario, Canada

Registration: GPS-ETV_VR2023-08-31_Imbrium-JF

In accordance with

ISO 14034:2016

Environmental Management —
Environmental Technology Verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

August 15, 2023
Vancouver, BC, Canada

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

Technology description and application

The Jellyfish® Filter is an engineered stormwater quality treatment technology designed to remove a variety of stormwater pollutants including floatable trash and debris, oil, coarse and fine suspended sediments, and particulate-bound pollutants such as nutrients, heavy metals, and hydrocarbons. The Jellyfish Filter combines gravitational pre-treatment (sedimentation and floatation) and membrane filtration in a single compact structure. The system utilizes membrane filtration cartridges comprised of multiple pleated filter elements ("filtration tentacles") that provide high filtration surface area with the associated advantages of high flow rate, high sediment capacity, and low filtration flux rate.

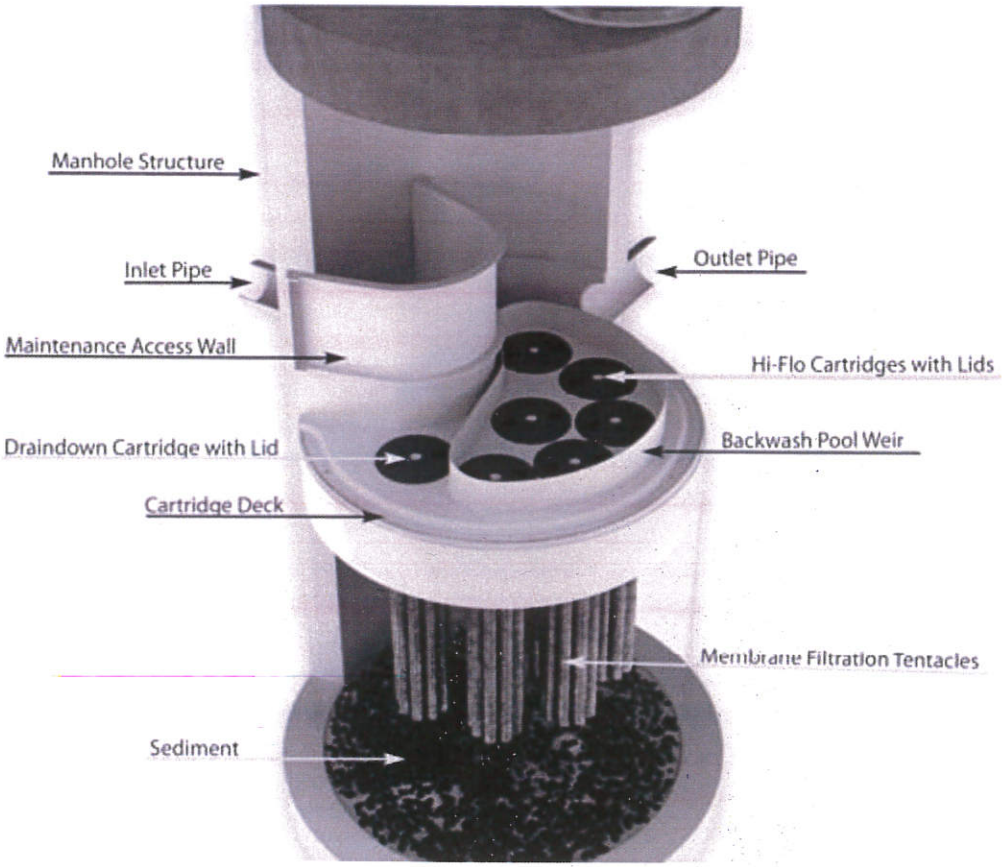


Figure 1. Cut-away graphic of a Jellyfish® Filter manhole with 6 hi-flo cartridges and 1 draindown cartridge

Figure 1 depicts a cut-away graphic of a typical 6-ft diameter Jellyfish® Filter manhole with 6 hi-flo cartridges and 1 draindown cartridge (JF6-6-1). Stormwater influent enters the system through the inlet pipe and builds a pond behind the maintenance access wall, with the pond elevation providing driving head. Flow is channeled downward into the lower chamber beneath the cartridge deck. A flexible separator skirt (not shown in the graphic) surrounds the filtration zone where the filtration tentacles of each cartridge are suspended, and the volume between the vessel wall and the outside surface of the separator skirt comprises a pretreatment channel. As flow spreads throughout the pretreatment channel, floatable pollutants accumulate at the surface of the pond behind the maintenance access wall and also beneath the cartridge deck in the pretreatment channel, while coarse sediments settle to the sump. Flow proceeds under the separator skirt and upward into the filtration zone, entering each filtration tentacle and depositing fine suspended sediment and associated particulate-bound pollutants on the outside surface of the membranes. Filtered water proceeds up the center tube of each tentacle, with the flow from each tentacle combining under the cartridge lid, and discharging to the top of the

cartridge deck through the cartridge lid orifice. Filtered effluent from the hi-flo cartridges enters a pool enclosed by a 15-cm high weir, and if storm intensity and resultant driving head is sufficient, filtered water overflows the weir and proceeds across the cartridge deck to the outlet pipe. Filtered effluent discharging from the draindown cartridge(s) passes directly to the outlet pipe, and requires only a minimal amount of driving head (2.5 cm) to provide forward flow. As storm intensity subsides and driving head drops below 15 cm, filtered water within the backwash pool reverses direction and passes backward through the hi-flo cartridges, and thereby dislodges sediment from the membranes which subsequently settles to the sump below the filtration zone. During this passive backwashing process, water in the lower chamber is displaced only through the draindown cartridge(s). Additional self-cleaning processes include gravity, as well as vibrational pulses emitted when flow exits the orifice of each cartridge lid, and these combined processes significantly extend the cartridge service life and maintenance cleaning interval. Sediment removal from the sump by vacuum is required when sediment depths reach 30 cm, and cartridges are typically removed, externally rinsed, and recommissioned on an annual basis, or as site-specific maintenance conditions require. Filtration tentacle replacement is typically required every 3 – 5 years.

Performance conditions

The data and results published in this Technology Fact Sheet were obtained from a field monitoring program conducted on a Jellyfish® Filter JF4-2-1 (4-ft diameter manhole with 2 hi-flo cartridges and 1 draindown cartridge), in accordance with the provisions of the TARP Tier II Protocol (TARP, 2003) and New Jersey Tier II Stormwater Test Requirements—Amendments to TARP Tier II Protocol (NJDEP, 2009). Testing was completed by researchers led by Dr. John Sansalone at the University of Florida's Engineering School of Sustainable Infrastructure and Environment. The drainage area providing stormwater runoff to the test unit varied between 502 m^2 and 799 m^2 (5400 ft^2 to 8600 ft^2) depending on storm intensity and wind direction. The unit was monitored for a total of 25 TARP qualifying storm events (i.e. $\geq$ 2.5 mm of rainfall) contributing cumulative rainfall of 381 mm (15 in) over the 13-month period between May 28, 2010 and June 27, 2011. Only TARP-qualified storms were routed through the unit, and maintenance was not required during the testing period based on sediment accumulation less than the depth indicated for maintenance, and also based on hydraulic testing performed on the system after the conclusion of monitoring.

Table 1 shows the specified and achieved amended TARP criteria for storm selection and sampling.
Table 2 shows the observed ranges of operational conditions that occurred over the testing period.

Table 1. Specified and achieved amended TARP criteria for storm selection and sampling

Description	Criteria value	Achieved value
Total rainfall	$\geq$ 2.5 mm (0.1 in)	> 2.5 mm (0.1 in)
Minimum inter-event period	6 hrs	10 hrs
Minimum flow-weighted composite sample storm coverage	70% including as much of the first 20% of the storm	100%
Minimum influent/effluent samples	10, but a minimum of 5 subsamples for composite samples	Minimum of 8 subsamples for composite samples
Total sampled rainfall	Minimum 381 mm (15 in)	384 mm (15.01 in)
Number of storms	Minimum 20	25

Table 2. Observed operational conditions for events monitored over the study period

Operational condition	Observed range
Storm durations	26 – 691 min
Previous dry hours	10 - 910 hrs
Rainfall depth	3 – 50 mm
Initial rainfall to runoff lag time	1 – 34 min
Runoff volume	206 – 13,229 L
Peak rainfall intensity	5 – 137 mm/hr
Peak runoff flow rate	0.5 – 14.3 L/s
Event median flow rate	0.01 – 5.5 L/s

The 4-ft diameter test unit has sedimentation surface area of 1.17 m^2 (12.56 ft^2). Each of the three filter cartridges employed in the test unit uses filtration tentacles of 137 cm (54 in) length, with filter surface area of 35.4 m^2 (381 ft^2) per cartridge, and total filter surface area of 106.2 m^2 (1143 ft^2) for the three cartridges combined. The design treatment flow rate is 5 L/s (80 gal/min) for each of the two hi-flo cartridges and 2.5 L/s (40 gal/min) for the single draindown cartridge, for a total design treatment flow rate of 12.6 L/s (200 gal/min) at design driving head of 457 mm (18 in). This translates to a filtration flux rate (flow rate per unit filter surface area) of 0.14 L/s/m^2 (0.21 gal/min/ft^2) for each hi-flo cartridge and 0.07 L/s/m^2 (0.11 gal/min/ft^2) for the draindown cartridge. The design flow rate for each cartridge is controlled by the sizing of the orifice in the cartridge lid. The distance from the bottom of the filtration tentacles to the sump is 61 cm (24 in).

Performance claims

The Jellyfish® Filter demonstrated the removal efficiencies indicated in **Table 3** for respective constituents during field monitoring of 25 TARP qualified storm events with cumulative rainfall of 381 mm, conducted in accordance with the provisions of the TARP Tier II Protocol (TARP, 2003) and New Jersey Tier II Stormwater Test Requirements—Amendments to TARP Tier II Protocol (NJDEP, 2009), and using the following design parameters:

- System hydraulic loading rate (system treatment flow rate per unit of sedimentation surface area) of 10.8 L/s/m^2 (15.9 gal/min/ft^2) or lower
- Filtration flux rate (flow rate per unit filter surface area) of 0.14 L/s/m^2 (0.21 gal/min/ft^2) or lower for each hi-flo cartridge and 0.07 L/s/m^2 (0.11 gal/min/ft^2) or lower for each draindown cartridge
- Distance from the bottom of the filtration tentacles to the sump of 61 cm (24 in) or greater
- Driving head of 457 mm (18 in) or greater

Table 3. Mean, median and 95% confidence interval (median) for removal efficiencies of selected stormwater constituents

Parameter	Mean	Median	Median - 95% Lower Limit	Median - 95% Upper Limit
TSS	84.7	85.6	82.8	89.8
SSC	97.5	98.3	97.1	98.7
Total phosphorus	48.8	49.1	43.3	60.1
Total nitrogen	37.9	39.3	31.2	54.6
Zinc	55.3	69	39	75
Copper	83.0	91.7	75.1	98.9
Oil and grease	60.1	60	42.7	100

N.B. As with any field test of stormwater treatment devices, removal efficiencies will vary based on pollutant influent concentrations and other site specific conditions.

❖The performance claims can be applied to other Jellyfish® Filter models smaller or larger than the tested model as long as the untested models are designed in accordance with the design parameters specified in the performance claims.

Performance results

The frequency of rainfall depths monitored during the study is presented in **Figure 2**. The median and 90th percentile rainfall depths were 11 mm and 31.7 mm, respectively. These values represent the depth of rainfall that is not exceeded in 50 and 90 percent of the monitored rainfall events.

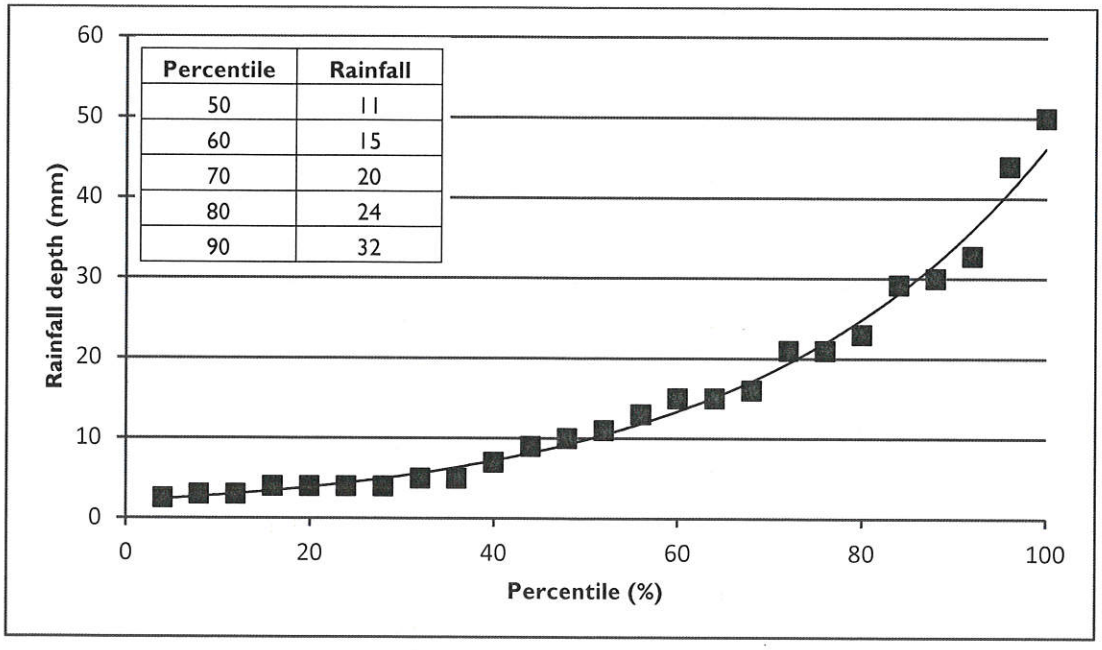


Figure 2. Rainfall depth frequency curve

Sediment removal performance was assessed by measuring the event mean concentration and mass of suspended sediment entering and leaving the unit during runoff events. This involved sampling the full cross-section of influent and effluent flows manually at 2 - 10 minute intervals for the full duration of each storm event and combining discrete samples into flow-weighted composites. Comparing the theoretical mass recovery from the sump calculated by the difference between the influent and effluent mass to the actual dry weight of the recovered sump mass showed an overall mass balance recovery of 94.5% over the study period.

The median d50 particle size (i.e. 50th percentile particle size) of the influent and effluent was 82 and 3 µm, respectively (**Figure 3**). The median influent particles sizes ranged between 22 and 263 µm, whereas median effluent particle sizes ranged between 1 and 11 µm.

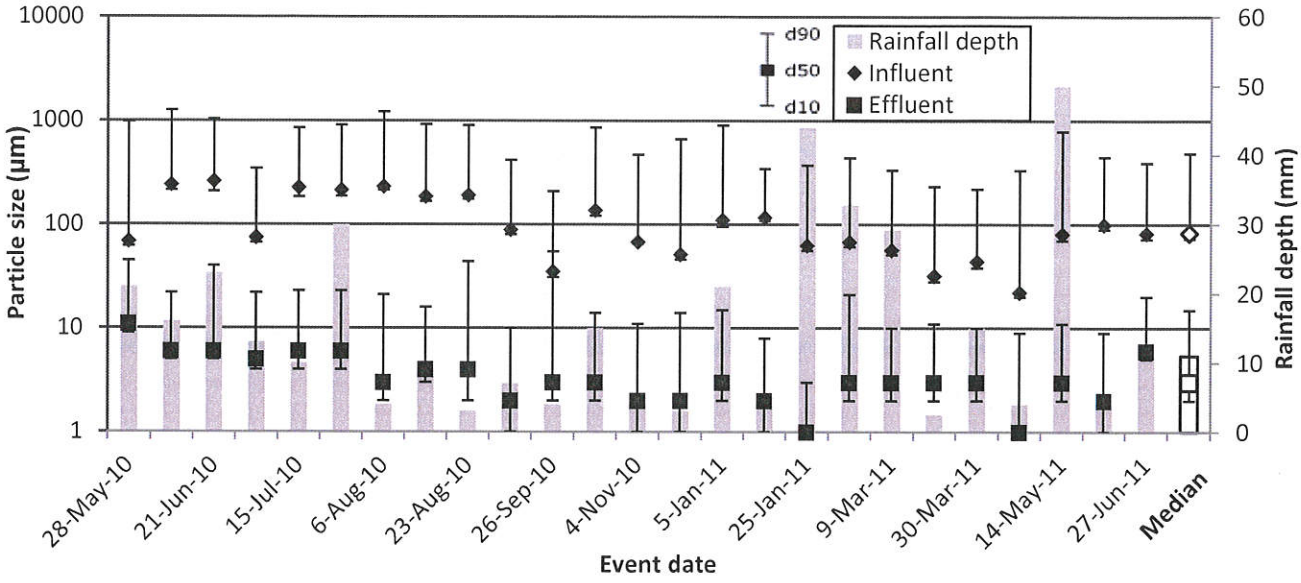


Figure 3. The rainfall depth and d10, d50, and d90 particle sizes of the influent and effluent composite samples for each monitored storm event over the 13-month testing period

Sampling of flows into and out of the Jellyfish Filter over the testing period showed statistically significant reductions ($p < 0.05$; Wilcoxon signed-rank test) in influent event mean concentrations for all selected stormwater constituents (**Table 4** and **Figure 4**). Effluent event mean Suspended Sediment Concentrations (SSC) were below 19 mg/L during all monitored events. Load-based removal rates were also calculated based on the sum of loads over the study period. These removal rages ranged from 46.3 for Total Nitrogen to 98.6 for SSC (**Table 4**).

Table 4. Summary statistics for influent and effluent event mean concentrations for selected constituents

Water Quality Variable	Sampling Location	Min	Max	Median	Range	Mean	SD	Load based removal efficiency (%)
TSS	Influent (mg/L)	16.30	261.00	79.30	244.70	86.26	51.37	87.2
	Effluent (mg/L)	3.20	21.70	11.80	18.50	10.99	4.79	
SSC	Influent (mg/L)	78.20	1401.70	444.50	1323.50	482.26	338.34	98.6
	Effluent (mg/L)	2.80	18.10	7.30	15.30	7.88	3.77	
TP	Influent (µg/L)	887.00	8793.00	3063.00	7906.00	3550.20	1914.50	64.2
	Effluent (µg/L)	472.00	4769.00	1480.00	4297.00	1688.08	1059.98	
TN	Influent (µg/L)	1170.00	10479.00	3110.00	9309.00	3519.32	2161.47	46.3
	Effluent (µg/L)	553.00	6579.00	1610.00	6026.00	2091.76	1613.61	
Zn	Influent (µg/L)	0.005	7600.00	1500.00	7600.00	1792.00	1852.91	76.1
	Effluent (µg/L)	0.005	2760.00	450.00	2760.00	561.64	594.70	
Cu	Influent (µg/L)	0.001	880.40	79.50	880.40	171.28	229.33	92.1
	Effluent (µg/L)	0.001	51.30	6.90	51.30	14.36	17.22	
Oil and Grease	Influent (mg/L)	0.20	4.06	0.93	3.86	1.07	0.82	46.4
	Effluent (mg/L)	0.00	2.32	0.35	2.32	0.50	0.60	

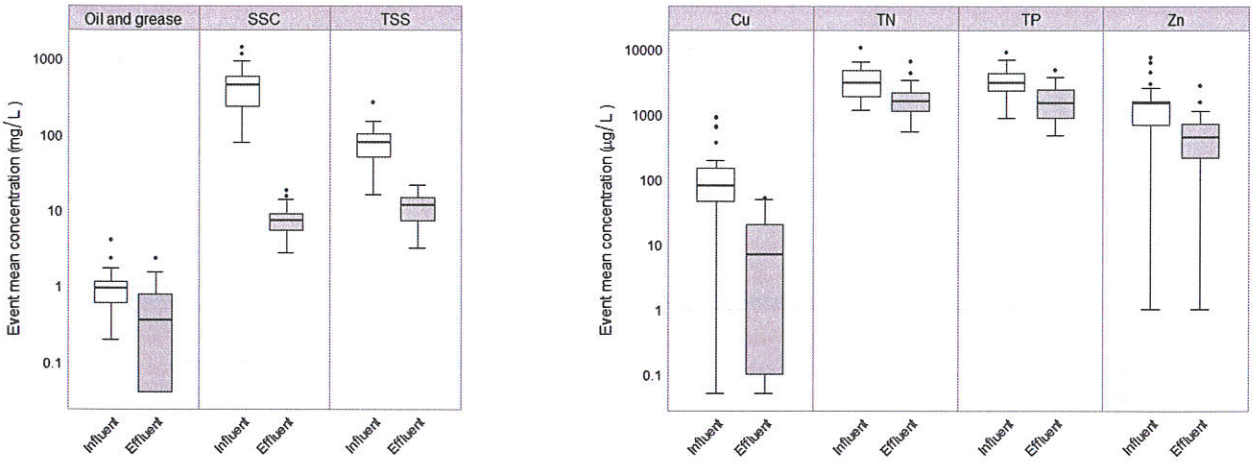


Figure 4. Boxplots showing the distribution of influent and effluent event mean concentrations (EMC) for selected stormwater constituents over the study period

Verification

The verification was completed by the Verification Expert, Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the International Standard ***ISO 14034:2016 Environmental Management -- Environmental Technology Verification (ETV)***. Data and information provided by Imbrium Systems to support the performance claim included the performance monitoring report prepared by University of Florida, Engineering School of Sustainable Infrastructure and Environment, and dated November 2011. This report is based on testing completed in accordance with the Technology Acceptance Reciprocity Partnership (TARP) Tier II Protocol (2003) and New Jersey Tier II Stormwater Test Requirements--Amendments to TARP Tier II Protocol (NJDEP, 2009).

What is ISO14034:2016 Environmental Management – Environmental Technology Verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for Environmental Technology Verification (ETV), and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on the Jellyfish® Filter please contact:

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407 Fairview Drive
Whitby, ON
L1N 3A9, Canada
Tel: 416-960-9900
info@imbriumsystems.com

For more information on ISO 14034:2016 / ETV please contact:

GLOBE Performance Solutions
404 – 999 Canada Place
Vancouver, BC
V6C 3E2 Canada
Tel: 604-695-5018 / Toll Free: 1-855-695-5018
etv@globeperformance.com

APPENDIX E

Figure S-1a – Conceptual Servicing Layout Plan
Figure S-1b – Conceptual Phase 1 Servicing Plan

Figure S-2 – Conceptual Grading Plans

Figure S-3 – Existing conditions Sanitary Tributary Plan
Figure S-4 – Phase 1 conditions Sanitary Tributary Plan
Figure S-5 – Conceptual conditions Sanitary Tributary Plan

Figure S-6 – Existing Storm Drainage Boundary Plan
Figure S-7 – Conceptual Storm Tributary Area Plan

Figure S-8 – Notion Road Profile – 450mm Interim Sanitary Sewers
Figure S-9 – Pickering Parkway – Profile 1/2
Figure S-10 – Pickering Parkway – Profile 2/2

City of Pickering Storm Tributary Area Plans
MTO Plan & Profiles

Pickering Pkwy

EXISTING MARK'S WORK WEARHOUSE

EXISTING RETTMAN'S

EXISTING McDONALD'S

EXISTING WAL-MART

EXISTING CANADIAN TIRE

BROCK ROAD

EXISTING 600mm DIA WATERMAIN

MH16A
RIM=84.43
SE INV=82.16 Out

PUT 118.5m 675mm SAN @ 0.40%

PROP STM MH17
RIM=85.49
SW INV=81.19 In
E INV=81.16 Out

PROP 42.06m 675mm
SAN @ 0.45%

PROP 28.39m 1200mm
CONC STM @ 0.78%

PROP 14.79m 1200mm
CONC STM @ 1.12%

MH9A
RIM=85.48
SINV=80.86 In
WINV=80.12 In
E INV=80.07 Out

PROP 14.30m 450mm SAN @ 0.72%

MH8A
RIM=85.37
EX T/G=85.74
SINV=81.00 In
N INV=80.97 Out

PROP 49.09m 675mm
SAN @ 0.45%

SAN MH 34-83
RIM=85.30
WINV=79.88 In
E INV=79.83 Out

EX MH4
RIM=85.29
W INV=80.94 In
E INV=80.94 Out

EX.MH090

EX 300mm W/M

PROP 99.99m 675mm SAN @ 0.45%

PROP 71.76m 1200mm STM @ 0.78%

EXISTING 600mm DIA WATERMAIN

SAN MH 34-82
RIM=85.73
NWINV=81.00 In
E INV=80.34 Out

PROP 29.89m 450mm
SAN @ 0.52%

MH7A
RIM=85.31
EX T/G=85.83
SINV=81.16 In
EINV=81.41 In
WINV=81.41 In
N INV=81.16 Out

PROP 45.41m 450mm
SAN @ 0.66%

MH1A-1
RIM=83.88
EX T/G=85.65
SINV=81.45 In
N INV=81.43 Out

PROP 19.04m 450mm
SAN @ 0.77%

MH6A
RIM=86.01
EX T/G=85.50
SINV=81.60 In
EINV=81.60 In
N INV=81.60 Out

PROP 71m 250mm
PVC STM @ 1.50%

PROP STM MH16
RIM=85.56
EX T/G=85.73
S INV=81.38 In
NE INV=81.36 Out

PROP 40.45m 1200mm STM @ 1.26%

RIM=85.45
EX T/G=85.67
S INV=81.92 In
N INV=81.89 Out
E INV=81.82 Out

PROP 57.17m 1200mm STM @ 1.14%

PROP STM MH14
RIM=85.99
PP?
S INV=82.60 In
E INV=83.17 In
W INV=83.32 In
SE INV=-1.01 In
SW INV=83.78 In
N INV=82.57 Out

PROP 95.87m 750mm
CONC STM @ 0.74%

PROP 77.92m 300mm
SAN @ 0.49%

EX MH5
RIM=84.82
W INV=80.90 In
SW INV=80.44 In
E INV=80.36 Out

SAN MH 35-5
RIM=84.75
WINV=79.38 In
E INV=79.33 Out

SAN MH 35-6
RIM=84.23
WINV=78.88 In
E INV=78.83 Out

EX MH6
RIM=168.24
W INV=79.65 In
NW INV=79.49 In
E INV=79.49 Out

PROP 82.45m 675mm SAN @ 0.45%

PROP 80.09m 675mm SAN @ 0.45%

EX 155.84m 1350mm CONC STM @ 0.33%

EX 140.65m 1200mm CONC STM @ 0.50%

PROP 99.80m 675mm SAN @ 0.45%

PICKERING PARKWAY

Beechlawn Dr

Marshcourt Dr

Ashford Dr

EX.MH018

EX.MH023

EX SAN MH 35-25

SAN MH 35-27

SAN MH35-26

BENCHMARK
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE TOWN OF PICKERING BENCH MARK No. 67-U-002
LOCATION:
TABLET IN SOUTHWEST CONCRETE FOUNDATION WALL AT THE NORTHWEST SIDE OF MAIN ENTRANCE TO THE TOWN OF PICKERING MUNICIPAL BUILDING. AND 0.53 METRES ABOVE GRADE.
ELEVATION:
PUBLISHED ELEVATION =87.581 metres.

NOTE:
NOTION ROAD PIPES INTERIM PHASE 1 ONLY

Notion Rd

MH14A
RIM=82.99
S INV=76.69 In
N INV=76.69 Out

PROP 100.00m 450mm SAN @ 0.22%

SAN MH 35-7
RIM=83.30
WINV=78.46 In
E INV=78.41 Out

SAN MH 35-8
RIM=83.34
WINV=78.05 In
E INV=77.44 Out

PROP 14.47m 675mm
SAN @ 0.40%

SAN MH 35-28
RIM=83.42
WINV=76.94 In
E INV=76.94 Out

PROP 110.13m 675mm SAN @ 0.45%

EX 83.45m 2100mm CONC STM @ 0.20%

EX 300mm W/M

PHASE 2/ULTIMATE CONNECT TO REGION TRUNK SEWER

PROP 300mm PVC W/M

EX 150 mm DIA SANITARY SEWER

EX 250 mm DIA SANITARY SEWER

BLOCK '3'
PROPOSED
7 STOREY PODIUM
PROPOSED RESIDENTIAL TOWER 3 *26 STOREYS*

BLOCK '6'
PROPOSED RESIDENTIAL TOWER 6B *7 STOREYS*
PROPOSED *7 STOREY PODIUM*
PROPOSED COMMERCIAL TOWER 6A *23 STOREYS*

METROPIA

METROPIA EXMH3A

OPEN SPACE (0.523 ha)

PROP STM MH1
RIM=89.64
EX T/G=89.41
S INV=-0.86 In
E INV=87.13 Out

PROP STM MH2
RIM=88.95
EX T/G=89.39
W INV=86.51 In
S INV=86.45 Out

PROP 33.14m 375mm
PVC STM @ 1.43%

PROP 62.83m 300mm
PVC STM @ 0.98%

PROP 300mm PVC W/M

5.15m WIDENING FUTURE 18.5m ROW

CONNECT TO EXISTING 600mm DIA WATERMAIN

PHASE 1

PHASE 2

PHASE 3

PHASE 4

PHASE 5

PHASE 7

POSSIBLE FUTURE CONNECTION

N73°23'00"E (N74°40'00"E P1)

N74°55'00"E

N74°00'20"E

N15°57'40"W

N16°50'40"W

N72°12'00"E

N72°29'00"E

N81°06'50"E

N57°27'00"E

N60°07'00"E

N89°47'30"E

N87°52'00"W (N87°50'20" P1)

N87°26'00"W

18.50 m R-o-W

PRIVATE DRIVEWAY

FIRE ROUTE

PUBLIC ROAD

6m EASEMENT

6m STORM EASEMENT

6m EASEMENT (WATER)

SEMENT (WATER)

PROP 300mm PVC W/M

PROP 48.27m 525mm STM @ 0.56%

PROP 90.04m 300mm SAN @ 0.44%

PROP 89.70m 525mm CONC STM @ 0.50%

PROP 66.06m 300mm SAN @ 0.74%

MH11A
RIM=87.12
EX T/G=85.60
EINV=82.47 In
W INV=82.47 Out
S INV=82.52 Out

PROP SAN MH B7A
RIM=86.92
EX T/G=85.71
W INV=82.87 Out

PROP STM MH B7
RIM=87.16
EX T/G=85.75
W INV=84.70 Out

PROP STM MH11
RIM=86.85
EX T/G=85.58
E INV=84.25 In
S INV=85.83 In
W INV=84.22 Out

PROP STM OGS B7
RIM=87.08
???

PROP STM MH (B5)
RIM=86.99
???
N INV=85.84 Out

PROP STM OGS B5
RIM=87.01
???

PROP 46.42m 600mm
STM @ 0.50%

PROP STM MH9
RIM=86.81
EX T/G=85.90
SW INV=84.21 In
N INV=84.16 Out

PROP STM MH8
RIM=87.26
EX T/G=86.01
NE INV=84.53 Out

PROP 40.61m 525mm STM @ 0.78%

PROP CBMH6
RIM=86.99
E INV=-0.89 In
NW INV=-0.99 Out

MH12A
RIM=86.17
EX T/G=85.07
EINV=81.98 In
W INV=81.98 Out

PROP 54.32m 250mm
PVC STM @ 0.11%

PROP 22.09m 250mm
SAN @ 1.45%

PROP 13.53m 375mm
PVC STM @ 1.54%

PROP STM MH4
RIM=86.66
EX T/G=86.68
S INV=85.05 In
W INV=84.91 Out

MH4A (1)
RIM=86.52
SINV=85.14 In
W INV=82.46 Out

PROP 11.76m 75mm
SAN @ 8.34%

Structure - (343)
RIM=86.91
N INV=86.12 Out

PROP STM MH B3
RIM=86.92
EX T/G=86.92
N INV=85.83 Out

PROP STM OGS B4
RIM=86.95
EX T/G=86.95

PROP STM MH13
RIM=87.21
EX T/G=86.97
E INV=84.35 Out

PROP 68.55m 1200mm
CONC STM @ 1.19%

PROP 37.57m 300mm
SAN @ 1.46%

MH5A
RIM=86.20 RK
EX T/G=85.90
SINV=82.14 In
N INV=82.14 Out

PROP 32.34m 300mm
SAN @ 1.91%

PROP 90.01m 300mm
SAN @ 0.72%

MH2A
RIM=86.12
EX T/G=89.90
WINV=83.84 In
E INV=83.84 Out

PROP 60.76m 300mm
SAN @ 0.70%

PROP 61.43m 525mm
CONC STM @ 0.85%

EX 150mm W/M

PROP 300mm PVC W/M

MH3A
RIM=88.19
EX T/G=87.84
WINV=83.41 In
E INV=83.41 Out

MH1A
RIM=85.76
E INV=84.02 Out
W INV=84.20 In
W INV=84.20 Out

PROP 11.35m 300mm
SAN @ 1.59%

PROP. STM. MH B1
RIM=89.03
N INV=88.05 Out

PROP. STM. OGS B1
RIM=89.04
N INV=85.77 Out

PROP STM MH5
RIM=88.87
EX T/G=89.90
S INV=87.61 In
N INV=85.98 In
E INV=85.77 Out

PROP STM MH3
RIM=87.93
EX T/G=87.89
W INV=85.25 In
S INV=86.68 In
E INV=85.13 Out

PROP STM MH B2
RIM=88.08
N INV=87.16 Out

PROP STM OGS B2
RIM=88.11

PROP 96.61m 600mm
STM @ 0.80%

MH4A
RIM=85.11
EX T/G=87.31
WINV=82.76 In
EINV=82.14 In
SINV=83.50 In
N INV=82.76 Out

PROP 11.82m 250mm
SAN @ 1.27%

PROP SAN MH BK2
RIM=87.20
N INV=83.65 Out

PROP STM MH7
RIM=86.60
EX T/G=86.80
SE INV=83.77 In
W INV=84.36 In
E INV=84.70 In
N INV=83.42 Out

EX MHS4
RIM=87.65
EX T/G=86.89
W INV=84.95 Out

PROP STM MH6
RIM=87.99
EX T/G=87.39
SE INV=84.39 In
NW INV=84.36 Out

PROP 40.99m 1200mm STM @ 1.37%

PUBLIC PARK

LANDSCAPE

Structure - (4345)

EX 84.56m 150mm PVC SAN @ 1.00%

SAN MH 35-33

EX 83.07m 375mm PVC SAN @ 1.00%

TRUNK SEWER TO BE DESIGNED BY REGIONAL MUNICIPALITY OF DURHAM

FUTURE PROPOSED PUMPING STATION BY REGIONAL MUNICIPALITY OF DURHAM

HIGHWAY ONTARIO 401 EXPRESS

14m SETBACK FROM HIGHWAY

BLOCK '1'
PHASE '1'
PROPOSED RESIDENTIAL TOWER 1A *31 STOREYS*
PROPOSED
7 STOREY PODIUM
PROPOSED RESIDENTIAL TOWER 1B *31 STOREYS*

BLOCK '2'
PHASE '2'
PROPOSED RESIDENTIAL TOWER 2A *24 STOREYS*
PROPOSED
7 STOREY PODIUM
PROPOSED RESIDENTIAL TOWER 2B *32 STOREYS*
PROPOSED
7 STOREY PODIUM
PROPOSED RESIDENTIAL TOWER 2C *43 STOREYS*

BLOCK '4'
PROPOSED RESIDENTIAL TOWER 4A *43 STOREYS*
PROPOSED
7 STOREY PODIUM
PROPOSED RESIDENTIAL TOWER 4B *32 STOREYS*
PROPOSED
7 STOREY PODIUM

BLOCK '5'
PROPOSED
5 STOREY PODIUM
PROPOSED RESIDENTIAL TOWER 5 *26 STOREYS*

BLOCK '7'
PROPOSED RESIDENTIAL TOWER 7 *20 STOREYS*
PROPOSED
5 STOREY PODIUM

LEGEND:

- EXISTING STORM MANHOLE
- PROPOSED STORM MANHOLE
- EXISTING CATCH BASIN MANHOLE
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED STORMCEPTOR
- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED SANITARY TRUNK SEWER (BY REGION)
- PROPOSED SANITARY SEWER
- FUTURE SANITARY SEWER (BY OTHERS)
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- PROPERTY LINE

1:1,000 0 10 20 40 70 100

FIGURE S-1a
CONCEPTUAL SERVICING LAYOUT PLAN

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
SEPT 2021	20266	1:1000

ODAN-DETECH CONSULTING ENGINEERS

The Odan/Detech Group Inc. P: (905) 632-3811 F: (905) 632-3363
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

P:\2020\20266\20266\2020\Drawings\01_Functional\02_FD_Production Dwgs\20266 - CONCEPTUAL SS ULTIMATE

LEGEND:

- EXISTING STORM MANHOLE
- PROPOSED STORM MANHOLE
- EXISTING CATCH BASIN MANHOLE
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED STORMCEPTOR
- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED SANITARY TRUNK SEWER (BY REGION)
- PROPOSED SANITARY SEWER
- FUTURE SANITARY SEWER (BY OTHERS)
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- PROPERTY LINE

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE TOWN OF PICKERING BENCH MARK No. 67-U-002

LOCATION :
TABLET IN SOUTHWEST CONCRETE FOUNDATION WALL AT THE NORTHWEST SIDE OF MAIN ENTRANCE TO THE TOWN OF PICKERING MUNICIPAL BUILDING. AND 0.53 METRES ABOVE GRADE.

ELEVATION:

EXISTING MARK'S WORK WEARHOUSE
EXISTING REITMAN'S
EXISTING McDONALD'S
EXISTING WAL-MART
EXISTING CANADIAN TIRE
EXISTING METROPIA

Pickering Pkwy
Brock Rd
Orchard Rd
Notion Rd
Ashford Dr
Beechlawn Dr
Marshcourt Dr
MARSHCOURT DRIVE
PICKERING PARKWAY
HWY 401

SAN MH 17
RIM=82.65
SINV=76.17 In

PROP 3.46m 450mmø CONC SAN @ 0.23%

SAN MH 35-30
RIM=82.67
SINV=76.30 In
N INV=76.18 Out

EX 67.10m 750mm CONC SAN @ 0.17%

PROP 71.49m 450mmø CONC SAN @ 0.42%

SAN MH 35-29
RIM=82.97
SINV=76.47 In
N INV=76.46 Out

PROP 101.76m 450mmø PVC SAN @ 0.22%

SAN MH35-26

MH14A
RIM=82.99
SINV=76.69 In
N INV=76.69 Out

PROP 100.00m 450mmø PVC SAN @ 0.22%

SAN MH 35-27

SAN MH 35-25

EX.MH023

EX.MH018

SAN MH 35-7
RIM=83.82
WINV=78.46 In
E INV=78.41 Out

SAN MH 35-8
RIM=83.34
WINV=78.05 In
E INV=77.44 Out

SAN MH 35-28
RIM=85.42
WINV=76.64 In
E INV=76.94 Out

SAN MH 35-6
RIM=84.23
WINV=78.88 In
E INV=78.83 Out

SAN MH 35-5
RIM=84.75
WINV=79.38 In
E INV=79.33 Out

SAN MH 34-82
RIM=85.73
WINV=80.98 In
E INV=80.34 Out

SAN MH 34-83
RIM=85.30
WINV=79.88 In
E INV=79.83 Out

MH9A
RIM=85.48
SINV=80.86 In
WINV=80.12 In
E INV=80.07 Out

ISOLATION VALVE

CONNECT TO EXISTING 300mm PVC WM

PROP 45.05m 675mmø PVC SAN @ 0.45%

PROP 42.06m 675mmø CONC SAN @ 0.45%

PROP 99.99m 675mmø CONC SAN @ 0.45%

PROP 82.43m 675mmø CONC SAN @ 0.45%

PROP 67.10m 675mmø CONC SAN @ 0.45%

PROP 110.43m 675mmø CONC SAN @ 0.45%

EX 59.82m 300mmø PVC SAN @ 0.33%

CONNECT TO EXISTING 300mm PVC WM

ISOLATION VALVE

EX MH4-1

EX 1200mm STM

EX MH5

EX MH5-1

EX MH5-2

EX 375mm STM

PROP 14.30m 450mmø CONC SAN @ 0.72%

PROP 29.89m 450mmø CONC SAN @ 0.88%

MH7A
RIM=85.31
EX T/G=85.83
SINV=81.29 In
N INV=81.27 Out

MH8A
RIM=171.08
EX T/G=85.74
SINV=81.01 In
N INV=80.97 Out

MH1A-1
RIM=83.88
EX T/G=85.65
SINV=82.20 In
N INV=81.43 Out

PROP 45.41m 450mmø PVC SAN @ 0.33%

PROP 300mm W/M

EXTEND PROP. 300mmø WATER MAIN TO 600mm REGIONAL TRUNK MAIN

INTERSECTION REQUIRES REDESIGN TO SUIT (BY OTHERS)

5.15m WIDENING FUTURE 18.5m ROW

MH1
RIM=89.64
EX T/G=89.41
E INV=87.13 Out

PROP 62.83m 300mmø PVC STM @ 0.98%

MH2
RIM=88.95
EX T/G=89.39
W INV=86.51 In
S INV=86.45 Out

PROP 33.14m 375mmø PVC STM @ 1.43%

PROP 11.35m 300mmø PVC SAN @ 1.59%

PROP 300mm PVC W/M

MH2A
RIM=88.86
EX T/G=89.90
WINV=83.84 In
E INV=83.84 Out

MH3
RIM=88.87
EX T/G=89.90
S INV=85.84 In
N INV=85.98 In
E INV=85.77 Out

PROP 60.76m 300mmø PVC SAN @ 0.70%

PROP 61.43m 525mmø CONC STM @ 0.85%

PROP SECOND FIRE 300mm W/M

PROP FIRST FIRE & DOMESTIC 300mm W/M

FFE 90.50

MH1A
RIM=89.11
EX T/G=89.90
E INV=84.02 Out

EX 150mm W/M

EX 450mm STM

PROP 94.76m 300mmø PVC SAN @ 1.01%

PROP 8.95m 450mmø CONC STM @ 2.23%

PROP 70.88m 600mmø CONC STM @ 1.16%

MH4
RIM=89.03
EX T/G=89.90
N INV=86.04 Out

MH3A
RIM=87.89
EX T/G=87.84
WINV=83.41 In
E INV=83.41 Out

MH5
RIM=87.93
EX T/G=87.89
W INV=85.25 In
E INV=85.13 Out

MH4A
RIM=87.05
EX T/G=86.84
WINV=82.76 In
N INV=82.73 Out

MH6-1
EX T/G=86.96
W INV=84.30 In
N INV=83.99 Out

MH6-2
EX T/G=86.65
S INV=83.80 In

PROP 17.72m 600mmø CONC STM @ 1.07%

MH13A
RIM=83.53
WINV=76.91 In
N INV=76.91 Out

PROP 14.47m 450mmø PVC SAN @ 0.22%

EX 400mm W/M

SAN MH 35-33

SAN MH 35-34

EX 150mm W/M

OPEN GREEN SPACE (0.16 ha)

OPEN SPACE (0.523 ha)

METROPIA EXMH3A

6.5m WIDE LANEWAY

1:1,000 0 10 20 40 70 100

FIGURE S-1b
SITE SERVICING PHASE 1
LAYOUT PLAN

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
SEPT 2021	20266	1:1000

ODAN·DETECH CONSULTING ENGINEERS
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5255 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE TOWN OF PICKERING BENCH MARK NO: 67-U-002

LOCATION :
TABLET IN SOUTHWEST CONCRETE FOUNDATION WALL AT THE NORTHWEST SIDE OF MAIN ENTRANCE TO THE TOWN OF PICKERING MUNICIPAL BUILDING. AND 0.53 METRES ABOVE GRADE.

ELEVATION:
PUBLISHED ELEVATION =87.581 metres.

Brock Rd

Pickering Parkway

Notion Road

EXISTING WAL-MART

EXISTING CANADIAN TIRE

BEECHLAWN DRIVE

MARSHCOURT DRIVE

OPEN GREEN SPACE (0.16 ha)

6.5m WIDE LANEWAY

INTERSECTION REQUIRES REDESIGN TO SUIT (BY OTHERS)

5.15m WIDENING
FUTURE 18.5m ROW

FUTURE NOTION ROAD OVERPASS

GRADING LEGEND:

EXISTING STORM MANHOLE	EXISTING WATER VALVE & BOX	(100.00)	PROPOSED SWALE INVERT ELEVATION
PROPOSED STORM MANHOLE	PROPOSED WATER VALVE & BOX	1.0%	PROPOSED FLOW ARROW AND SLOPE
EXISTING CATCH BASIN MANHOLE	EXISTING VALVE CHAMBER		PROPOSED EMERGENCY OVERLAND FLOW
PROPOSED CATCH BASIN MANHOLE	BOREHOLE LOCATION	195.50	EXISTING CONTOUR
PROPOSED STORMCEPTOR	PROPOSED VALVE CHAMBER		PROPOSED SLOPE (3:1 OR HIGHER)
EXISTING CATCH BASIN	(100.00) FUTURE ELEVATION		DENOTES PROPOSED PROPERTY LINE
PROPOSED CATCH BASIN	*100.00* EXISTING SPOT ELEVATION		DENOTES PROPOSED LIMIT OF CONSTRUCTION
PROPOSED AREA DRAIN	(100.00) PROPOSED ELEVATION		DENOTES PROPOSED HEAVY DUTY ASPHALT AREA
EXISTING SANITARY MANHOLE	(100.00)TC PROPOSED TOP OF CURB ELEVATION		
PROPOSED SANITARY MANHOLE	(100.00)GL PROPOSED GUTTER LINE ELEVATION		
EXISTING HYDRANT	(100.00)HP PROPOSED HIGH POINT		
PROPOSED HYDRANT	(100.00)LP PROPOSED LOW POINT		

FIGURE S-2
CONCEPTUAL GRADING PLAN
(ULTIMATE)

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
SEPT 2021	20266	1:1000

ODAN·DETECH CONSULTING ENGINEERS
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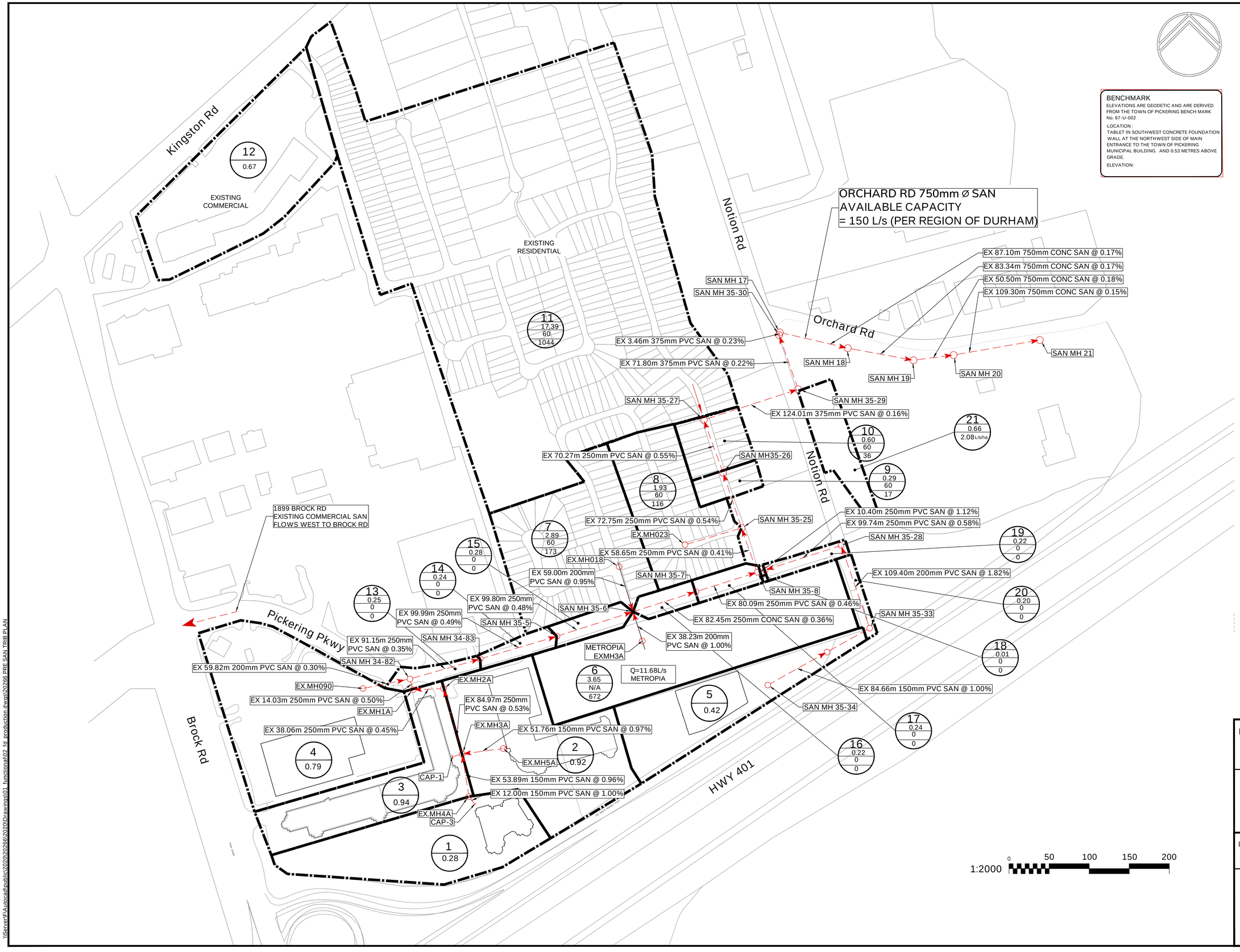

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE TOWN OF PICKERING BENCH MARK No. 67-U-002

LOCATION :
TABLET IN SOUTHWEST CONCRETE FOUNDATION WALL AT THE NORTHWEST SIDE OF MAIN ENTRANCE TO THE TOWN OF PICKERING MUNICIPAL BUILDING. AND 0.53 METRES ABOVE GRADE.

ELEVATION:

LEGEND

- EXISTING SANITARY MANHOLE
- EXISTING SANITARY SEWER
- EXISTING DRAINAGE AREA

COMMERCIAL

5 — TRIBUTARY AREA ID NO.
0.42 — GROSS FLOOR AREA (ha)

RESIDENTIAL

9 — TRIBUTARY AREA ID NO.
0.29 — TRIBUTARY AREA (ha)
60 — POPULATION DENSITY (Persons/ha)
17 — EQUIVALENT POPULATION

INDUSTRIAL

9 — TRIBUTARY AREA ID NO.
0.29 — TRIBUTARY AREA (ha)
60 — L/s
17 — EQUIVALENT POPULATION

FIGURE S-3

EXISTING CONDITIONS
SANITARY TRIBUTARY PLAN

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
SEPT 2021	20266	1:2000

ODAN•DETECH
CONSULTING ENGINEERS
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BENCHMARK
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE TOWN OF PICKERING BENCH MARK No. 67-U-002
LOCATION :
TABLET IN SOUTHWEST CONCRETE FOUNDATION WALL AT THE NORTHWEST SIDE OF MAIN ENTRANCE TO THE TOWN OF PICKERING MUNICIPAL BUILDING. AND 0.53 METRES ABOVE GRADE.
ELEVATION:

LEGEND

- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- EXISTING DRAINAGE AREA
- PHASE 1 DRAINAGE AREA

COMMERCIAL
5 / 0.42 — TRIBUTARY AREA ID NO. / GROSS FLOOR AREA (ha)

RESIDENTIAL
9 / 0.29 / 60 / 17 — TRIBUTARY AREA ID NO. / TRIBUTARY AREA (ha) / POPULATION DENSITY (Persons/ha) / EQUIVALENT POPULATION

Kingston Rd
Notion Rd
Orchard Rd
Pickering Pkwy
Brock Rd
HWY 401
EXISTING COMMERCIAL
EXISTING RESIDENTIAL
CONTINUES

12 / 0.67
11 / 17.39 / 60 / 1044
10 / 0.60 / 60 / 36
9 / 0.29 / 60 / 17
8 / 1.93 / 60 / 116
7 / 2.89 / 60 / 173
6 / 3.65 / N/A / 672
5 / 0.42
4 / 0.79
2 / 0.92
P3 / 0.58
P2 / 0.28
15 / 0.28 / 0 / 0
14 / 0.24 / 0 / 0
13 / 0.25 / 0 / 0
18 / 0.22 / 0 / 0
17 / 0.24 / 0 / 0
20 / 0.5 / 0 / 0
16 / 0.22 / 0 / 0

SAN MH 17
SAN MH 35-30
SAN MH 18
SAN MH 19
SAN MH 20
SAN MH 21
SAN MH 35-29
SAN MH 35-27
SAN MH35-26
SAN MH 35-28
SAN MH 35-25
SAN MH 35-6
SAN MH 35-5
SAN MH 34-83
SAN MH 34-82
SAN MH 35-7
SAN MH 35-8
SAN MH 35-33
SAN MH 35-34
MH14A
MH13A
MH9A
MH8A
MH7A
MH1A-1
MH2A
MH1A
MH3A
MH4A
EX.MH023
EX.MH018
EX.MH090
EX.MH1A
EX.MH3A
EX.MH5A
EX.MH4A
METROPIA EXMH3A
CAP-1
CAP-3

PROP 3.46m 450mm PVC SAN @ 0.23%
PROP 71.80m 450mm PVC SAN @ 0.22%
PROP 101.76m 450mm PVC SAN @ 0.22%
PROP 100.00m 450mm PVC SAN @ 0.22%
PROP 99.80m 675mm PVC SAN @ 0.45%
PROP 42.06m 675mm PVC SAN @ 0.45%
PROP 80.09m 675mm PVC SAN @ 0.45%
PROP 82.45m 675mm PVC SAN @ 0.45%
PROP 99.99m 675mm PVC SAN @ 0.45%
PROP 14.30m 450mm PVC SAN @ 0.72%
PROP 29.89m 450mm PVC SAN @ 0.52%
PROP 45.41m 300mm PVC SAN @ 0.31%
PROP 49.09m 675mm PVC SAN @ 0.45%
PROP 96.38m 300mm PVC SAN @ 0.55%
PROP 90.01m 300mm PVC SAN @ 0.72%
PROP 60.76m 300mm PVC SAN @ 0.70%
PROP 11.35m 300mm PVC SAN @ 1.59%
PROP 14.47m 450mm PVC SAN @ 0.22%
PROP 110.13m 675mm PVC SAN @ 0.45%
EX 87.10m 750mmØ CONC SAN @ 0.17%
EX 83.34m 750mmØ CONC SAN @ 0.17%
EX 50.50m 750mmØ CONC SAN @ 0.18%
EX 109.30m 750mmØ CONC SAN @ 0.15%
RECONNECT EX. SERVICE CONNECTIONS AS REQ'D
Q=11.68L/s METROPIA

P1 PHASE 1 - 'BLOCK 1'

A = 1.18ha

RESIDENTIAL
POP. DENSITY: 2.5(PP/UNIT)
UNITS: 678
RES POP = 1,793

RETAIL/COMMERCIAL
GFA: 0.17ha [1,688m²]

1: 2,000 — 0 20 40 80 140 200

FIGURE S-4
PHASE 1 CONDITIONS
SANITARY TRIBUTARY PLAN

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
SEPT 2021	20266	1:2000

ODAN·DETECH CONSULTING ENGINEERS
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5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

BENCHMARK
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE TOWN OF PICKERING BENCH MARK No. 67-U-002
LOCATION :
TABLET IN SOUTHWEST CONCRETE FOUNDATION WALL AT THE NORTHWEST SIDE OF MAIN ENTRANCE TO THE TOWN OF PICKERING MUNICIPAL BUILDING. AND 0.53 METRES ABOVE GRADE.
ELEVATION:

LEGEND

- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- REGION TRUNK SEWER
- SANITARY SEWER REMOVALS
- EXISTING DRAINAGE AREA
- PHASED DRAINAGE AREA

COMMERCIAL
5 / 0.42 — TRIBUTARY AREA ID NO. / GROSS FLOOR AREA (ha)

RESIDENTIAL
9 / 0.29 / 60 / 17 — TRIBUTARY AREA ID NO. / TRIBUTARY AREA (ha) / POPULATION DENSITY (Persons/ha) / EQUIVALENT POPULATION

Kingston Rd
EXISTING COMMERCIAL
EXISTING RESIDENTIAL
Notion Rd
Orchard Rd
Pickering Pkwy
Brock Rd
HWY 401
HIGHWAY ONTARIO 401 EXPRESS
1899 BROCK ROAD & FUTURE DEVELOPMENT (FROM REGION)

P9 - FUTURE DEVELOPMENT
A = 29.5ha
MIXED-USE
POP. DENSITY: 800(PP/ha) [PER REGION]
POP = 23,600

P8 - 'BLOCK 6'
A = 0.82ha
RESIDENTIAL
POP. DENSITY: 2.5(PP/UNIT)
UNITS: 762
RES POP = 1,905
RETAIL/COMMERCIAL
GFA: 2.17ha

P7 - 'BLOCK 3'
A = 0.63ha
RESIDENTIAL
POP. DENSITY: 2.5(PP/UNIT)
UNITS: 446
RES POP = 1,115
RETAIL/COMMERCIAL
GFA: 0.09ha

P10 - FUTURE DEVELOPMENT
A = 4.1ha
MIXED-USE
POP. DENSITY: 1,200(PP/ha) [PER REGION]
POP = 4,920

P4 - 'PARK'
A = 2.12ha

P1 PHASE 1 - 'BLOCK 1'
A = 1.09ha
RESIDENTIAL
POP. DENSITY: 2.5(PP/UNIT)
UNITS: 678
RES POP = 1,793
RETAIL/COMMERCIAL
G A 0.17ha 1 688m²

P2 - 'BLOCK 2'
A = 1.28ha
RESIDENTIAL
POP. DENSITY: 2.5(PP/UNIT)
UNITS: 1090
RES POP = 2,725
RETAIL/COMMERCIAL
GFA: 0.10ha

P5 - 'BLOCK 7'
A = 1.42ha
RESIDENTIAL
POP. DENSITY: 2.5(PP/UNIT)
UNITS: 659
RES POP = 1,648

P6 - 'BLOCK 5'
A = 1.21ha
RESIDENTIAL
POP. DENSITY: 2.5(PP/UNIT)
UNITS: 641
RES POP = 1,543
RETAIL/COMMERCIAL
GFA: 0.07ha

P3 - 'BLOCK 4'
A = 0.89ha
RESIDENTIAL
POP. DENSITY: 2.5(PP/UNIT)
UNITS: 1,022
RES POP = 2,555
RETAIL/COMMERCIAL
GFA: 0.07ha

11 — 17.39 / 60 / 1044
10 — 0.60 / 60 / 36
9 — 0.29 / 60 / 17
8 — 1.93 / 60 / 116
7 — 2.89 / 60 / 173
6 — 3.65 / N/A / 672
13 — 0.25 / 0 / 0
15 — 0.28 / 0 / 0
14 — 0.24 / 0 / 0
18 — 0.22 / 0 / 0
17 — 0.24 / 0 / 0
16 — 0.22 / 0 / 0

SAN MH 17 → SAN MH 18 → SAN MH 19 → SAN MH 20 → SAN MH 21 → CONTINUES
SAN MH 35-29
SAN MH 35-27
SAN MH35-26
SAN MH 35-25
SAN MH 35-28
MH13A
PROP. 14.5m 675mm SAN. @ 0.45%
EX.MH023
PROP. 110.1m 675mm SAN. @ 0.45%
PROP. 80.1m 675mm SAN. @ 0.45%
EX.MH018
PROP. 83.5m 675mm SAN. @ 0.45%
SAN MH 35-8
SAN MH 35-7
SAN MH 35-6
METROPIA EXMH3A
SAN MH 35-33
SAN MH 35-5
Q=11.68L/s METROPIA
SAN MH 35-34
PROP. 99.8m 675mm PICKERING PARKWAY SAN. @ 0.45%
PROP. 100.0m 675mm SAN. @ 0.45%
SAN MH 34-83
PROP. 41.8m 675mm SAN. @ 0.45%
PROP. 49.4m 675mm SAN. @ 0.45%
SAN MH 34-82
PROP. 116.0m 525mm SAN. @ 0.45%
MH16A
MH9A
EX 59.8m 200mm PVC SAN @ 0.30%
EX.MH090
MH8A
MH7A
MH11A
PROP SAN MH B7A
PROP. SAN. MH B5A
MH12A
PROP. 14.3m 450mm SAN. @ 0.72%
PROP. 29.9m 450mm SAN. @ 0.52%
PROP. 19.0m 450mm SAN. @ 0.77%
MH6A
MH5A
MH4A
MH4A (1)
MH2A
MH1A
MH3A
PROP SAN MH BK2
PROP. 11.3m 300mm SAN. @ 1.59%
PROP. 60.8m 300mm SAN. @ 0.70%
PROP. 90.0m 300mm SAN. @ 0.72%
PROP. 32.3m 300mm SAN. @ 1.91%
PROP. 90.0m 300mm SAN. @ 0.44%
PROP. 66.1m 300mm SAN. @ 0.74%
PROP. 77.9m 300mm SAN. @ 0.49%
PROP. 37.6m 300mm SAN. @ 1.46%

FUTURE PROP TRUNK SEWER TO BE DESIGNED BY REGIONAL MUNICIPALITY OF DURHAM
FUTURE PROP PUMPING STATION LOCATION TBD BY REGIONAL MUNICIPALITY OF DURHAM

1: 2,000 — 0 20 40 80 140 200

FIGURE S-5
CONCEPTUAL CONDITIONS
SANITARY TRIBUTARY PLAN

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
SEPT 2021	20266	1:2000

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The Odan/Detech Group Inc. P: (905) 632-3811 F: (905) 632-3363
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

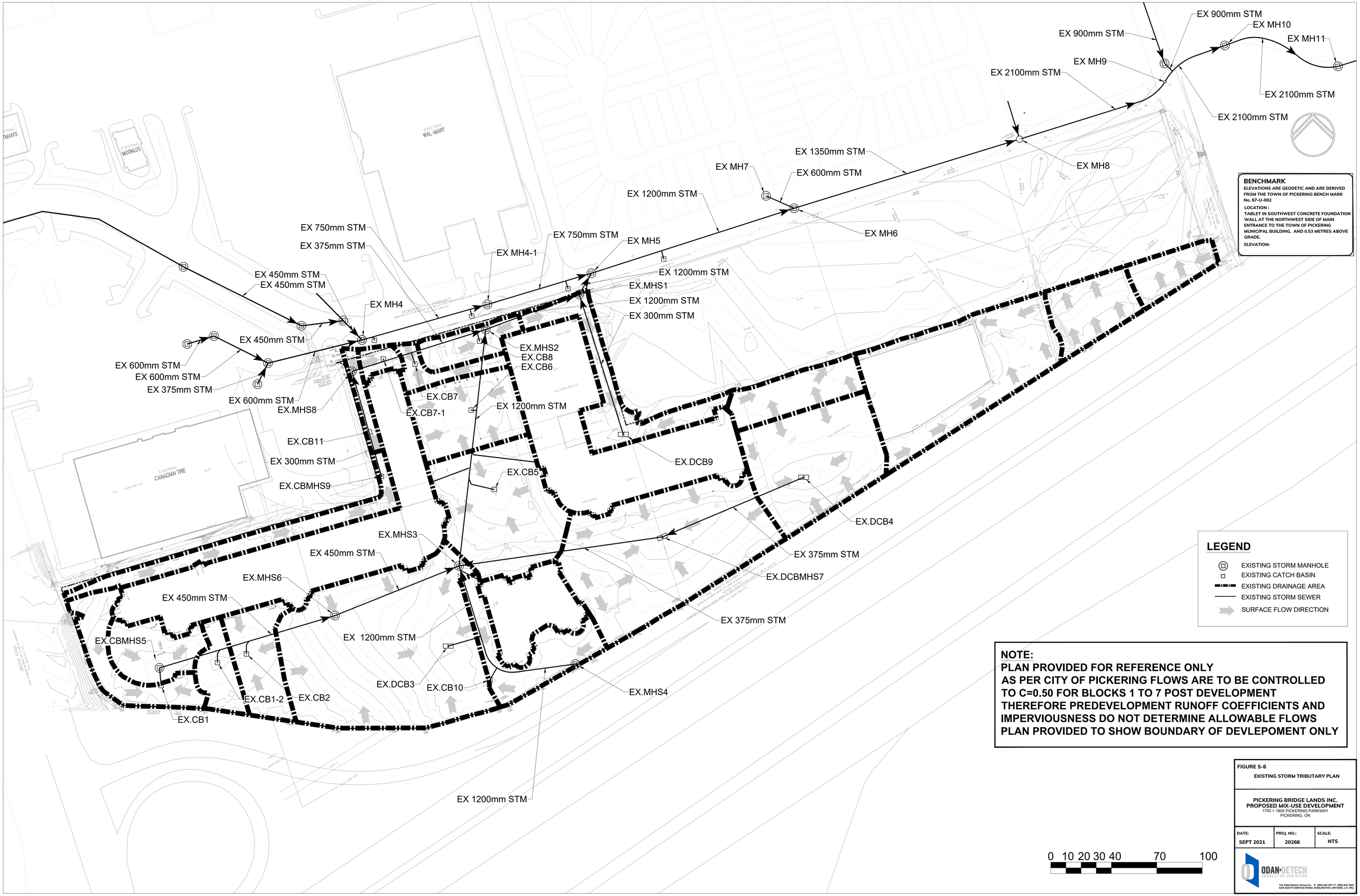


FIGURE S-6

EXISTING STORM TRIBUTARY PLAN

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
SEPT 2021	20266	NTS

ODAN·DETECH CONSULTING ENGINEERS
The Odan/Detech Group Inc., P: (905) 632-3911 F: (905) 632-3343
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

PICKERING PARKWAY
HIGHWAY ONTARIO 401 EXPRESS
BROCK ROAD
NOTION ROAD
BLOCK '2'
PHASE '2'
BLOCK '4'
BLOCK '5'
BLOCK '6'
BLOCK '7'
PUBLIC PARK
18.50 m ROAD
PRIVATE DRIVEWAY
14m SETBACK FROM HIGWAY
EXISTING WAL-MART
CANADIAN TIRE
PROPOSED RESIDENTIAL TOWER 1A 31 STOREYS
PROPOSED RESIDENTIAL TOWER 1B 31 STOREYS
PROPOSED RESIDENTIAL TOWER 2A 24 STOREYS
PROPOSED RESIDENTIAL TOWER 2B 32 STOREYS
PROPOSED RESIDENTIAL TOWER 2C 43 STOREYS
PROPOSED RESIDENTIAL TOWER 3 26 STOREYS
PROPOSED RESIDENTIAL TOWER 4A 43 STOREYS
PROPOSED RESIDENTIAL TOWER 4B 32 STOREYS
PROPOSED RESIDENTIAL TOWER 5 26 STOREYS
PROPOSED RESIDENTIAL TOWER 6B 22 STOREYS
PROPOSED RESIDENTIAL TOWER 7 20 STOREYS
PROPOSED 7 STOREY PODIUM
PROPOSED 5 STOREY PODIUM
1 0.19 0.75
2 0.73 0.25
3 0.94 0.90
4 0.14 0.90
5 0.10 0.90
6 0.18 0.90
7 1.29 0.90
8 0.07 0.90
9 0.12 0.90
10 0.89 0.90
11 0.98 0.90
12 1.02 0.90
13 0.16 0.75
14 0.10 0.75
15 0.50 0.25
17 0.12 0.75
20 0.12 0.75
21 0.47 0.75
22 0.82 0.90
23 0.08 0.75
24 0.09 0.75
24 0.40 0.25
25 0.21 85
A1 41.9 0.10
AS PER CITY OF PICKERING TRIBUTARY PLAN (JUNE 1991)
EX 2100mm STM
EX 1350mm STM
EX 1200mm STM
PROP 1200mm STM
PROP 600mm STM
PROP 525mm STM
PROP 450mm STM
PROP 300mm STM
EX 750mm STM
EX 600mm STM
EX 450mm STM
EX 375mm STM
LEGEND
PROPOSED STORM MANHOLE
EXISTING STORM MANHOLE
PROPOSED CATCH BASIN
EXISTING CATCH BASIN
PROPOSED DRAINAGE AREA
PROPOSED STORM SEWER
EXISTING STORM SEWER
SURFACE FLOW DIRECTION
ID NUMBER
RUNOFF COEFFICIENT
DRAINAGE AREA (ha)
0 10 20 30 40 70 100
FIGURE S-7
PROPOSED STORM TRIBUTARY PLAN
PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON
DATE: SEPT 2021
PROJ. NO.: 20266
SCALE: NTS
ODAN·DETECH CONSULTING ENGINEERS
P:\2020\20266\2020\Drawings\01_Functional\02_FD_Production Dwgs\20266 PROP STM TRIB PLAN - RATIONALE

NOTION ROAD - PROFILE

SANITARY IS ON EAST SIDE

PICKERING PARKWAY — **ORCHARD ROAD**

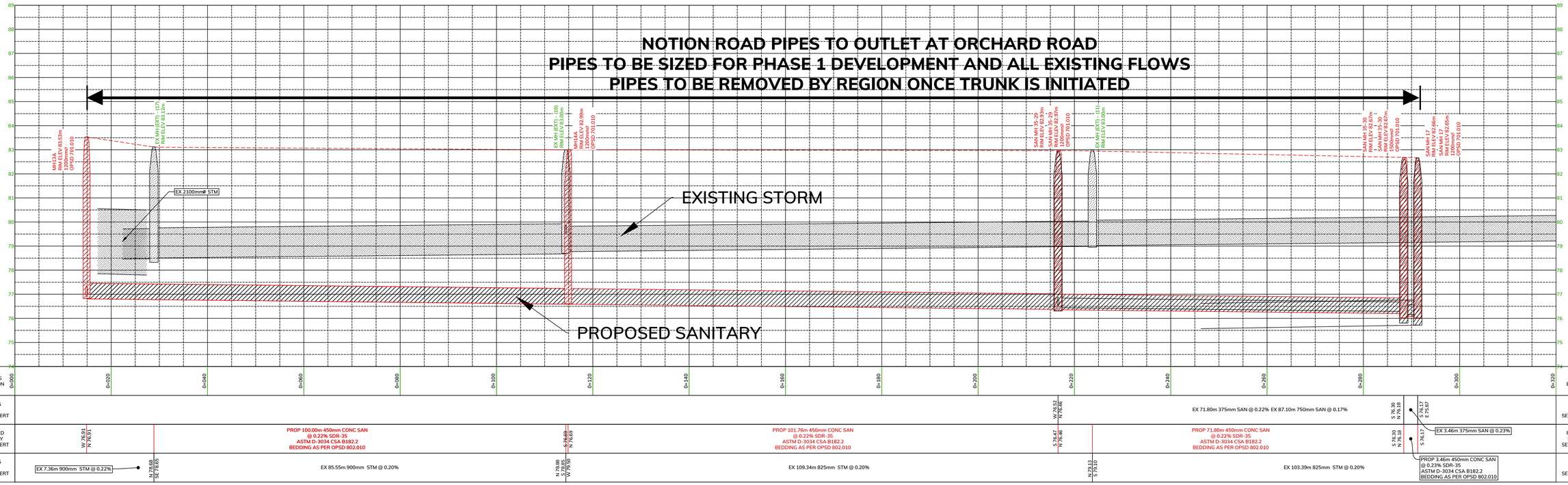


FIGURE S-8
NOTION ROAD PROFILE
(0+000 to 0+320)

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
APR 2024	20266	NTS

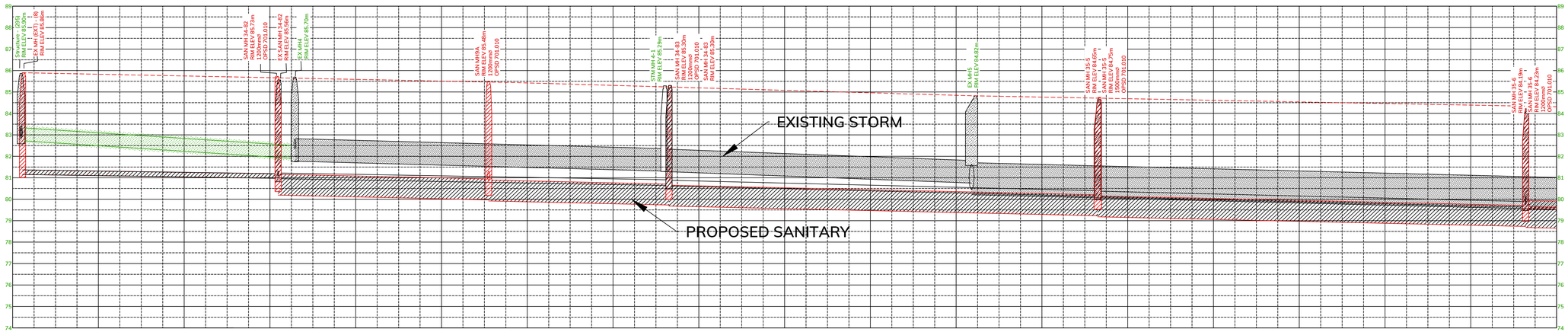
ODAN/DETECH CONSULTING ENGINEERS
The Odan/Detech Group Inc. P: (905) 632-3811 F: (905) 632-3363
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

PICKERING PARKWAY - PROFILE 1of2

SANITARY IS ON NORTH SIDE

PIPES TO NOTION ROAD TO BE SIZED AND CONSTRUCTED FOR FULL BUILD OUT OF SUBJECT SITE, 1899 BROCK ROAD AND FUTURE DEVELOPMENTS (PER REGION)

SEE FIGURE 11



	0+000	0+020	0+040	0+060	0+080	0+100	0+120	0+140	0+160	0+180	0+200	0+220	0+240	0+260	0+280	0+300	0+320	0+340	0+360	
EXISTING ELEVATION			85.85	85.76	85.65	85.54														EXISTING ELEVATION
PROPOSED SANITARY	E 81.16	PROP 59.82m 200mm PVC SAN @ 0.30% PVC-SDR 35 ASTM D-3034 CSA B182.2 BEDDING AS PER OPSD 802.010		E 80.34 W 80.09	PROP 49.09m 675mm CONC SAN @ 0.45% PVC-SDR 35 ASTM D-3034 CSA B182.2 BEDDING AS PER OPSD 802.010		S 80.86 E 80.62 W 80.12	PROP 42.06m 675mm CONC SAN @ 0.45% PVC-SDR 35 ASTM D-3034 CSA B182.2 BEDDING AS PER OPSD 802.010	W 79.88 E 79.63	PROP 99.99m 675mm CONC SAN @ 0.45% PVC-SDR 35 ASTM D-3034 CSA B182.2 BEDDING AS PER OPSD 802.010			W 79.38 E 79.13	PROP 99.80m 675mm CONC SAN @ 0.45% PVC-SDR 35 ASTM D-3034 CSA B182.2 BEDDING AS PER OPSD 802.010				W 78.88 E 78.63		PROPOSED SANITARY SEWER INVERT
EXISTING SANITARY		EX 59.82m 200mm SAN @ 0.30%		E 80.96 S 81.07 W 80.98	EX 91.15m 250mm SAN @ 0.35%				W 80.65 E 80.63	EX 99.99m 250mm SAN @ 0.49%			W 80.14 E 80.12	EX 99.80m 250mm SAN @ 0.48%			PROP 82.45m 675mm CONC SAN @ 0.45% PVC-SDR 35 ASTM D-3034 CSA B182.2 BEDDING AS PER OPSD 802.010	W 79.64 E 79.39 S 79.50 W 79.14		EXSTING SAN SEWER INVERT
EXISTING STORM	E 82.73 SW 82.33 NW 82.83	EX 63.91m 600mm STM @ 1.30%		W 81.90 NW 82.34	EX 86.05m 750mm STM @ 0.54%				E 81.44 W 81.46	EX 71.76m 750mm STM @ 0.75%			W 80.90 E 80.36 SW 80.64	EX 140.65m 1200mm STM @ 0.50%				EX 82.45m 250mm SAN @ 0.36%		EXSTING STORM SEWER INVERT

FIGURE S-9
PICKERING PARKWAY PROFILE (0+000 to 0+360)

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
APR 2024	20266	NTS

ODAN/DETECH CONSULTING ENGINEERS
The Odan/Detech Group Inc. P: (905) 632-3811 F: (905) 632-3363
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

PICKERING PARKWAY - PROFILE 2of2

SANITARY IS ON NORTH SIDE

PIPES TO NOTION ROAD TO BE SIZED AND CONSTRUCTED FOR FULL BUILD OUT OF SUBJECT SITE, 1899 BROCK ROAD AND FUTURE DEVELOPMENTS (PER REGION)

SEE FIGURE 10

NOTION ROAD

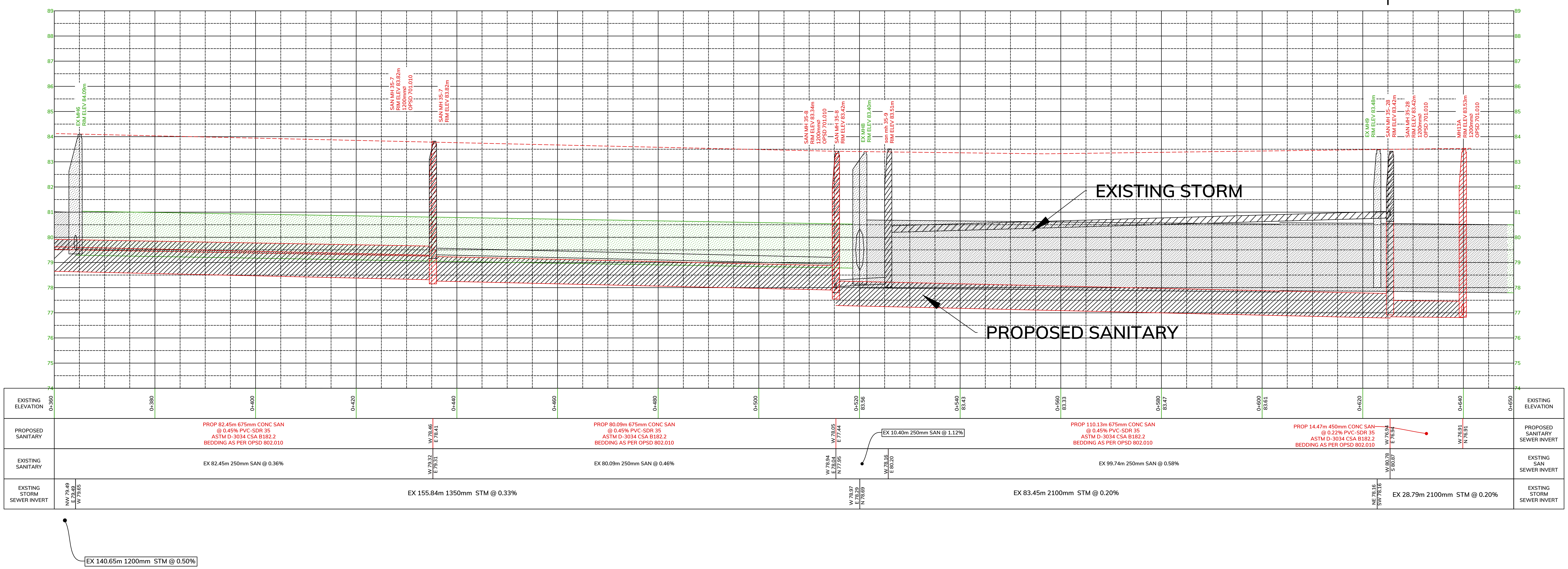
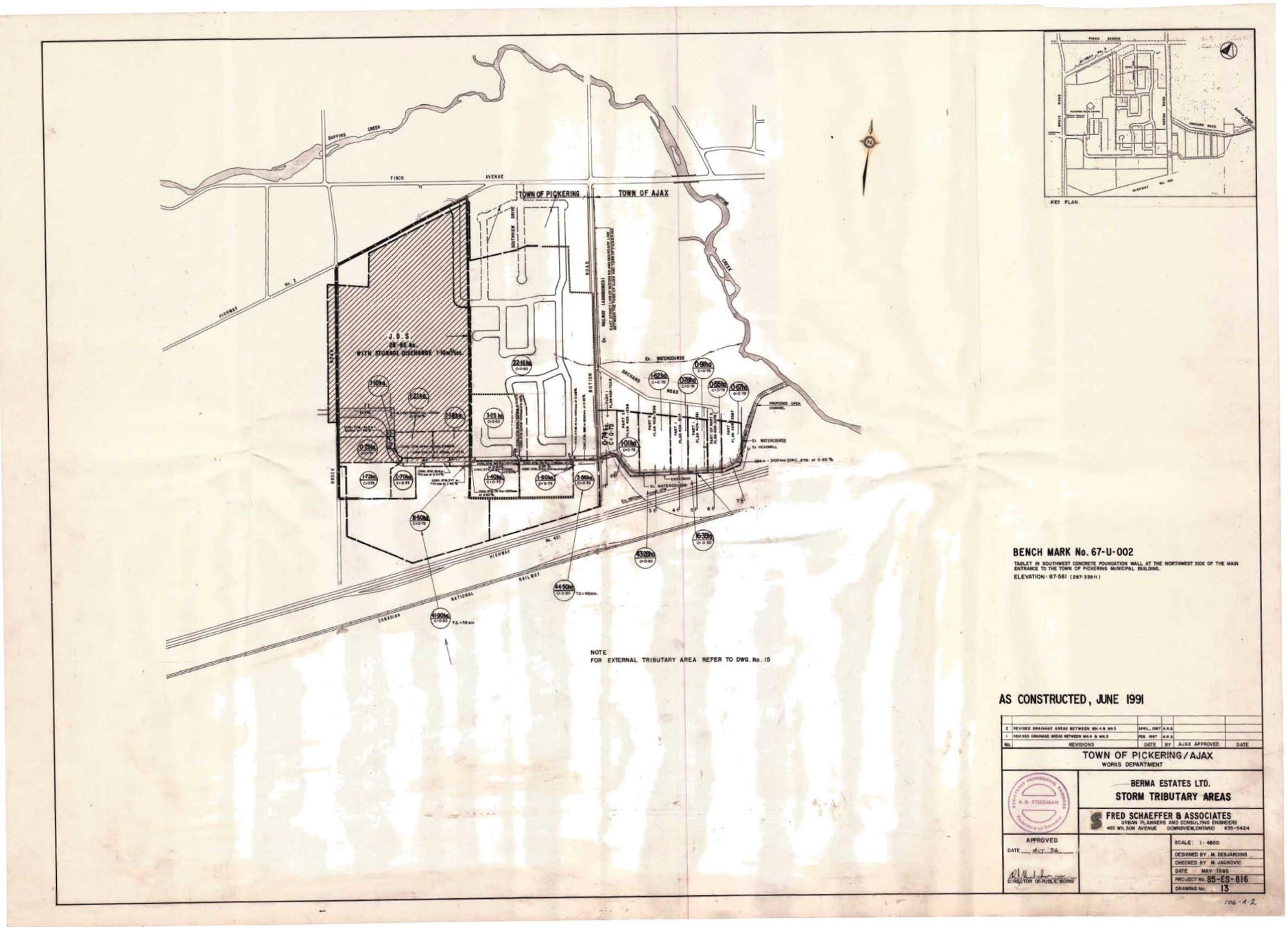


FIGURE S-10
PICKERING PARKWAY PROFILE
(0+360 to 0+650)

PICKERING BRIDGE LANDS INC.
PROPOSED MIX-USE DEVELOPMENT
1755 + 1805 PICKERING PARKWAY
PICKERING, ON

DATE:	PROJ. NO.:	SCALE:
APR 2024	20266	NTS

ODAN DETECH
CONSULTING ENGINEERS
The Odan/Detech Group Inc. P: (905) 632-3811 F: (905) 632-3363
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2



BENCH MARK No. 67-U-002

TABLET IN SOUTHWEST CONCRETE FOUNDATION WALL AT THE NORTHWEST SIDE OF THE MAIN ENTRANCE TO THE TOWN OF PICKERING MUNICIPAL BUILDING.
ELEVATION: 87.581 (287.339ft)

NOTE:
FOR EXTERNAL TRIBUTARY AREA REFER TO DWG. No. 15

AS CONSTRUCTED, JUNE 1991

No.	REVISIONS	DATE	BY	AJAX APPROVED	DATE
2	REVISED DRAINAGE AREAS BETWEEN MH.4 & MH.5	APRIL, 1987	A.R.S.		
1	REVISED DRAINAGE AREAS BETWEEN MH.4 & MH.5	FEB. 1987	A.R.S.		

TOWN OF PICKERING/AJAX
WORKS DEPARTMENT

A.R. STEEDMAN

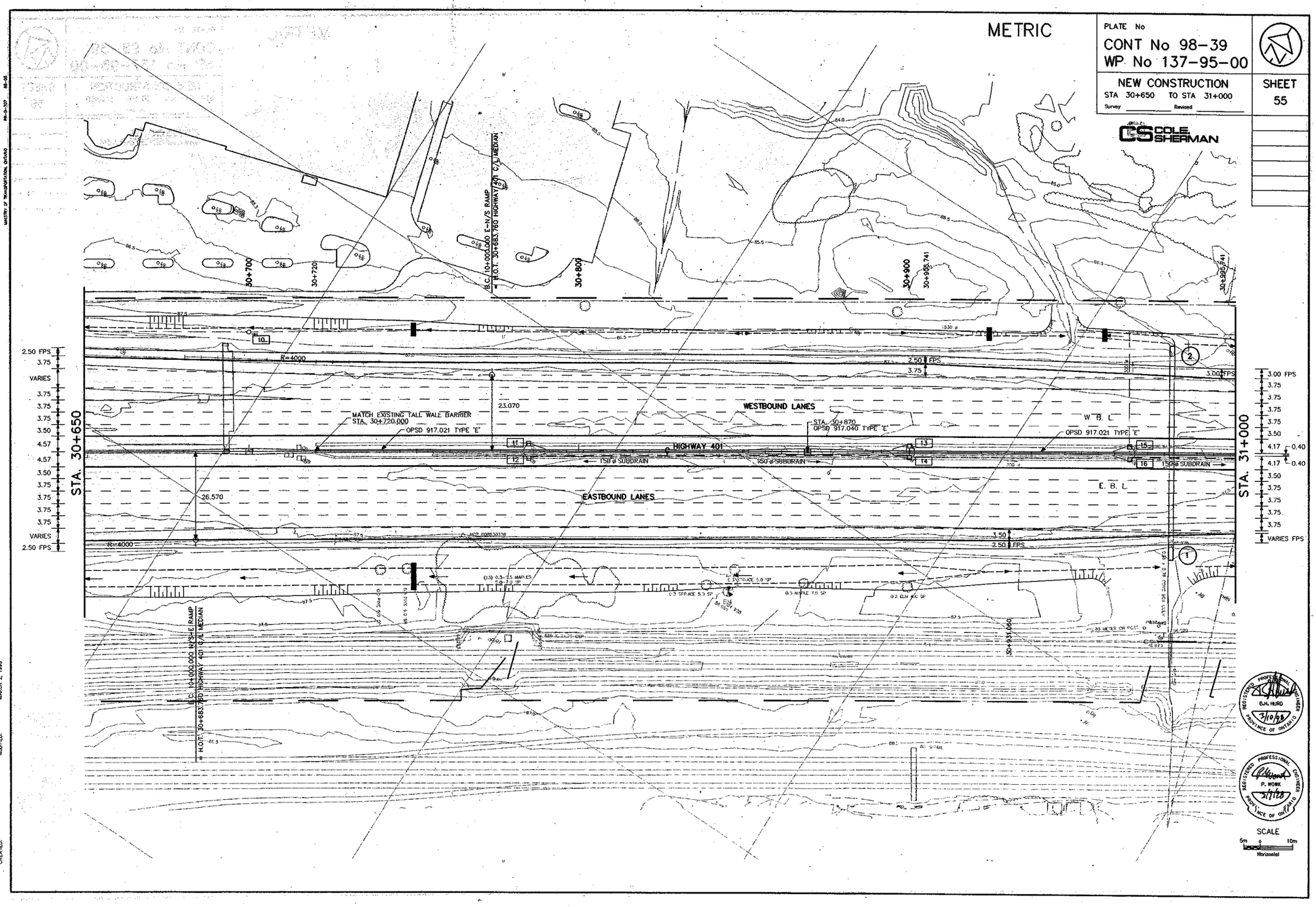
BERMA ESTATES LTD.
STORM TRIBUTARY AREAS

FRED SCHAEFFER & ASSOCIATES
URBAN PLANNERS AND CONSULTING ENGINEERS
465 WILSON AVENUE DOWNSVIEW, ONTARIO 635-5424

APPROVED
DATE OCT 86
DIRECTOR OF PUBLIC WORKS

SCALE: 1:4800
DESIGNED BY M. DESJARDINS
CHECKED BY M. JAUKOVIC
DATE MAY 1986
PROJECT No. 85-ES-816
DRAWING No. 13

106-1-2


METRIC
PLATE No
CONT No 98-39
WP No 137-95-00
NEW CONSTRUCTION
STA 30+650 TO STA 31+000
Survey Revised
SHEET
55
COLE SHERMAN
STA. 30+650
STA. 31+000
HIGHWAY 401
WESTBOUND LANES
EASTBOUND LANES
W. B. L.
E. B. L.
MATCH EXISTING TALL WALL BARRIER STA. 30+720.000
OPSD 917.021 TYPE 'E'
STA. 30+870
OPSD 917.040 TYPE 'E'
150ø SUBDRAIN
E.C. 10+000.000 N'S/H E. RAMP
H.O.T. 30+683.760 HIGHWAY 401 C/L MEDIAN
30+700
30+720
30+800
30+900
30+935.741
R=4000
23.070
26.570
2.50 FPS
3.75
VARIES
3.00 FPS
0.40
SCALE
5m 0 10m
Horizontal
B.H. HURD
P. WORK
MARCH 2, 1998
MODIFIED:
DRAWING NAME: 30650NC.DGN
CREATED:

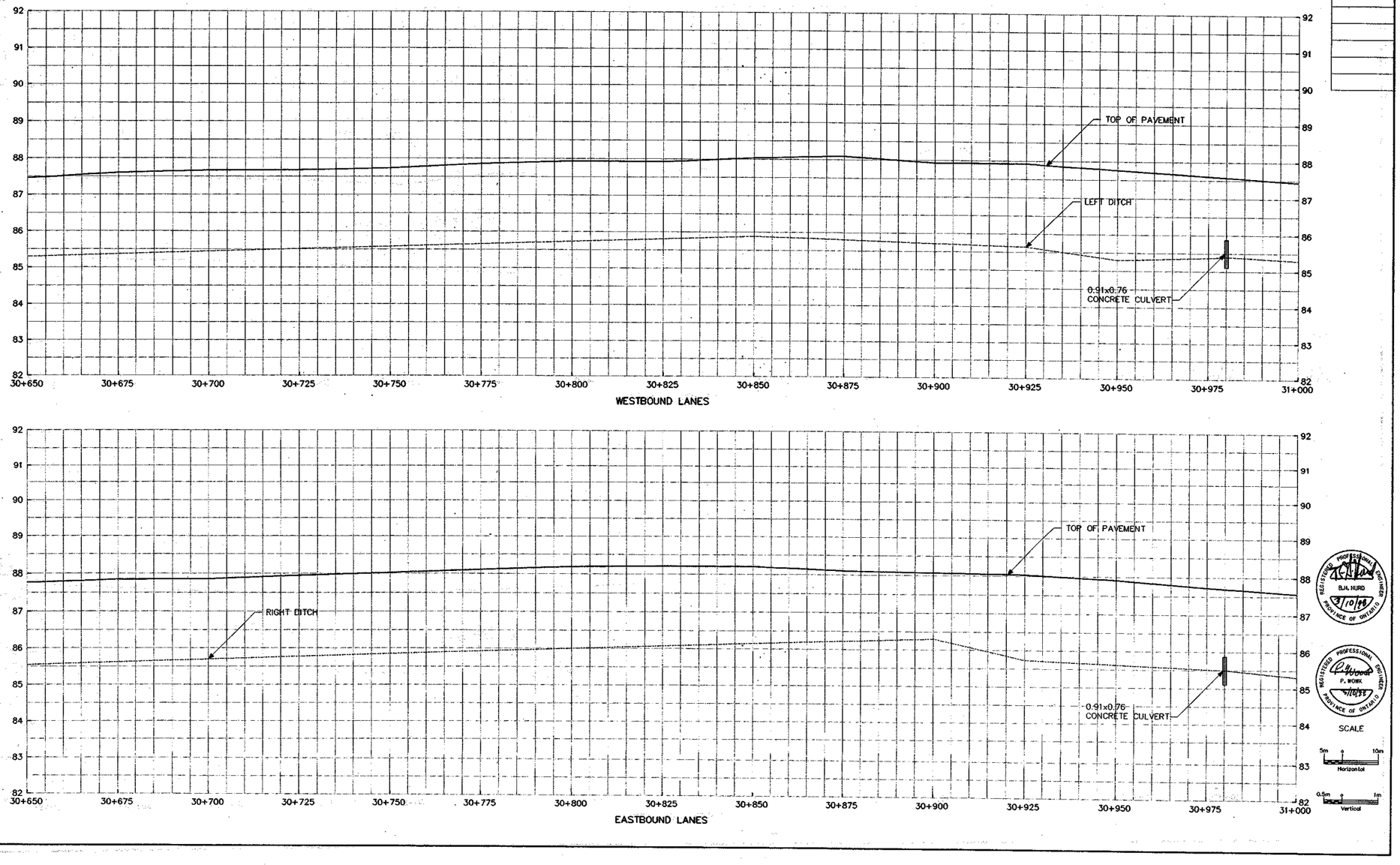
METRIC

COLE SHERMAN

PLATE No
CONT No 98-39
WP No 137-95-00

PROFILES
STA 30+650 TO STA 31+300
Survey _____ Revised _____

SHEET 80



B.H. HURD
3/10/98
PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO

P. WONK
3/10/98
PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO

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

DRAWING NAME: PRF20660.DGN
CREATED: MODIFIED: MARCH 6,1998

MINISTRY OF TRANSPORTATION, ONTARIO 98-06 05-D-707