Functional Servicing Report
Thorncliffe Park Transit Oriented Communities

4-8 Overlea Boulevard, 10 Overlea Boulevard, 14-16 Overlea Boulevard,
1 Thorncliffe Park Drive, 2-6 Thorncliffe Park Drive, and 36 Overlea Boulevard
Toronto Ontario M4H 1B7

Issued for Rezoning

Contract RFS-2019-NAFC-110

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Ontario Line Technical Advisor

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Abbreviations

AW	Advanced Works
EGS	Elevated Guideway and Stations
FSR	Functional Service Report
GFA	Gross Floor Area
HONI	Hydro One Networks Inc.
OBM	Overlea Boulevard Modifications
OGS	Oil and Grit Separator
OMSF	Operation Maintenance and Storage Facility
PDB	Progressive Design Build
RCD	Reference Concept Design
SWM	Stormwater Management
SUE	Subsurface Utility Engineering
TGS	Toronto Green Standard
TMC681	Toronto Municipal Code Chapter 681
TOC	Transit-Oriented-Communities
TRCA	Toronto and Region Conservation Authority
TSS	Total Suspended Solids
TTC	Toronto Transit Commission
WWFMG	Wet Weather Flow Management Guidelines

1 Introduction

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

HDR Inc. has been retained by Metrolinx to prepare a Functional Servicing Report (FSR) to assess the servicing requirements related to the proposed Ontario Line TOC at five-(5) separate sites in the Thorncliffe Park neighbourhood. This FSR provides a preliminary study for water distribution, electrical service, sanitary sewage, and storm drainage for the developments of the above-mentioned sites.

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

1.1 Site Description

The Thorncliffe Park TOC has five-(5) sites and six-(6) developments running parallel across Overlea Boulevard and Thorncliffe Park Drive. There are two-(2) developments which are off of Thorncliffe Park Drive, Blocks D1 (2-6 Thorncliffe Park Drive) and E1 (1 Thorncliffe Park Drive). D1 is located on the north side of the proposed Ontario Line station on the east side of Thorncliffe Park Drive. Block E1 is located on the west side of Thorncliffe Park Drive. A bus loop is proposed on the street level of Block D1 which will connect with the Ontario Line station. The remaining four-(4) block are located north of Overlea Boulevard. Block D (36 Overlea Boulevard) is located east of Block D1 and the Ontario Line Station while the remaining three-(3) sites, Blocks E3 (14-16 Overlea Boulevard), E4 (10 Overlea Boulevard), and E5 (4-8 Overlea Boulevard), are located off, of the Leaside Park Drive extension. Block E3 is located to the east of the Leaside Park Drive extension and Blocks E4 and E5 to the west.

The existing site conditions for Blocks D1 and D consist of single storey community center, distribution center, and medical clinic. Site E1 currently consists of a single storey commercial restaurant building with the remaining area utilized as a parking lot. Block E3 is located east of the Leaside Park Drive north extension. The extension of Leaside Park Drive will be constructed as part of the Metrolinx contract, 139905, the Overlea Boulevard Modifications (OBM) Advanced Works (AW) project. A single storey commercial building will be removed as part of the OBM AW project. The building occupies a portion of the west side of Block E3. The existing condition for the remaining portion of Block E3 are two single storey commercial office and warehouse facilities including parking facilities. The single storey commercial building removed as part of the OBM AW project for the extension of Leaside Park Drive also occupies a portion of the east side of Block E4 and E5. The other part of Block E4 and E5 is occupied by a single

storey commercial office and warehouse facilities including parking facilities. See **Figure 1-1** below which includes an aerial map of the site locations.

The OBM AW contract includes: the demolition of 26 Overlea Boulevard (Block E1), demolition of 10 Overlea Boulevard (construction of Leaside Park Drive north of Overlea Boulevard), closure of Thorncliffe Park Drive north of Overlea Boulevard, shifting the alignment of Overlea Boulevard south, constructing a cul-de-sac along Banigan Drive at 20 Banigan Drive, the construction of a new city street Leaside Park Drive extension, and all utility relocations associated with the prior listed work. The proposed roadway extension of Leaside Park Drive includes concrete unit pavers and landscape features.

Another project that is ongoing is the Metrolinx Elevated Guideway and Stations (EGS) Progressive Design Build (PDB) project. The EGS project will be constructed contiguous to the north side of Overlea Boulevard. This project will include the construction of the elevated guideway, Thorncliffe Station at the NE corner of Thorncliffe and Overlea, and the TPSS and driver relief building to the north of Block D.

Figure 1-1: Aerial Map of Subject Site Locations

1.2 Proposed Development

Based on the preliminary RCDs, the proposed developments at the sites differ from one to another.

Block D consists of a 13-storey building with two additional levels for mechanical and three-levels of below grade parking. First and second levels will be retail while level three to twelve will be offices. Block D underground parking structure, with 105 vehicle parking stalls and 99 bicycle parking stalls, will connect to Block D1 parking levels on the second and third levels. The plaza area will connect seamlessly to the Thorncliffe Park Station.

Block D1 consists of a 46-storey building with two additional levels for mechanical and three-levels of below grade parking. The mixed-use building will consist of retail on the first floor, amenity space on the second floor, and residential floors above. Block D1 underground parking structure, with 276 vehicle parking stalls and 468 bicycle parking stalls, will connect to Block D parking on the second and third levels. Block D1 consists of the TOC, below grade parking, plaza, and a bus loop directly north of Thorncliffe Park Station. All of these facilities will be operated by the Toronto Transit Commission (TTC). The plaza area will connect seamlessly to the Thorncliffe Park Station and Block D.

Block E1 consists of a 56-storey building with two additional levels for mechanical. Block E1 will be mixed-use with retail on the first floor and residential floors above. Block E1 has a three-storey underground parking with 252 vehicle parking stalls and 748 bicycle parking stalls.

Block E3 consists of two towers connected by a mezzanine. The north tower is a 46-storey building with two additional levels for mechanical. The south tower is a 31-storey building with two additional levels for mechanical. Retail and office are located on the first floor and residential floors above. Block E3 has a three-storey underground parking with 334 vehicle parking stalls and 865 bicycle parking stalls. The building and garage layout for Block E3 are encumbered by a potential Hydro One (HONI) utility easement. The easement is six metres wide and extends north and south along the east property line contiguous with Leaside Park Drive.

Block E4 consists of a 56-storey building with two additional levels for mechanical. Retail on the first floor and residential floors above. Block E5 consists of a 24-storey building with two additional levels for mechanical. Retail is located on the first floor and residential floors above. Block E4 and E5 has a shared three-storey underground parking with 333 vehicle parking stalls and 918 bicycle parking stalls. The building and garage layout for Site E4 are encumbered by a potential HONI utility easement. The easement is four metres wide and extends north and south along the west property line contiguous with Leaside Park Drive. The proposed development includes a park along the south side of Blocks E4 and E5. The park extends south to the EGS property line, west to the property line and east to the to the property line. The park site is also encumbered by the potential HONI easement.

There will need to be thorough coordination between the development of the TOC along Overlea Boulevard and the EGS PDB proponent. The development of the underground structure of Block D1 must be in place prior to the completion of the TTC bus loop along Thorncliffe Park Drive.

2 Site Condition

2.1 Existing Topography

The Blocks are situated on a generally flat surface consisting of one-storey buildings north of the Overlea Boulevard.

Generally, the TOC slopes gently to the south toward Overlea Boulevard. There is a highpoint on Overlea Boulevard at Leaside Park Drive that directs flows east and west. Based on the OBM AW, the existing topography will be altered. The alterations include the demolition of the buildings at 10 Overlea Boulevard and 26 Overlea Boulevard, the construction of a new city street Leaside Park Drive extension on the property of 20 Overlea Boulevard, and the closure of Thorncliffe Park Drive north of Overlea Boulevard. The Leaside Park Drive extension will be conveyed to the City upon completion and inspection of the of the roadway. The closure of Thorncliffe Park Drive north of Overlea Boulevard will only be completed once the Leaside Park Drive extension has been conveyed to the City to allow for access to Banigan Drive.

Block D has an approximate area of 0.23 Ha (2,300 m^2), Block D1 has an approximate area of 0.46 Ha (4,578 m^2), Block E1 has an approximate area of 0.43 Ha (4,323 m^2), Block E3 has an approximate area of 0.60 Ha (6,020 m^2), and Blocks E4 and E5 have an approximate area of 0.81 Ha (8,110 m^2).

Based on the OBM AW, the existing surface water flow patterns can be seen below in **Figure 2-1**. The properties along Banigan Drive and Banigan Drive itself will drain to the Leaside Park Drive extension, then to either along Leaside Park Drive or east or west along Overlea Boulevard. The properties located along Overlea Boulevard all drain towards Overlea Boulevard which drains further to the Millwood Road intersection.

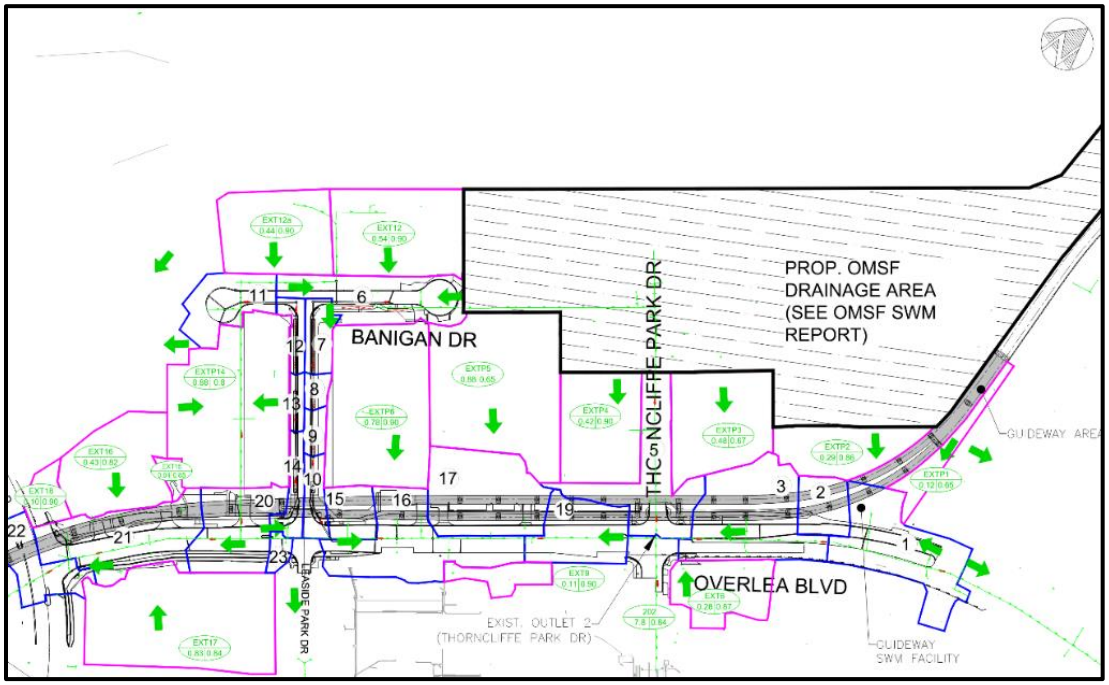

Figure 2-1: Overlea Blvd Modifications Advanced Works Surface Water Flow Paths

2.2 Existing Utility Information

The existing utility information in the surrounding area is based on Quality Levels A, B, C, and D Subsurface Utility Engineering (SUE) that was carried from 2020 to 2022. The existing composite utility plan that was developed as a part of the OBM AW is included in **Appendix A** for reference only.

The proposed composite utility plan that was developed as a part of the OBM AW is included in **Appendix B** for reference only.

There are a three-(3) easements located along the Leaside Park Drive extension. The easements are all 137.2 m long, parallel to the Leaside Park Drive extension between Overlea Boulevard and Banigan Drive. The easements from west to east are as follows: potential 4 m HONI easement, 6.5 m gap, potential 3 m HONI easement, 10.3 m gap, and a potential 6 m HONI easement. The easements can all be seen in **Appendix B**.

The proposed Thorncliffe Park Drive bus loop stormwater wet utilities plan is included in **Appendix C** for reference only but it is recommended that the OneTeam and Development Co. provide further details on the required storm services.

The existing utility information surrounding the TOC sites is provided on the Site Servicing Plans attached in **Appendix D**. The Site Servicing Plan was developed using the proposed composite utility plan developed as part of the OBM AW.

Prior to detailed design and construction, it is recommended that the OneTeam and Development Co. confirm the existing underground, aerial utilities, and the vertical elevation information.

2.3 Proposed Site Grading

Based on the OBM AW, the existing grading along the roadway is not expected to change, all grading changes are strictly limited to the properties the TOCs rest upon. The proposed grading plans are provided in **Appendix D**. The site's proposed grading is expected to follow the existing topography of the site.

Blocks D and D1 will gently slope towards the proposed TTC bus loop, then to Thorncliffe Park Drive. Block E1 will gently slope towards Thorncliffe Park Drive. Water runoff (within allowable limits) will be discharged to the storm sewer on Thorncliffe Park Drive via the existing 1,050 mm concrete storm sewer along Thorncliffe Park Drive.

Block E3 will discharge to the Overlea Boulevard via the 600 mm storm sewer.

Blocks E4 and E5 will gently slope towards the Leaside Park Drive extension, then to Overlea Boulevard. Water runoff (within allowable limits) will be discharged to Overlea Boulevard via the 525 mm storm sewer.

3 Water Supply and Appurtenances

3.1 Existing Condition

There is an existing watermain, of 400 mm diameter, that follows the Overlea Boulevard roadway north curb alignment beyond the Study limits to the east and transitions northernly along Millwood Road at the intersection of Millwood Road and Overlea Boulevard to the west. Along the Overlea Boulevard watermain, there are eight-(8) service connections to the properties along the Overlea Boulevard corridor. There is an existing watermain of 200 mm diameter that follows the Leaside Park Drive roadway alignment and ties into the Overlea Boulevard watermain at the intersection of Leaside Park Drive and Overlea Boulevard with three-(3) service connections to properties along the Leaside Park Drive corridor. There is two-(2) existing watermains of 300 mm diameter that follows the Thorncliffe Park Drive roadway alignment and ties into the Overlea Boulevard watermain at the intersection of Thorncliffe Park Drive and Overlea Boulevard. The first Thorncliffe Park Drive watermain goes easternly following the Thorncliffe Park Drive roadway alignment beyond the Study limits. The second Thorncliffe Park Drive watermain goes westerly tying into the Banigan Drive watermain and an unknown watermain north of Banigan Drive with four-(4) service connections to properties along the Thorncliffe Park Drive corridor. There is an existing watermain of 250 mm diameter that follows the Banigan Drive roadway alignment and ties into the second Thorncliffe Park Drive watermain at the intersection of Banigan Drive and Thorncliffe Park Drive with eight-(8) service connections to properties along the Banigan Drive. The above noted watermains can be seen in **Appendix A**.

Based on the OBM AW, the existing watermain network will be significantly altered which includes a realigning of the Overlea Boulevard watermain, all connections to secondary watermains along Overlea Boulevard, a new watermain along the Leaside Park Drive extension, the realigning of the Banigan Drive Thorncliffe Park Drive connection, and all service connections affected. The updated Overlea Boulevard watermain will tie into the existing Millwood Road watermain at the northwest corner of Millwood Road and Overlea Boulevard then transition south crossing Overlea Boulevard and will follow the new south curb. Beyond Thorncliffe Park Drive the Overlea Boulevard watermain will transition from 400 mm to 600 mm diameter with a small loop to allow for fire flows and service connections. The existing Leaside Park Drive watermain will be modified to accommodate the connection to the new alignment of the Overlea Boulevard watermain. Their will be a new 300 mm watermain along the Leaside Park Drive extension following the east curb with new service connections and will tie into the existing Banigan Drive watermain. The existing Thorncliffe Park Drive watermains will be modified to accommodate the connection to the new alignment of the Overlea Boulevard watermain. The west Thorncliffe Park Drive watermain will tie into the existing, terminate north of the new TTC bus loop, realigned along the edge of the Operation Maintenance and Storage Facility (OMSF), and will tie into the existing Banigan Drive watermain. The above noted watermains can be seen in **Appendix B**.

3.2 Water Supply

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

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

The watermain network will be designed and constructed to the City's *Design Criteria for Sewers and Watermains (2021)*. A Site Servicing Plan in **Appendix D** has been prepared to show the potential locations of the watermain service connections to the developments. The water demand for the proposed sites was calculated per the City's *Design Criteria for Sewers and Watermains (2021)* and using site statistics provided by the architect. Water demand calculation summaries for Blocks D, D1, E1, E3, and E4/E5 are provided in **Table 3-1**, **Table 3-2**, **Table 3-3**, **Table 3-4**, and **Table 3-5** respectively. As a part of the OBM AW, a detailed Sewer Capacity Analysis was completed in support of a stage-1 Sewer Discharge Approval application, this report is included below in **Appendix E**.

Table 3-1: Block D Development Water Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Average Day Water Consumption Rate	190 L/capita/day	190 L/capita/day
Total Site Area	13,957 m^2	
Total GFA	0 m^2	18,147 m^2
Residential units	0	n/a
Residential / commercial population	0	200
Peaking factor – peak hour	2.5	1.2
Average Water Demand from Site	0.0 L/s	0.4 L/s
Peak Water Demand from Site	0.0 L/s	0.5 L/s

Table 3-2: Block D1 Development Water Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Average Day Water Consumption Rate	190 L/capita/day	190 L/capita/day
Total Site Area	13,961 m^2	
Total GFA	30,866 m^2	193 m^2
Residential units	426	n/a
Residential / commercial population	1,151	3
Peaking factor – peak hour	2.5	1.2
Average Water Demand from Site	2.5 L/s	0.0 L/s
Peak Water Demand from Site	6.3 L/s	0.0 L/s

Table 3-3: Block E1 Development Water Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Average Day Water Consumption Rate	190 L/capita/day	190 L/capita/day
Total Site Area	5,389 m^2	
Total GFA	47,370 m^2	1,718 m^2
Residential units	663	n/a
Residential / commercial population	1,782	19
Peaking factor – peak hour	2.5	1.2
Average Water Demand from Site	3.9 L/s	0.0 L/s
Peak Water Demand from Site	9.8 L/s	0.1 L/s

Table 3-4: Block E3 Development Water Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Average Day Water Consumption Rate	190 L/capita/day	190 L/capita/day
Total Site Area	6,082 m^2	
Total GFA	55,926 m^2	2,000 m^2
Residential units	761	n/a
Residential / commercial population	2,055	22
Peaking factor – peak hour	2.5	1.2
Average Water Demand from Site	4.5 L/s	0.0 L/s
Peak Water Demand from Site	11.3 L/s	0.1 L/s

Table 3-5: Blocks E4 & E5 Development Water Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Average Day Water Consumption Rate	190 L/capita/day	190 L/capita/day
Total Site Area	11,864 m^2	
Total GFA	59,349 m^2	843 m^2
Residential units	805	n/a
Residential / commercial population	2,174	10
Peaking factor – peak hour	2.5	1.2
Average Water Demand from Site	4.8 L/s	0.0 L/s
Peak Water Demand from Site	12.0 L/s	0.0 L/s

The estimated fire flow requirements for each site were calculated based on recommendations by the *Fire Underwriters Survey Water Supply for Public Fire Protection (1999)* and the City's fire flow requirement. The largest flow between the City's requirement and Fire Underwriters Survey Guideline was used as the fire flow requirement. These were determined to be 23,709 L/min for Block D, 31,017 L/min for Block D1, 38,994 L/min for Block E1, 42,359 L/min for Site E3, and 43,180 L/min for Blocks E4 and E5. Detailed calculations can be found in **Appendix F**.

Block D will have one-(1) 150 mm water service connection to the existing 400 mm mainline watermain on Overlea Boulevard. This connection line will split into a 200 mm fire service and a 150 mm domestic service at the development end of the connection. Block D1 will have two-(2) 150 mm water service connection to the existing 400 mm mainline watermain on Thorncliffe Park Drive. These connections split into a 200 mm fire service and a 150 mm domestic service at the development end of the connection. Block E1 will have two-(2) 250 mm water service connection to the existing 400 mm mainline watermain on Thorncliffe Park Drive. These connections split into a 250 mm fire service and a 200 mm domestic service at the development end of the connection. Block E3 will have four-(4) 200 mm water service connection to the existing 300 mm mainline watermain on the Leaside Park Drive extension. These connections split into a 200 mm fire service and a 200 mm domestic service at the development end of the connection. Blocks E4 and E5 will have four-(4) 200 mm water service connection to the existing 300 mm mainline watermain on the Leaside Park Drive extension. These connections split into a 200 mm fire service and a 200 mm domestic service at the development end of the connection. Each of the watermain connections will split into a fire service and domestic water service per the City standards.

Based on the OBM AW Thorncliffe Park Watermain Replacement Hydraulic Analysis, included in **Appendix G**, the watermain design and constructed as a part of the OBM AW can accommodate the additional equivalent population capacity of 16,527 people. The calculations provided herein only include a residential and commercial population of 7,425 people which means that the watermain along Overlea Boulevard should be more than sufficient to meet the demands required by the TOCs.

4 Sanitary Servicing

4.1 Existing Condition

There is an existing sanitary sewer of 250 mm diameter that follows the Overlea Boulevard roadway alignment between Millwood Road to beyond the Study limits with five-(5) service connections within the Study limits. There are two-(2) existing sanitary sewers of differing diameters that follows the Thorncliffe Park Drive roadway alignment and ties into the Overlea Boulevard sanitary sewer at the intersection of Thorncliffe Park Drive and Overlea Boulevard. The first Thorncliffe Park Drive sanitary sewer has a 375 mm diameter and goes easternly following the Thorncliffe Park Drive roadway alignment beyond the Study limits. The second Thorncliffe Park Drive sanitary sewer has a 350 mm diameter and goes westerly with three-(3) service connections to properties along the Thorncliffe Park Drive corridor. The above noted sanitary sewers can be seen in **Appendix A**.

Based on the OBM AW, the existing sanitary sewer network will be mildly altered which includes a new service connection at 4-8 Overlea Boulevard, sanitary sewer along the Leaside Park Drive extension, new sanitary sewer manholes along the Thorncliffe Park Drive sanitary sewer, and a new sanitary sewer along Banigan Drive. The new service connection at 4-8 Overlea Boulevard will be 250 mm and will be confirmed on-site. It will be completed as a part of the OBM AW. The new sanitary sewer along the Leaside Park Drive extension will connect the new Banigan Drive sanitary sewer to the Overlea Boulevard sanitary sewer and further south along Leaside Park Drive. The sanitary sewer at Banigan Drive has a 300 mm diameter up to sanitary sewer manhole 03, beyond the manhole the sanitary sewer has a 450 mm diameter. The new sanitary sewer along Banigan Drive will allow for new service connections along Banigan Drive. The sanitary sewer at Banigan Drive has a 300 mm diameter. The above noted sanitary sewers can be seen in **Appendix B**.

Even with the available utility information provided in the OBM AW and Thorncliffe Park TOC drawings, it is recommended to be confirmed on site.

4.2 Proposed Sanitary Flow

Sanitary flows for the proposed developments were calculated based on design parameters from the *City of Toronto Design Criteria for Sewers and Watermains (2021)* and site statistics provided by the architect. **Table 4-1**, **Table 4-2**, **Table 4-3**, **Table 4-4**, and **Table 4-5** summarize the sanitary flow calculations for the proposed developments on Blocks D, D1, E1, E3, and E4/E5 respectively. Detailed sanitary flow calculations are included in **Appendix H**. As a part of the OBM AW, a memo for the Permanent Sanitary Sewer Upgrades Comparative Analysis Memo was prepared. The memo documents the expected sanitary flow using the City of Toronto approach by unit count, City of Toronto approach by floor area, or the OBC approach by fixture unit counts. The OBM AW Permanent Sanitary Sewer Upgrades Comparative Analysis Memo can be seen in **Appendix I**.

Table 4-1: Block D Development Sanitary Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Sanitary Demand Rate	450 L/capita/day	0 L/capita/day
Commercial Average Flow	n/a	180 000 L/floor ha/day
Total GFA	0 m^2	18,147 m^2
Peaking Factor	4.5	n/a
Peak Sanitary Flow	0.00 L/s	3.78 L/s
Inflow and Infiltration	0.36 L/s	
Maximum Cumulative Flow with Peaking Factor	4.14 L/s	
OBM AW – Expected Peak Sanitary Discharge	43.30 L/s	

Table 4-2: Block D1 Development Sanitary Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Sanitary Demand Rate	450 L/capita/day	0 L/capita/day
Commercial Average Flow	n/a	180 000 L/floor ha/day
Total GFA	30,866 m^2	193 m^2
Peaking Factor	3.8	n/a
Peak Sanitary Flow	5.99 L/s	0.04 L/s
Inflow and Infiltration	0.36 L/s	
Maximum Cumulative Flow with Peaking Factor	23.18 L/s	
OBM AW – Expected Peak Sanitary Discharge	22.10 L/s	

Table 4-3: Block E1 Development Sanitary Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Sanitary Demand Rate	450 L/capita/day	0 L/capita/day
Commercial Average Flow	n/a	180 000 L/floor ha/day
Total GFA	47,370 m^2	1,718 m^2
Peaking Factor	3.6	n/a
Peak Sanitary Flow	9.33 L/s	0.36 L/s
Inflow and Infiltration	0.14 L/s	
Maximum Cumulative Flow with Peaking Factor	34.08 L/s	
OBM AW – Expected Peak Sanitary Discharge	46.90 L/s	

Table 4-4: Block E3 Development Sanitary Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Sanitary Demand Rate	450 L/capita/day	0 L/capita/day
Commercial Average Flow	n/a	180 000 L/floor ha/day
Total GFA	55,926 m^2	2,000 m^2
Peaking Factor	3.6	n/a
Peak Sanitary Flow	10.70 L/s	0.42 L/s
Inflow and Infiltration	0.16 L/s	
Maximum Cumulative Flow with Peaking Factor	39.11 L/s	
OBM AW – Expected Peak Sanitary Discharge	71.50 L/s	

Table 4-5: Block E4 & E5 Development Sanitary Demand Calculation Summary

Parameter/ Items	Residential	Commercial
Sanitary Demand Rate	450 L/capita/day	0 L/capita/day
Commercial Average Flow	n/a	180 000 L/floor ha/day
Total GFA	59,349 m^2	843 m^2
Peaking Factor	3.6	n/a
Peak Sanitary Flow	11.32 L/s	0.18 L/s
Inflow and Infiltration	0.31 L/s	
Maximum Cumulative Flow with Peaking Factor	41.25 L/s	
OBM AW – Expected Peak Sanitary Discharge	63.00 L/s	

4.3 Sanitary Service Connection

Each of the proposed buildings will be connected to the mainline sanitary sewers. Block D will be connected to a proposed 200 mm sanitary sewer along Thorncliffe Park Drive via a 200 mm service connection. Block D1 will be connected to the proposed OBM AW 300 mm sanitary sewer Thorncliffe Park Drive via a 200 mm service connection. Block E1 will be connected to a newly proposed 200 mm sanitary sewer along Thorncliffe Park Drive via a 200 mm service connection. Block E3 will be connected to the proposed OBM AW 450 mm sanitary sewer along the Leaside Park Drive extension via two-(2) 300 mm service connections. Blocks E4 and E5 will be connected to the proposed OBM AW 450 mm sanitary sewer along the Leaside Park Drive extension via two-(2) 300 mm service connections.

The improvements to the sanitary sewer system on Overlea Boulevard, as part of the OBM AW project, provides the capacity anticipated for the TOC servicing needs. The developer will need to work with the City of Toronto to determine the improvements required downstream of Overlea Boulevard to meet the additional TOC service needs.

5 Storm Drainage and Stormwater Management

5.1 Existing Condition

Block D is the easternmost site, which partially covers an existing commercial building and green landscaped areas. The existing building at 36 Overlea Boulevard drains into the existing 675 mm storm sewer on Overlea Boulevard.

Block D1 is located at the northeast intersection of Overlea Boulevard and Thorncliffe Park Drive, and to the north of the proposed Thorncliffe Park Station. The Site comprises two existing commercial buildings, a parking lot, and green landscaped areas. The buildings at 28 Overlea Boulevard and 6 Thorncliffe Park Drive drain into the existing 600 mm storm sewer on Thorncliffe Park Drive. The parking lot between the two buildings drains towards the catch basin located in the center of the lot.

Block E1 is situated to the west of Blocks D and D1 and east of the existing 20 Overlea Boulevard. The site encompasses a commercial building and a parking lot. It is assumed that the commercial building at 26 Overlea Boulevard drains through the downspout connections to Thorncliffe Park Drive. The parking lot drains towards the catch basins located within the lot.

Block E3, situated to the west of Block E1 and is comprised of two existing commercial buildings and parking spaces. The downspout connections of the building located at 14 and 16 Overlea Boulevard are assumed to discharge into the existing 600 mm storm sewer on Overlea Boulevard. The parking lot north of the buildings drains into the catch basins located within the lot.

Blocks E4 and E5 is the westernmost development site, which includes two existing commercial buildings and parking spaces. It is assumed that the downspout drainage from the roof of the two commercial buildings will discharge into the existing 375 mm storm sewer system located on the passageway between the two buildings. Ultimately, this system will drain towards the 525 mm storm sewer on Overlea Boulevard. The parking spaces northwest of the Site drain west towards the catch basin within the lot, while those north-east of the Site drain east towards the catch basin within the lot.

Drainage west of the existing Leaside Drive heads west towards the Millwood Rd intersection. The remaining drainage from close to the Costco to Leaside Drive goes overland to the south down Leaside and Thorncliffe Park Drive. Please refer to **Appendix J** for the existing drainage plans.

5.2 Stormwater Management Criteria

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

5.2.1 Quality Control

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

5.2.2 Quality/ Flood Control

- Protect against surface flooding from ponding on streets during the 100-year event. Consult Toronto Water – Sewer Asset Planning Section for developments within the City's chronic basement flooding areas (WWFMG).
- Drainage discharged to the municipal storm sewer must be controlled to the peak release rate from the lower of:
    - the existing conditions peak flow from design event with a 2-year return period assuming a runoff coefficient of 0.5, if the existing imperviousness is greater than 50%; and,
    - the existing capacity of the storm sewer (WWFMG).

- In absence of an approved or adequate overland flow route, all flow from the 2-year up to the 100-year return storm events shall be stored on-site and released at the allowable release rate as defined above (WWFMG).
- Peak flows should be calculated using the intensity-duration-frequency information in the WWFMG.

5.2.3 Water Balance

- Retain all runoff from the 5 mm rainfall event on-site through infiltration, evaporation, and/or rainwater reuse (WWFMG, TGS - Tier 1).
- Retain all runoff from the 10 mm rainfall event on-site through infiltration, evaporation, and/or rainwater reuse (TGS - Tier 2).
- For sites located in high volume groundwater recharge areas, pre-development groundwater recharge rates should be maintained (TRCA).

5.2.4 Erosion Control

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

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

5.3 Stormwater Management Plan

As per the applicable stormwater management (SWM) criteria summarized in **Section 5.2**, water balance, water quantity, quality and erosion control for the proposed Exhibition development sites is required. The stormwater best management practices considered for the site include green roofs, underground detention/retention tanks, and OGS units. The Proposed Conditions Drainage Plan is presented in **Appendix J**.

All building openings should be protected from flooding. During detailed design, the depth of overland flow at these locations should be calculated using dual drainage models to confirm that all openings to the buildings will have sufficient freeboard above the maximum water elevation during a 100-year storm event. The Reference Concept Design (RCD) satisfies stormwater management (SWM) and drainage requirements for the Proposed Exhibition Sites as follows:

- **Quantity Control:**

  Storage tank units with orifice controls are proposed in the first underground level to provide quantity control. The required storage volumes are 47.14 m^3, 134.08 m^3, 122.93 m^3, 180.26 m^3, and 191.64 m^3 for Blocks D, D1, E1, E3, and E4/E5 respectively, released over 24 hours.

- **Quality Control:**

  Quality control for each site will be provided via the proposed green roof along with inline treatments, the water retained in the storage tanks for reuse, and Oil Grit Separator units. The required storage volumes are 4 m^3, 16 m^3, 14 m^3, 21 m^3, and 22 m^3 for Blocks D, D1, E1, E3, and E4/E5 respectively to meet quality requirements.

- **Water Balance:**

  Green roof and water reuse are proposed to satisfy the 5 mm retention requirement. Reuse volume for quality control will satisfy the water balance requirements.

- **Minor Drainage System:**

  Water captured from the roofs of the building will be discharged into the existing storm/ combined sewer systems after receiving quality and quantity treatment.

- **Major Drainage System:**

  Major system drainage patterns will be generally maintained under proposed conditions. For the proposed aboveground structures, major system flows will be captured and controlled using underground storage.

The summary of required storage by volume for all sites is shown below in

Table 5-1.

Table 5-1: Summary of Required Storage

Site ID	Site Area (ha)		Proposed Green Roof (ha)	Required Storage Volume for Quantity Control (m^3)	Required Storage Volume for Quality Control (m^3)
	Exist.	Prop.			
D	0.21	0.21	0.11	47.14	4
D1	0.46	0.46	0.03	134.08	16
E1	0.42	0.42	0.08	122.93	14
E3	0.61	0.61	0.07	180.26	21
E4 & E5	0.84	0.84	0.04	191.64	22

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

6 Site Utilities

These Blocks will be serviced by utilities provided by Enbridge Gas, THESL, and the relevant telecommunications providers. Future utility coordination is required with each utility company to determine the feasibility, requirements, and connection locations for their respective services.

6.1 Electrical Service

Electrical services will be provided by THESL. Based on the OBM AW proposed composite utility plan provided in **Appendix B**, shows proposed THESL conduits along Overlea Boulevard and the Leaside Park Drive extension. The developer is to initiate discussions with THESL to determine the requirements and connection locations for electrical service for all the sites.

6.2 Gas Service

Gas services will be provided by Enbridge Gas. Based on the OBM AW proposed composite utility plan provided in **Appendix B**, shows proposed gas mains along Overlea Boulevard and the Leaside Park Drive extension. Service connections are provided along the Overlea Boulevard. The developer is to initiate discussions with Enbridge Gas to determine the connection requirements and locations of gas service to the proposed Blocks D, D1, E1, E3, E4, and E5 developments.

6.3 Communication

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

7 Conclusions and Summary

A Site Servicing plan has been prepared to support the preliminary rezoning submission for the proposed developments along Overlea Boulevard north of Millwood Road to north of Thorncliffe Park Drive, in the City as part of the Ontario Line TOC. Due to limitations in the available existing utility information, this report focuses on the proposed developments water demand, sanitary demand, and stormwater management design requirements.

The watermain, sanitary sewer, and stormwater services are sufficient in the surrounding area, based on the upgrades made as a part of the OBM AW and EGS contracts. Downstream of Overlea Boulevard, the sanitary sewer capacity is limited in its capacity to accommodate the TOC servicing needs. The developer will need to work with the City of Toronto to determine the sanitary sewer improvements required downstream of Overlea Boulevard to meet the additional TOC service needs.

Appendix A. Existing (2023) Composite Utility Plan

LEGEND

- EGS LIMIT OF WORKS (L.O.W.) (OPEN CUT)
- MSF SITE LIMIT OF WORKS (L.O.W.)
- EXISTING SURVEYED RIGHT OF WAY
- EXISTING SURVEYED PROPERTY
- PROPOSED RIGHT OF WAY
- PROPOSED UTILITY EASEMENT
- COMBINATION SEWERS
- SANITARY SEWERS
- STORM SEWERS
- WATER MAIN
- GAS
- HYDRO
- HYDRO ONE (HONI)
- TORONTO HYDRO (THES)
- STREET LIGHTING
- TRAFFIC CONTROL
- ENWAVE
- STEAM
- OIL PIPELINES
- PIPE (FUEL, ETC.)
- NITROGEN METHANOL PIPELINES
- AMMONIA
- SUN-CANADIAN PIPELINE
- SARNIA PRODUCTS PIPELINE
- IMPERIAL OIL COMPANY
- TRANS-NORTHERN PIPELINE
- GO COMMUNICATIONS
- TORONTO TRANSIT COMMISSION (TTC)
- TTC ELECTRICAL
- TTC SIGNAL
- 360 NETWORK
- ALLSTREAM (PRESENTLY ZAYO)
- APTUM TECH (PRESENTLY BEANFILD)
- BELL 360
- BELL CANADA
- BEANFIELD
- CENTURY LINK
- COGECO
- GROUP TELECOM
- HYDRO ONE TELECOM
- ROGERS
- TELUS
- ZAYO GROUP
- VIDEOTRON

- FIBRE OPTIC CABLES
- TELECOM GENERAL
- UNKNOWN TELECOM
- HYDRO ONE TELECOM
- CN RAIL GENERAL
- CN COMMUNICATIONS
- CN POWER
- CN SIGNAL
- CN/MX
- METROLINX
- METROLINX GAS
- METROLINX POWER
- METROLINX SIGNAL
- METROLINX WATER
- UNKNOWN UTILITY
- OVERHEAD
- EXISTING ASSET TO BE ABANDONED/REMOVED AS REQ.
- SUE QL-B
- SUE QL-C
- SUE QL-D
- PROPOSED DRY UTILITIES UNDER 300mmØ
- PROPOSED DRY UTILITIES 300mmØ AND ABOVE
- PROPOSED WET UTILITIES
- TEST PIT
- PROPOSED STREET LIGHT
- STREET LIGHT TO BE REMOVED
- PROPOSED TRAFFIC SIGNAL POLE
- PROPOSED DIRECT BURIED TRAFFIC POLE
- PROPOSED ELECTRICAL HANDWELL
- PROPOSED TREE, REFER TO LANDSCAPE PLANS

TOPO FEATURE LEGEND

- EXISTING SHRUB
- EXISTING TREE
- EXISTING TREE LINE
- EXISTING CULVERT CENTERLINE
- EXISTING SIGNAL BUNGALOW
- EXISTING SWITCH
- HEATER
- EXISTING CATCH BASIN
- EXISTING CATCH BASIN SIDE INLET
- EXISTING DITCH INLET
- EXISTING DECK DRAIN
- EXISTING GUIDE RAIL (TOP OF POST)
- EXISTING GUIDE RAIL (TOP OF WIRE)
- BOLLARD
- MAILBOX
- PARKING M ETER
- ANCHOR
- ANCHOR POLE
- BELL HYDRO POLE
- BELL POLE
- BELL TERMINAL BOX
- FIRE HYRDRANT
- FIRE MAIN INDICATOR
- GAS KEY
- GAS METER
- GAS VALVE
- HYDRO CROSSING WIRE ELEVATION
- HYDRO METER
- HYDRO POLE
- HYDRO TERMINAL BOX
- HANDWELL
- EXISTING LIGHT STANDARD
- EXISTING LIGHT STANDARD BELL
- EXITING LIGHT STANDARD BELL AND HYDRO
- EXISTING LIGHT STANDARD HYDRO
- EXISTING LIGHT STANDARD TRAFFIC SIGNAL

- EXITING MAINTENANCE HOLE BELL
- EXISTING MAINTENANCE HOLE HYDRO
- EXISTING MAINTENANCE HOLE SANITARY
- EXISTING MAINTENANCE HOLE COMBINED
- EXISTING MAINTENANCE HOLE STORM
- EXISTING MAINTENANCE HOLE UNKNOWN
- EXISTING MAINTENANCE HOLE WATER
- EXISTING MONITORING WELL
- EXISTING PHONE BOOTH
- EXISTING POLE
- EXISTING POLE WELL
- EXISTING SPRINKLER HEAD
- EXISTING SEPTIC TANK ACCESS
- EXISTING STANDPIPE
- EXISTING SPRINKLER VALVE
- EXISTING UTILITY TERMINAL BOX
- EXISTING TRAFFIC SIGNAL POLE
- EXISTING TRAFFIC SIGNAL BELL
- EXISTING TRAFFIC SIGNAL BELL AND HYDRO
- EXISTING TRAFFIC SIGNAL CONTROL
- EXISTING TRAFFIC SIGNAL HYDRO
- EXISTING TV CABLE TERMINAL BOX
- EXISTING UNDERGROUND BELL MARKER
- EXISTING UNDERGROUND GAS MARKER
- EXISTING UNDERGROUND HYDRO MARKER
- EXISTING UNDERGROUND UTILITY MARKER
- EXISTING VENT
- EXISTING WELL
- EXITING WATER KEY
- EXISTING WATER VALVE

GENERAL NOTES

1. EXISTING UTILITY INFORMATION SHOWN IS BASED ON SUBSURFACE UTILITY ENGINEERING (SUE) SURVEY PROVIDED BY PLANVIEW UTILITY SERVICES LTD, AND IS TO BE READ IN CONJUNCTION WITH THE CORRESPONDING REPORT.
2. REFER TO TEST PIT RESULTS IN PLANVIEW UTILITY SERVICES SUE REPORT FOR CORRESPONDING TEST PIT INFORMATION.
3. TOPOGRAPHIC INFORMATION SHOWN IS PROVIDED BY TULLOCH ENGINEERING, ALL INFORMATION ON THIS SET OF DRAWINGS IS FOR INFORMATION ONLY.
4. WORK LIMITS FOR PROPOSED ELEVATED GUIDEWAY AND STATIONS ARE BASED ON THE REFERENCE CONCEPT DESIGN (RCD) FOR THE ONTARIO LINE SUBWAY PROJECT.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL EXPOSED UTILITY INFRASTRUCTURE IS ADEQUATELY PROTECTED DURING CONSTRUCTION AND REPAIR ANY DAMAGE THAT MAY OCCUR DURING CONSTRUCTION AT THEIR OWN EXPENSE.
6. LOCATION, SIZE AND CONFIGURATION OF PRIVATE UTILITIES TO BE PROVIDED BY RESPECTIVE UTILITY COMPANY, AND SUBMITTED FOR MUNICIPAL CONSENT REQUIREMENTS (MCR) APPROVAL TO THE CITY OF TORONTO.
7. FOR PROPOSED PUBLIC UTILITY RELOCATIONS, REFER TO WET UTILITIES RELOCATION PLANS.
8. FOR PROPOSED PRIVATE UTILITY DETAILED DESIGNS, REFER TO THE RESPECTIVE UTILITY COMPANY PLANS TO BE PROVIDED ON THE DATA ROOM.
9. PROPOSED PRIVATE UTILITIES SHOWN ARE NOT FINAL LOCATIONS. FINAL LOCATIONS WILL BE DETAILED BY UTILITY COMPANIES.
10. UNLESS OTHERWISE STATED, ALL PROPOSED PRIVATE UTILITY RELOCATIONS (EXCEPT STREET LIGHTING) SHOWN ARE TO BE COMPLETED BY THE RESPECTIVE UTILITY COMPANIES UNDER CONTRACT TO METROLINX.

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ONETEAM
ONTARIO LINE TECHNICAL ADVISOR

METROLINX

HDR

Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
LEGEND AND GENERAL NOTES

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8000	C	1

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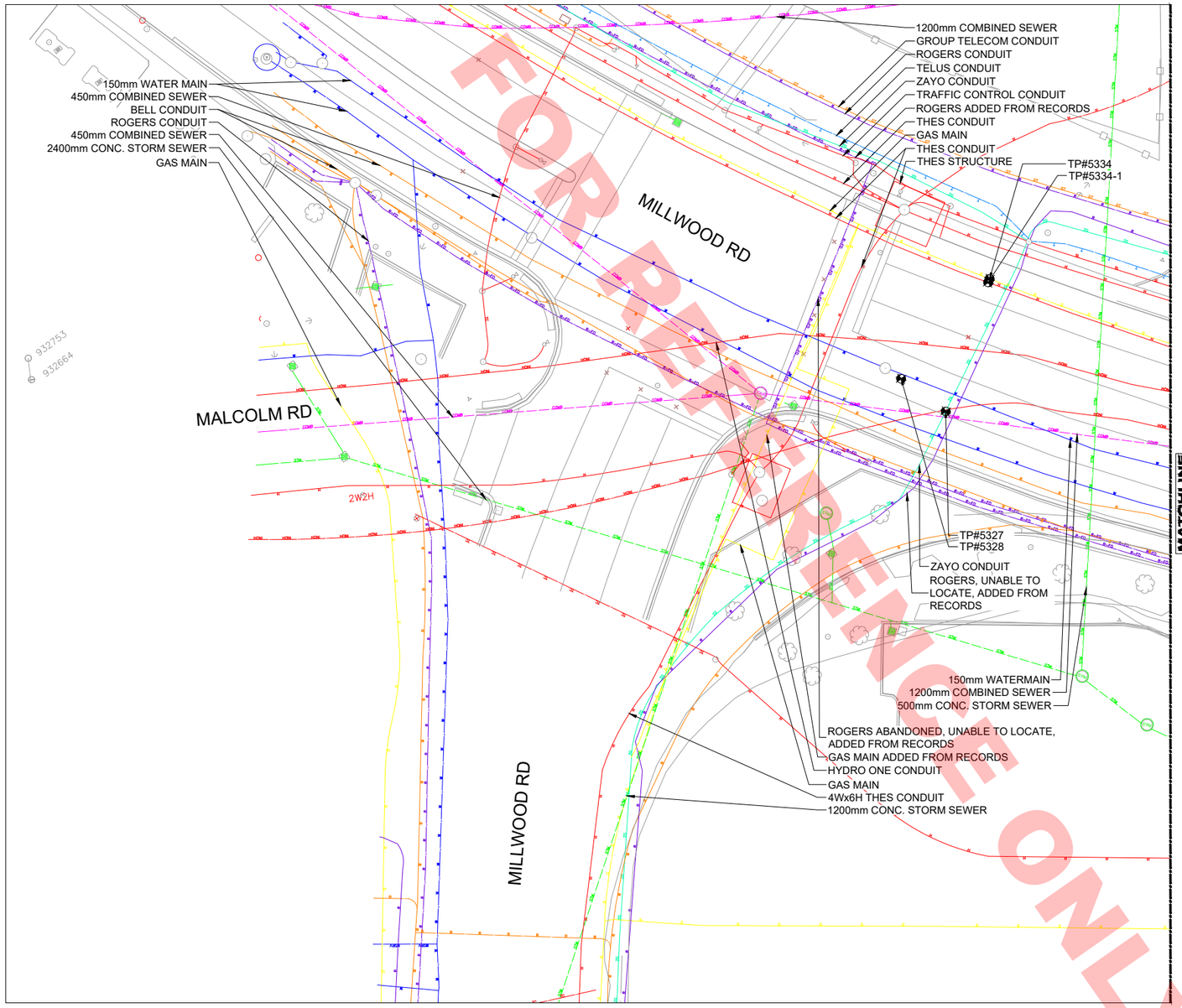

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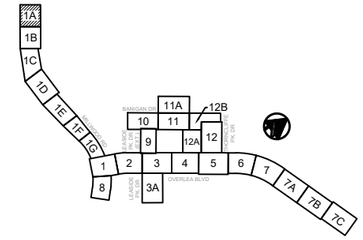

KEY PLAN

NOTES

1. FOR UTILITY LEGEND AND GENERAL NOTES, REFER TO OBM-U8000.
2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

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ONTARIO LINE TECHNICAL ADVISOR
HDR
METROLINX
Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
MILLWOOD RD

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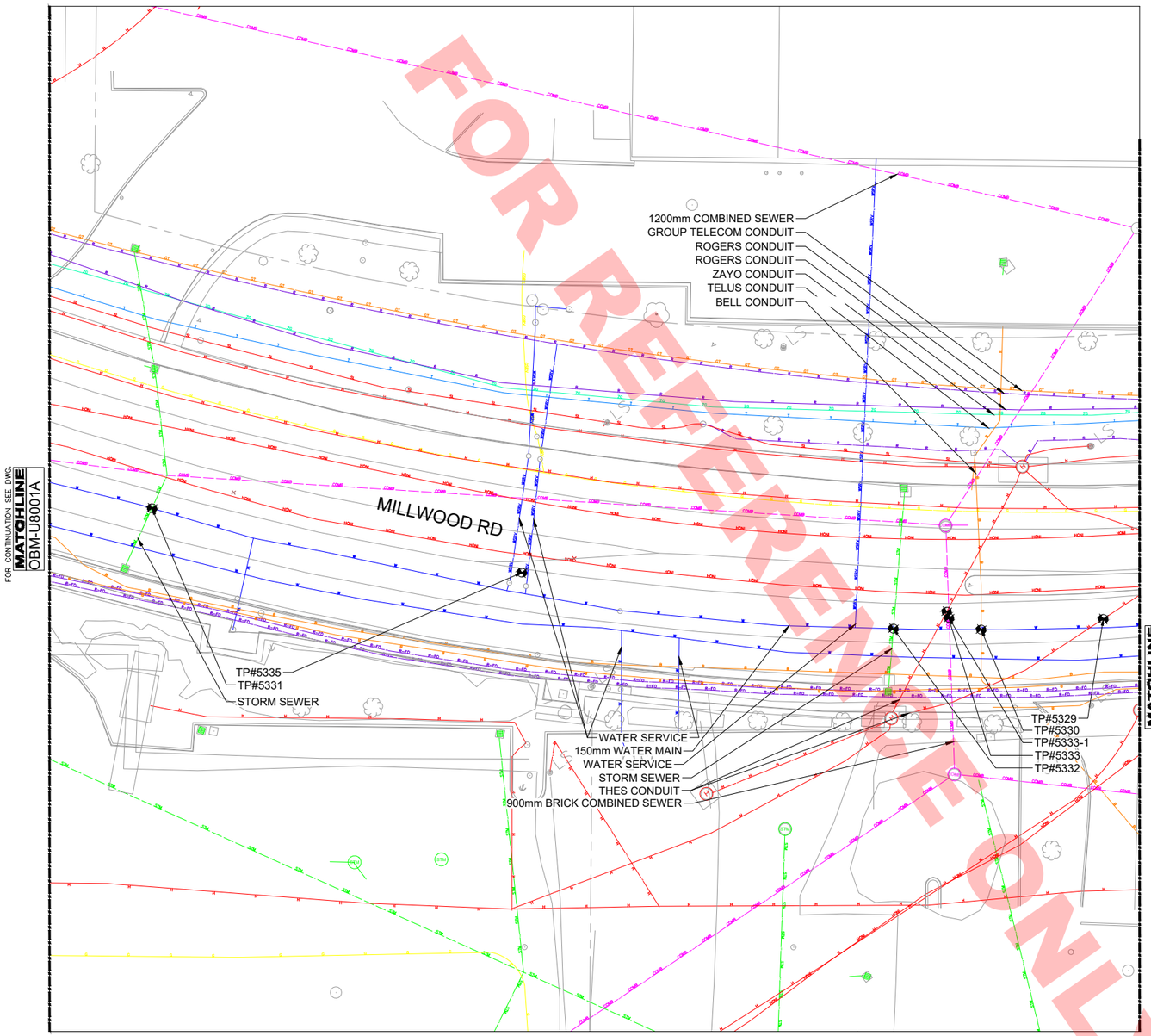

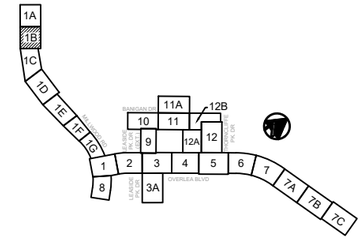

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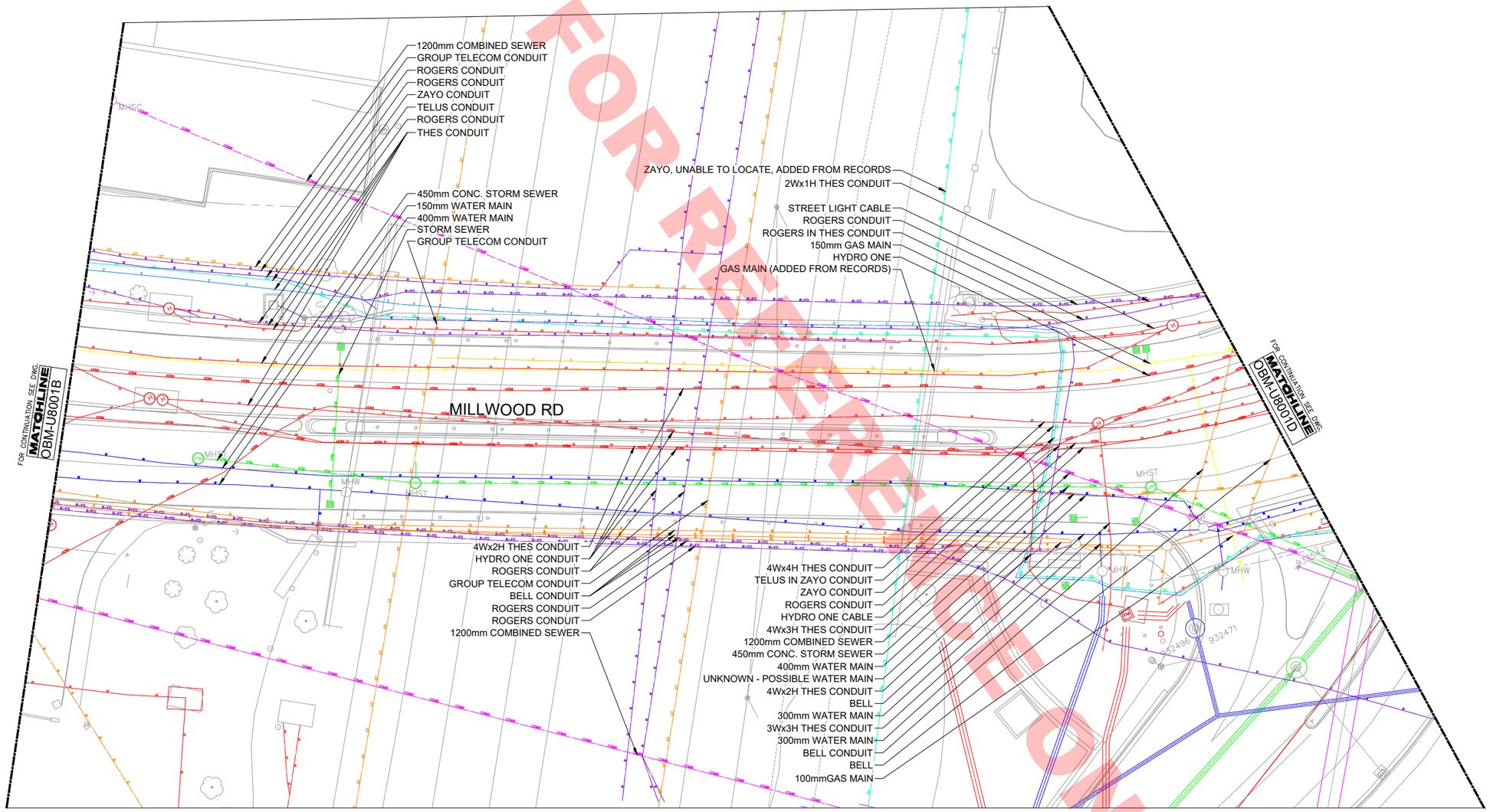

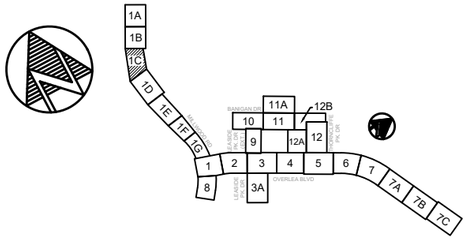

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DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
MILLWOOD RD

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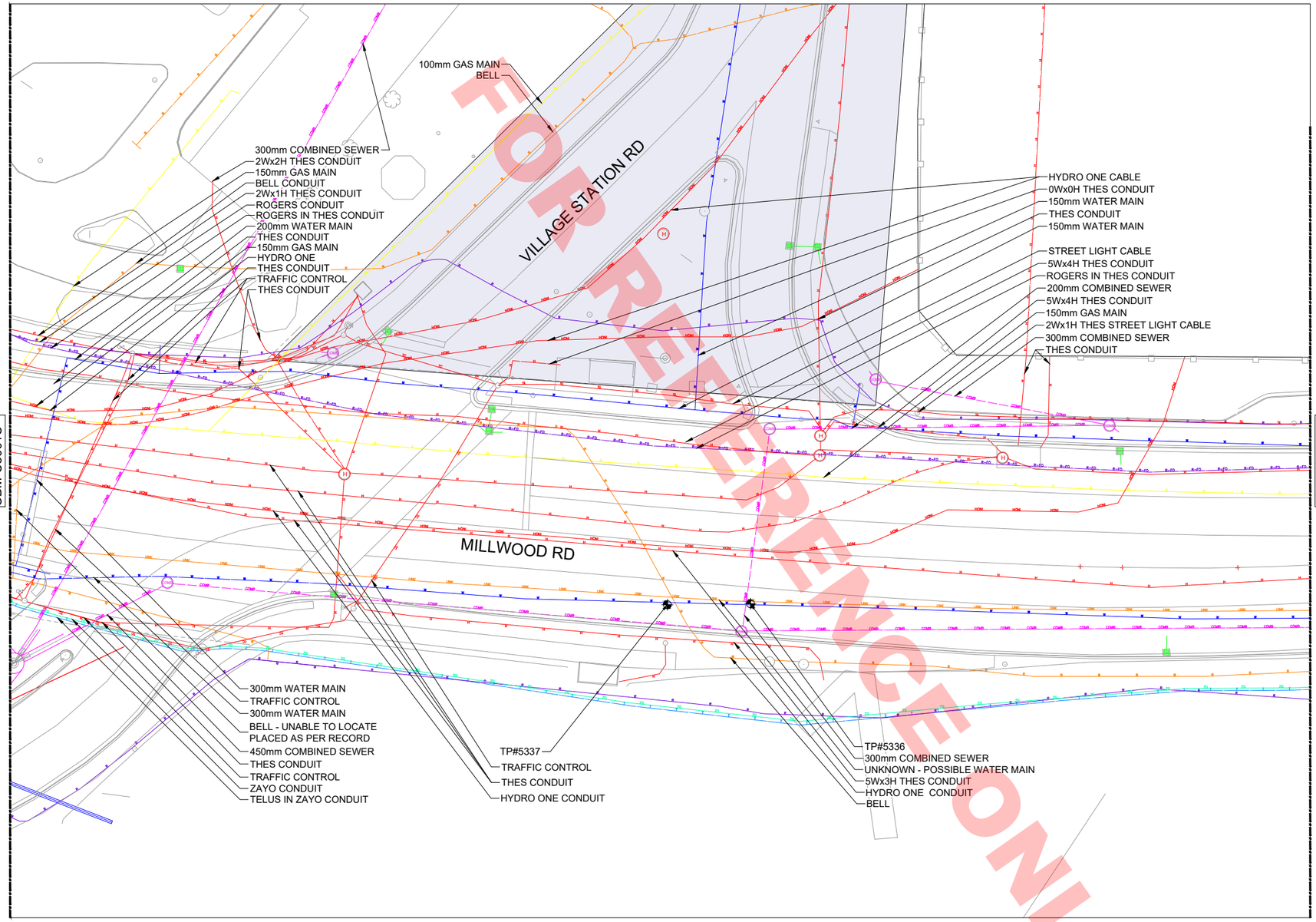

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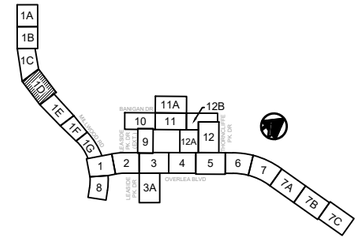

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OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
MILLWOOD RD

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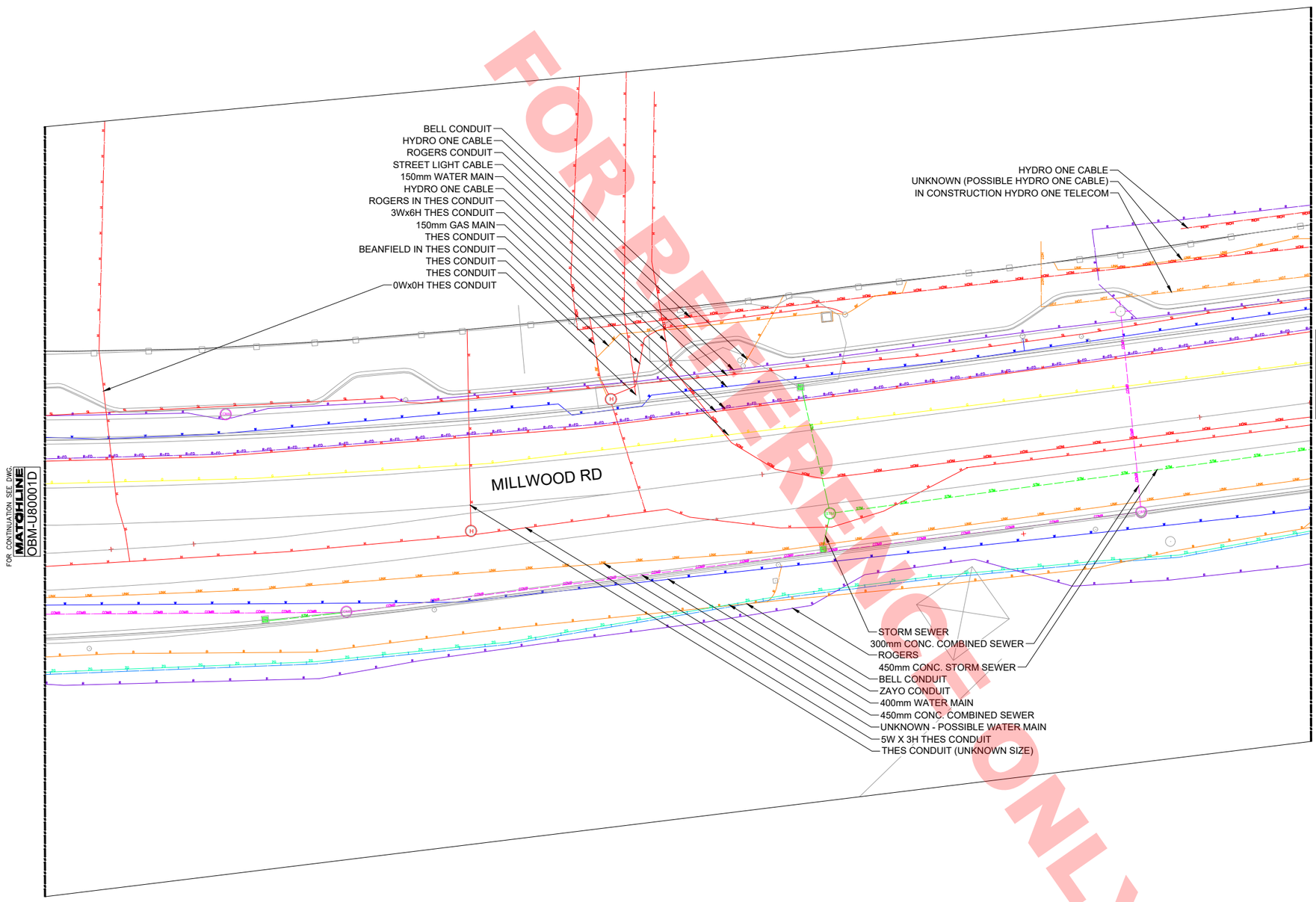

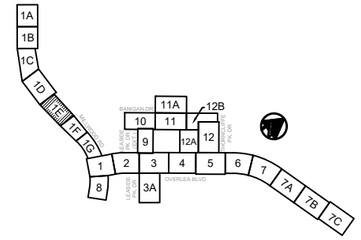

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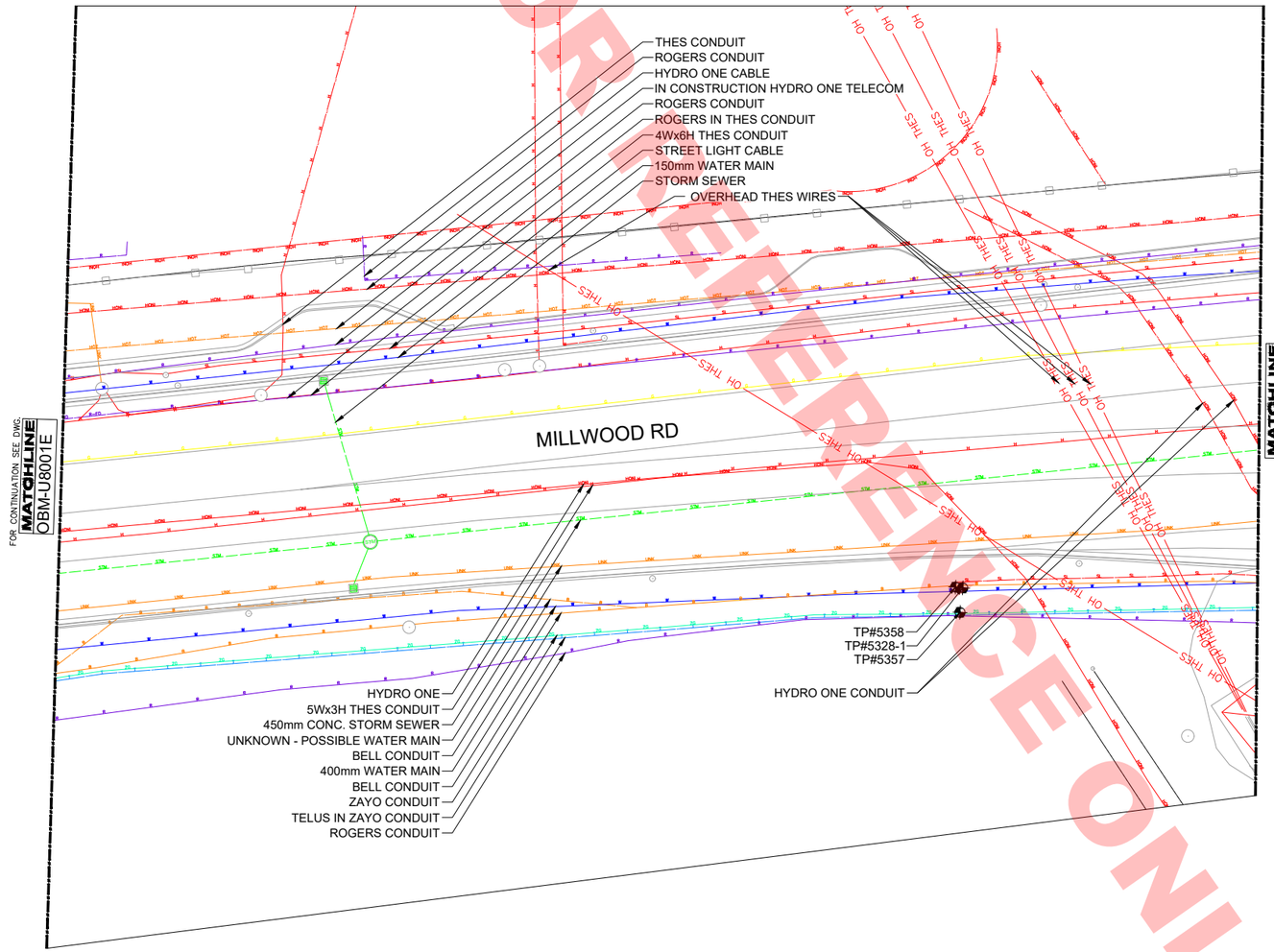
HDR
METROLINX
Infrastructure Ontario

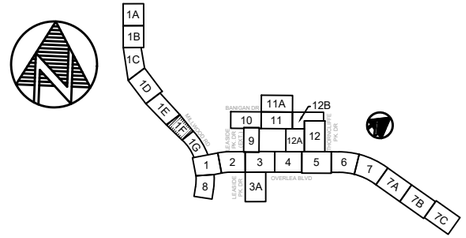
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8001E	C	6

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

1. FOR UTILITY LEGEND AND GENERAL NOTES, REFER TO OBM-U8000.
2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		C	2023/06/28	ISSUE FOR 100% REVIEW			
		B	2023/12/23	ISSUE FOR 90% DESIGN			
		A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONETEAM
ONTARIO LINE TECHNICAL ADVISOR

HDR

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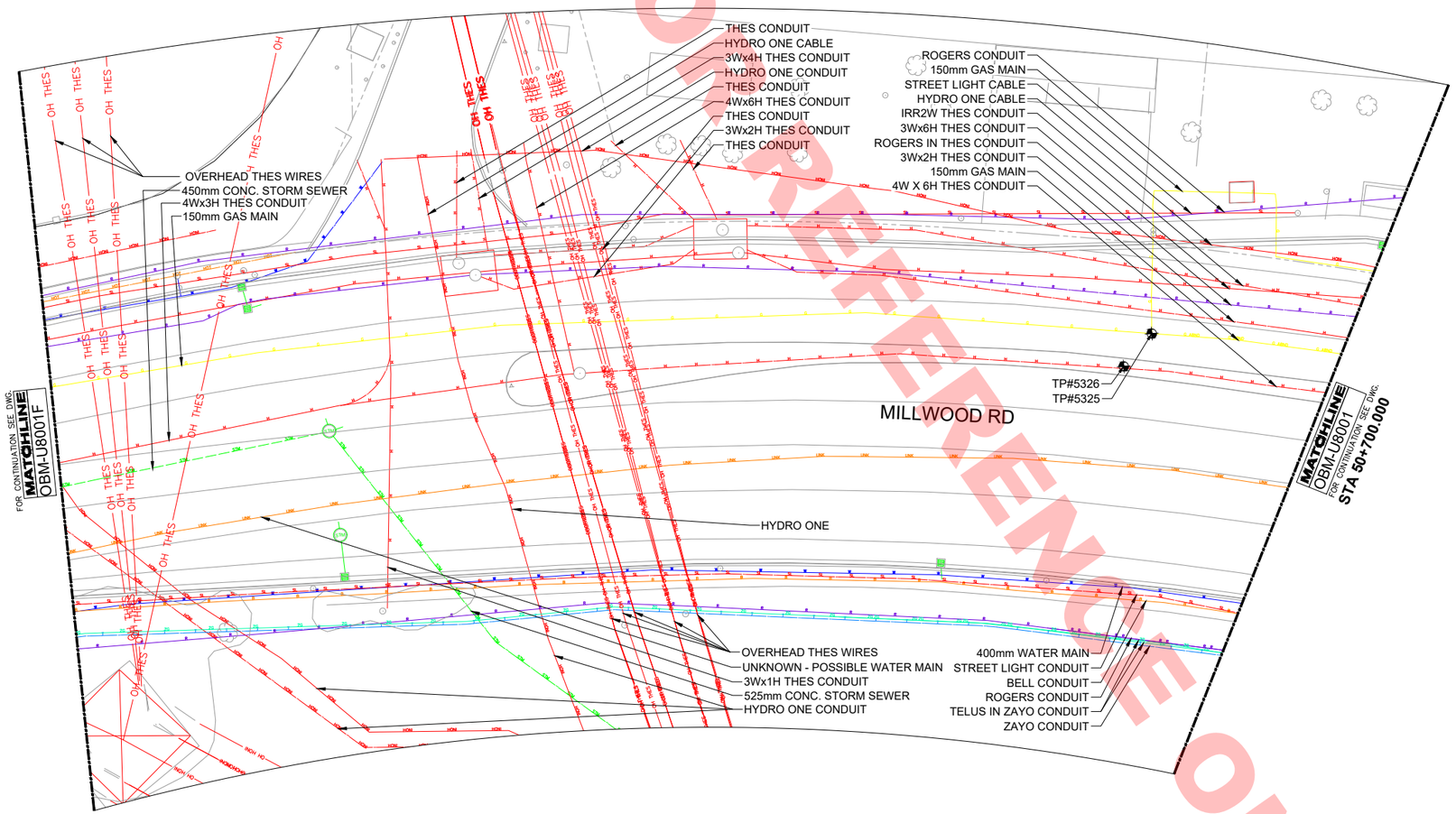
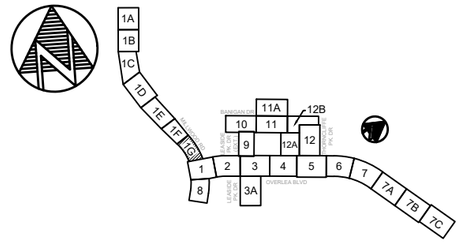
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8001F	C	7

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-23





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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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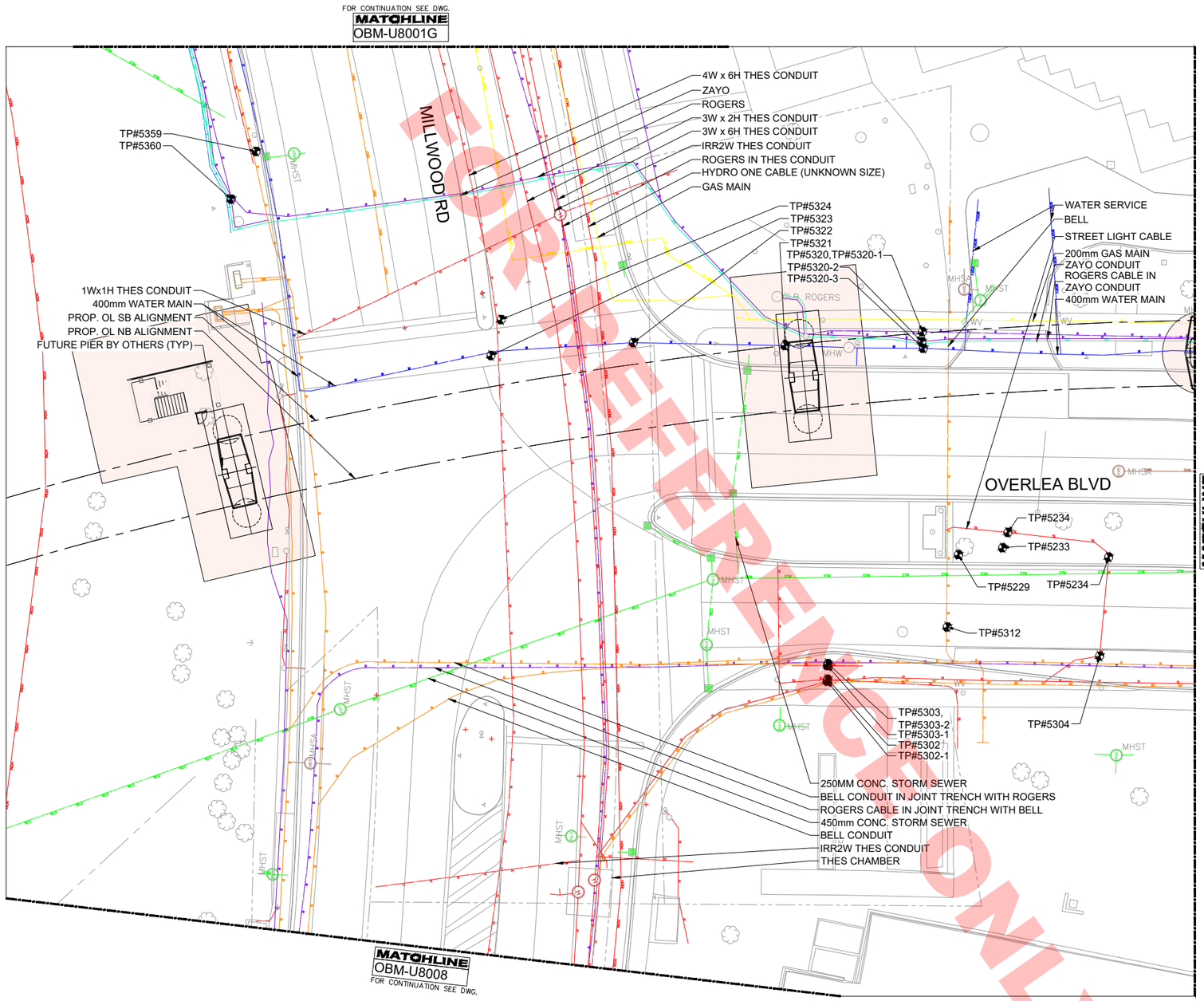
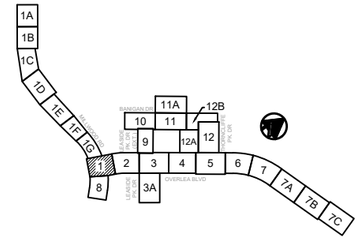
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8001G	C	8

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-23





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0 1 2 3 4 5 8m

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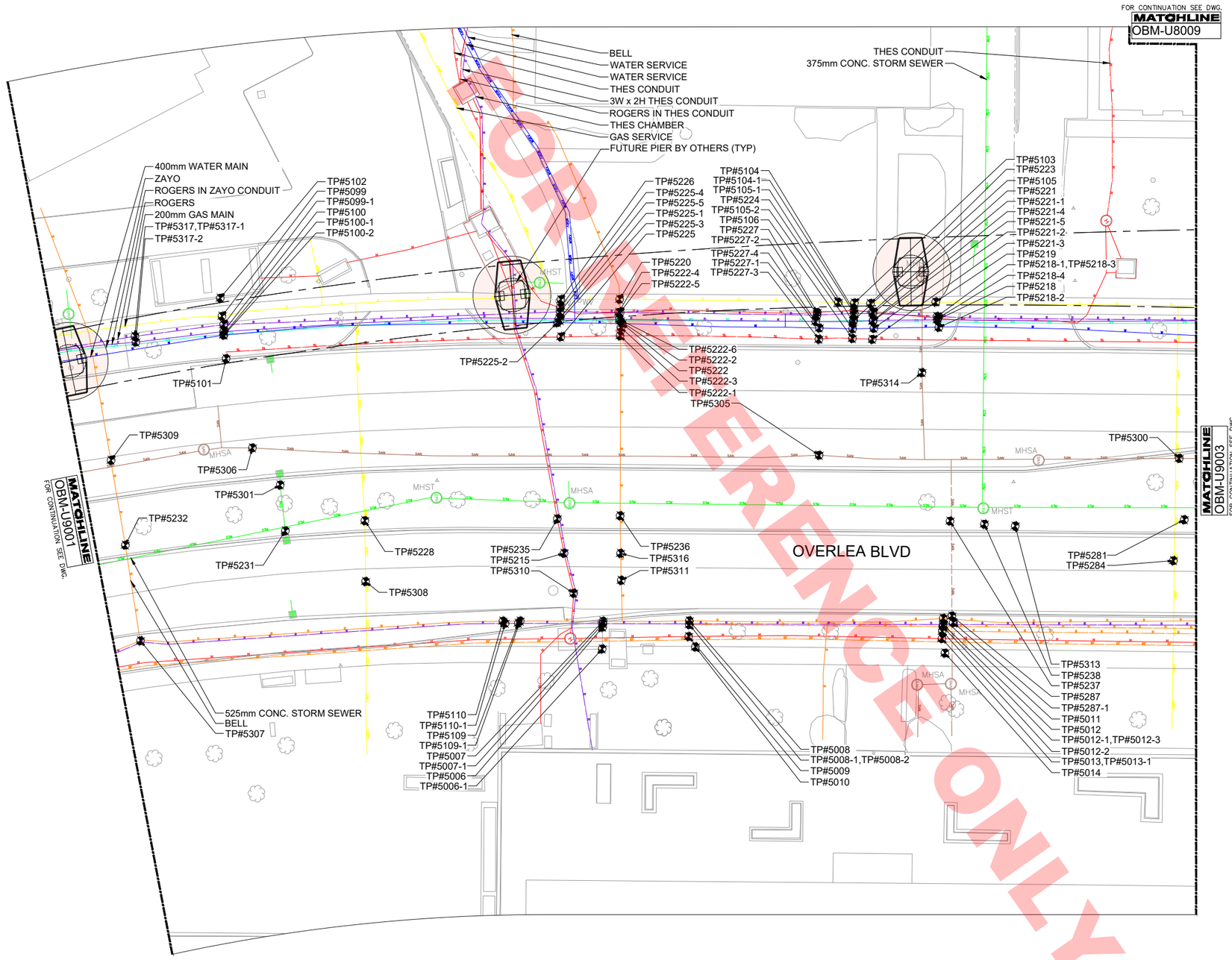
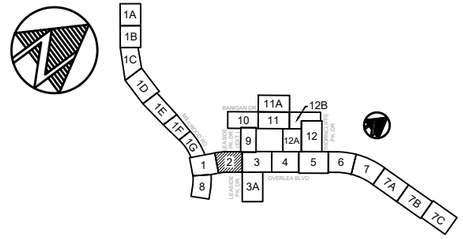
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8001	C	9

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





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0 1 2 3 4 5 8m

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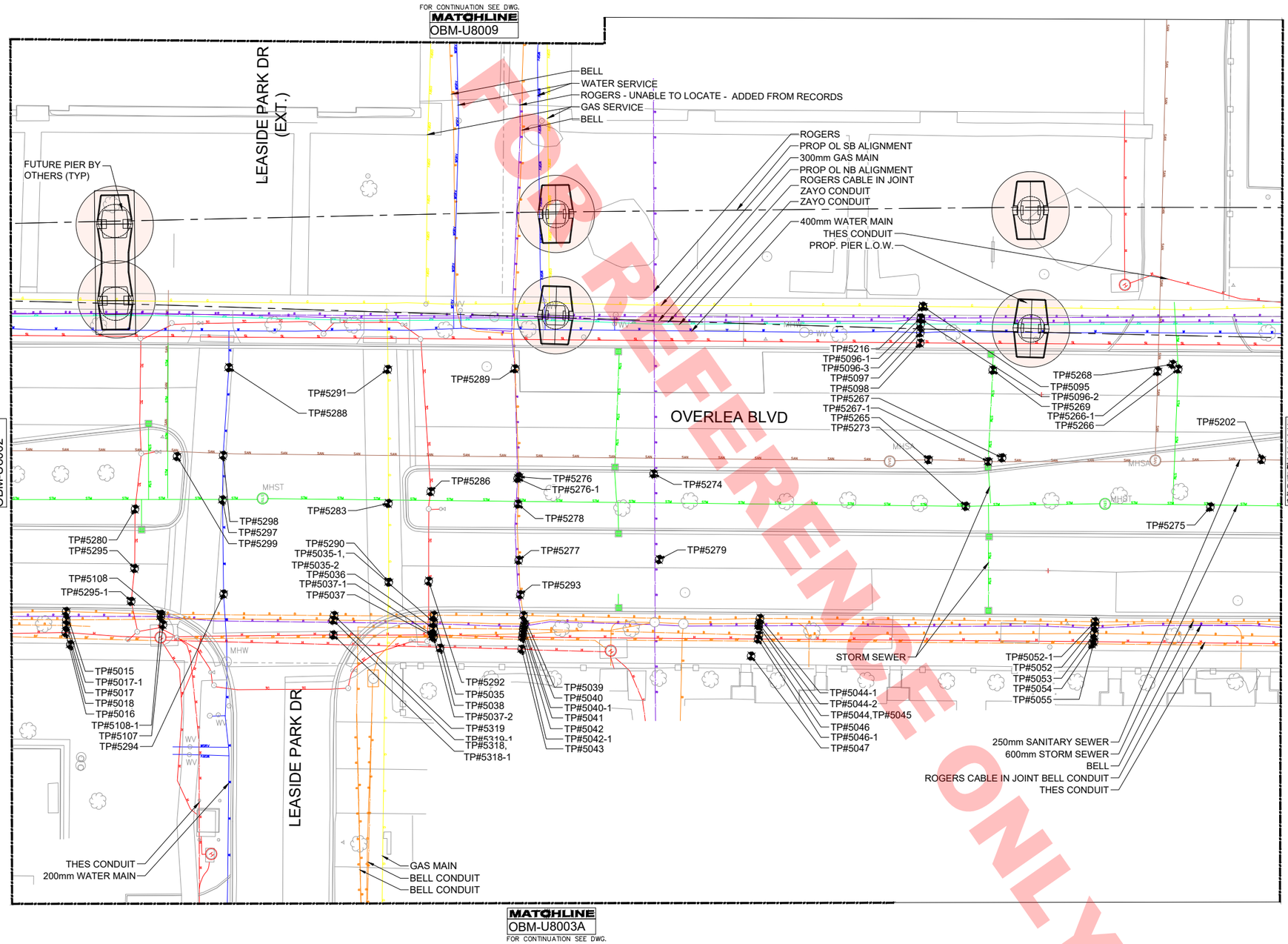
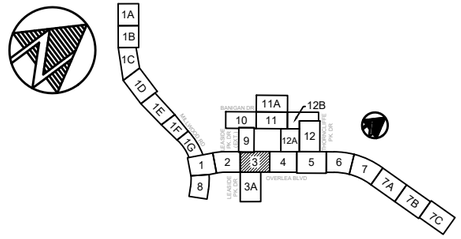
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U8002**	C	10

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA	DESIGNED BY: P. JALALI
2023/05/22	2023/05/22
CHECKED BY: P. JALALI	APPROVED BY: A. ALIZADEH
2023/05/22	2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR
HDR
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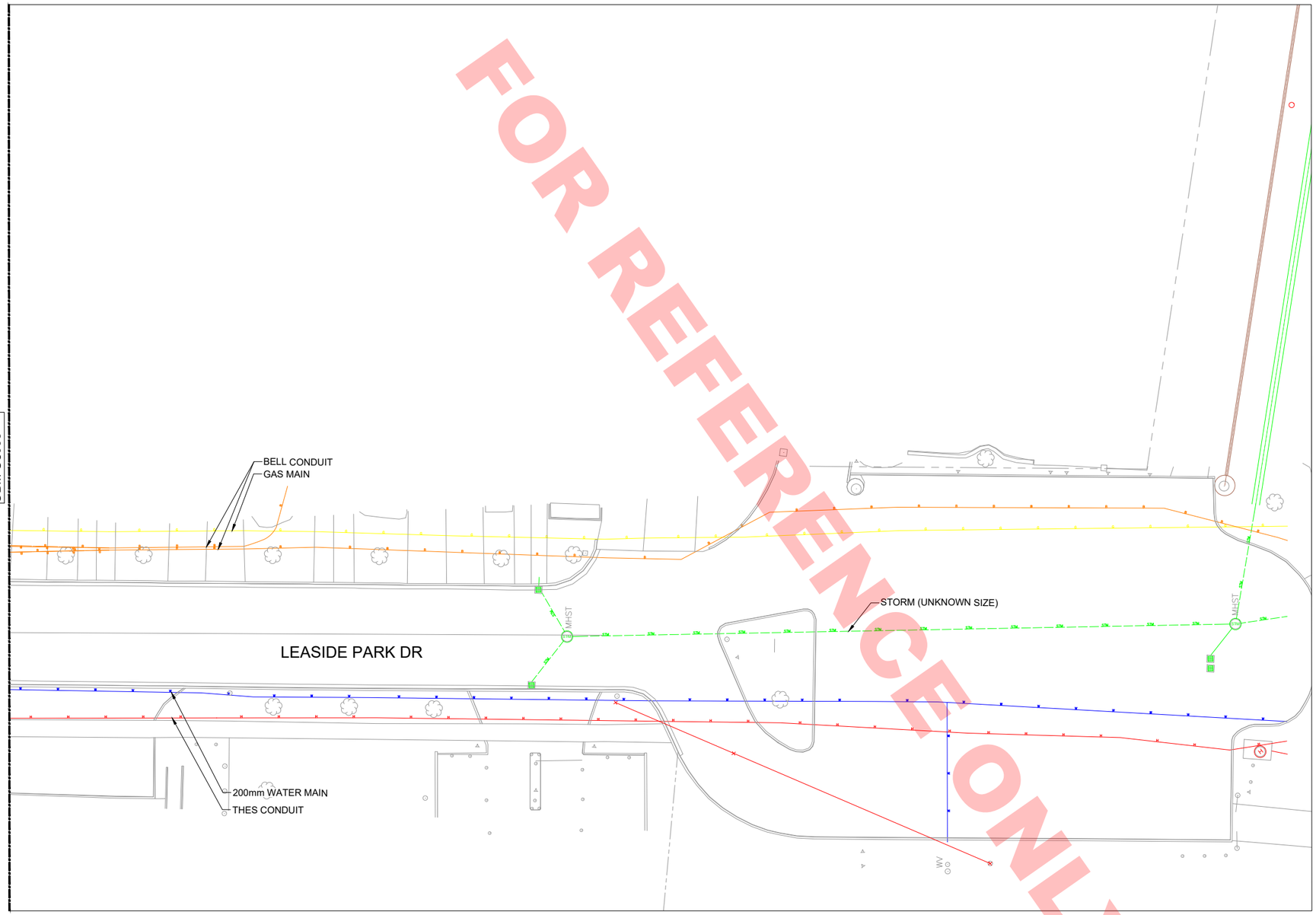
Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

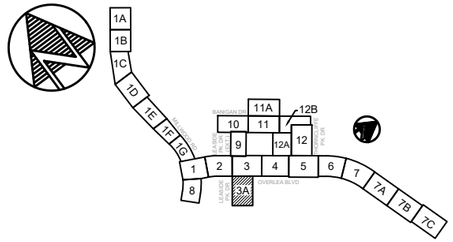
DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD & LEASIDE PARK DR
LEASIDE PARK DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U8003**	C	11

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22



FOR CONTINUATION, SEE DWG.
MATCHLINE
OBM-U8003



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METROLINX PROJECT NO. 139905

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SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR
HDR

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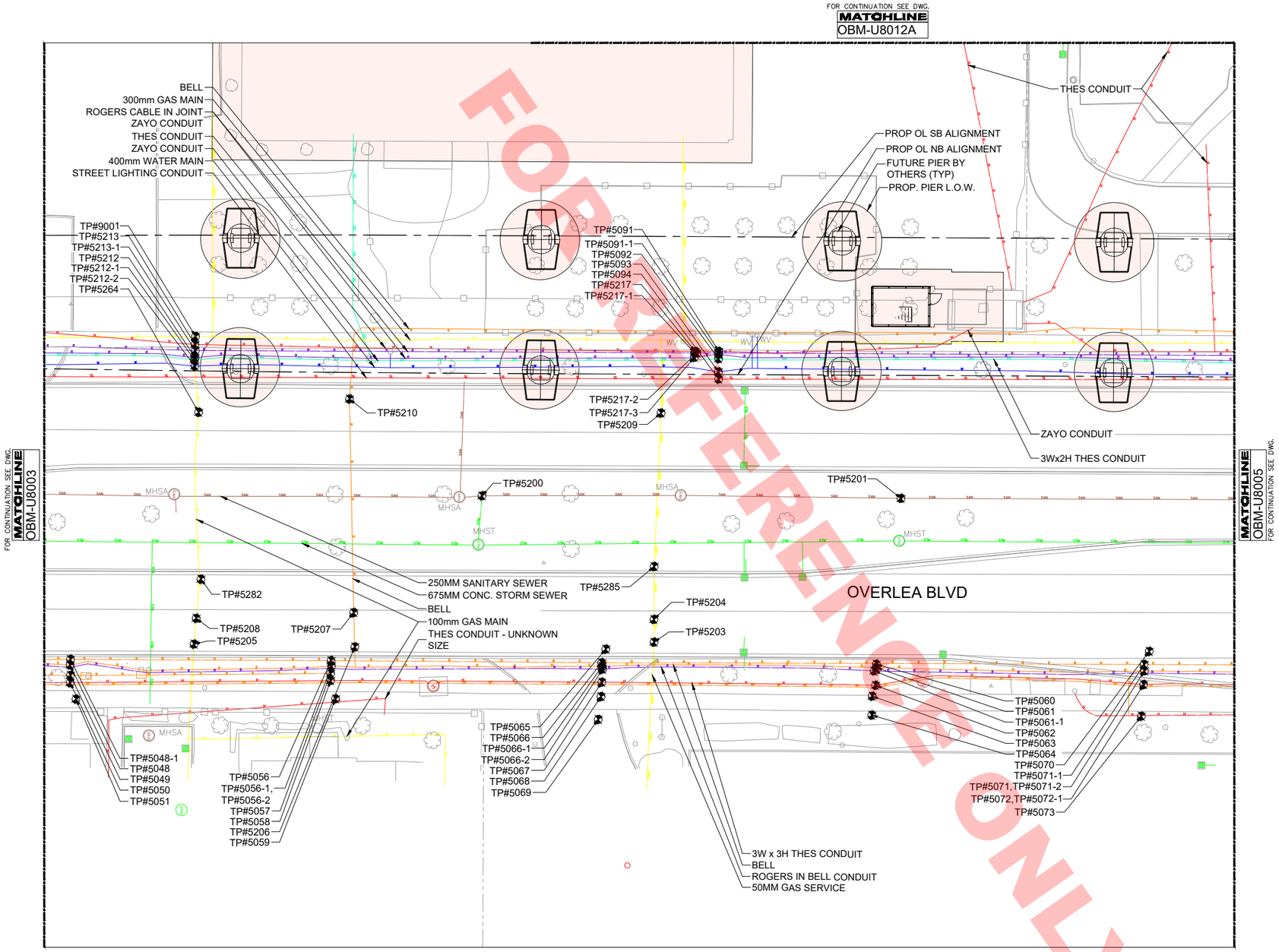
Infrastructure Ontario

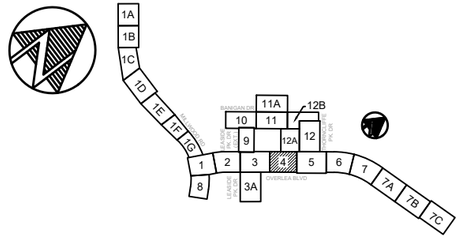
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
LEASIDE PARK DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8003A	C	12

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONETEAM
ONTARIO LINE TECHNICAL ADVISOR

HDR

METROLINX

Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8004	C	13

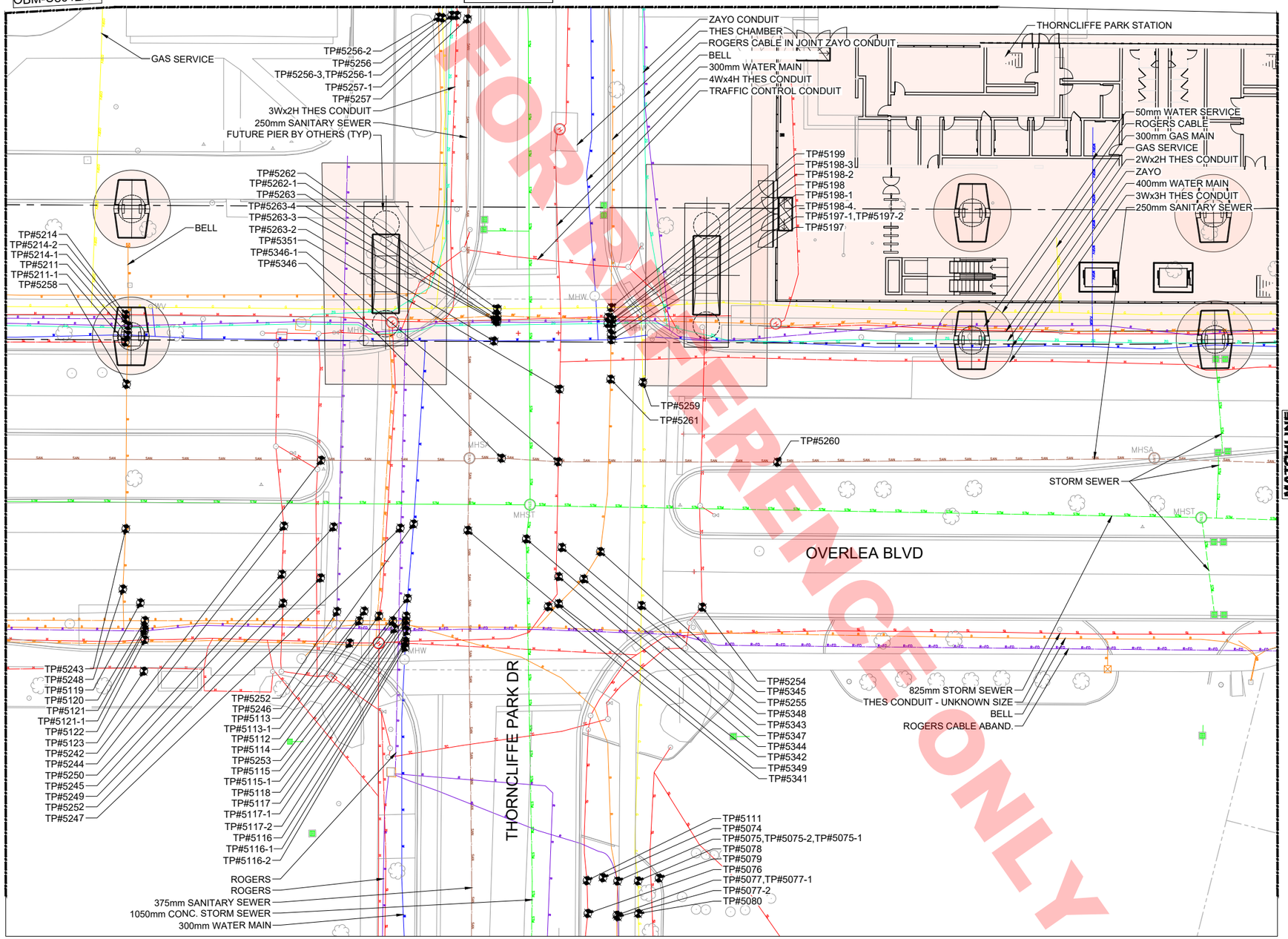
FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22

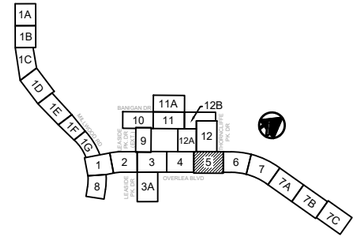
FOR CONTINUATION SEE DWG. MATCHLINE OBM-U8012A

FOR CONTINUATION SEE DWG. MATCHLINE OBM-U8012

FOR CONTINUATION SEE DWG. MATCHLINE OBM-U8004

MATCHLINE OBM-U8006 FOR CONTINUATION SEE DWG.





KEY PLAN

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0 1 2 3 4 5 8m

ONETEAM ONTARIO LINE TECHNICAL ADVISOR

HDR

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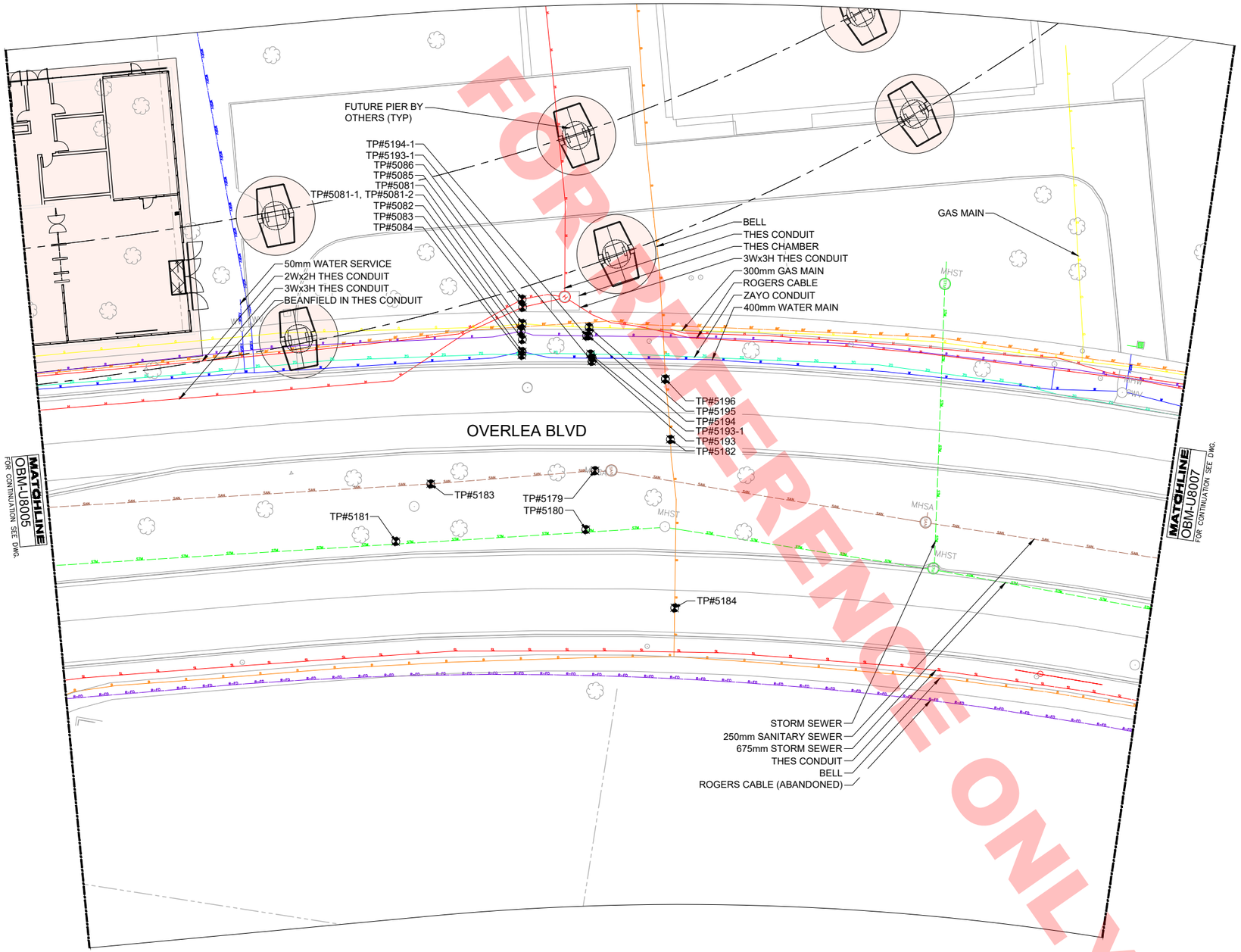
Infrastructure Ontario

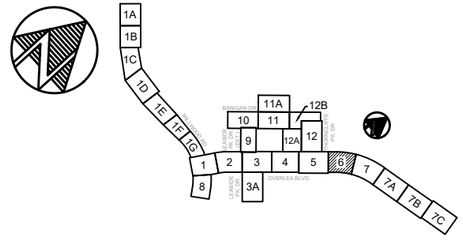
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD & THORNCLIFFE PARK DR
THORNCLIFFE PARK DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8005	C	14

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





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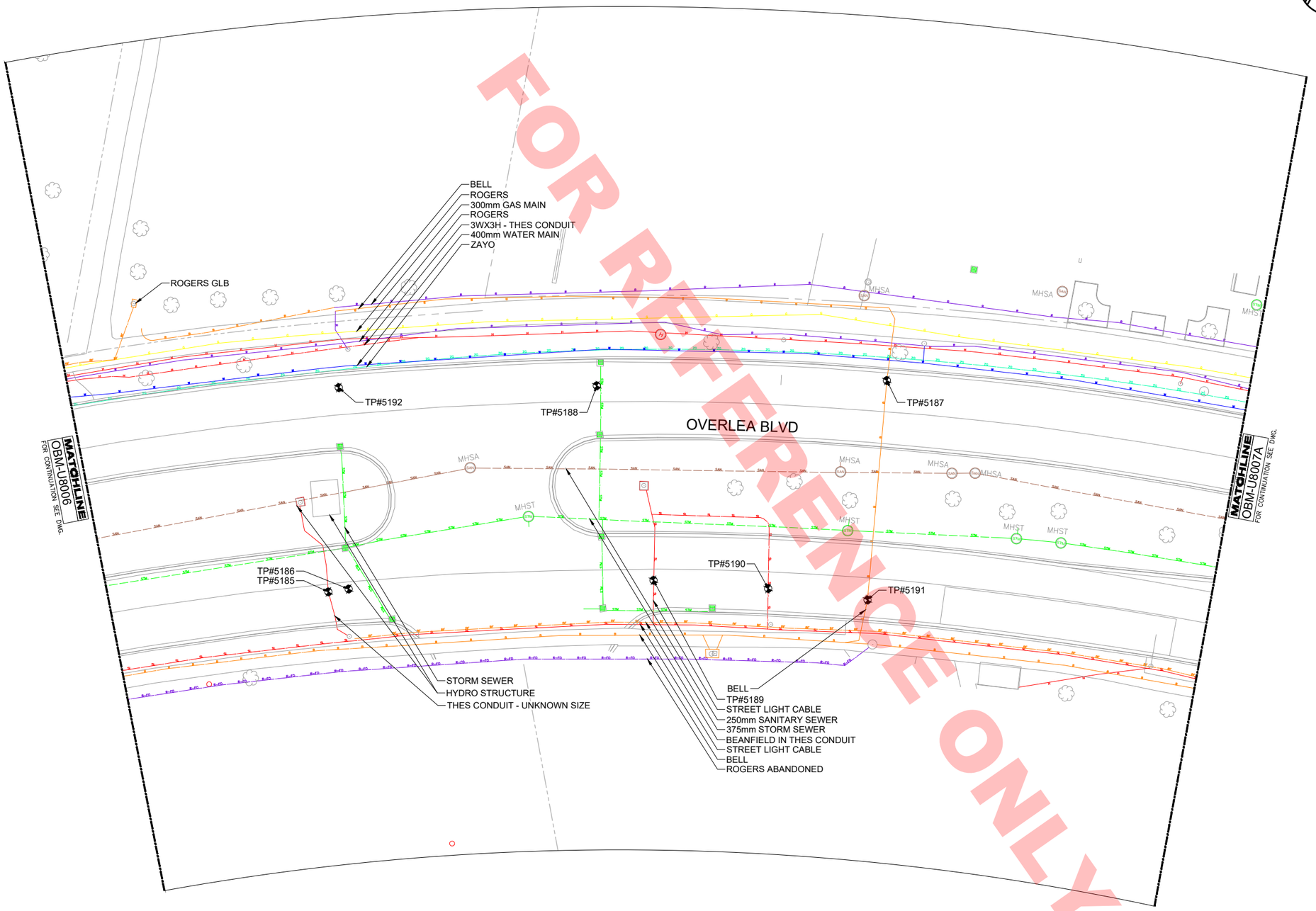
Infrastructure Ontario

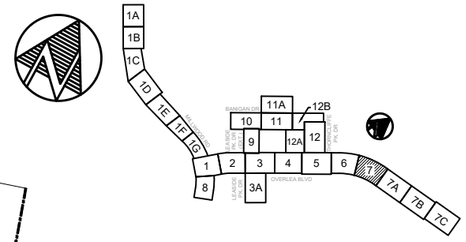
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8006	C	15

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





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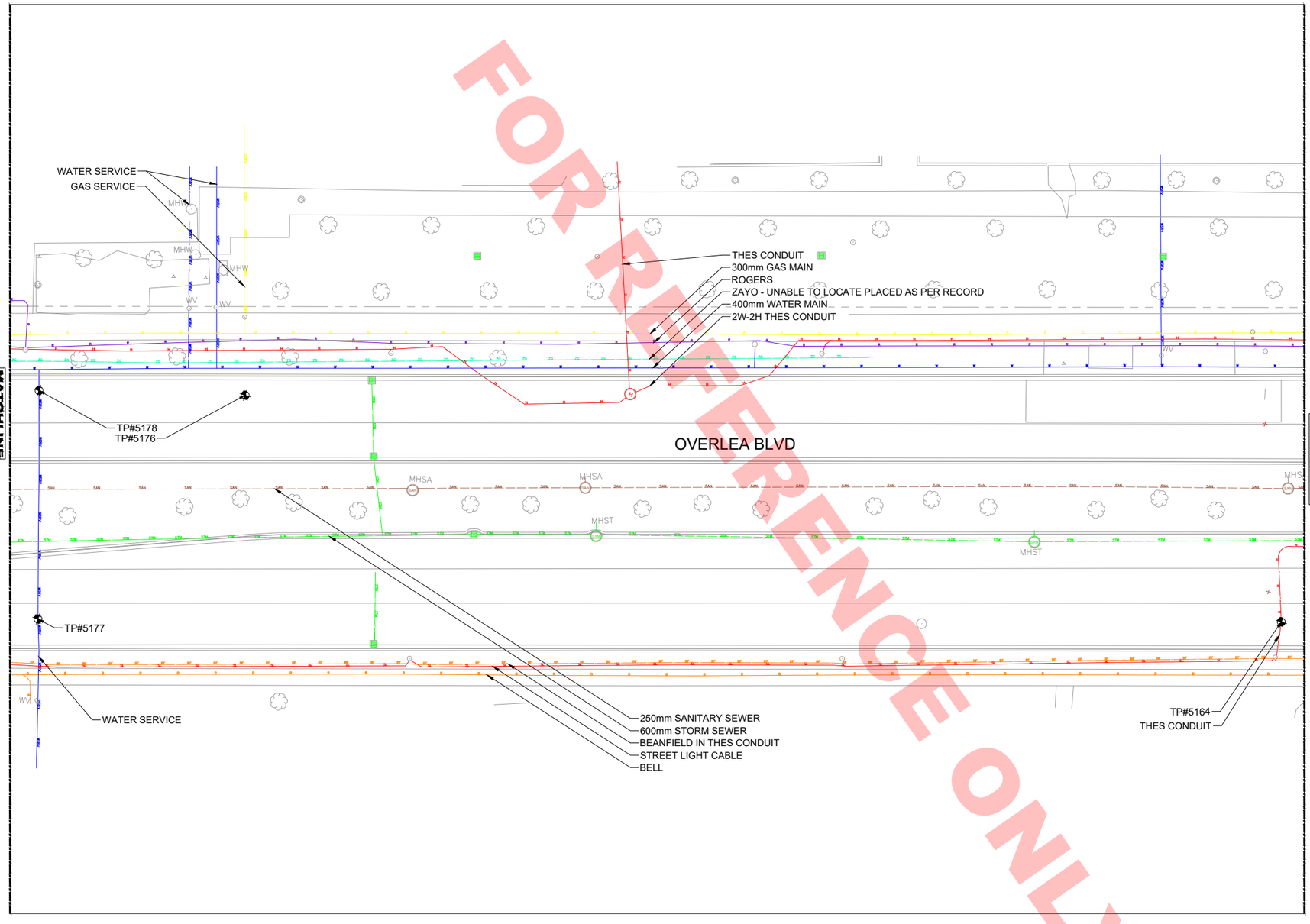
HDR
Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8007	C	16

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22



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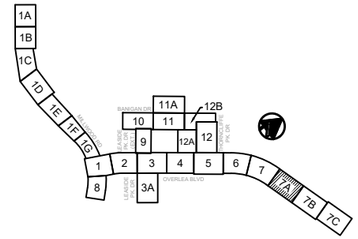
MATCHLINE OBM-U8007B FOR CONTINUATION SEE DWG.



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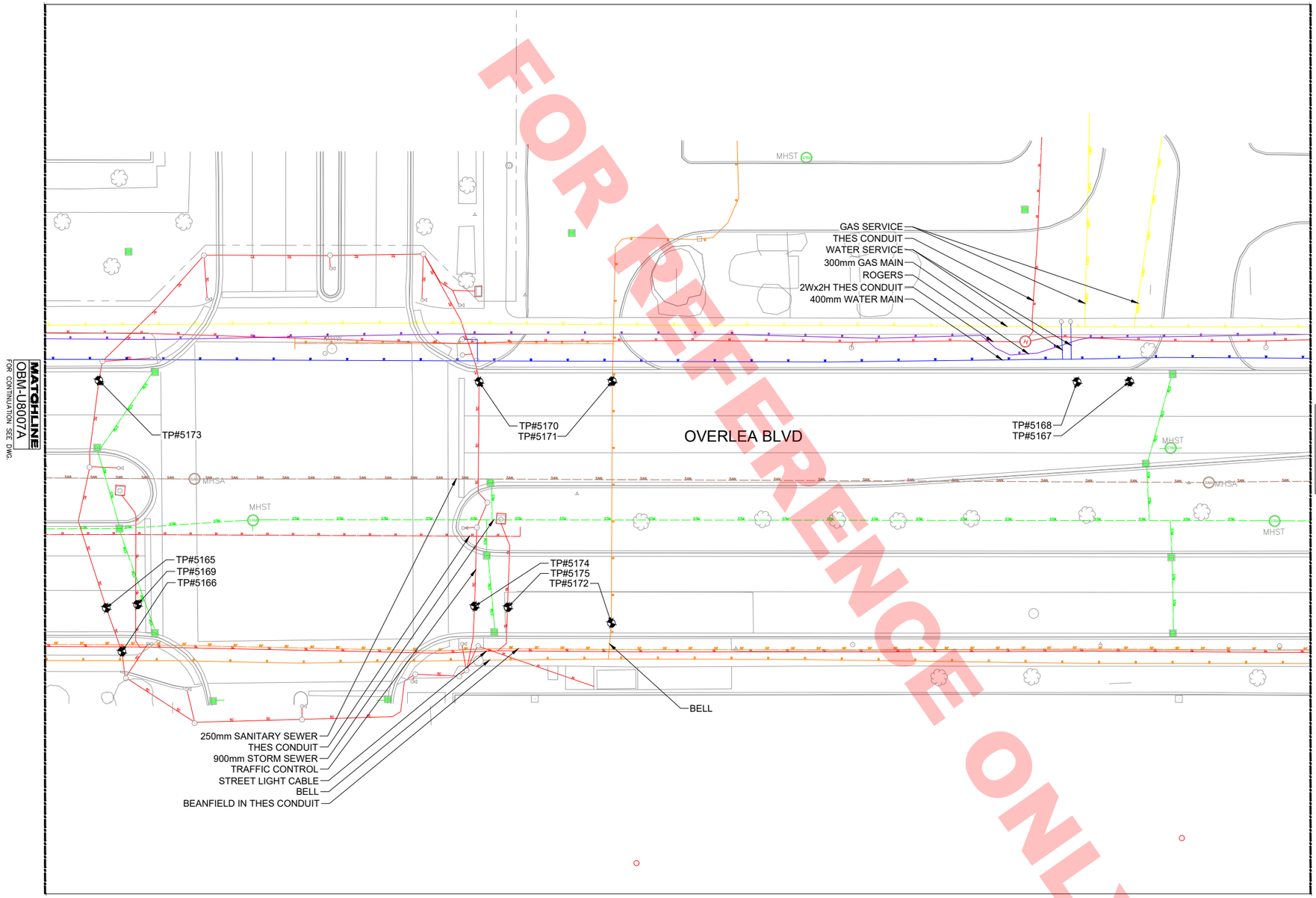
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8007A	C	17

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22



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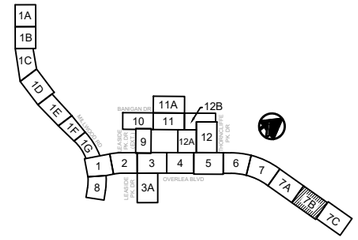
OBM-U8007A
FOR CONTINUATION SEE DWG.

MATCHLINE
OBM-U8007C
FOR CONTINUATION SEE DWG.



KEY PLAN

NOTES

1. FOR UTILITY LEGEND AND GENERAL NOTES, REFER TO OBM-U8000.
2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		C	2023/06/28	ISSUE FOR 100% REVIEW			
		B	2023/12/23	ISSUE FOR 90% DESIGN			
		A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONETEAM
ONTARIO LINE TECHNICAL ADVISOR

HDR

METROLINX

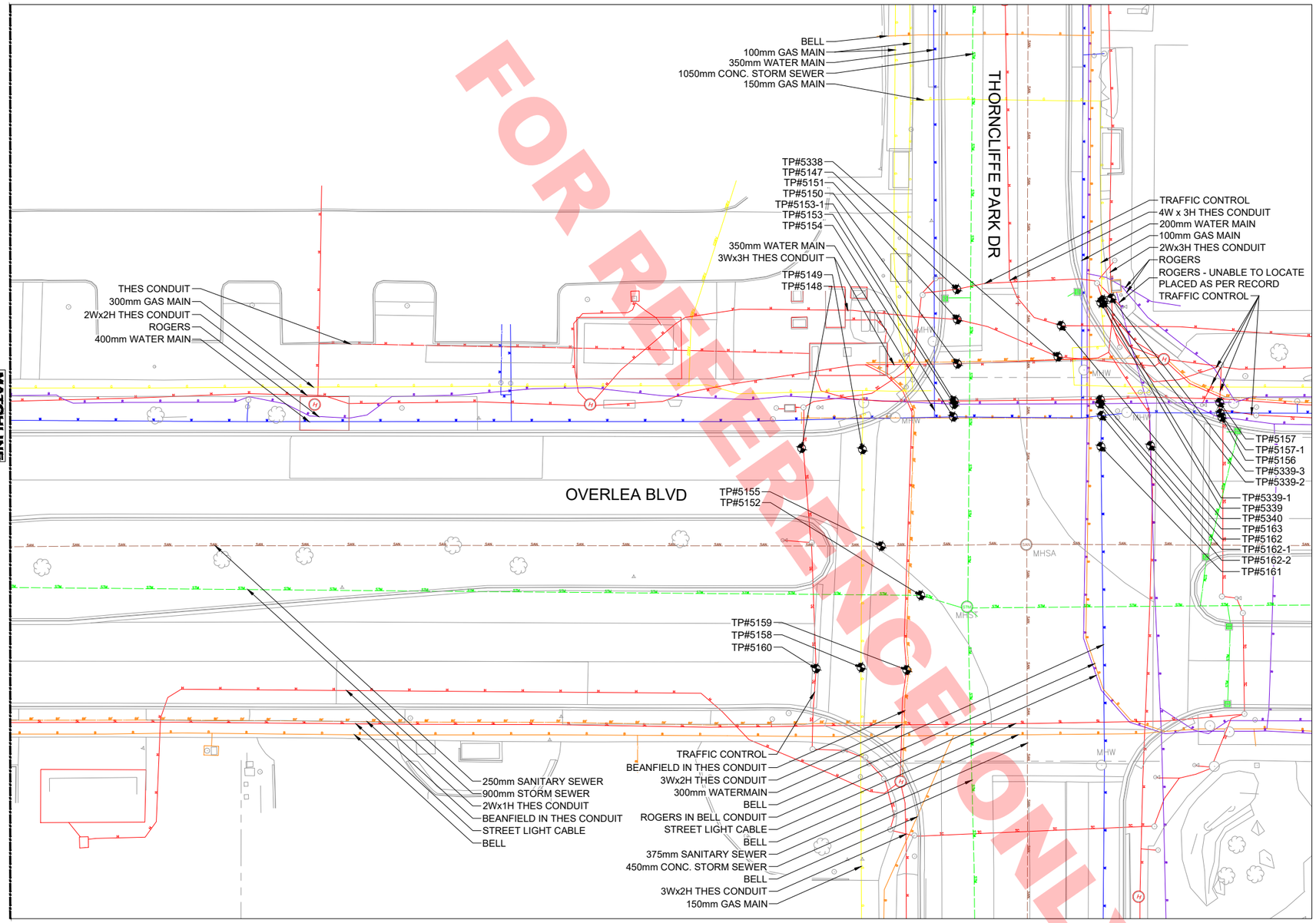
Infrastructure Ontario

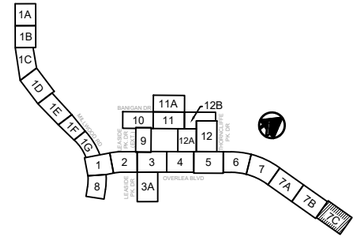
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U8007B**	C	18

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

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		A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR
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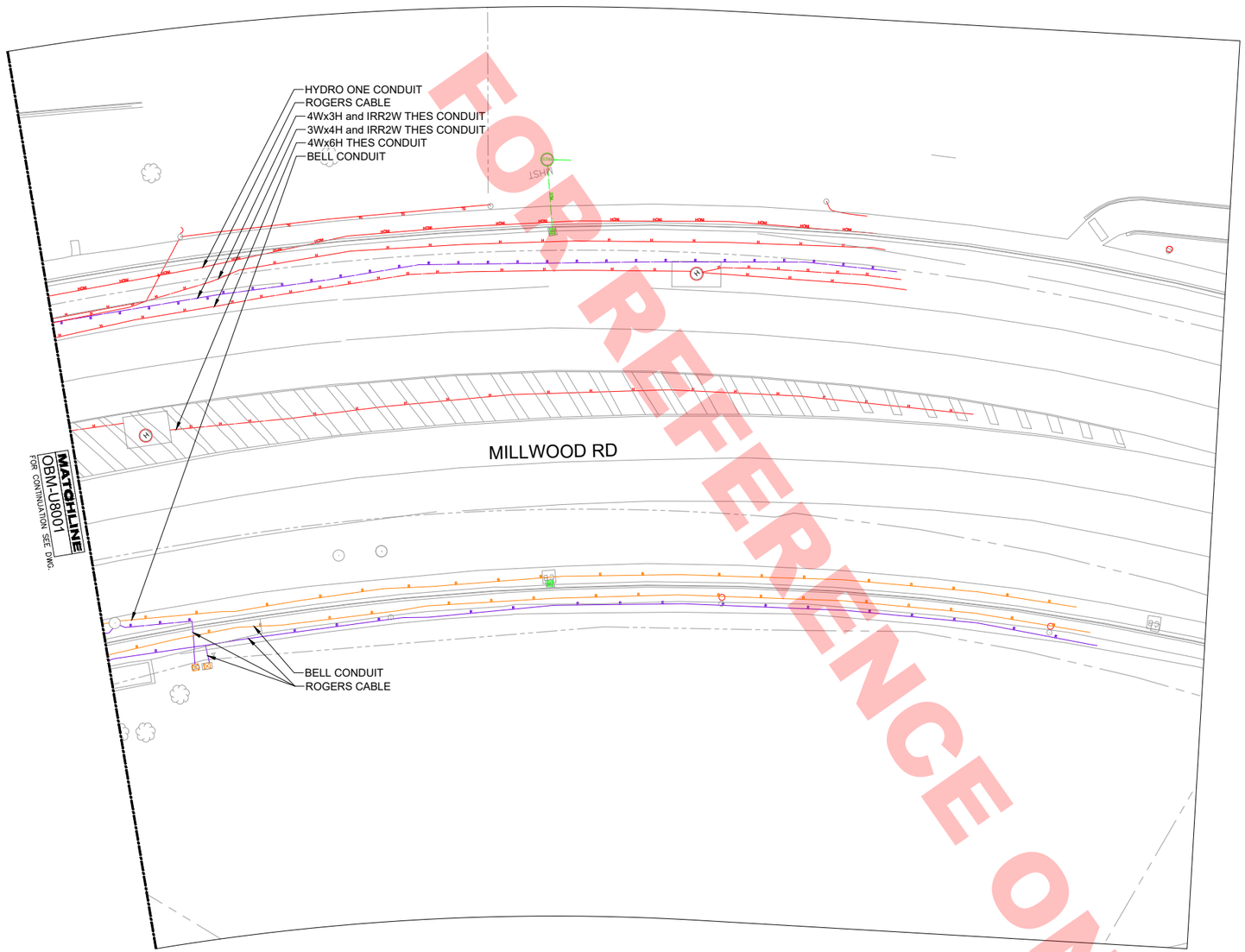
Infrastructure Ontario

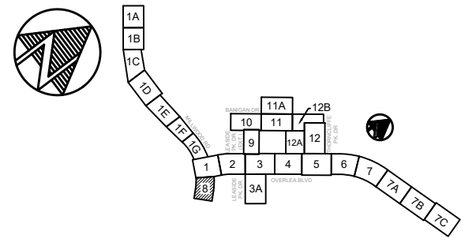
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U8007C**	C	19

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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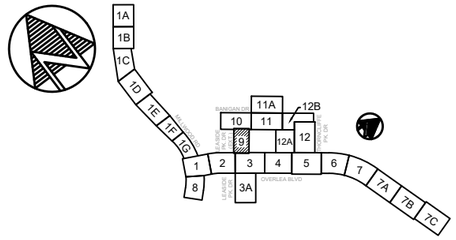
Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8008	C	20

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22



KEY PLAN

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2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

100%
DESIGN SUBMISSION
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METROLINX PROJECT NO. 139905

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR

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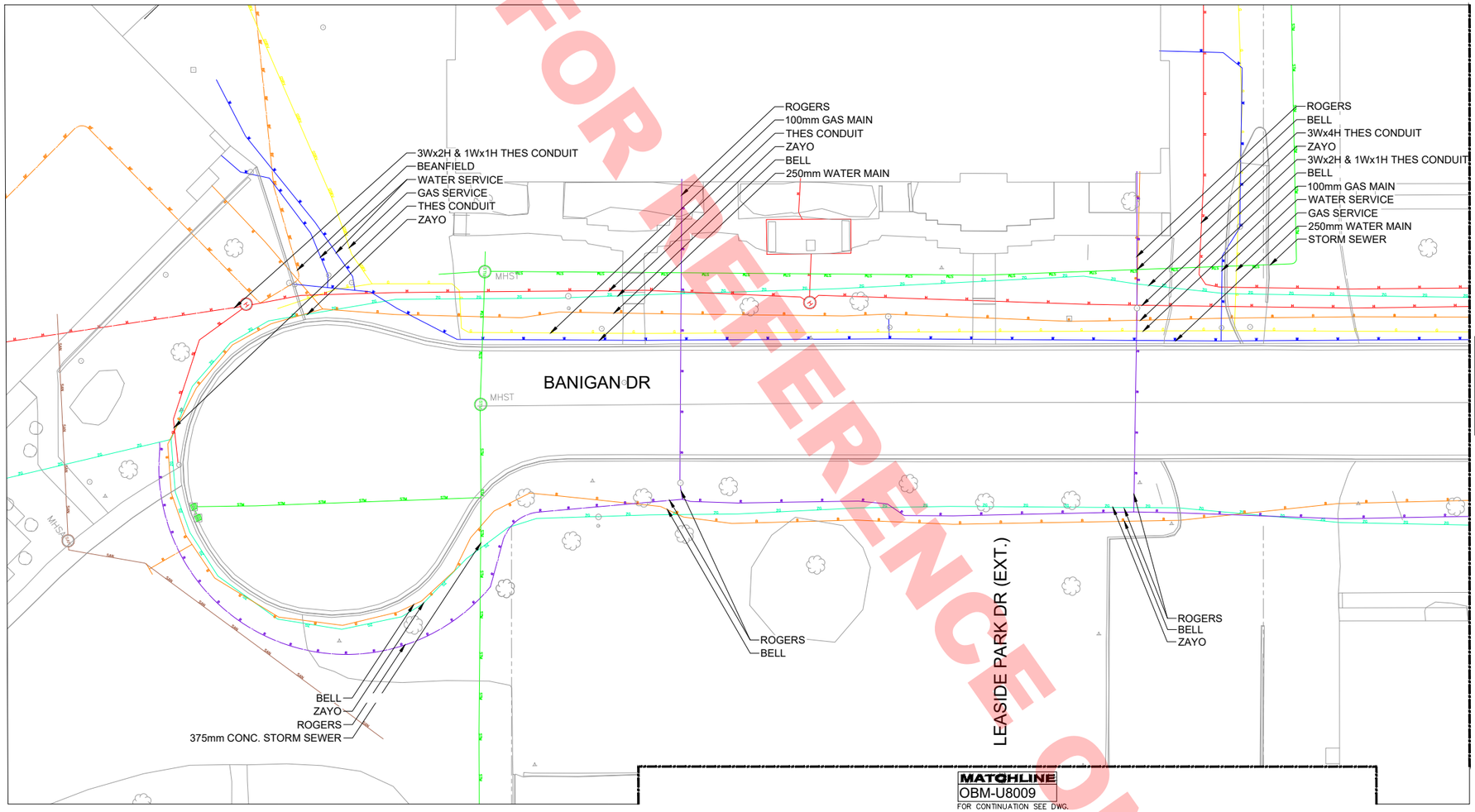
Infrastructure Ontario

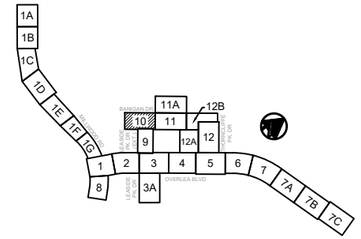
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
LEASIDE PARK DR (EXT.)

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U8009**	C	21

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONE TEAM
ONTARIO LINE TECHNICAL ADVISOR

HDR

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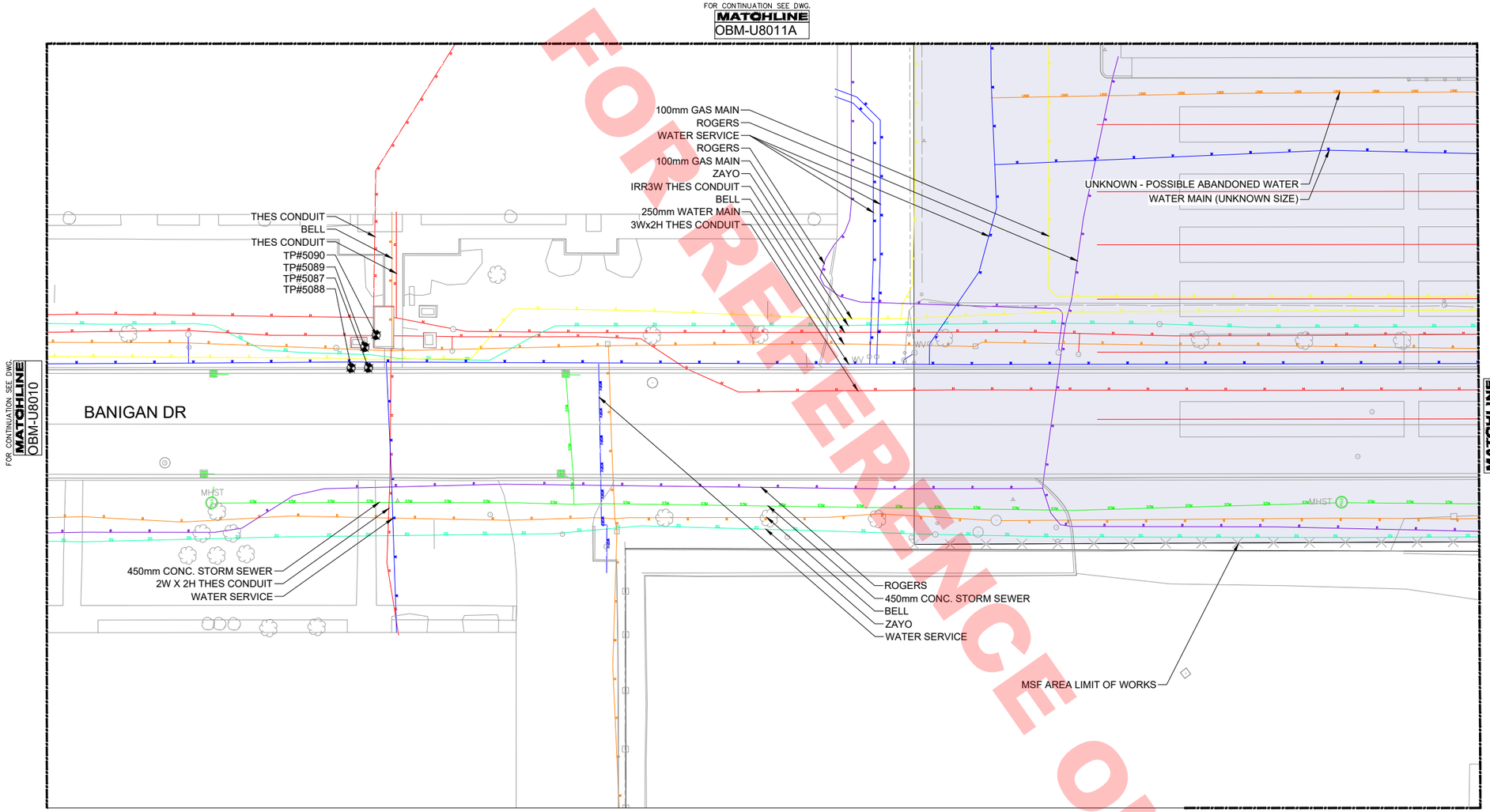
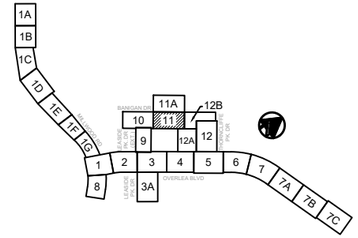
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
BANIGAN DR
LEASIDE PARK DR EXT.

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U8010**	C	22

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

100%
DESIGN SUBMISSION
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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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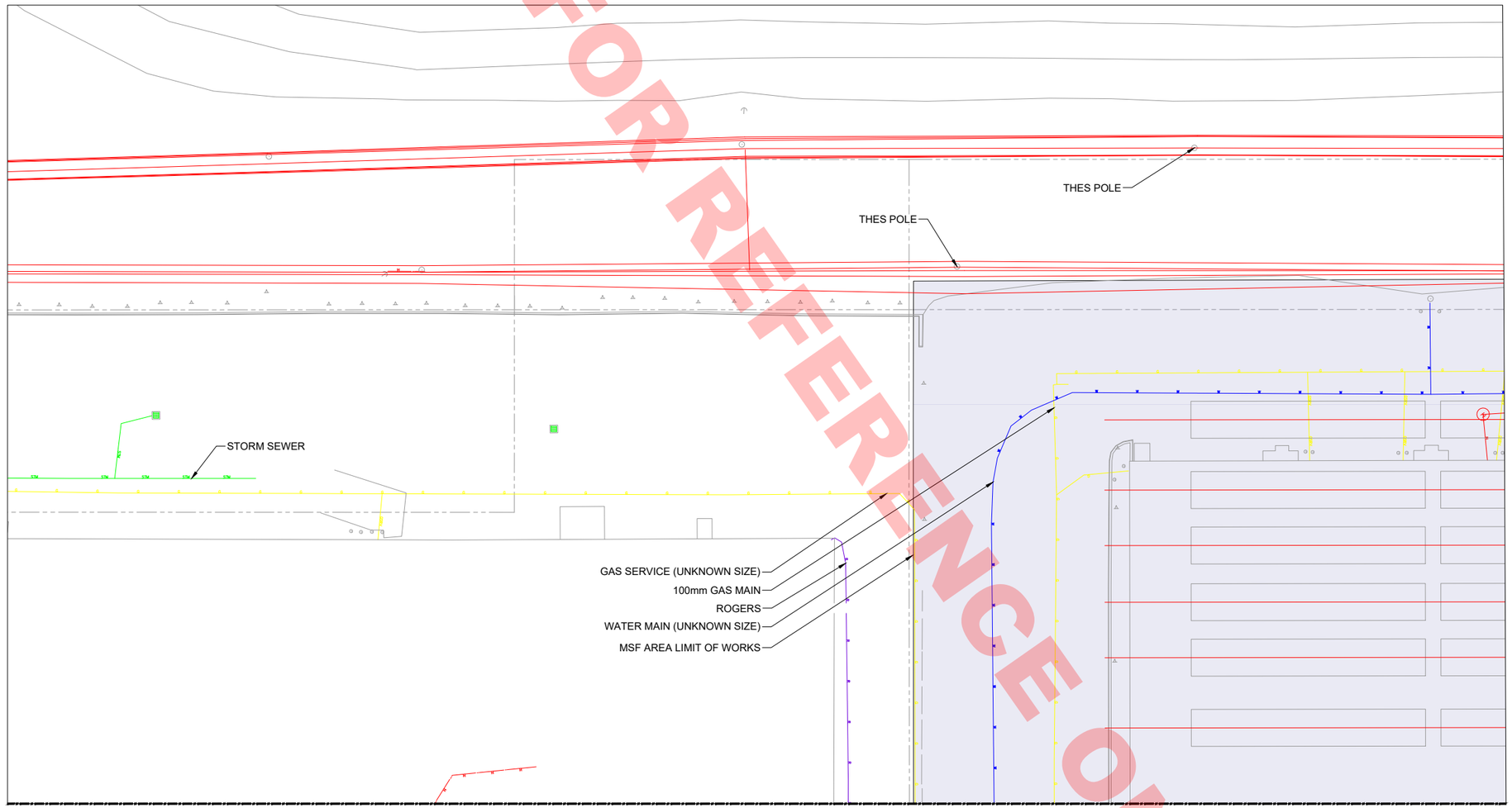
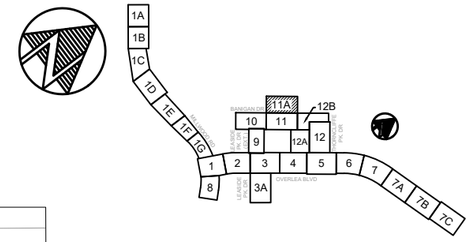
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
BANIGAN DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8011	C	23

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

100%
DESIGN SUBMISSION
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METROLINX PROJECT NO. 139905

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DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:201	FULL SIZE ONLY

0 1 2 3 4 5 8m

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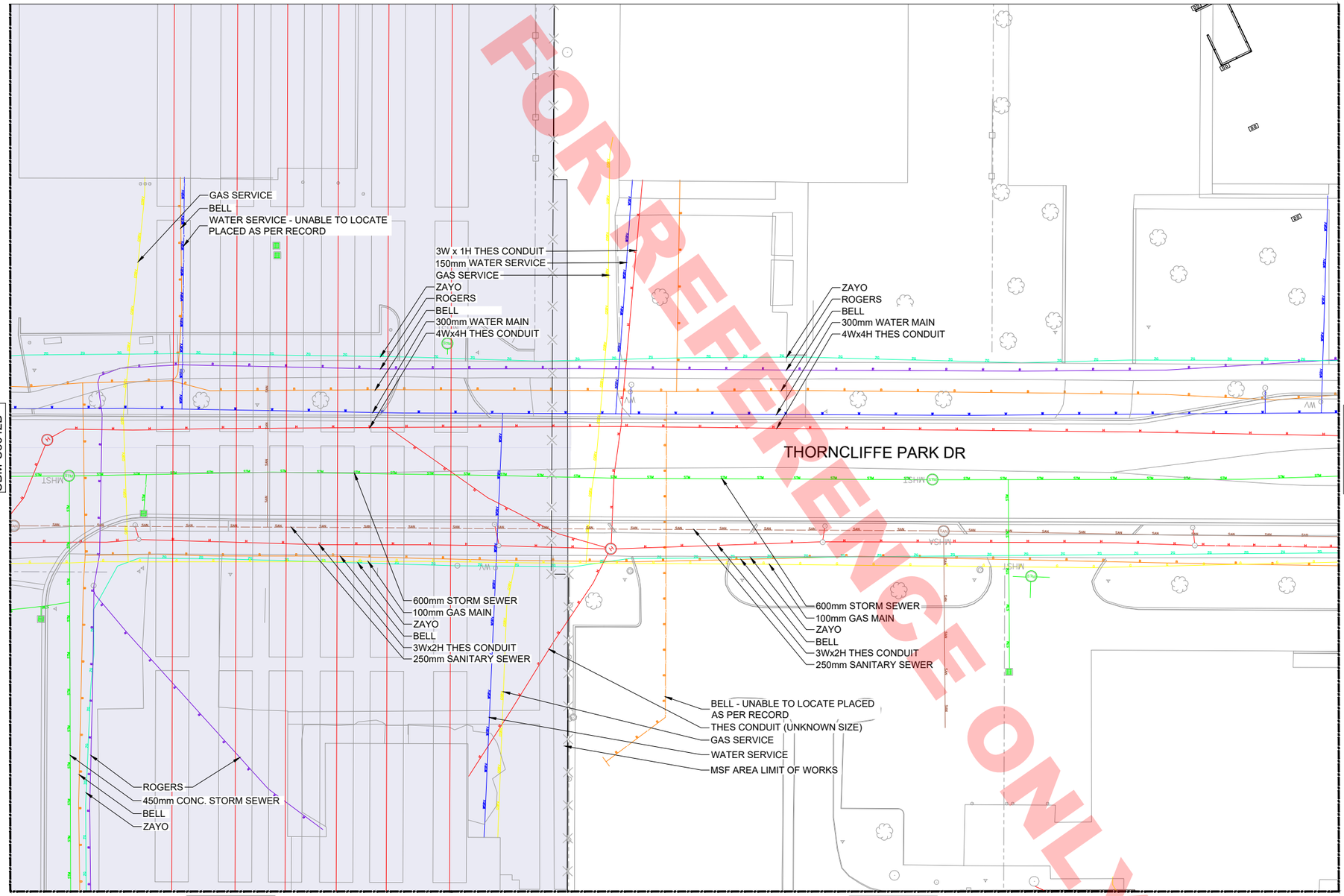
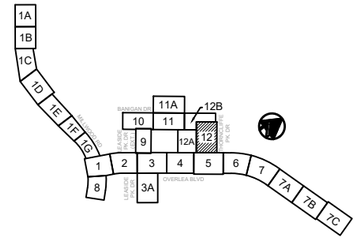
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
BANIGAN DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8011A	C	24

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

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2. FOR PROPOSED DRY UTILITY RELOCATION COMPOSITE PLAN, REFER TO OBM-11-U9000.

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METROLINX PROJECT NO. 139905

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:202	FULL SIZE ONLY

0 1 2 3 4 5 8m

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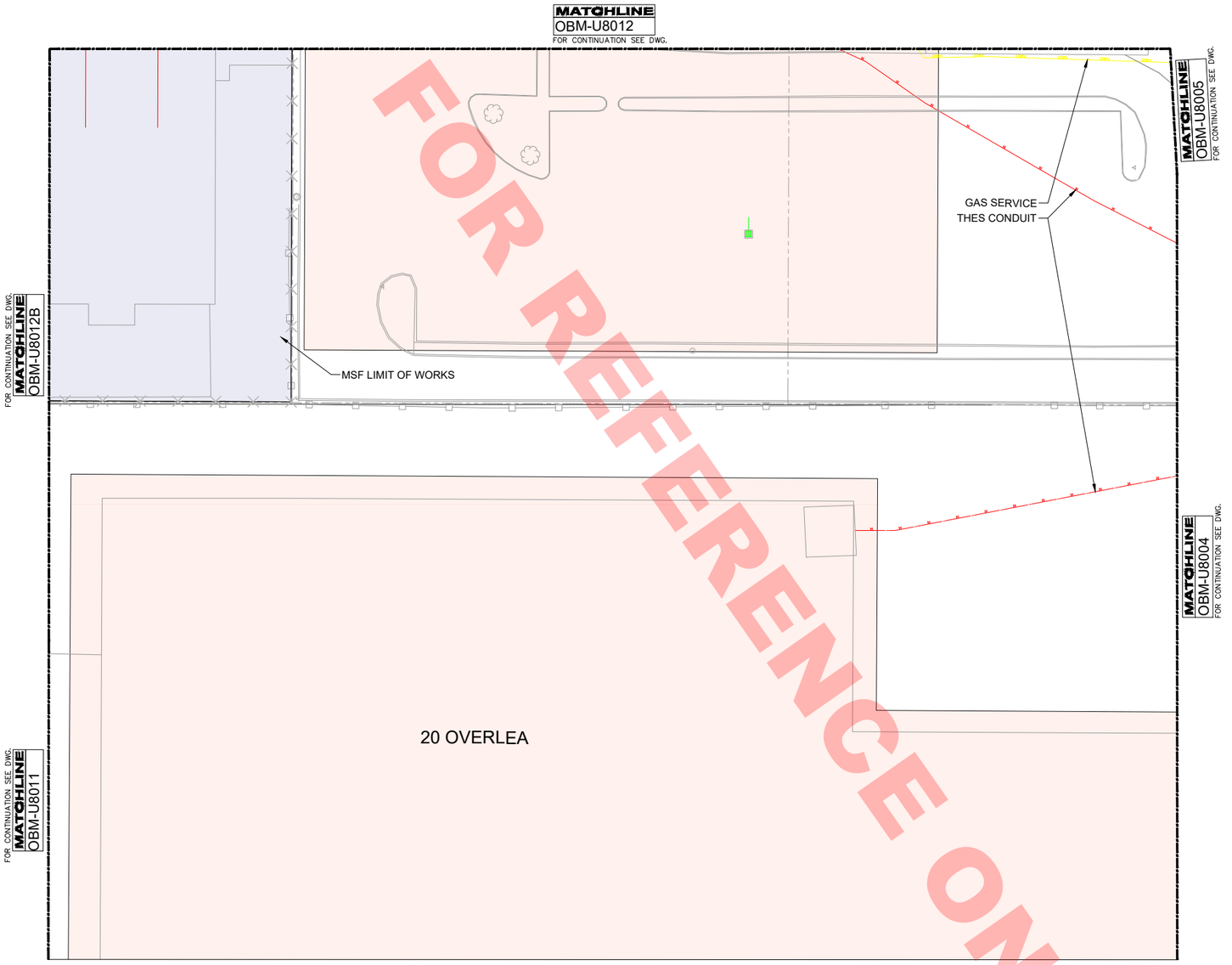
Infrastructure Ontario

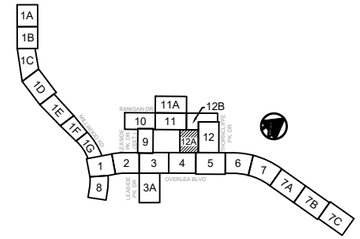
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
THORNCLIFFE PARK DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8012	C	25

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22
DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22
APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:203 FULL SIZE ONLY
0 1 2 3 4 5 8m

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Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
BANIGAN DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U8012A	C	26

FILE: 11-obm-u8001.dwg
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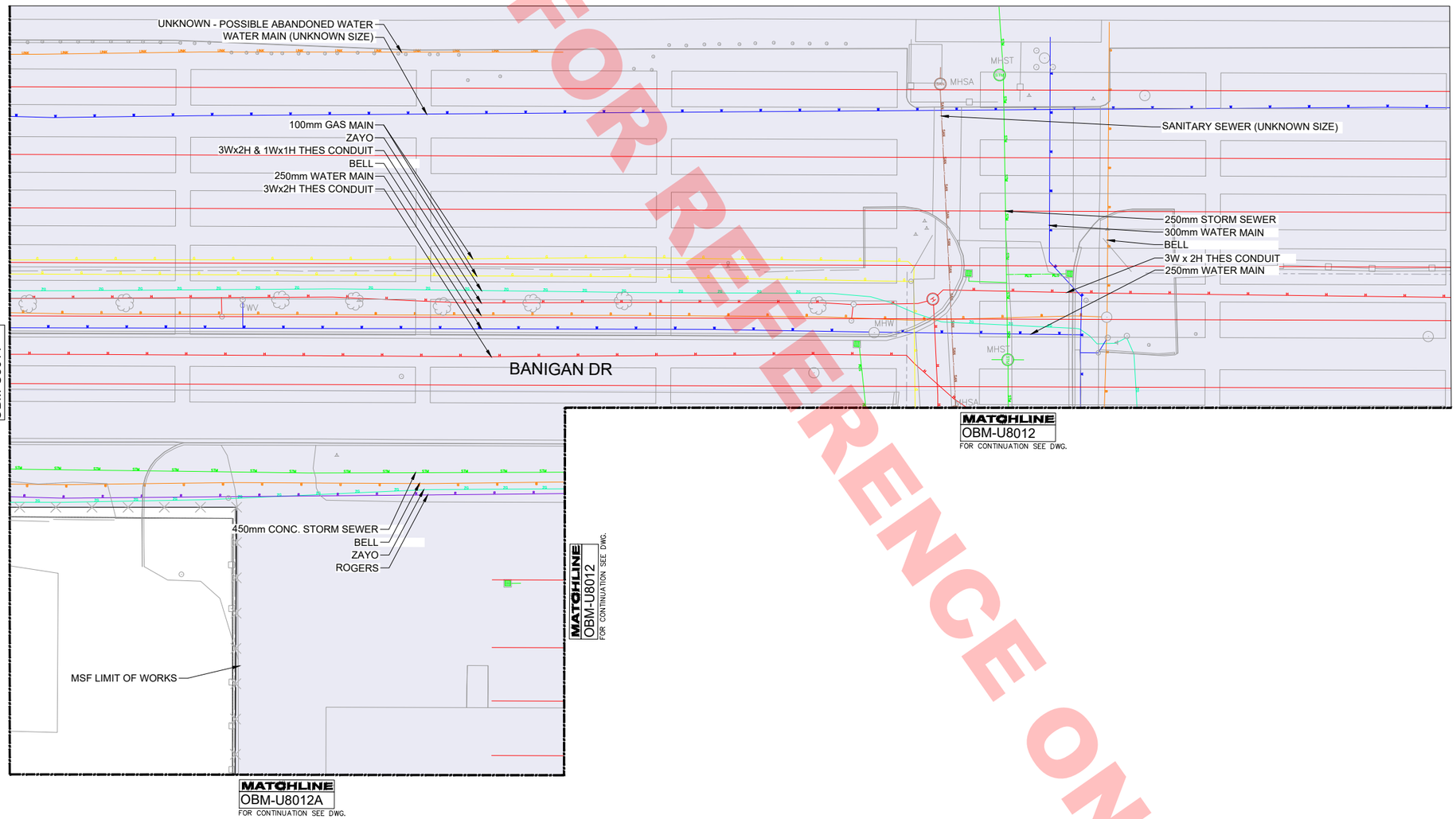

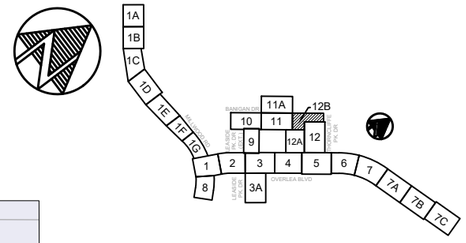

KEY PLAN

NOTES

1. EXISTING UTILITY INFORMATION SHOWN IS BASED ON SUBSURFACE UTILITY ENGINEERING (SUE) INVESTIGATION BY PLANVIEW, AND IS TO BE READ IN CONJUNCTION WITH THE CORRESPONDING REPORT. ALL LOCATIONS AND DEPTHS ARE TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. FOR PROPOSED DRY UTILITY RELOCATION PLAN REFER TO 11-OBM-U8001A.
3. FOR PROPOSED WET UTILITIES REFER TO 11-OBM-U1100, 11-OBM-U1200 AND 11-OBM-U1300.
4. FOR UTILITY LEGEND AND GENERAL NOTES, REFER TO OBM-U8000.
5. REFER TO TEST PIT RESULTS IN PLANVIEW SUE REPORT FOR CORRESPONDING TEST PIT INFORMATION.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:204	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR

HDR

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Infrastructure Ontario

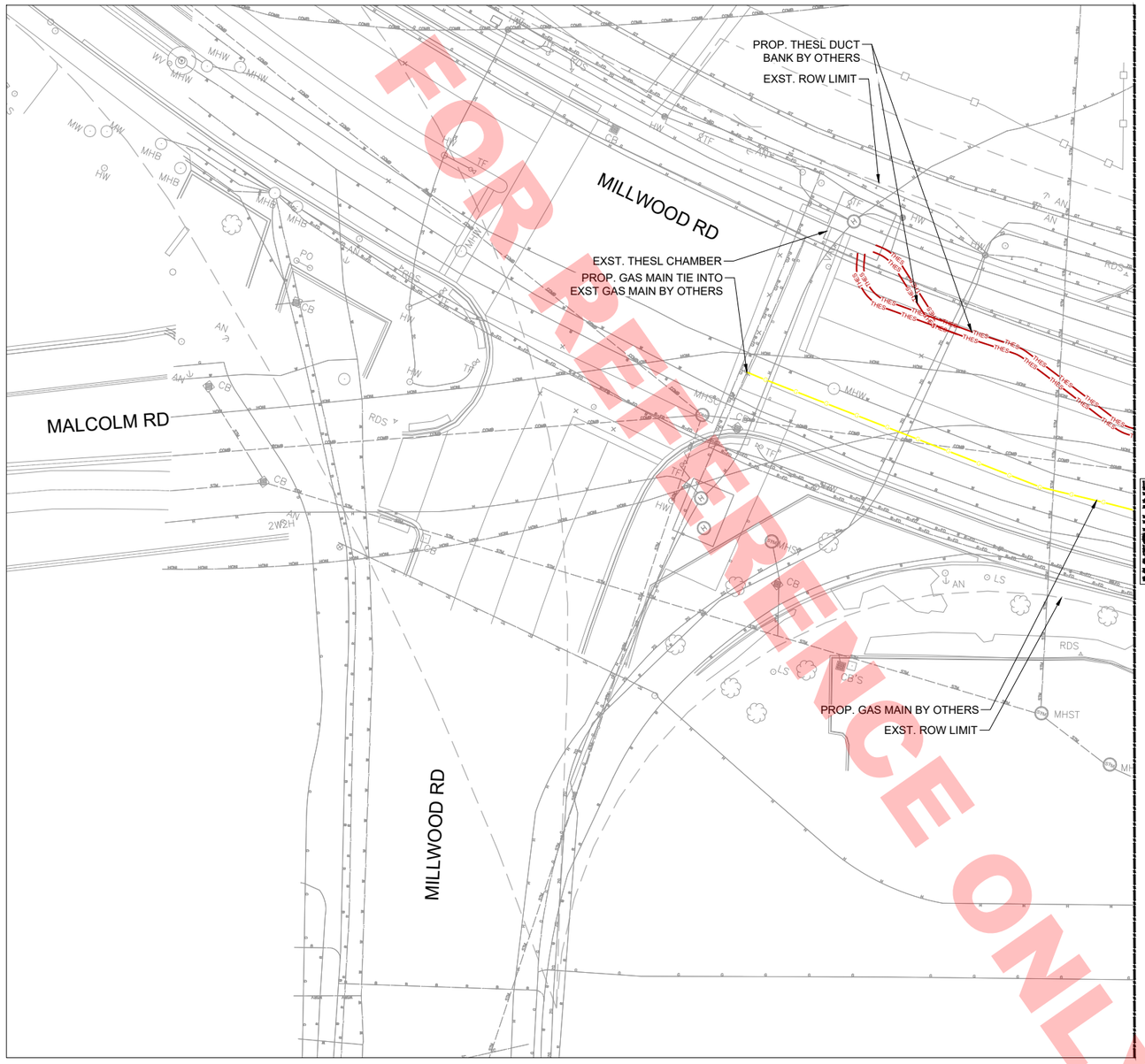
OVERLEA BOULEVARD MODIFICATIONS

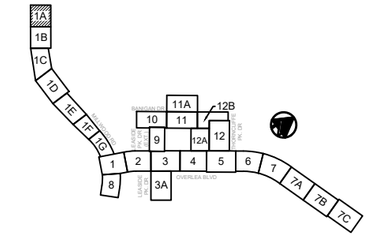
DRY UTILITIES
EXISTING COMPOSITE UTILITY PLAN
MSF
THORNCLIFFE PARK DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U8012B**	C	27

FILE: 11-obm-u8001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22

Appendix B. Overlea Boulevard Modifications Advanced Works Proposed Composite Utility Plan





KEY PLAN

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DESIGN SUBMISSION
NOT FOR CONSTRUCTION

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22 | APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200 FULL SIZE ONLY
0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR
HDR

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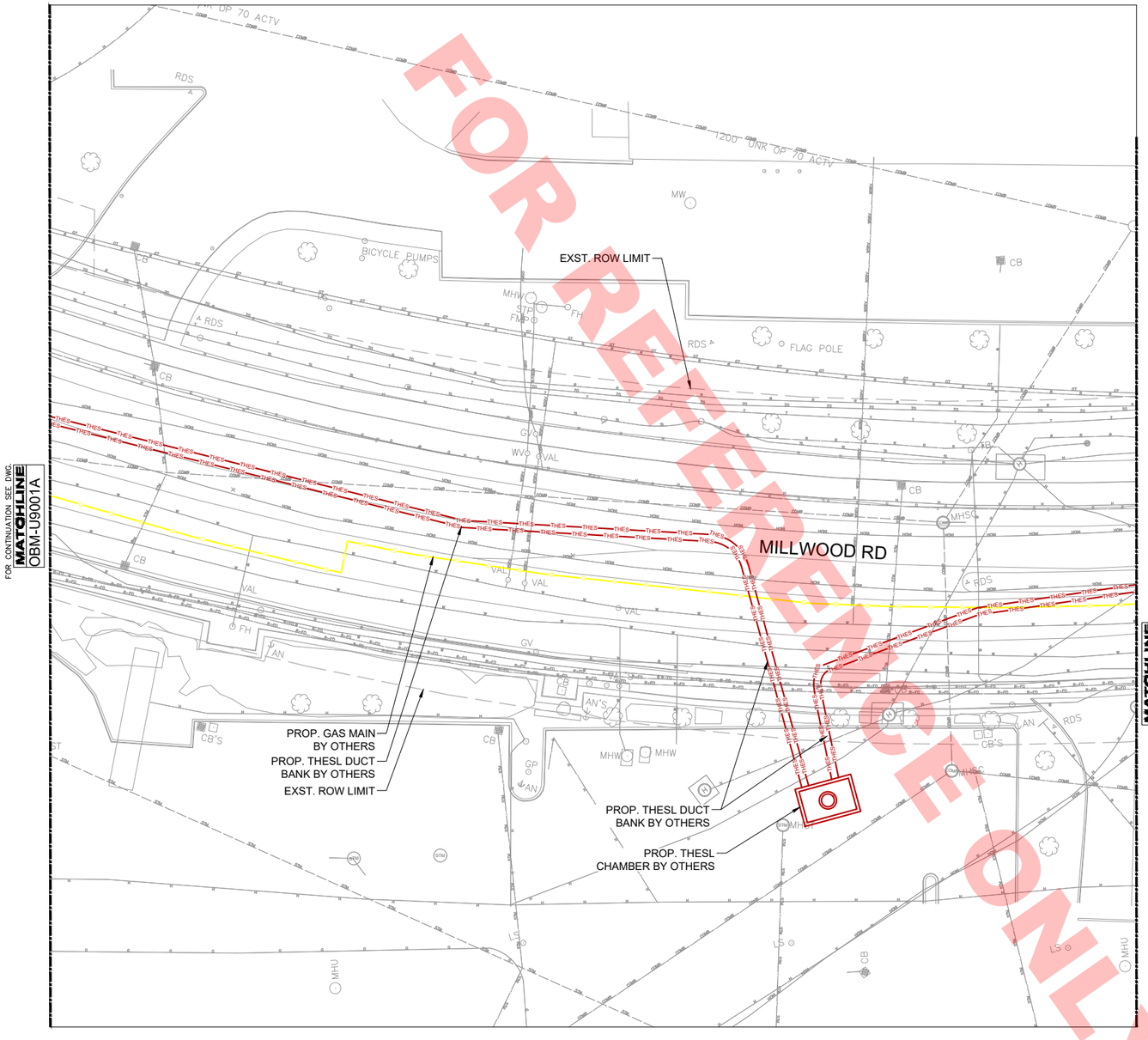
Infrastructure Ontario

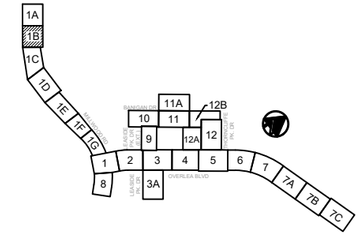
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9001A	C	28

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

1. FOR UTILITY LEGEND AND GENERAL NOTES, REFER TO OBM-U8000.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

REFERENCE DRAWINGS		ISSUE			REVISIONS		
		C	2023/06/28	ISSUE FOR 100% REVIEW			
		B	2023/12/23	ISSUE FOR 90% DESIGN			
		A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONETEAM
ONTARIO LINE TECHNICAL ADVISOR

HDR

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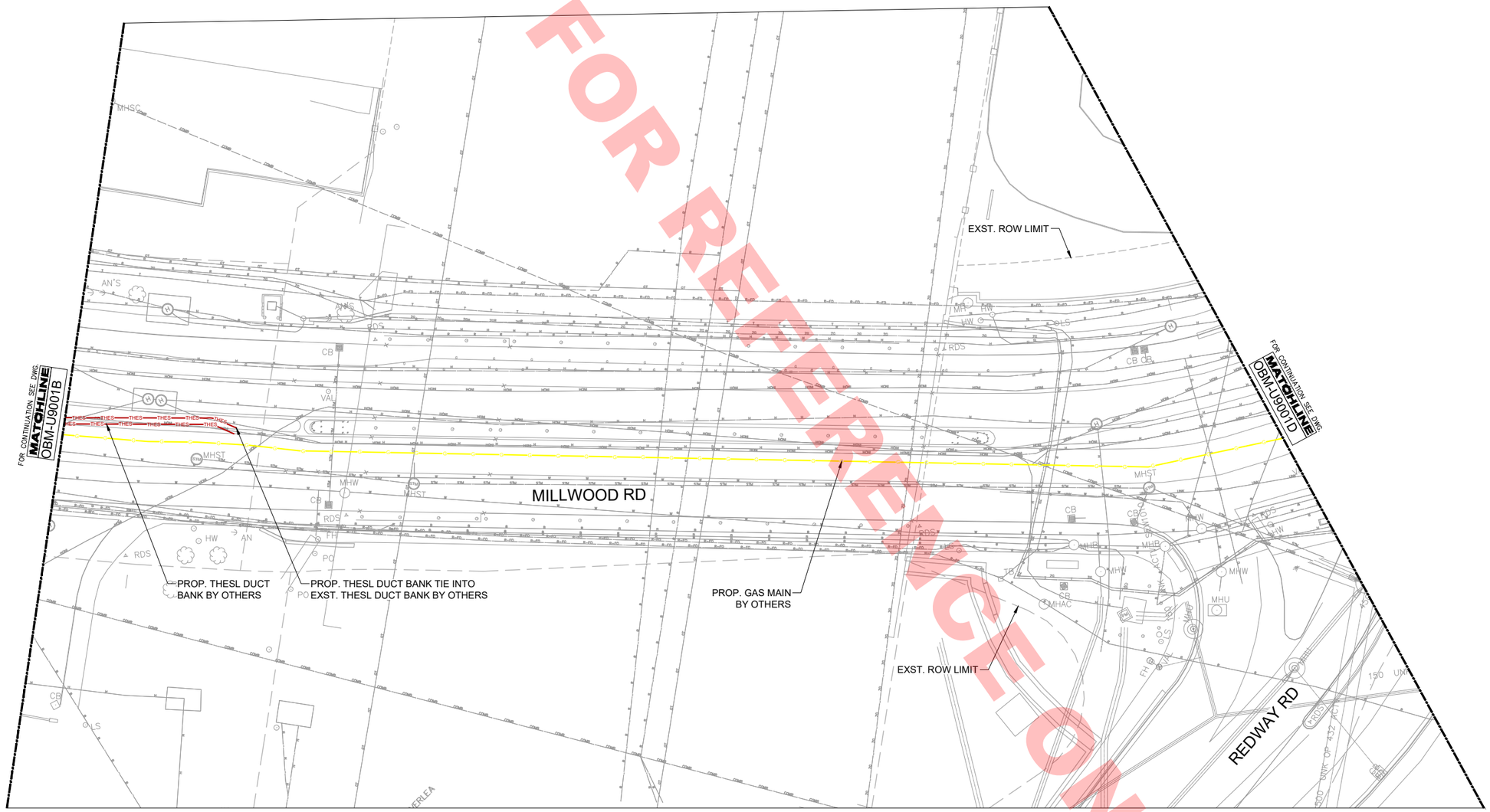
Infrastructure Ontario

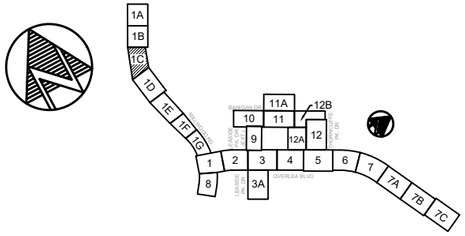
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9001B	C	29

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

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100%
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METROLINX PROJECT NO. 139905

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		A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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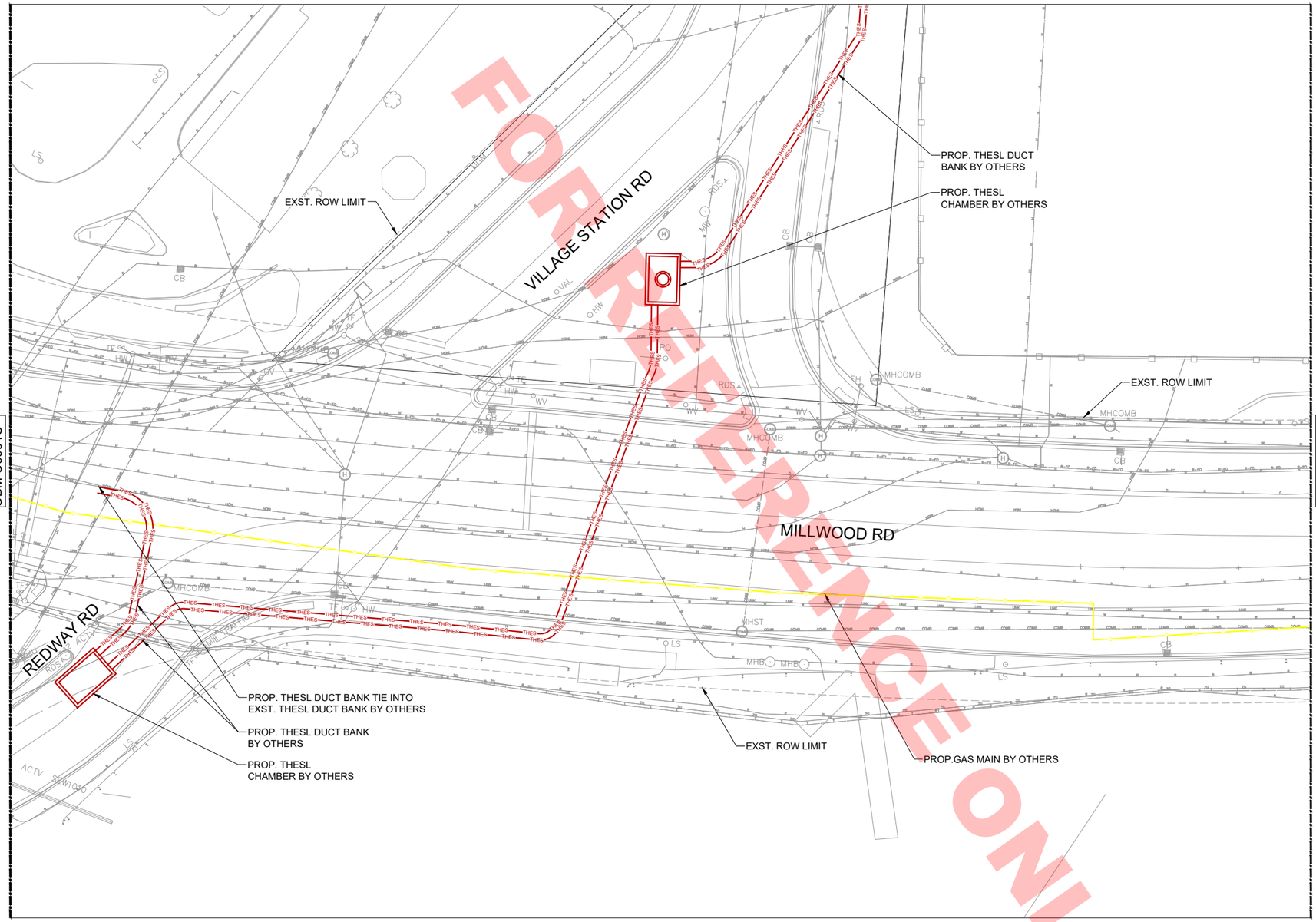
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9001C	C	30

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22



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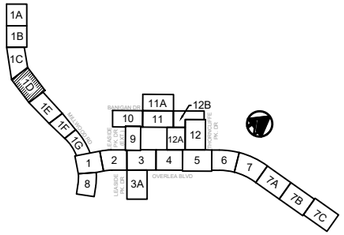
MATCHLINE OBM-U9001E FOR CONTINUATION SEE DWG.



KEY PLAN

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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
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SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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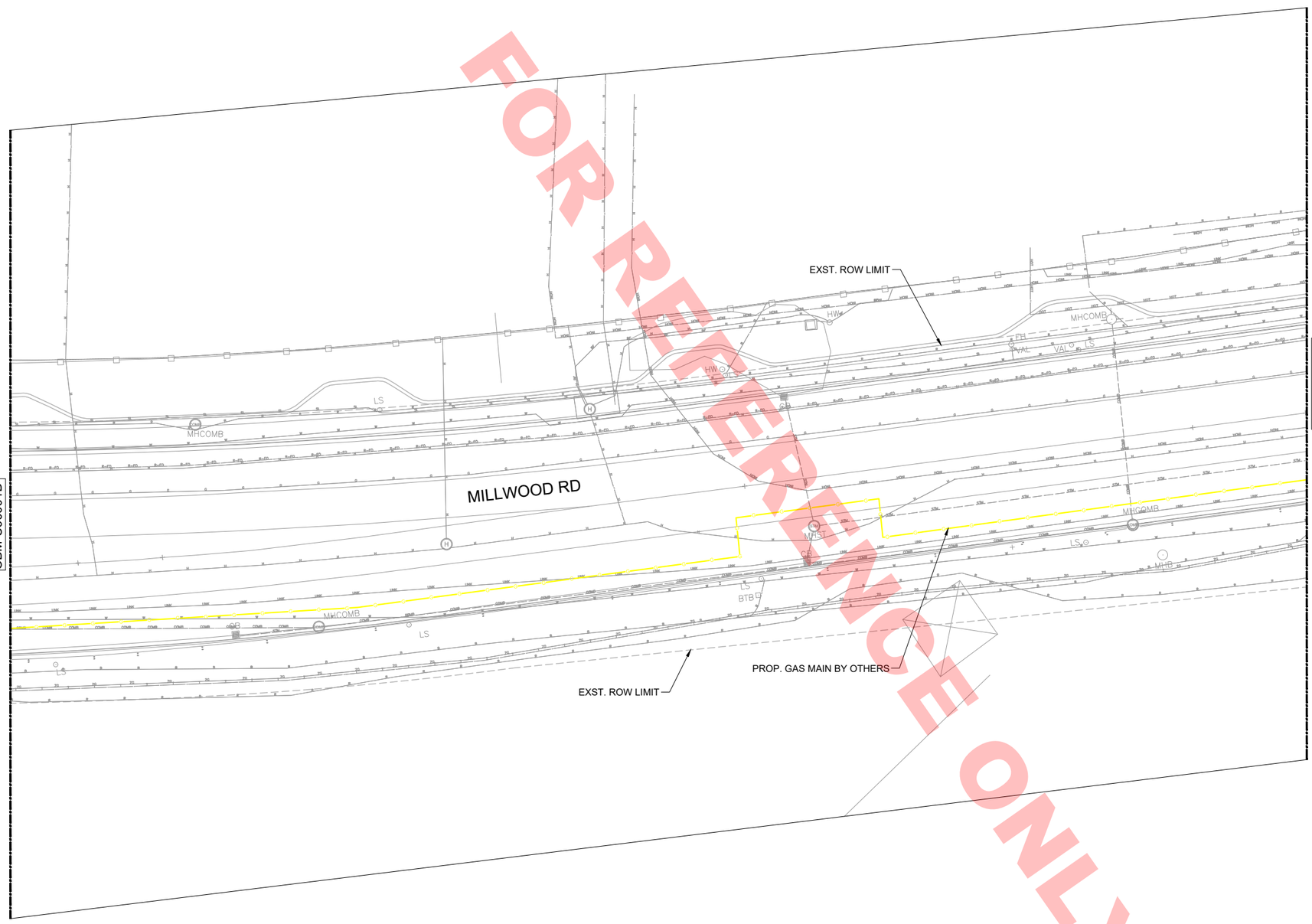
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MILLWOOD RD

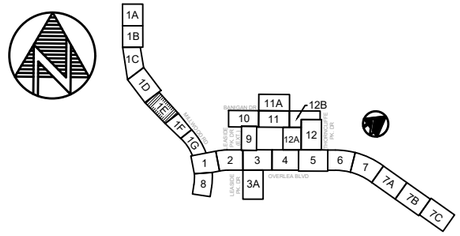
CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9001D**	C	31

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22



FOR CONTINUATION SEE DWG. MATCHLINE OBM-U9001D

MATCHLINE OBM-U9001F FOR CONTINUATION SEE DWG.



KEY PLAN

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100%
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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR
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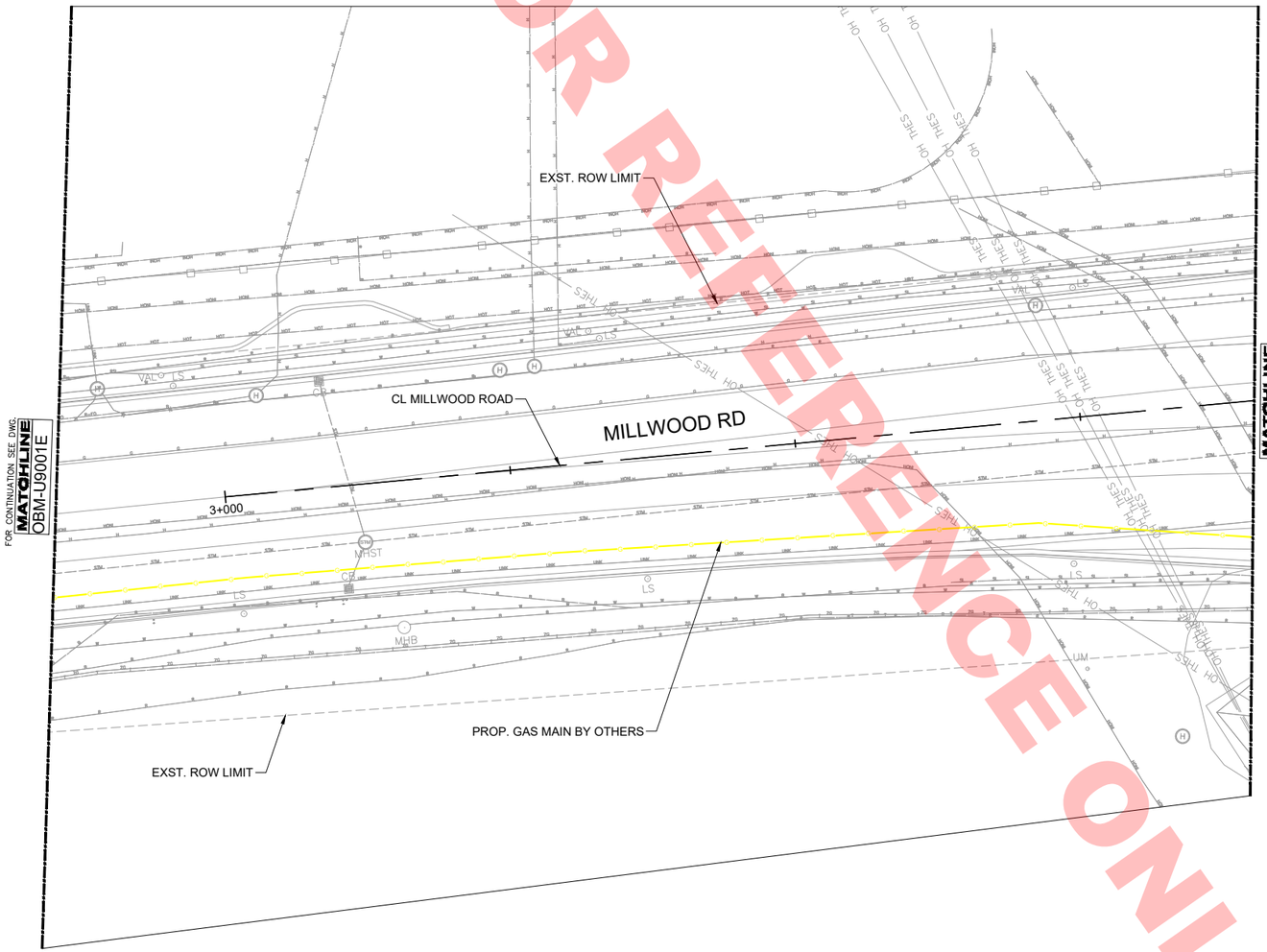
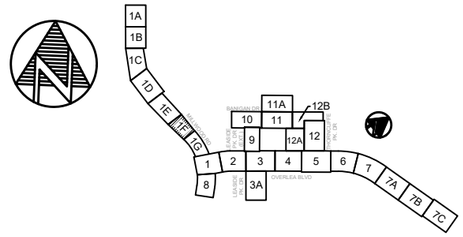
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9001E**	C	32

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

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METROLINX PROJECT NO. 139905

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SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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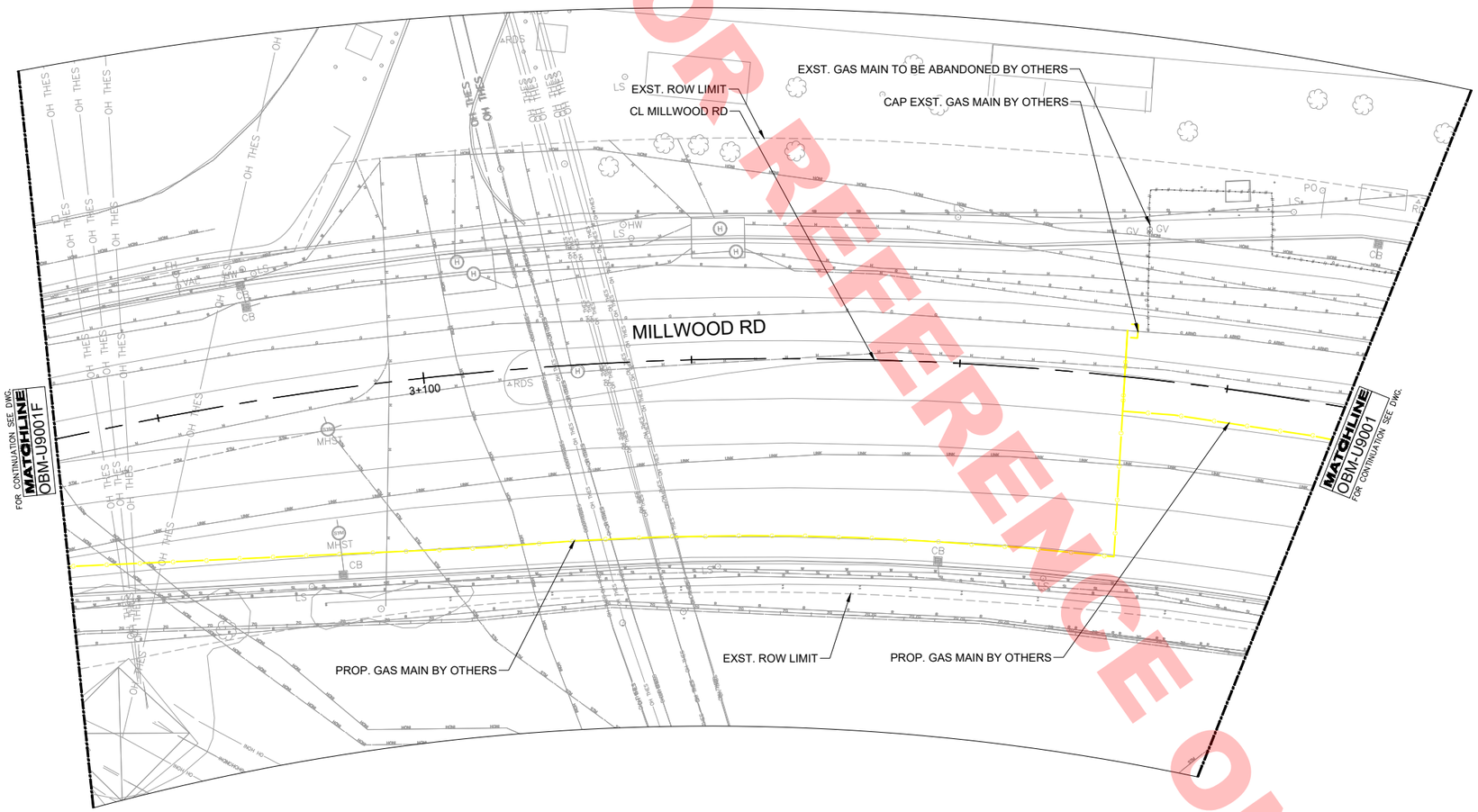
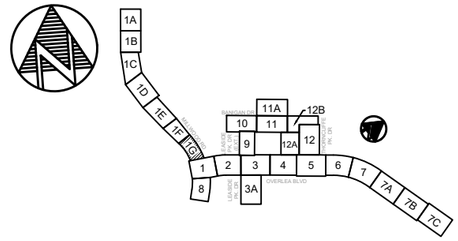
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9001F**	C	33

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22
APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200 FULL SIZE ONLY
0 1 2 3 4 5 8m

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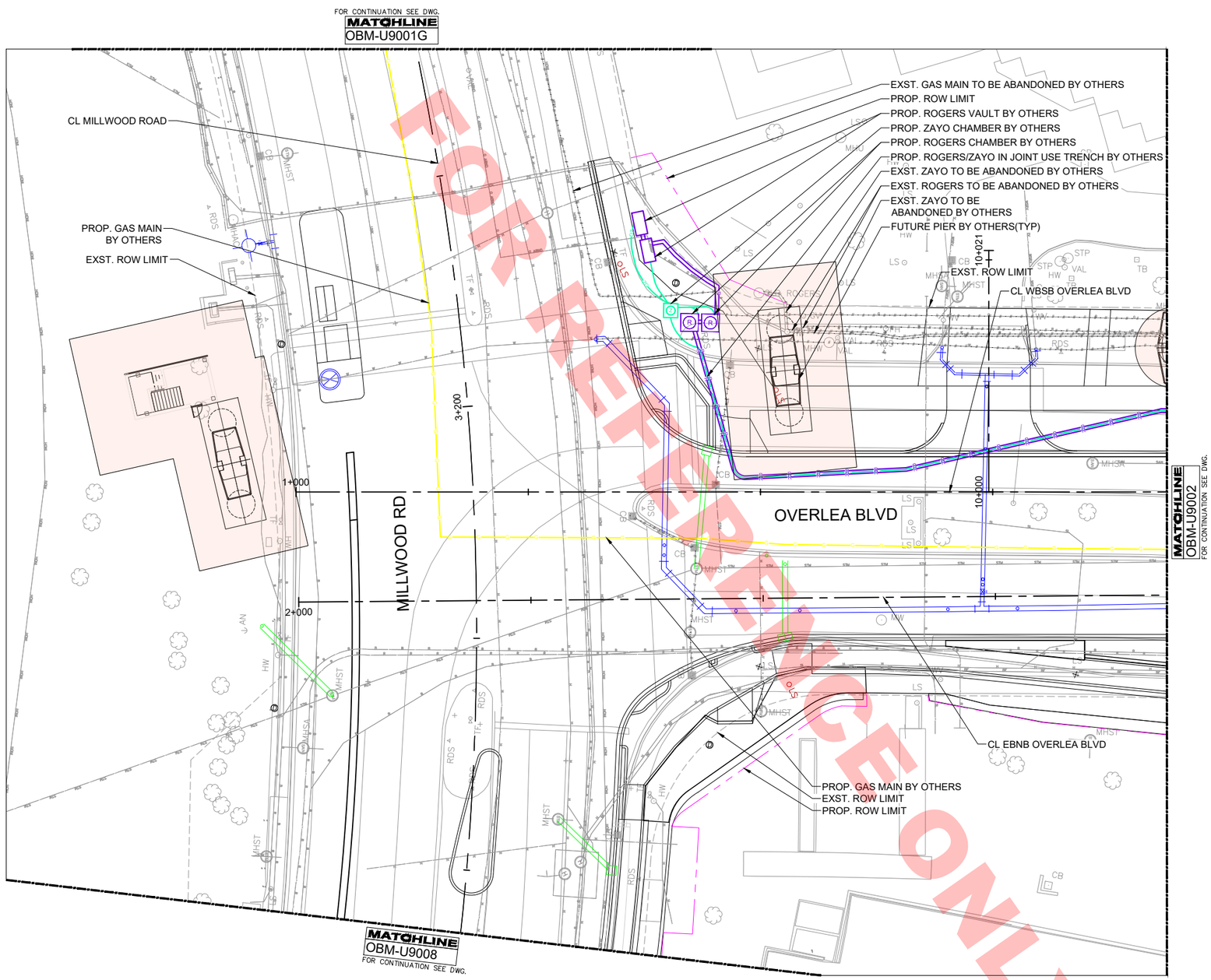
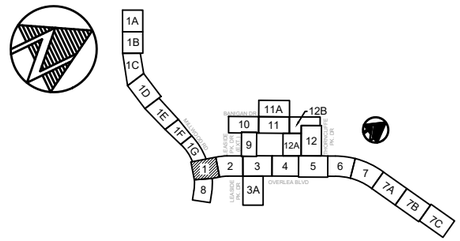
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9001G	C	34

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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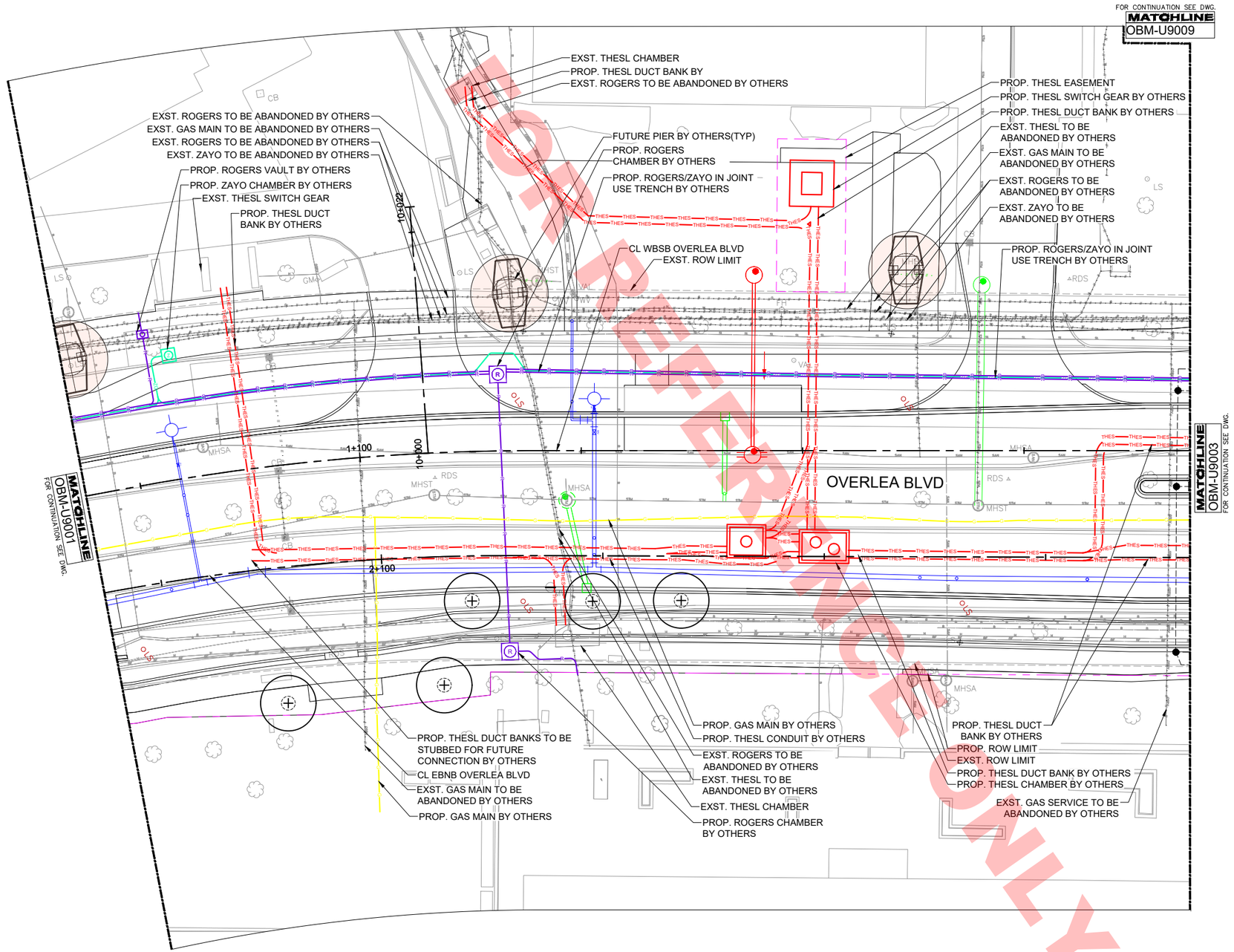
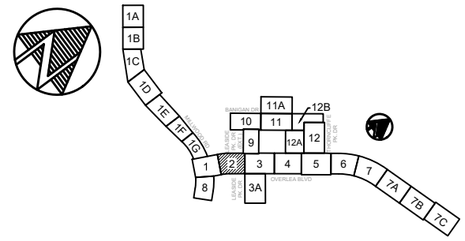
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9001**	C	35

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

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METROLINX PROJECT NO. 139905

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SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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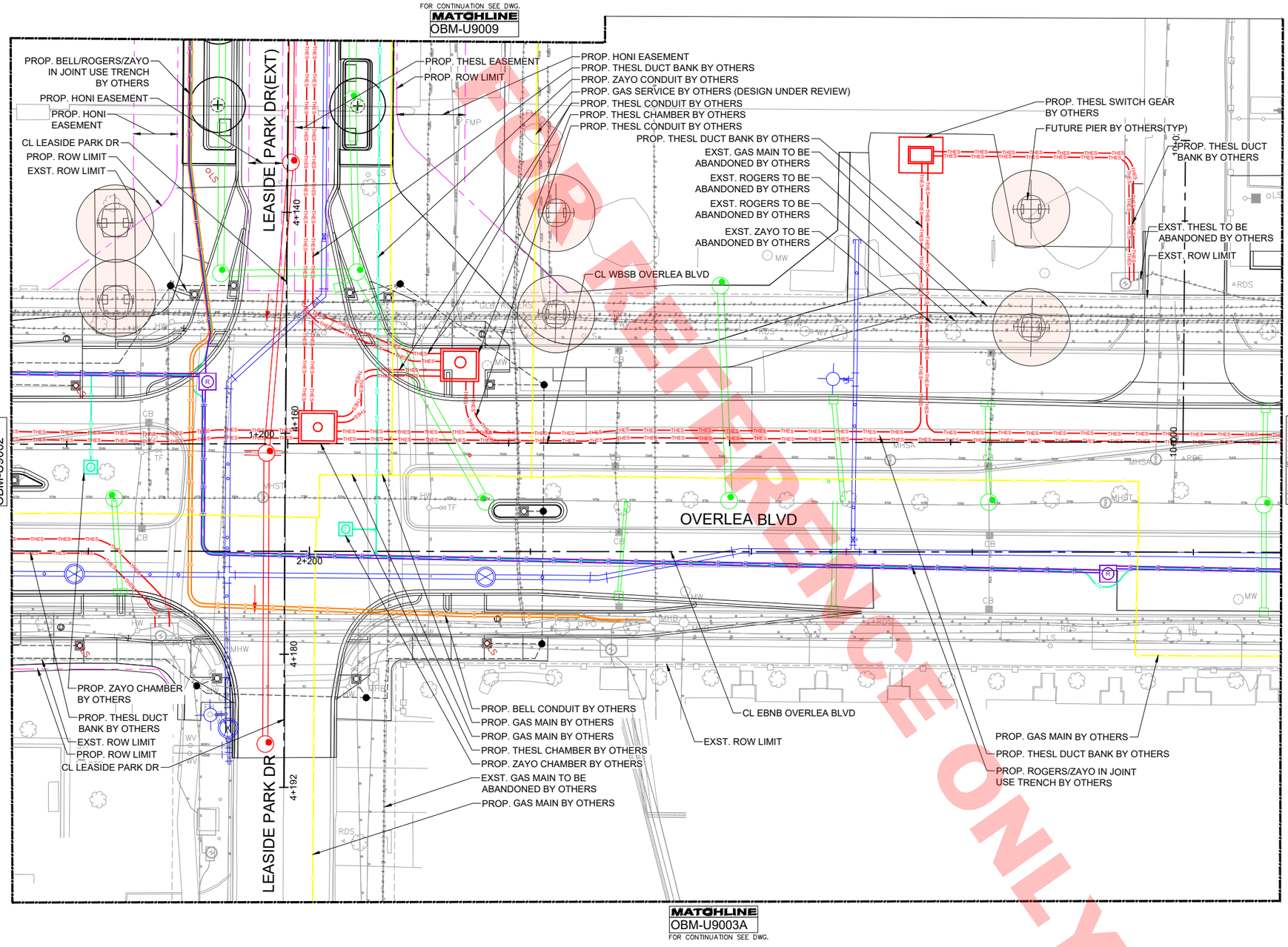
Infrastructure Ontario

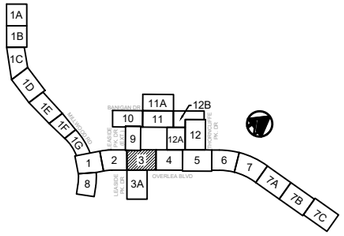
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9002**	C	36

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-23





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SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR

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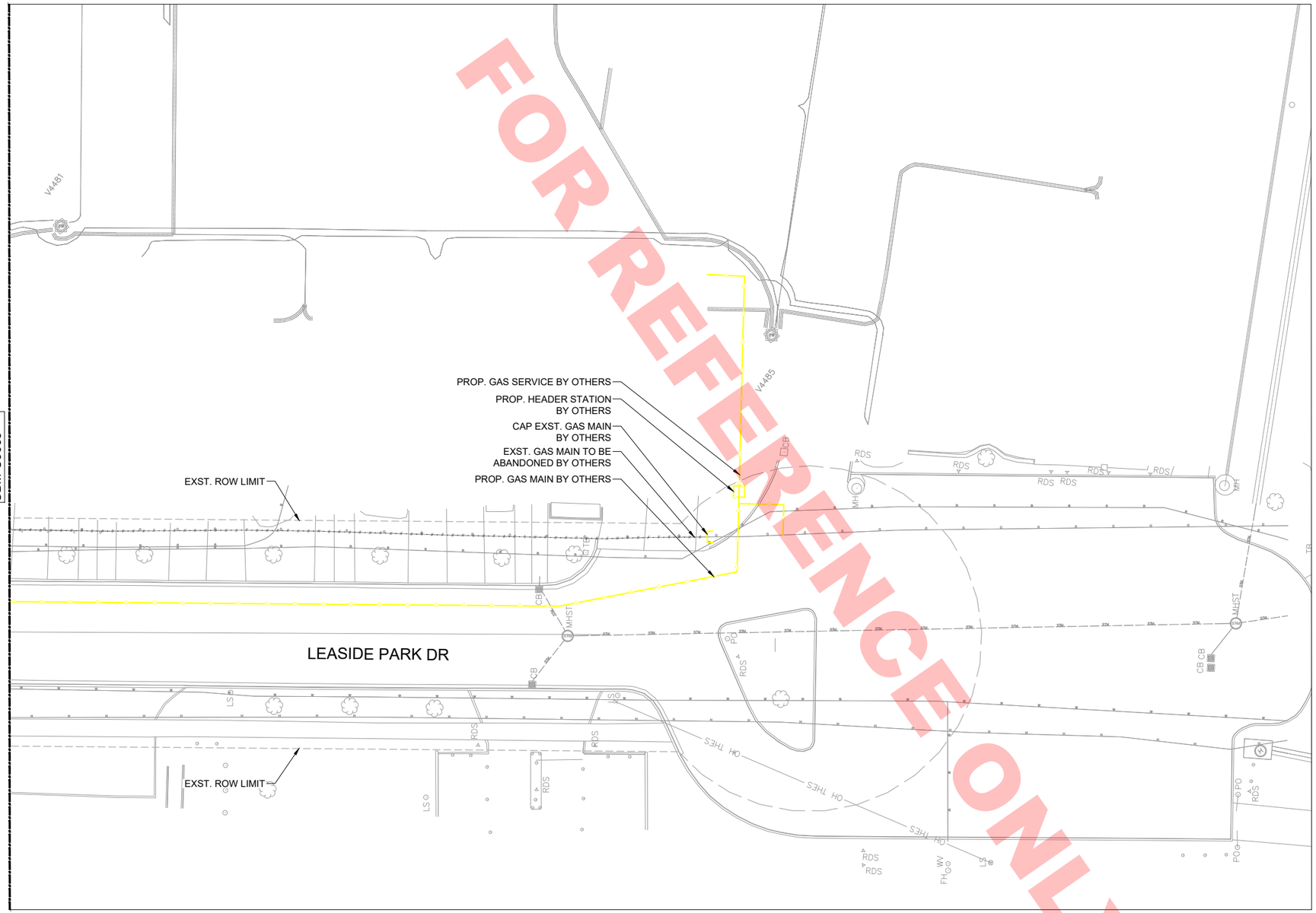
Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD & LEASIDE PARK DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9003	C	37

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22



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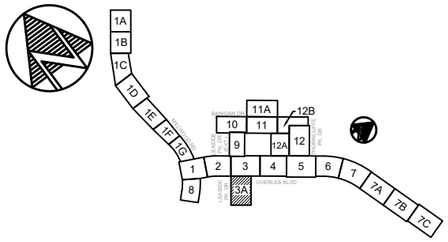

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0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR

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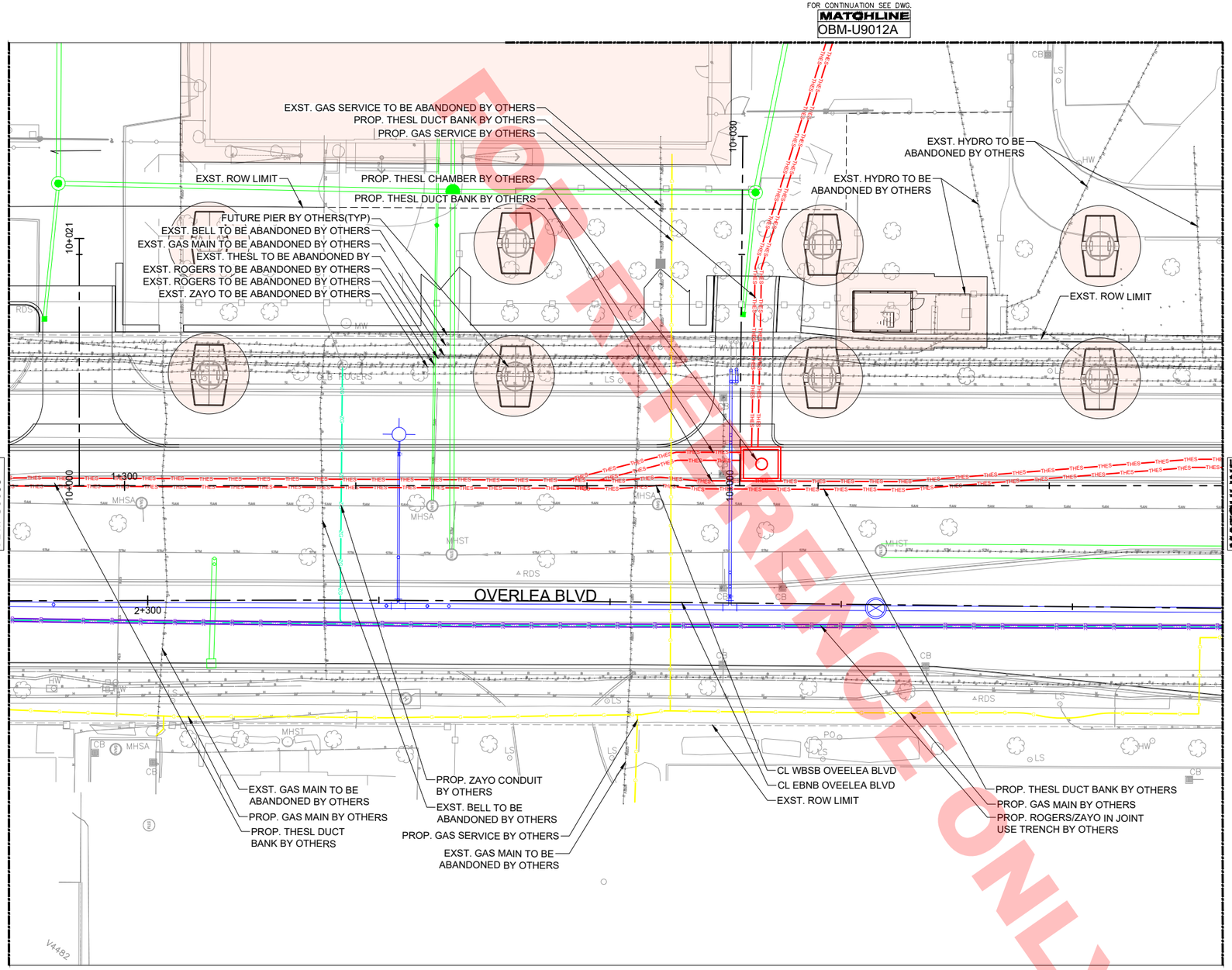
Infrastructure Ontario

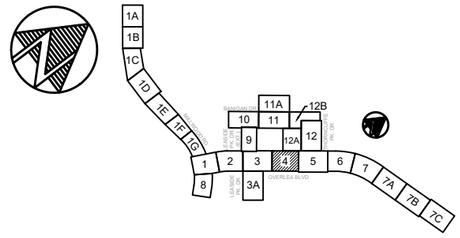
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
LEASIDE PARK DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9003A**	C	38

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





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OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9004	C	39

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22

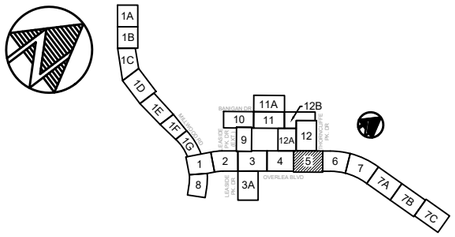
FOR CONTINUATION SEE DWG. MATCHLINE OBM-U9012A

FOR CONTINUATION SEE DWG. MATCHLINE OBM-U9012

FOR CONTINUATION SEE DWG. MATCHLINE OBM-U9004

MATCHLINE OBM-U9006 FOR CONTINUATION SEE DWG.

EXST. ROW LIMIT
EXST. THESL TO BE ABANDONED BY OTHERS
EXST. ZAYO TO BE ABANDONED BY OTHERS
EXST. BELL TO BE ABANDONED BY OTHERS
EXST. GAS MAIN TO BE ABANDONED BY OTHERS
PROP. BELL CONDUIT BY OTHERS
CL THORNCLIFFE PARK DR
EXST. GAS MAIN TO BE ABANDONED BY OTHERS
PROP. THESL DUCT BANK BY OTHERS
EXST. THESL TO BE ABANDONED BY OTHERS
EXST. ZAYO TO BE ABANDONED BY OTHERS
EXST. ROGERS TO BE ABANDONED BY OTHERS
PROP. ROGERS/ZAYO IN JOINT USE TRENCH BY OTHERS
EXST. THESL TO BE ABANDONED BY OTHERS
EXST. GAS MAIN TO BE ABANDONED BY OTHERS
EXST. THESL CHAMBER TO BE ABANDONED BY OTHERS
EXST. ROGERS TO BE ABANDONED BY OTHERS
EXST. THESL TO BE ABANDONED BY OTHERS
EXST. ZAYO TO BE ABANDONED BY OTHERS
CL WBSB OVERLEA BLVD
1+400
1+500
2+400
2+500
10+200
OVERLEA BLVD
THORNCLIFFE PARK DR
PROP. ROGERS/ZAYO IN JOINT USE TRENCH BY OTHERS
PROP. THESL DUCT BANK BY OTHERS
PROP. THESL CHAMBER BY OTHERS
PROP. ROGERS/ZAYO IN JOINT USE TRENCH BY OTHERS
EXST. THESL TO BE ABANDONED BY OTHERS
PROP. BELL CONDUIT TIE IN TO EXST. BELL BY OTHERS
CL THORNCLIFFE PARK DR
EXST. ROW LIMIT
PROP. ROGERS CHAMBER BY OTHERS
PROP. GAS MAIN BY OTHERS
PROP. GAS MAIN BY OTHERS
PROP. ROGERS/ZAYO IN JOINT USE TRENCH BY OTHERS
PROP. GAS MAIN BY OTHERS
EXST. ROW LIMIT
CL EBNB OVERLEA BLVD



KEY PLAN

NOTES

1. FOR UTILITY LEGEND AND GENERAL NOTES, REFER TO OBM-U8000.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

REFERENCE DRAWINGS	ISSUE			REVISIONS		
	C	2023/06/28	ISSUE FOR 100% REVIEW			
	B	2023/12/23	ISSUE FOR 90% DESIGN			
	A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO. TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONETEAM ONTARIO LINE TECHNICAL ADVISOR

HDR

METROLINX

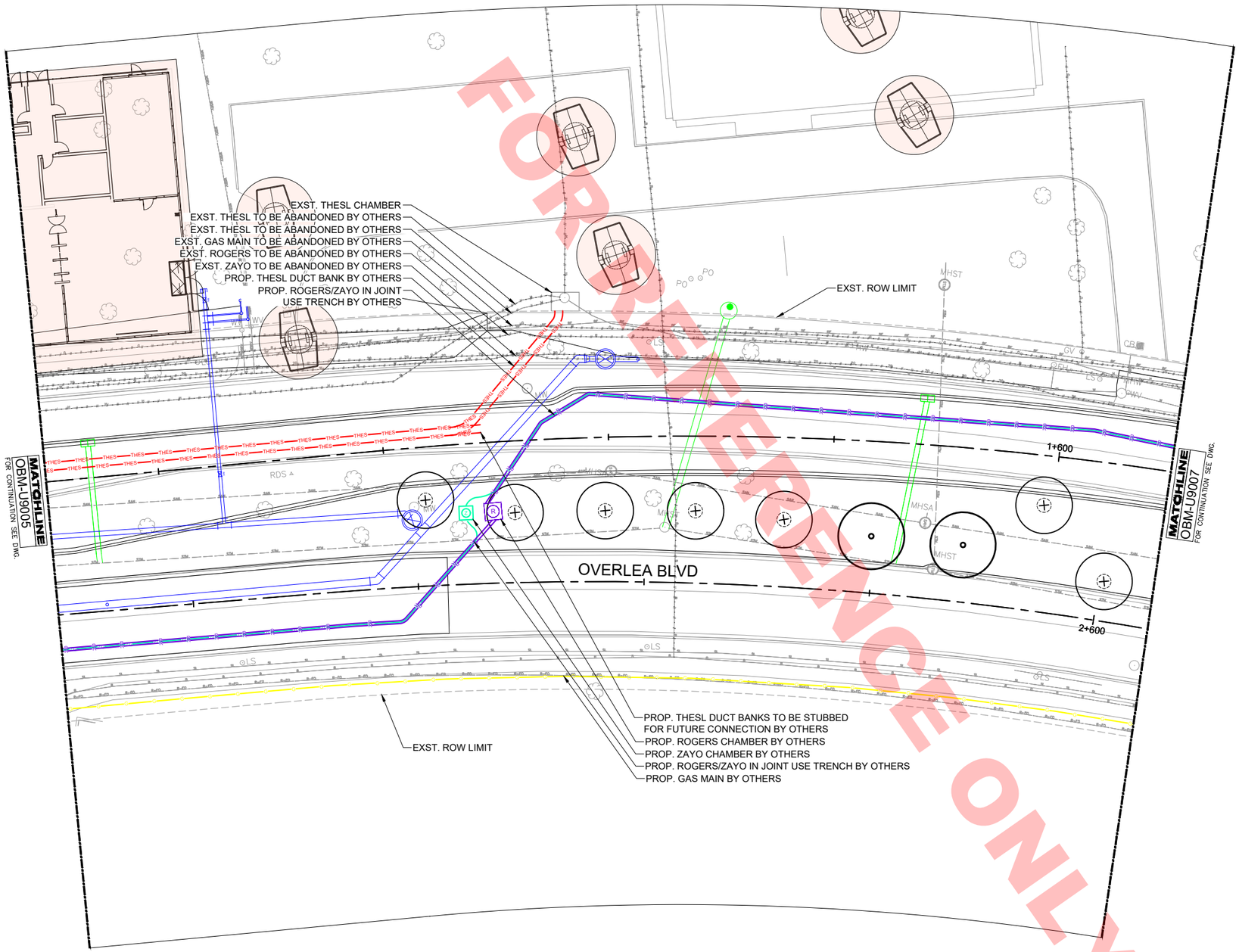
Infrastructure Ontario

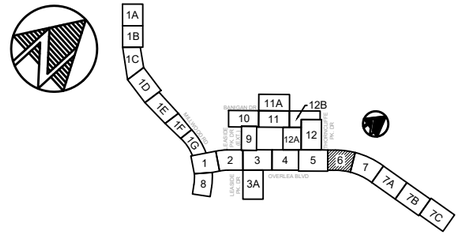
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD & THORNCLIFFE PARK DR
THORNCLIFFE PARK DR STA 10+130.000 TO STA 10+220.000

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9005	C	40

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-23





KEY PLAN

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100%
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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR

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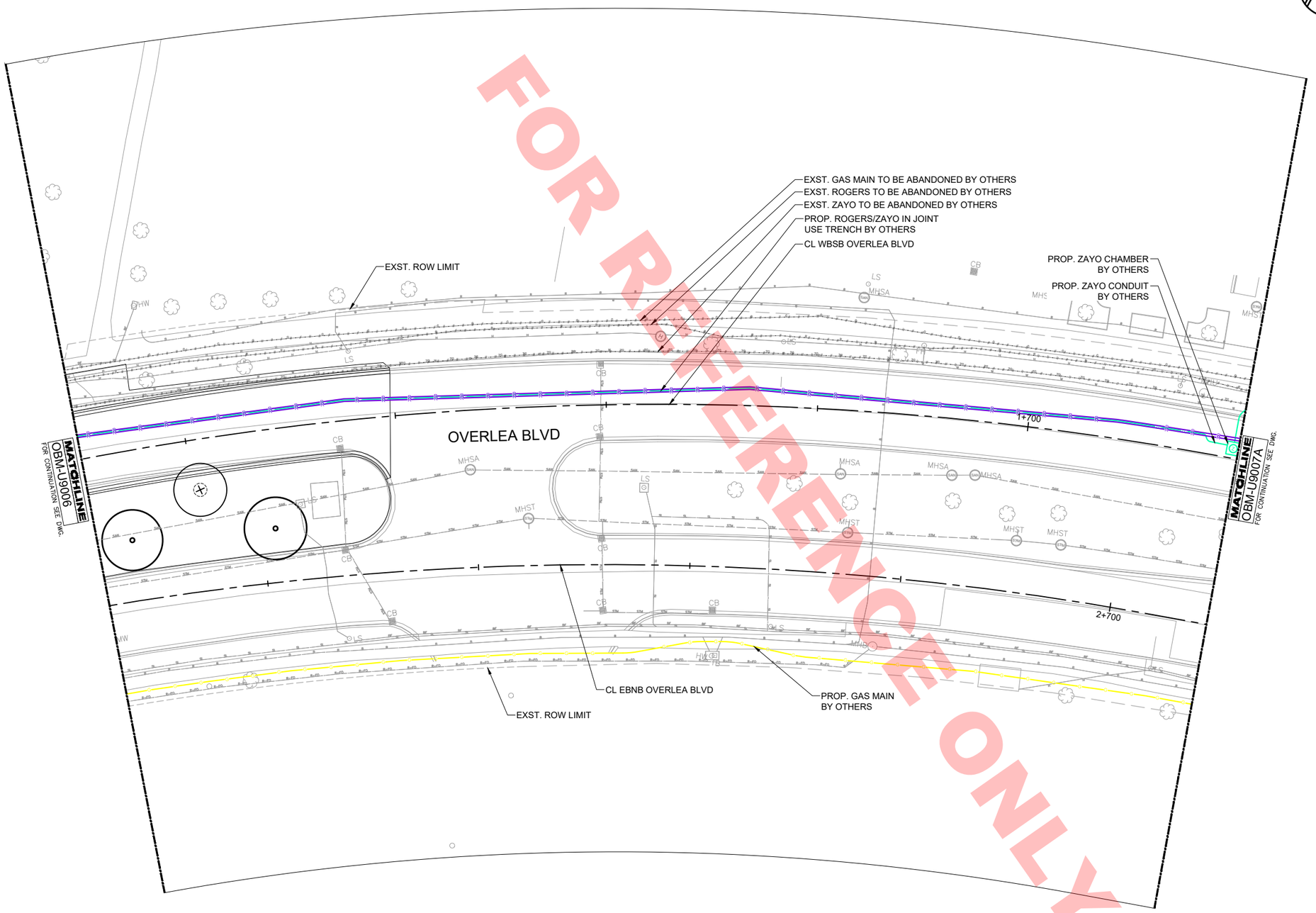
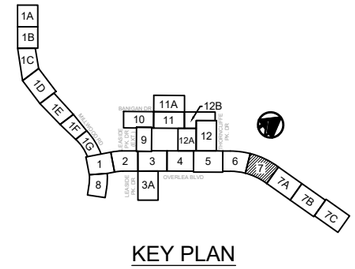
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9006	C	41

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-23





KEY PLAN

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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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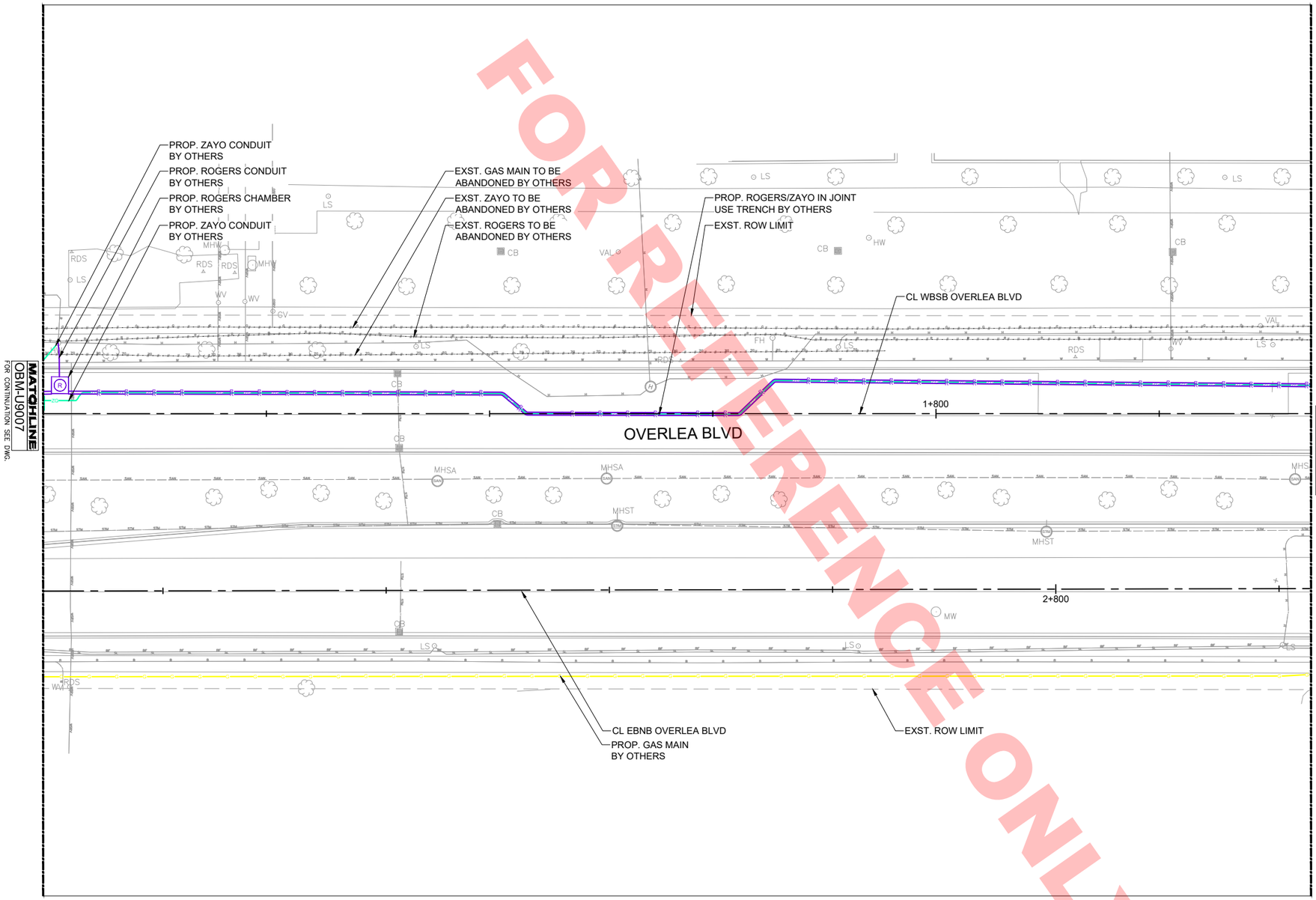
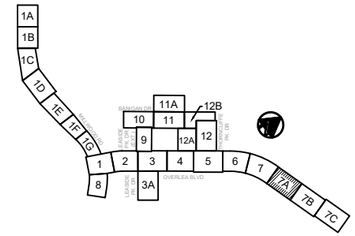
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9007**	C	42

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

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100%
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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22
DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22
APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200 FULL SIZE ONLY
0 1 2 3 4 5 8m

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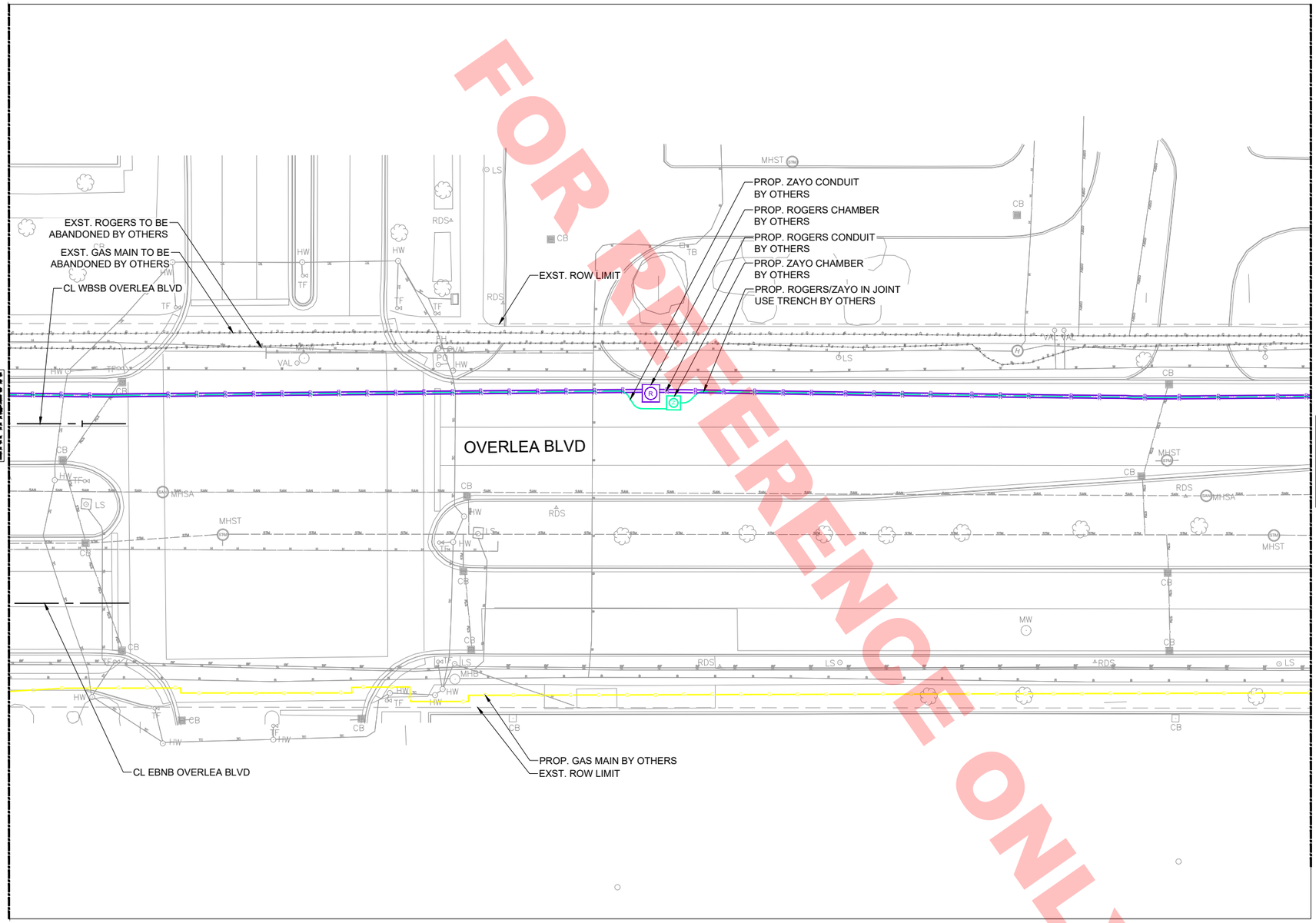
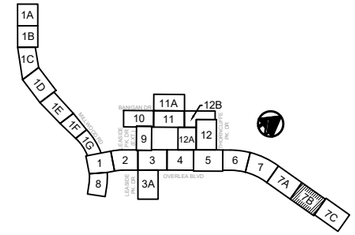
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9007A	C	43

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

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METROLINX PROJECT NO. 139905

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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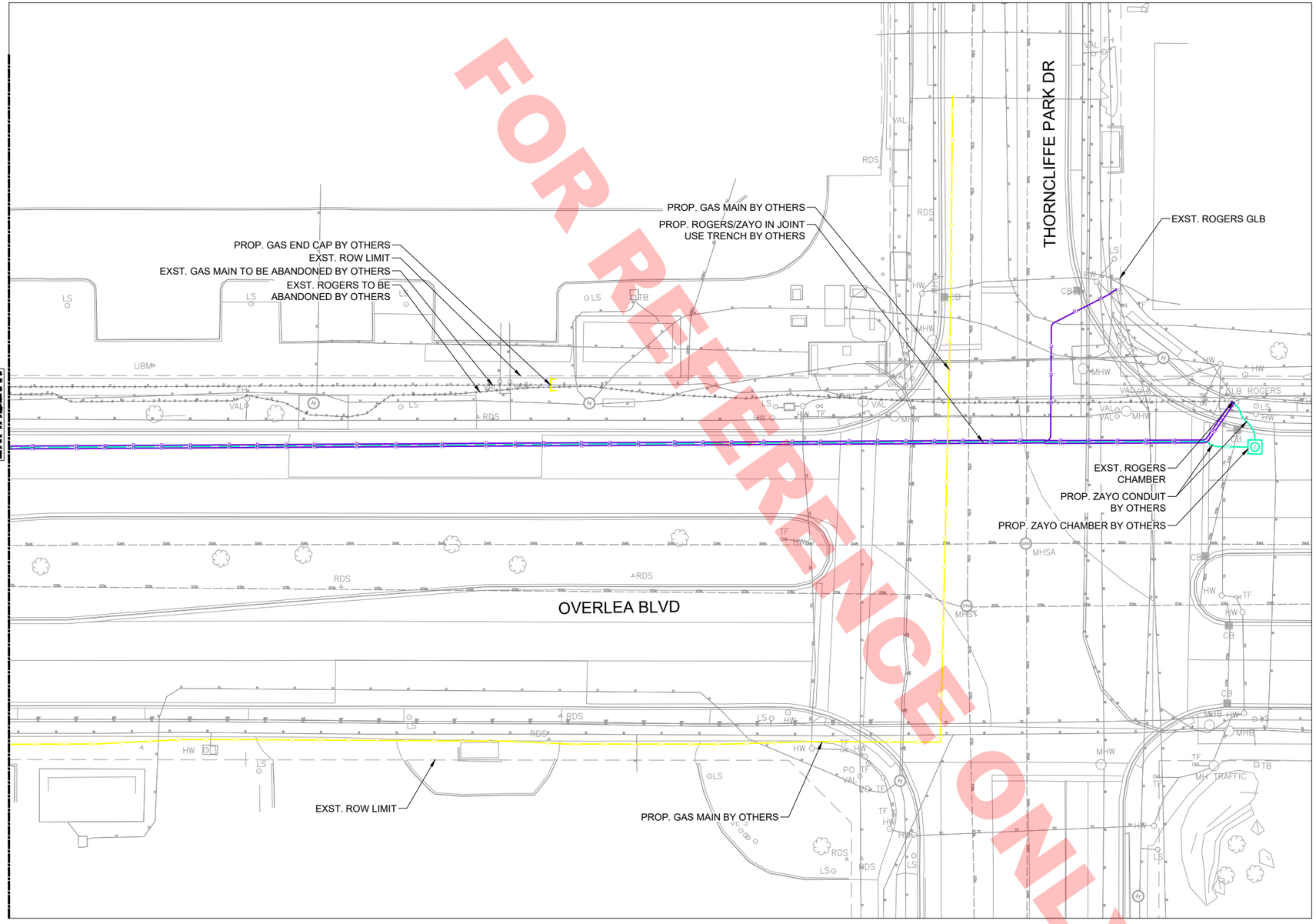
OVERLEA BOULEVARD MODIFICATIONS

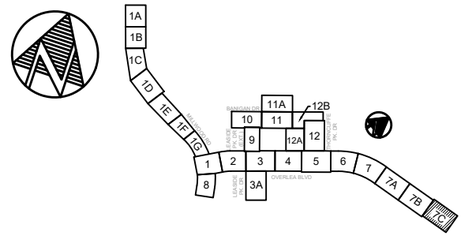
DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9007B	C	44

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22



MATCHLINE
OBM-U9007B
FOR CONTINUATION SEE DWG.



KEY PLAN

NOTES

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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

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CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR

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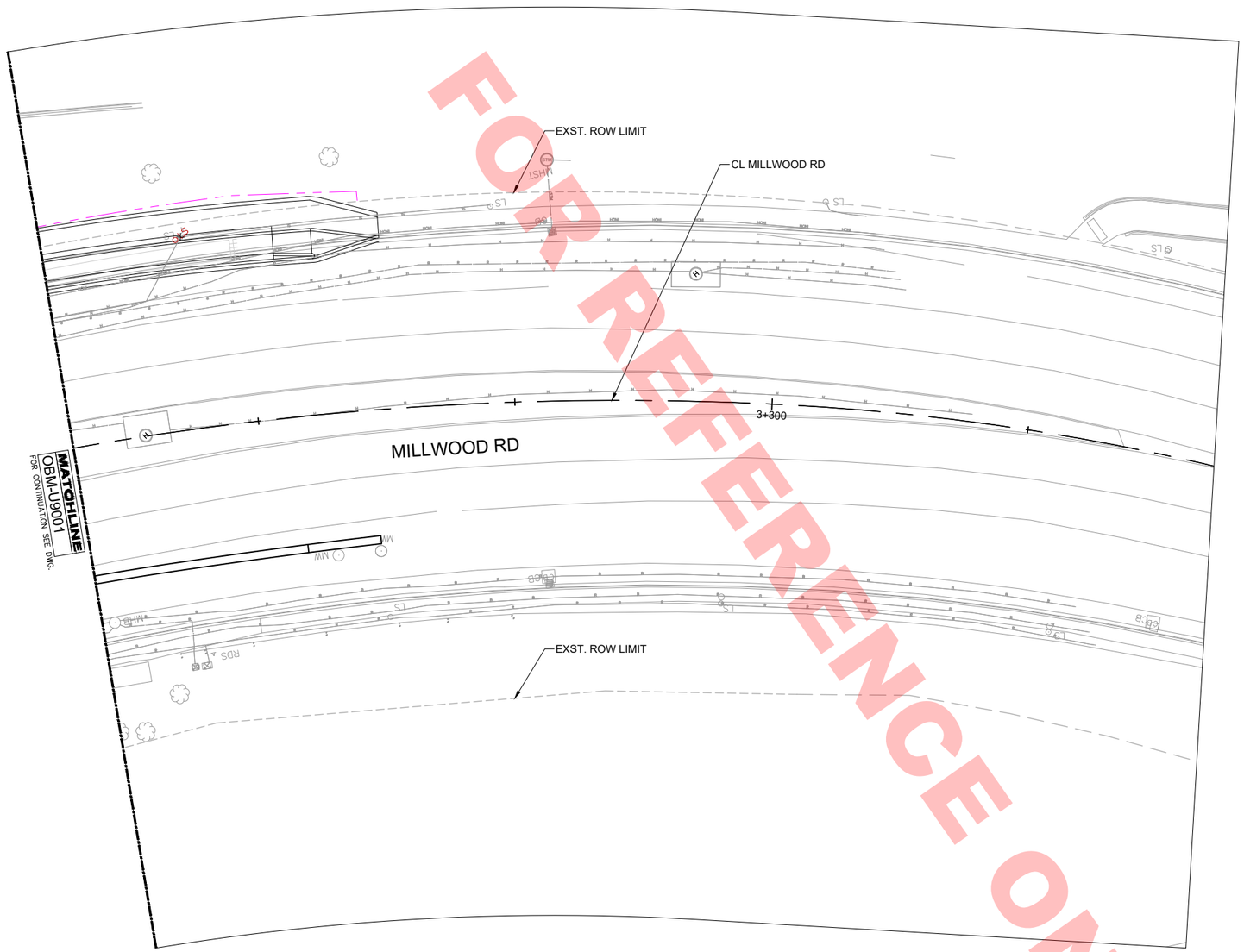
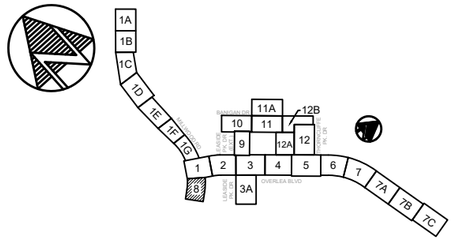
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
OVERLEA BLVD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9007C	C	45

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

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METROLINX PROJECT NO. 139905

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DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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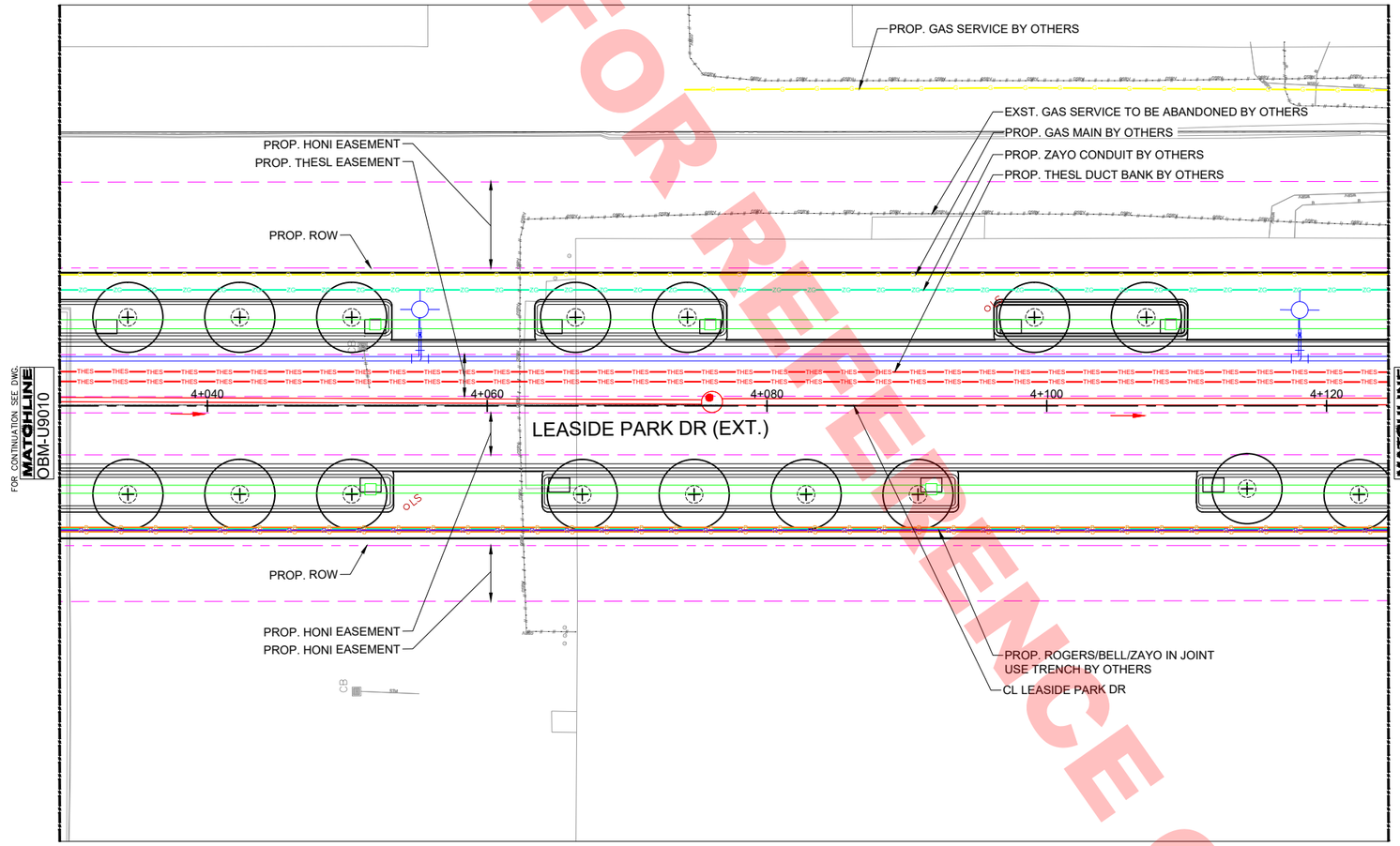
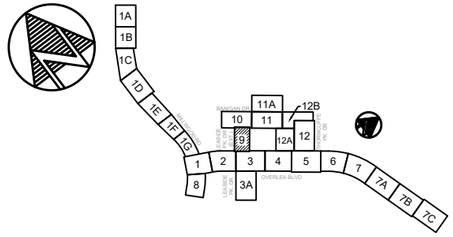
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MILLWOOD RD

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9008	C	46

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





KEY PLAN

NOTES

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METROLINX PROJECT NO. 139905

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DRAWN BY: S.GALLA 2023/05/22
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CHECKED BY: P. JALALI 2023/05/22
APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200 FULL SIZE ONLY
0 1 2 3 4 5 8m

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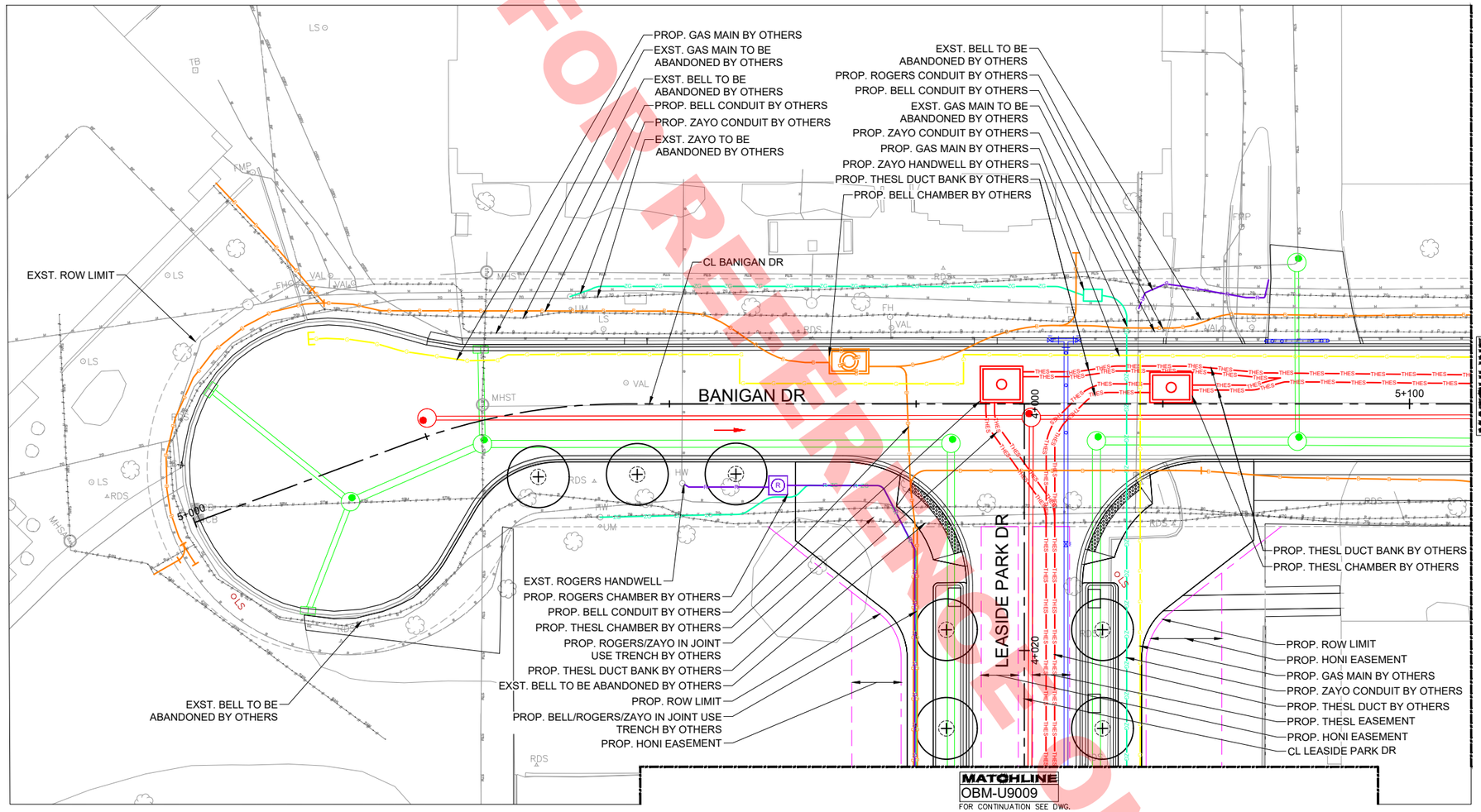
Infrastructure Ontario

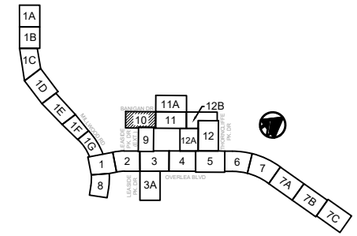
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
LEASIDE PARK DR (EXT.)
NEW CITY STREET STA 1+000.000 TO STA 1+052.500

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9009	C	47

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22





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APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200 FULL SIZE ONLY
0 1 2 3 4 5 8m

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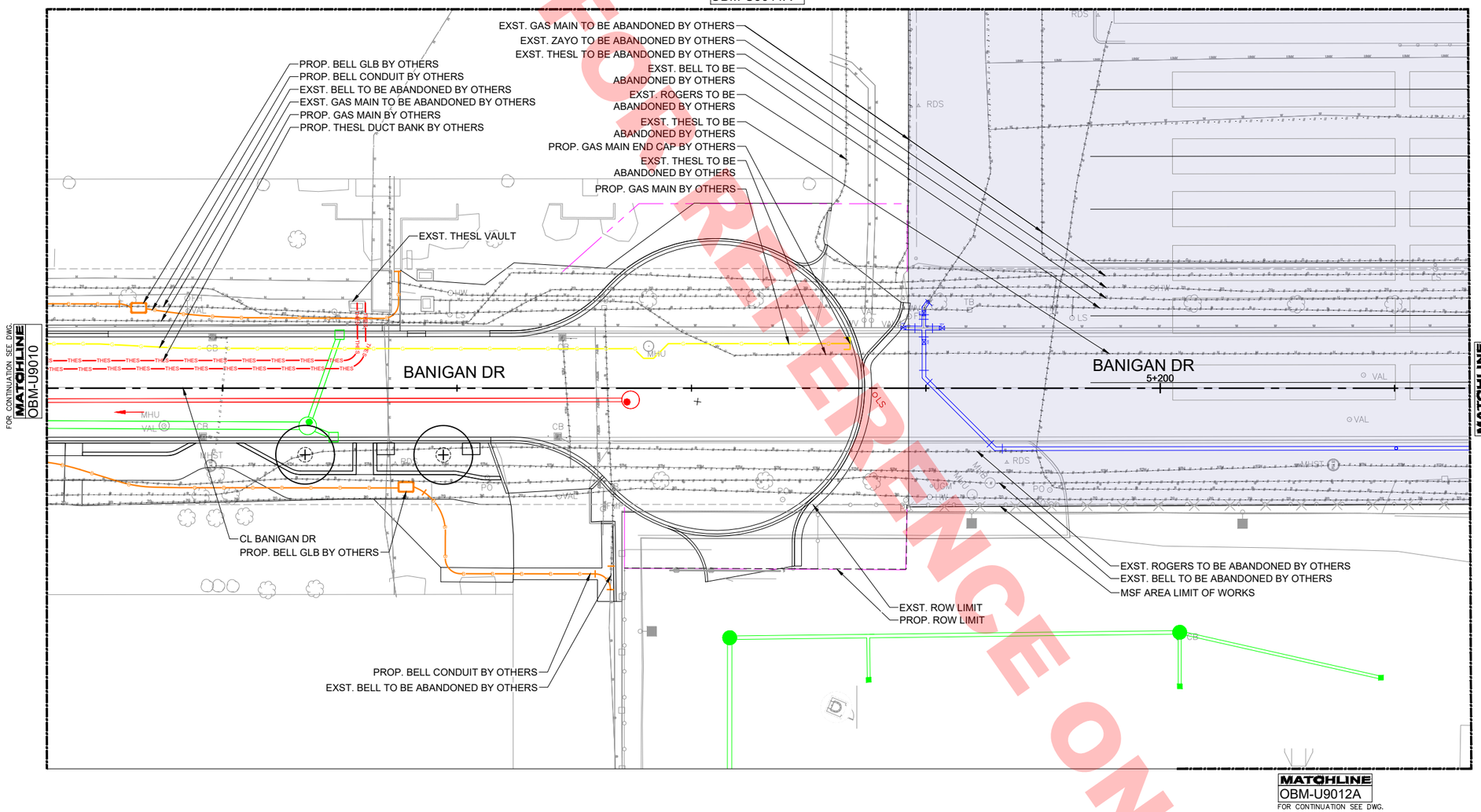
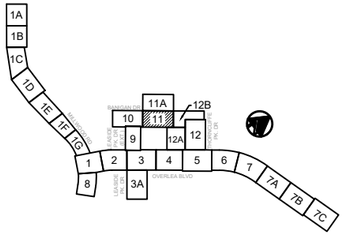
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
BANIGAN DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9010**	C	48

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-23





KEY PLAN

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DESIGNED BY: P. JALALI 2023/05/22
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APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200 FULL SIZE ONLY
0 1 2 3 4 5 8m

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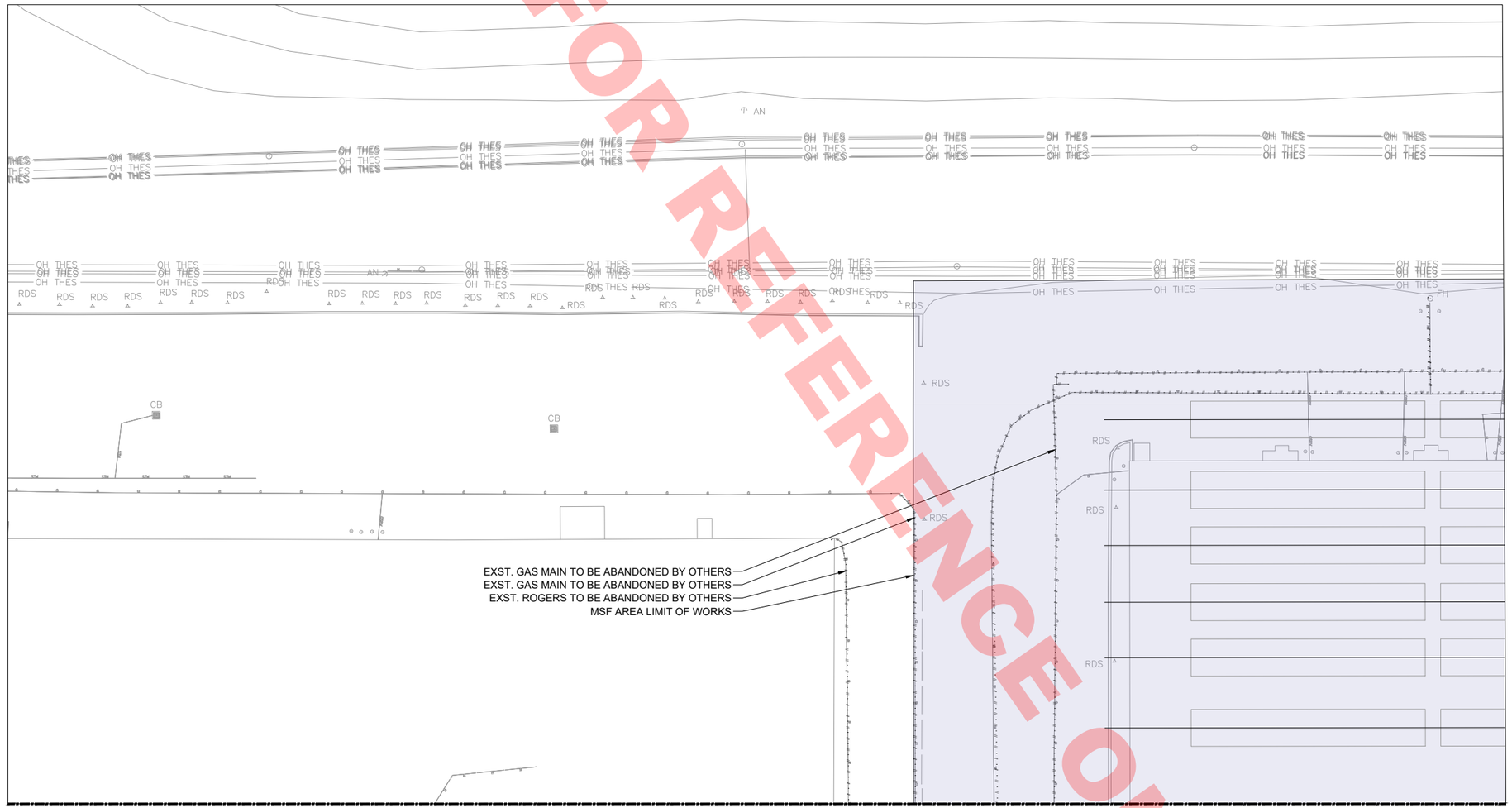
Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

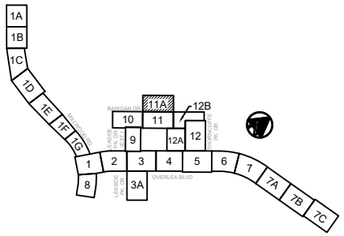
DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
BANIGAN DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9011	C	49

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-23



MATCHLINE
OBM-U9011
FOR CONTINUATION SEE DWG.



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SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

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ONTARIO LINE TECHNICAL ADVISOR

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OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
BANIGAN DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9011A**	C	50

FILE: 11-obm-u9001.dwg
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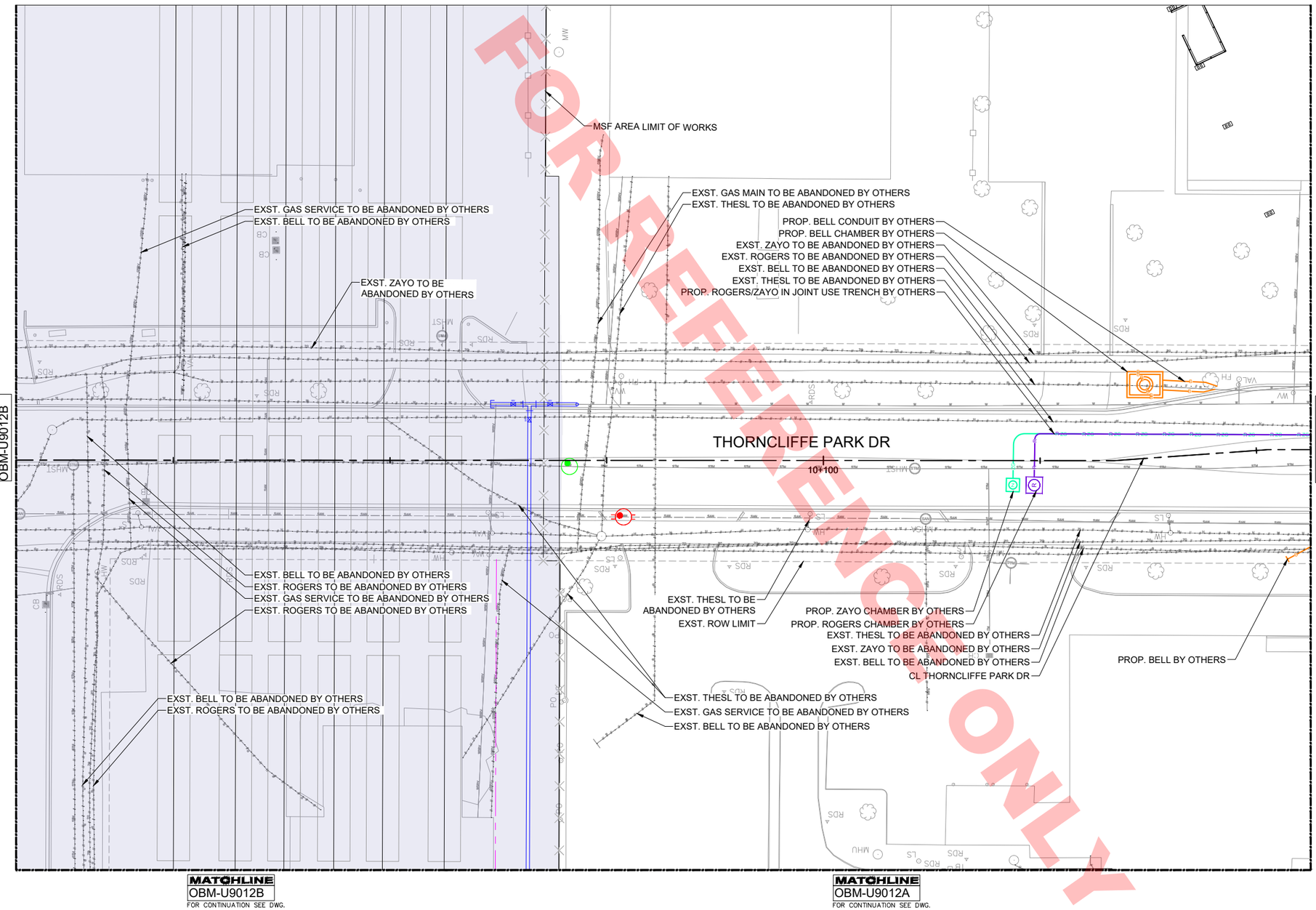
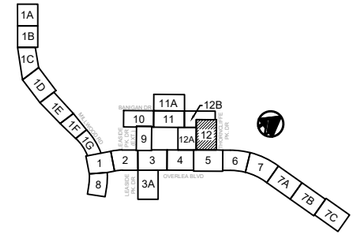
PLOT DATE: 2023-06-23





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		B	2023/12/23	ISSUE FOR 90% DESIGN			
		A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONE TEAM
ONTARIO LINE TECHNICAL ADVISOR

HDR

METROLINX

Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
THORNCLIFFE PARK DR
THORNCLIFFE PARK DR STA 10+000.000 TO STA 10+075.000

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9012**	C	51

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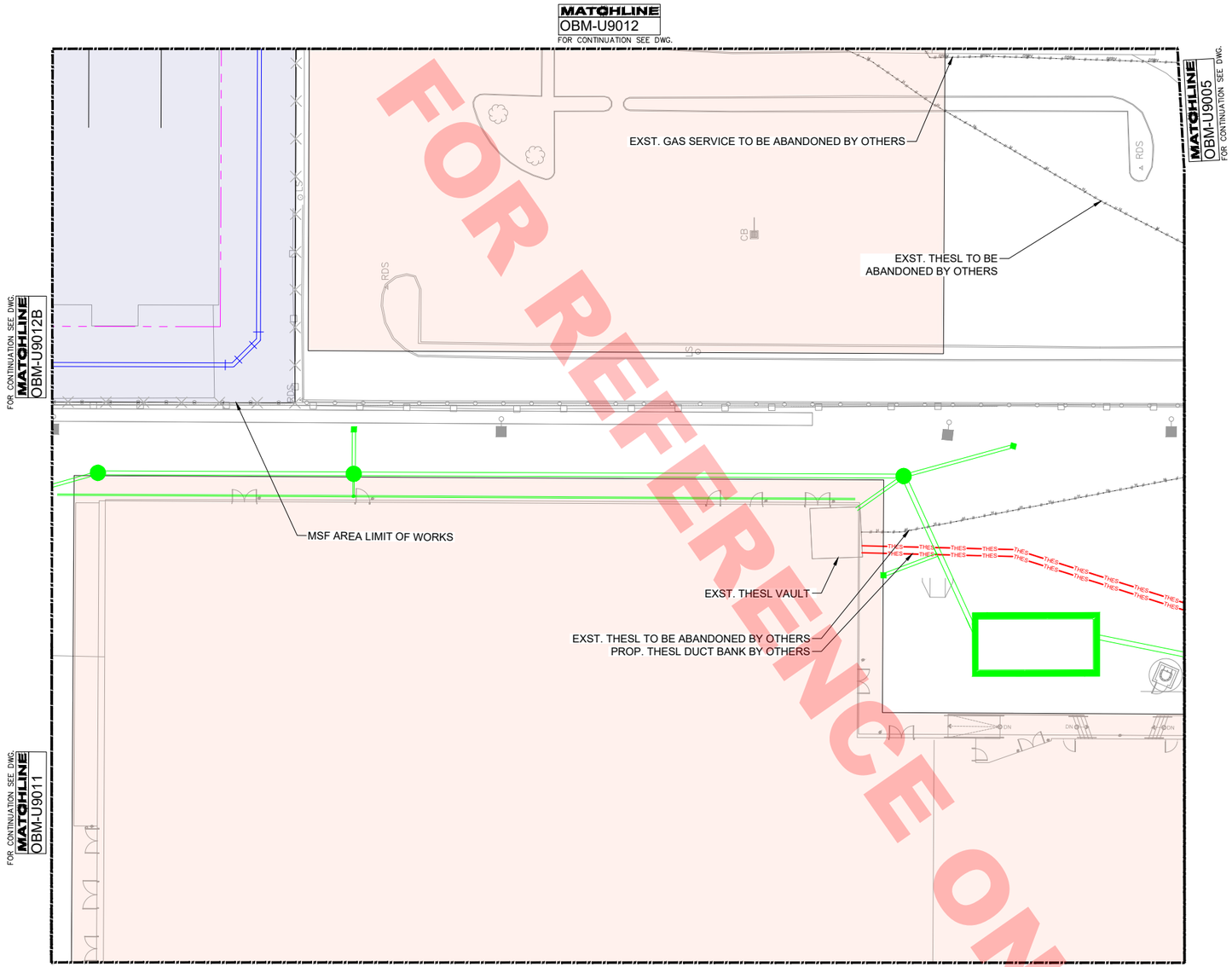
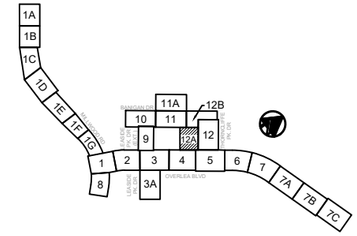
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-23





KEY PLAN

NOTES

1. FOR UTILITY LEGEND AND GENERAL NOTES, REFER TO OBM-U8000.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

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		B	2023/12/23	ISSUE FOR 90% DESIGN			
		A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONE TEAM
ONTARIO LINE TECHNICAL ADVISOR

HDR

METROLINX

Infrastructure Ontario

OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
BANIGAN DR

CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	**OBM-U9012A**	C	52

FILE: 11-obm-u9001.dwg
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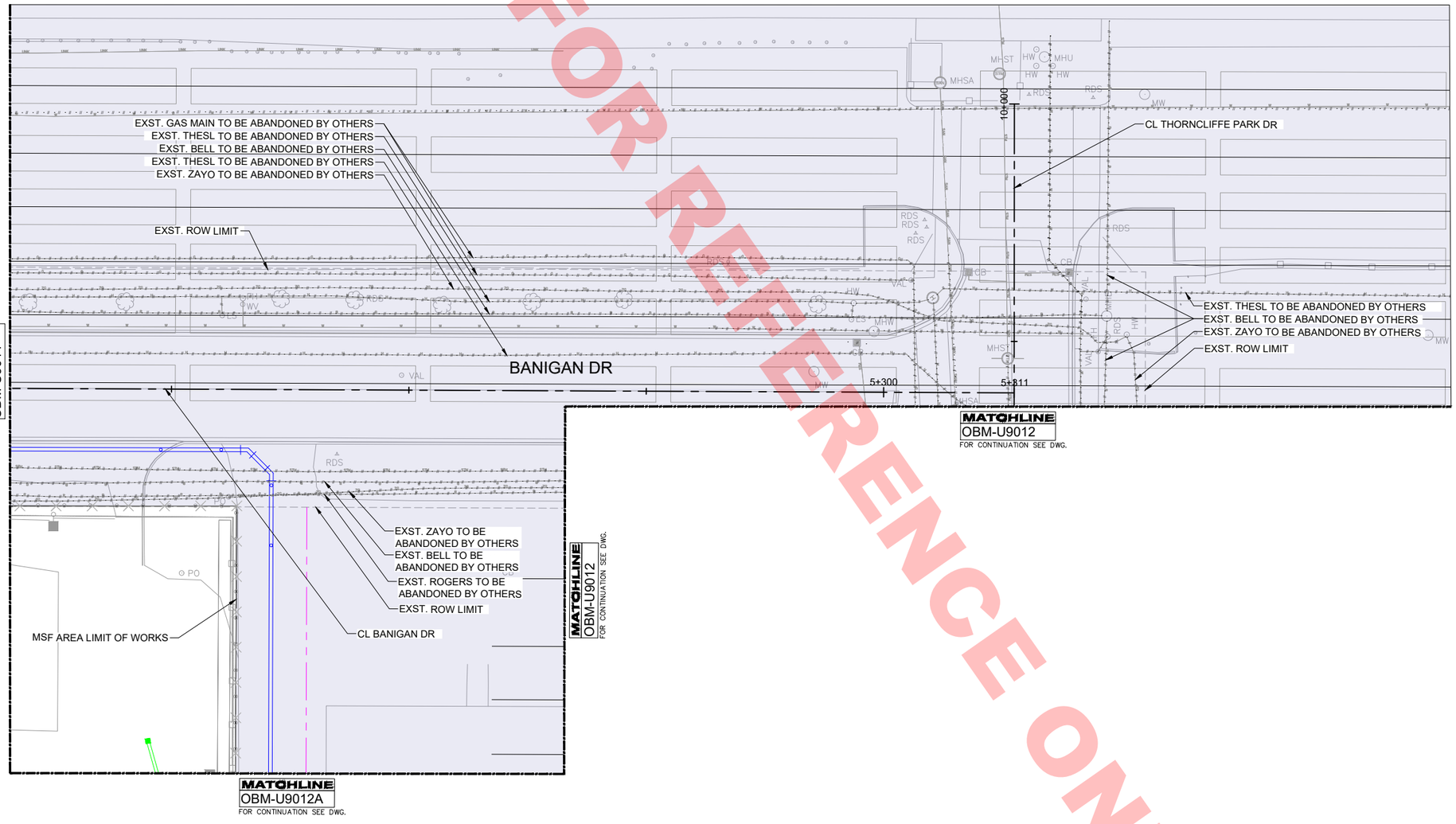

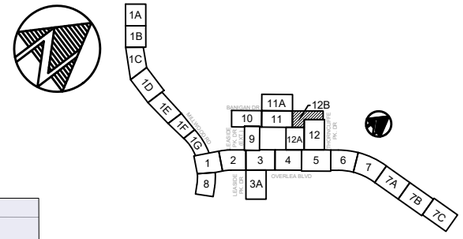

KEY PLAN

NOTES

1. FOR UTILITY LEGEND AND GENERAL NOTES, REFER TO OBM-U8000.

100%
DESIGN SUBMISSION
NOT FOR CONSTRUCTION

METROLINX PROJECT NO. 139905

REFERENCE DRAWINGS		ISSUE			REVISIONS		
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		B	2023/12/23	ISSUE FOR 90% DESIGN			
		A	2022/02/02	ISSUE FOR 50% REVIEW			
DWG NO.	TITLE	NO.	DATE	ISSUED FOR	REV.	DATE	

DRAWN BY: S.GALLA 2023/05/22	DESIGNED BY: P. JALALI 2023/05/22
CHECKED BY: P. JALALI 2023/05/22	APPROVED BY: A. ALIZADEH 2023/05/22
SCALE: 1:200	FULL SIZE ONLY

0 1 2 3 4 5 8m

ONETEAM ONTARIO LINE TECHNICAL ADVISOR

METROLINX

HDR

Infrastructure Ontario

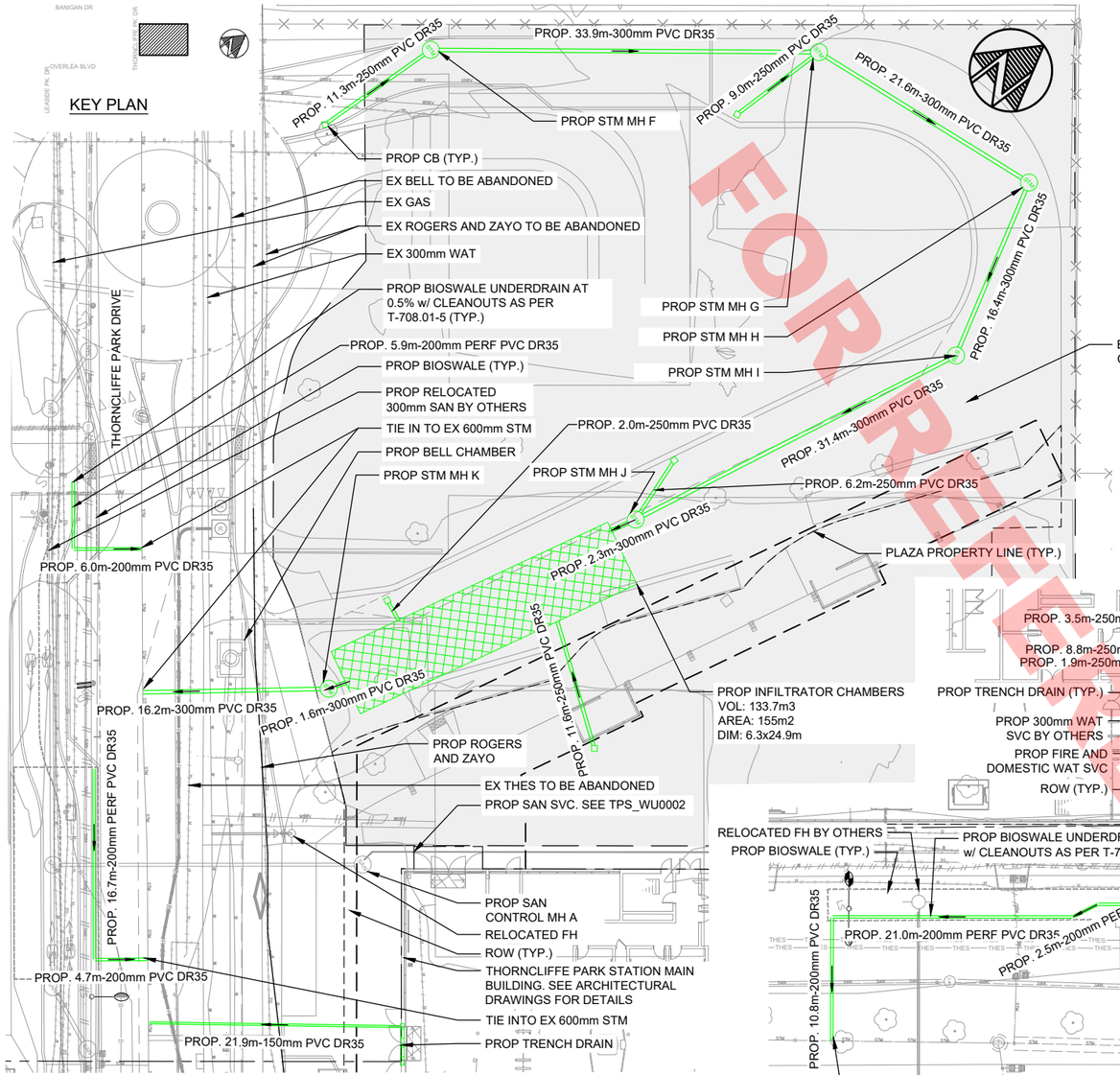
OVERLEA BOULEVARD MODIFICATIONS

DRY UTILITIES
PROPOSED COMPOSITE UTILITY PLAN
MSF

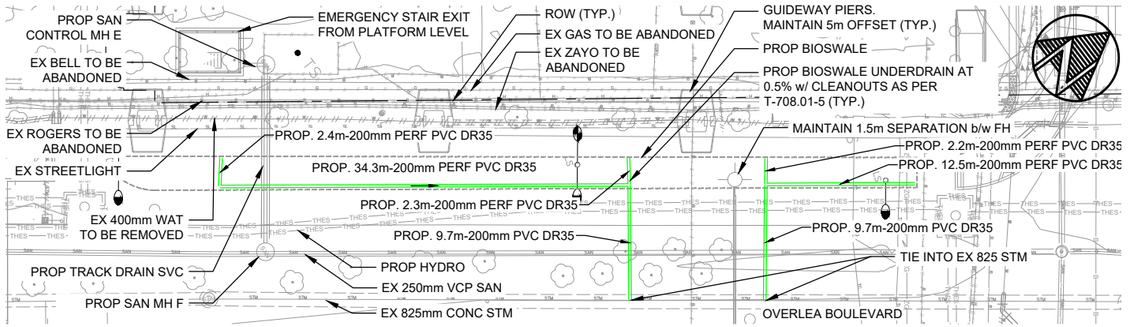
CONTRACT NO.	DWG. NO.	REV.	SHEET
RFP-2023-CCPC-426	OBM-U9012B	C	53

FILE: 11-obm-u9001.dwg
PLOTTED BY: GALLA, SOWJANYA
PLOT DATE: 2023-06-22

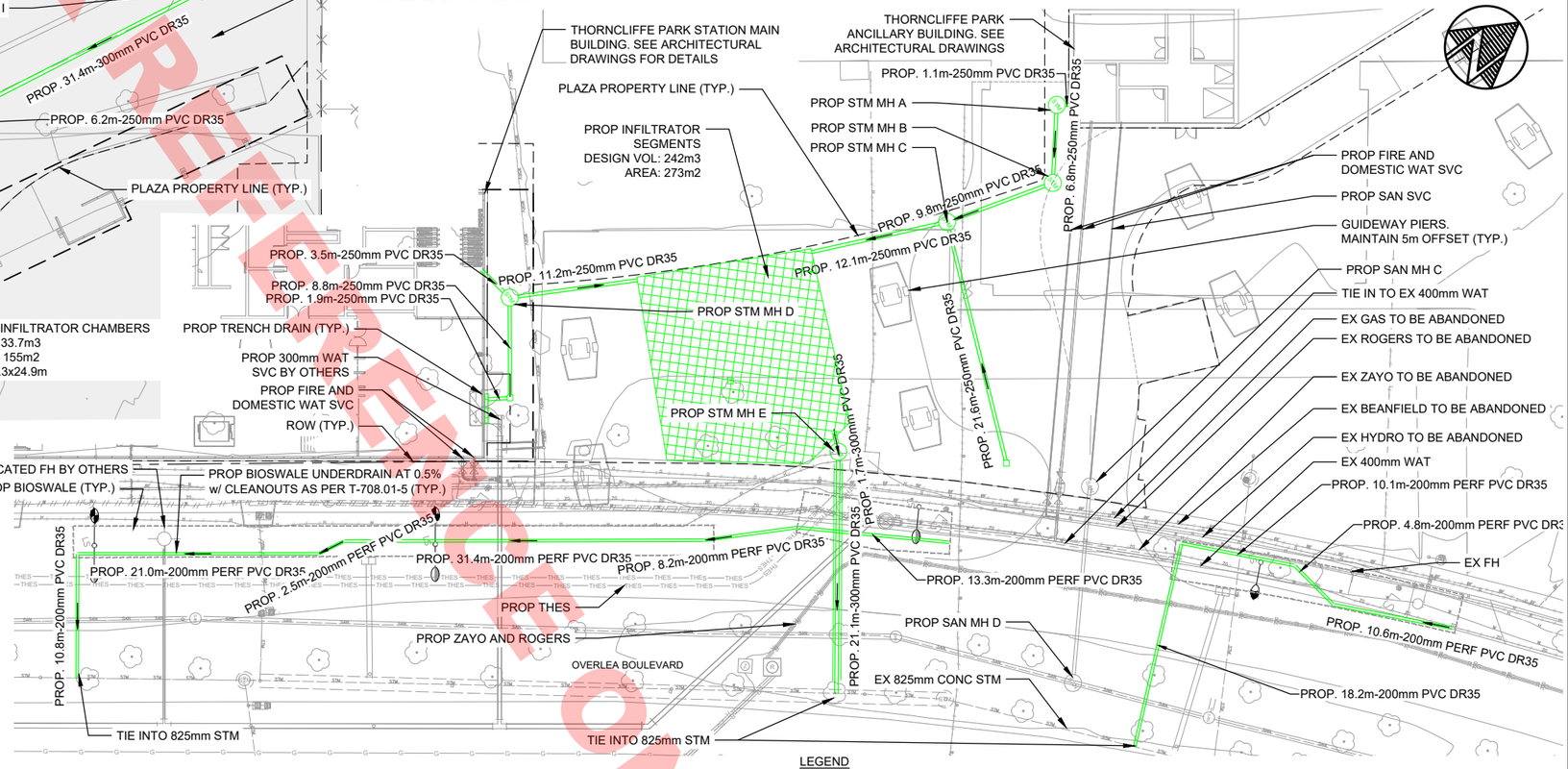
Appendix C. Proposed Thorncliffe Park Drive Bus Loop Design



STORM PLAN
1:250 (2)



STORM PLAN
1:250 (3)



STORM PLAN
1:250 (1)

GENERAL NOTES:

1. THIS PLAN PRESENTS A CONCEPT FOR SERVICING OF THE THORNCLIFFE PARK STATION FOR STORMWATER DISCHARGE.
2. INFORMATION FOR EXISTING SEWER AND WATERMAIN, INVERTS, ELEVATIONS / ALIGNMENT / SIZES, WHERE INDICATED, MAY NOT ACCURATELY REFLECT AS BUILT/ACTUAL SITE CONDITIONS AND IS BASED ON INTERPRETATION OF SUE PROVIDED BY PLANVIEW AND RECORD DRAWINGS OBTAINED FROM THE CITY. THESE CONCEPTUAL PLANS HAVE BEEN PREPARED WITHOUT THE BENEFIT OF A SURFACE UTILITY INVESTIGATION OR EXISTING UTILITY LOCATES. IT IS EXPECTED THAT THE PROPOSED SEWER AND WATERMAIN ALIGNMENTS AND DEPTH WILL BE ADJUSTED TO MITIGATE UTILITY CONFLICTS AND TO MINIMIZE THE RELOCATION OF EXISTING UTILITIES.
3. TOPO SHOWN IS PROVIDED BY TULLOCH ENGINEERING AS OF JUNE 2022.
4. PROPOSED PRIVATE UTILITY RELOCATIONS TO BE CONFIRMED WITH RESPECTIVE PRIVATE UTILITY COMPANIES. PROPOSED RELOCATION CONCEPTS TO BE PRESENTED TO PRIVATE UTILITY COMPANIES FOR APPROVAL AND FURTHER DEVELOPMENT OF DESIGNS.
5. LOCATION, SIZE AND CONFIGURATION OF PRIVATE UTILITIES TO BE PROVIDED BY RESPECTIVE UTILITY COMPANY, AND SUBMITTED FOR MUNICIPAL CONSENT REQUIREMENTS (MCR) APPROVAL TO THE CITY OF TORONTO.
6. PROPOSED DRY UTILITIES SHOWN ARE NOT FINAL LOCATIONS. FINAL LOCATIONS WILL BE DETAILED BY UTILITY COMPANIES.
7. ONLY UTILITY RELOCATIONS IN PHASE 2 ARE SHOWN IN COLOR. UTILITY RELOCATIONS DONE AS PARTS OF OTHER PACKAGES ARE SHOWN IN GREY.
8. ALL SERVICES CROSSING PHASE 1 HYDRO WILL REQUIRE CASING INSTALLED PRIOR TO HYDRO.
9. UTILITY ABANDONMENT/REMOVAL TO BE CONFIRMED PRIOR TO ABANDONMENT/REMOVAL.
10. ALL REMOVAL/ABANDONING OF DRY UTILITIES TO BE DONE BY OTHERS.

LEGEND

PROP SANITARY	EX BEANFIELD	PROP STORM MANHOLE
PROP STORM	EX ZAYO	EX STORM MANHOLE
PROP WATERMAIN	EX HYDRO	FIRE HYDRANT
EX SANITARY	EX STREETLIGHT	SANITARY MANHOLE
EX STORM	EX BELL	WATER VALVE
EX WATERMAIN	TO BE ABANDONED/REMOVED	BACKFLOW PREVENTER
EX GAS		WATER METER
EX ROGERS		

REVISIONS		REVISIONS	
1 - 2023-02-28 RCD -	4 - -		
- - -	5 - - -		
3 - - -	6 - - -		

RCD
NOT FOR CONSTRUCTION
28 FEBRUARY 2023

SCALE(S) 1:250 0 5 10m

STATUS

DESIGNED R.ZALAZAR
DRAWN M.GABLE
CHECKED Y.CHEANG
APPROVED R.ZALAZAR

ONTARIO LINE SUBWAY

TITLE
THORNCLIFFE PARK STATION
WET UTILITY DESIGN - STORM SERVICES PLAN AND PROFILE

Plot Date: 24 February 2023

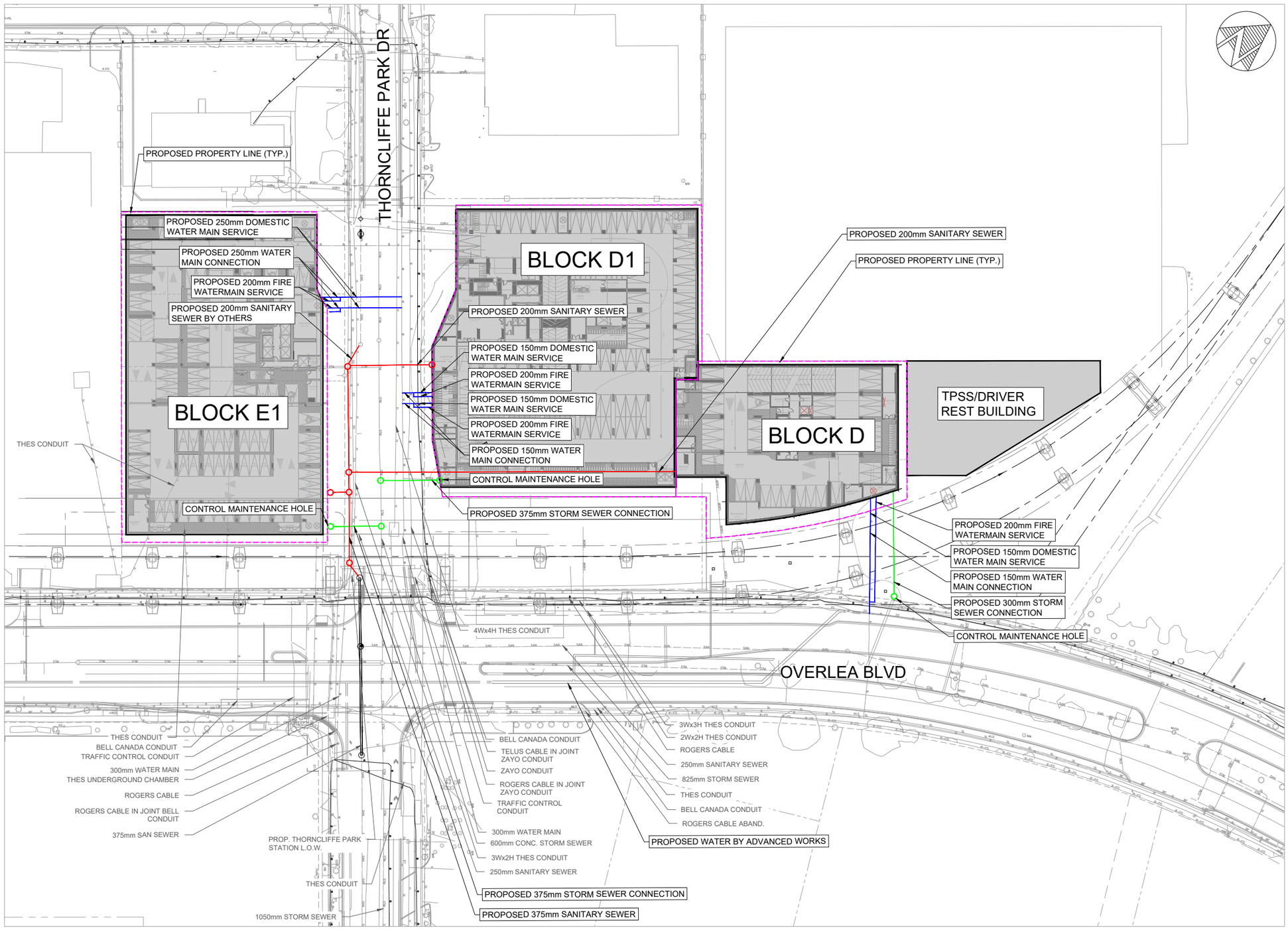
METROLINX Infrastructure Ontario

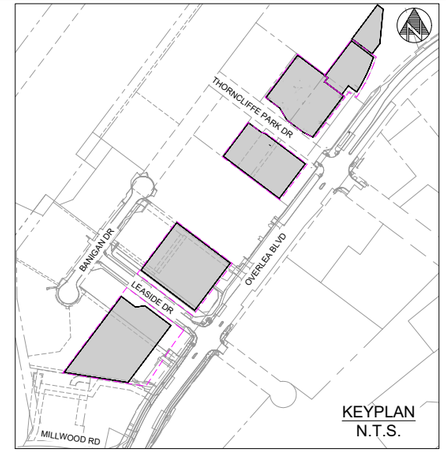
Dwg. No. TPS_WU0003

Sheet No.

FILE: tps_wu0003.dwg
PLOTTED BY: GABLE, MATT

Appendix D. Site Servicing Plan and Grading Plan





LEGEND

- PROPOSED STORM CONNECTION
- PROPOSED SANITARY CONNECTION
- PROPOSED WATER CONNECTION

NOTES:

1. EXISTING UTILITY INFORMATION SHOWN IS BASED ON SUBSURFACE UTILITY ENGINEERING (SUE) QL-B, QL-C AND QL-D. ALL LOCATIONS AND DEPTH ARE TO BE CONFIRMED BY THE CONTRACTOR PRIOR CONSTRUCTION.
2. FOR PROPOSED PUBLIC UTILITY RELOCATION WITHIN ROW, REFER TO CIVIL RELOCATION PLANS. DRY UTILITY RELOCATIONS TO BE CONFIRMED WITH PRIVATE UTILITY COMPANIES.
3. NOT ALL AERIAL UTILITIES HAVE BEEN IDENTIFIED OR SHOWN ON THIS PLAN.
4. FINAL SITE SERVICING WILL BE AS PER TOC DESIGN DEVELOPMENT

REVISIONS		REVISIONS	
1		4	
2		5	
3		6	

RCD
NOT FOR CONSTRUCTION
DD MONTH YYYY

SCALE(S) 1:500 0 10 20m

STATUS

DESIGNED T.KANG
DRAWN T.KANG
CHECKED H.ALKADHALLY
APPROVED J.SCHUMANN

ONTARIO LINE SUBWAY

TITLE THORNCLIFFE STATION TOC
SERVICING PLAN
SHEET 1 OF 2

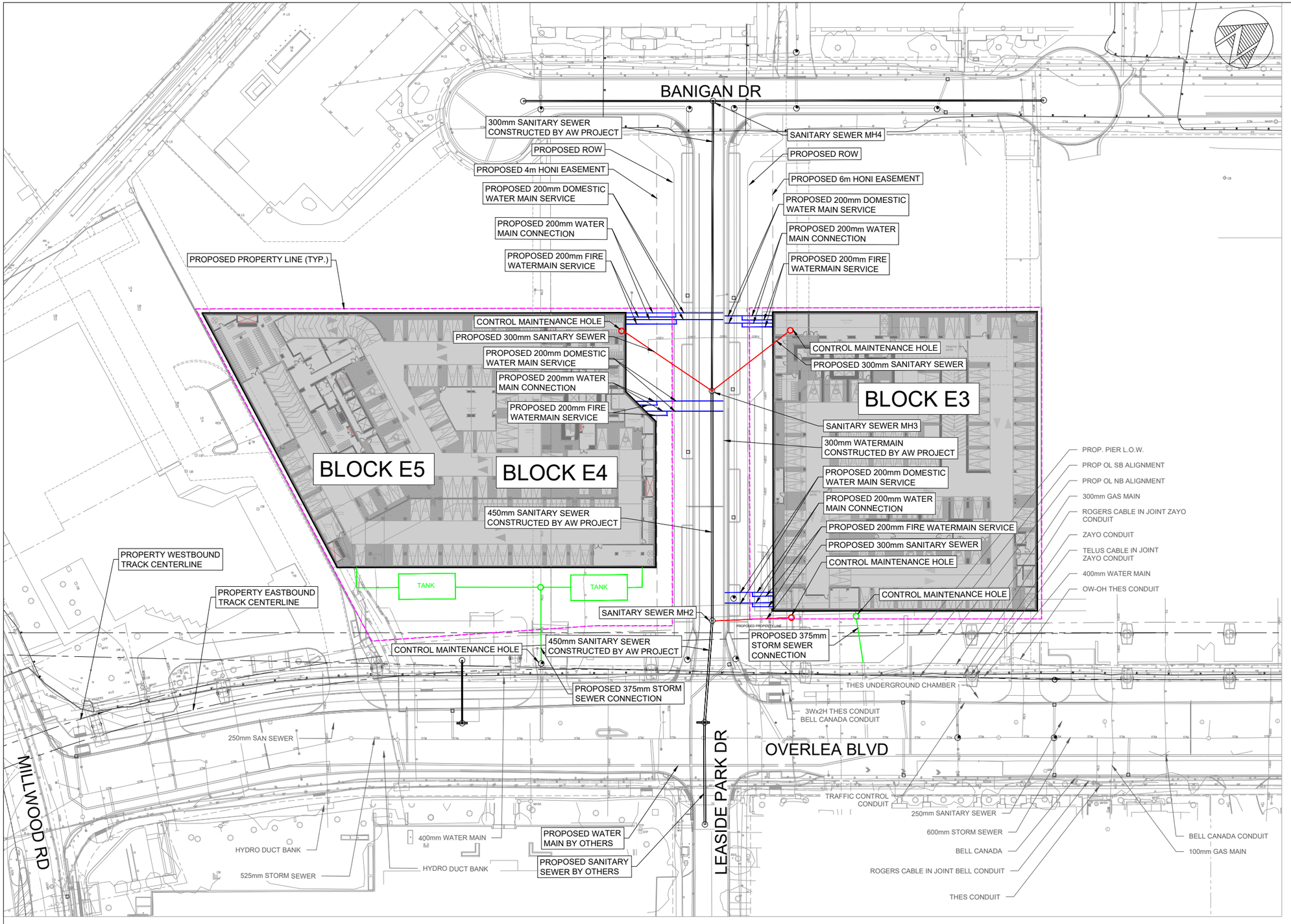
Plot Date: 1 September 2023

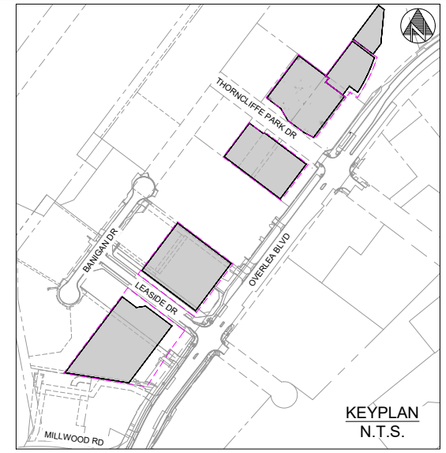
METROLINX
Infrastructure Ontario

Dwg. No. SS0500-05-SF001

Sheet No. 1

FILE: servicing plan-10206938-ss0500-05-sf001.dwg
PLOTTED BY: KANG, TIAN





LEGEND

- PROPOSED STORM CONNECTION
- PROPOSED SANITARY CONNECTION
- PROPOSED WATER CONNECTION

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1. EXISTING UTILITY INFORMATION SHOWN IS BASED ON SUBSURFACE UTILITY ENGINEERING (SUE) QL-B, QL-C AND QL-D. ALL LOCATIONS AND DEPTH ARE TO BE CONFIRMED BY THE CONTRACTOR PRIOR CONSTRUCTION.
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3. NOT ALL AERIAL UTILITIES HAVE BEEN IDENTIFIED OR SHOWN ON THIS PLAN.
4. FINAL SITE SERVICING WILL BE AS PER TOC DESIGN DEVELOPMENT

REVISIONS		REVISIONS	
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RCD
NOT FOR CONSTRUCTION
DD MONTH YYYY

SCALE(S) 1:500 0 10 20m

STATUS

HDR

ONE TEAM
ONTARIO LINE TECHNICAL ADVISOR

DESIGNED	T.KANG
DRAWN	T.KANG
CHECKED	H.ALKADHALLY
APPROVED	J.SCHUMANN

ONTARIO LINE SUBWAY

TITLE THORNCLIFFE STATION TOC
SERVICING PLAN
SHEET 2 OF 2

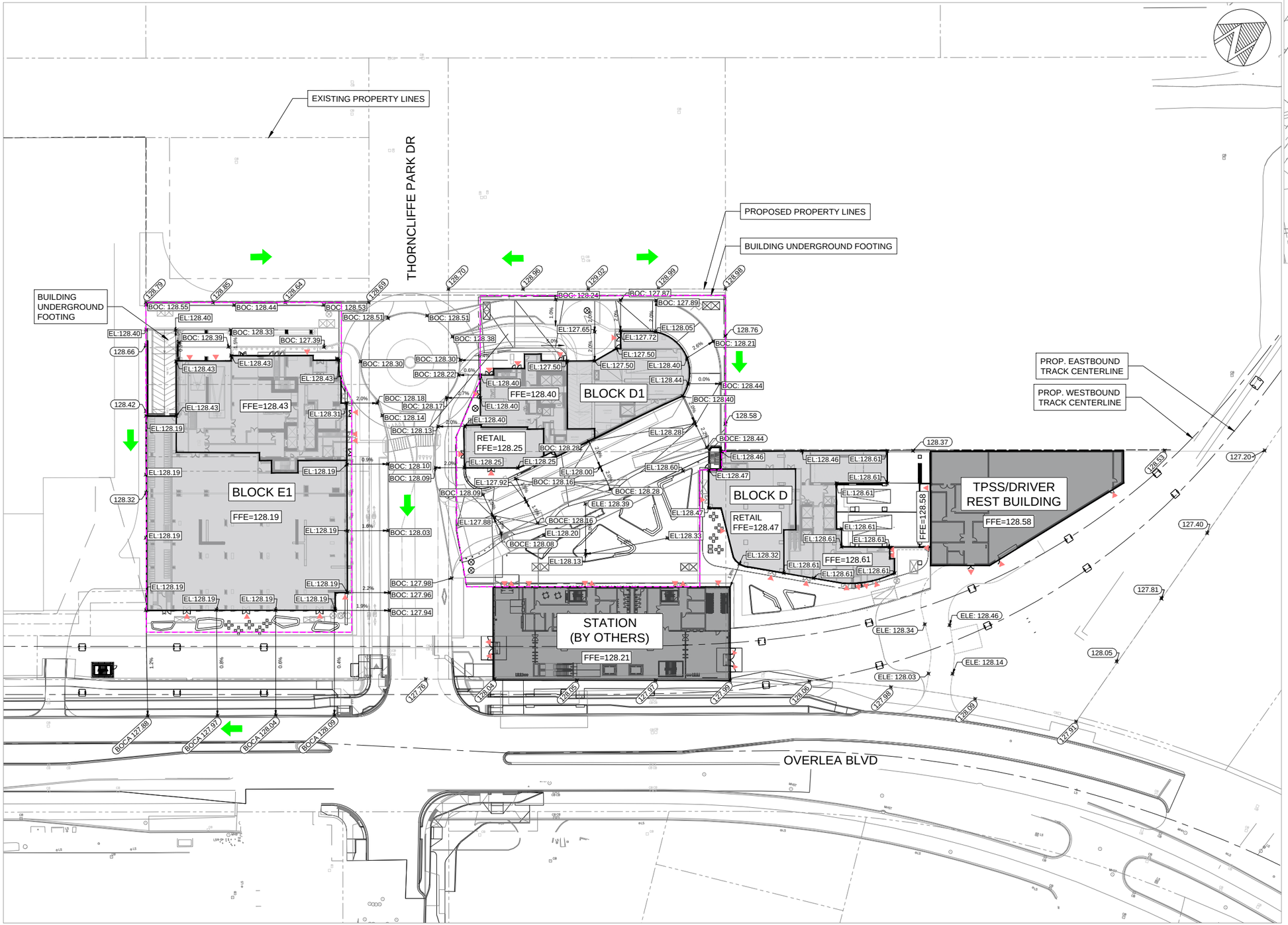
Plot Date: 1 September 2023

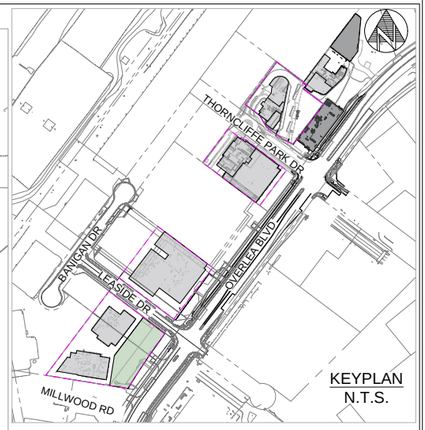
METROLINX
Infrastructure Ontario

Dwg. No. SS0500-05-SF001

Sheet No. 2

FILE: servicing plan-10206938-ss0500-05-sf001.dwg
PLOTTED BY: KANG, TIAN





LEGEND

ELE:89.66	EXISTING ELEVATION BASED ON ELEVATED GUIDEWAY AND STATIONS
BOCE:89.66	EXISTING BACK OF CURB BASED ON ELEVATED GUIDEWAY AND STATIONS
BOCA:89.66	EXISTING BACK OF CURB BASED ON ADVANCED WORK PLANS
89.66	EXISTING ELEVATION
EL:89.66	PROPOSED ELEVATION
BOC:89.66	PROPOSED BACK OF CURB
	GRADE BREAK
2.0%	GRADING SLOPE
	OVERLAND FLOW DIRECTION
	BUILDING ENTRANCE

NOTE

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

REVISIONS		REVISIONS	
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3		6	

RCD
NOT FOR CONSTRUCTION
DD MONTH YYYY

SCALE(S) 1:500 — 0 10 20m

STATUS

HDR

ONETEAM
ONTARIO LINE TECHNICAL ADVISOR

DESIGNED	T.KANG
DRAWN	T.KANG
CHECKED	H.ALKADHALLY
APPROVED	J.SCHUMANN

ONTARIO LINE SUBWAY

TITLE
THORNCLIFFE STATION
TOC
GRADING PLAN
SHEET 1 OF 2

Plot Date: 1 September 2023

METROLINX
Infrastructure Ontario

Dwg. No.	Sheet No.
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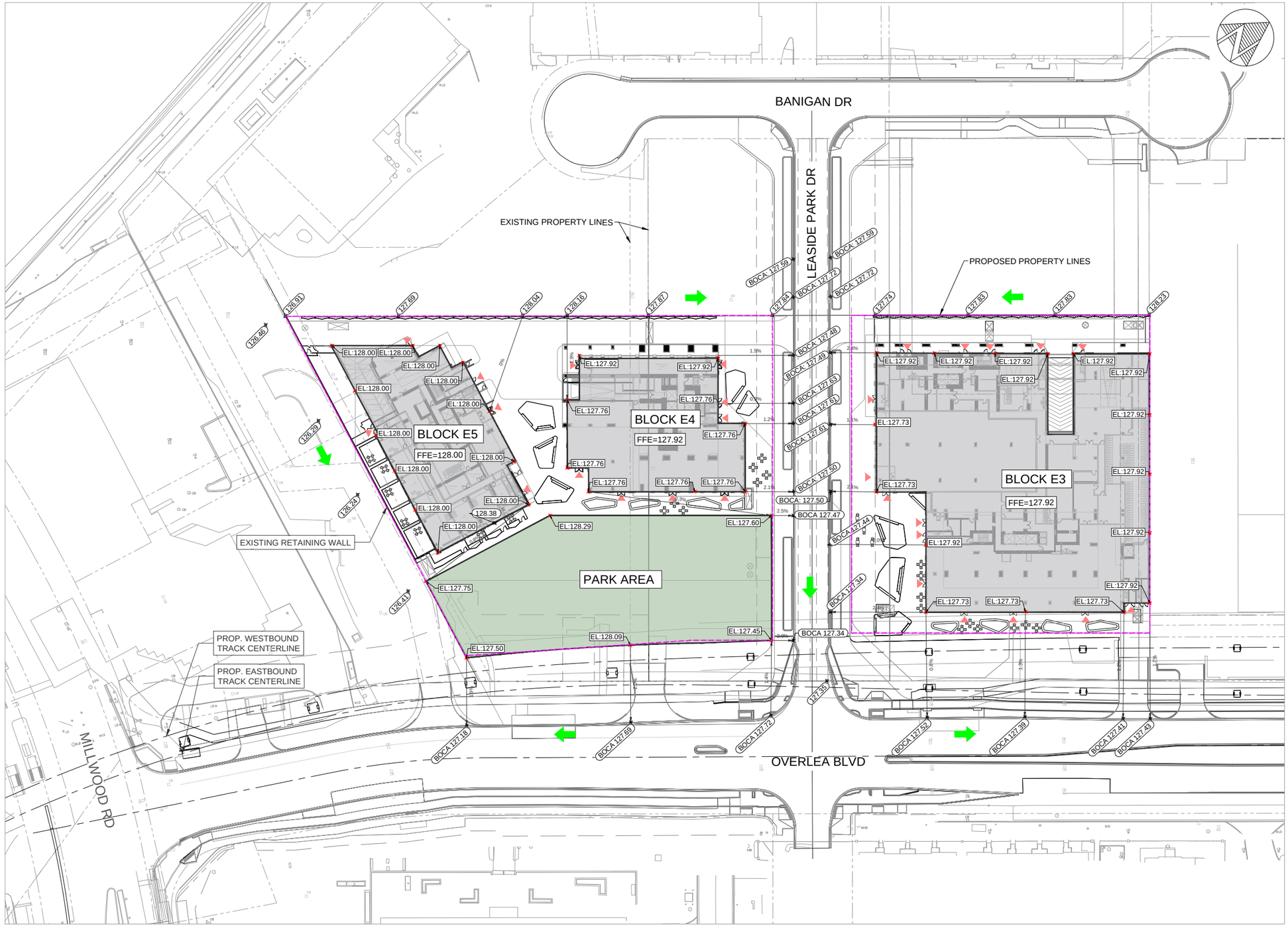
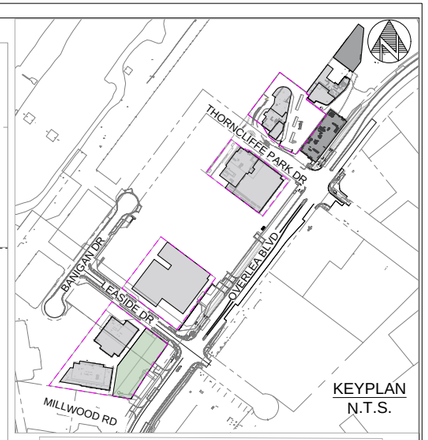
FILE: 10206938-gr0500-05-sf001.dwg
PLOTTED BY: KANG, TIAN





KEYPLAN
N.T.S.

LEGEND

ELE:89.66	EXISTING ELEVATION BASED ON ELEVATED GUIDEWAY AND STATIONS
BOCE:89.66	EXISTING BACK OF CURB BASED ON ELEVATED GUIDEWAY AND STATIONS
BOCA:89.66	EXISTING BACK OF CURB BASED ON ADVANCED WORK PLANS
89.66	EXISTING ELEVATION
EL:89.66	PROPOSED ELEVATION
BOC:89.66	PROPOSED BACK OF CURB
	GRADE BREAK
2.0%	GRADING SLOPE
	OVERLAND FLOW DIRECTION
	BUILDING ENTRANCE

NOTE

1. ALL GRADES WITHIN THE REGULATORY FLOOD PLAIN WILL BE MAINTAINED OR MATCHED.

2. THE EXISTING DRAINAGE PATTERN IN THE AREA OF THE SITE SHOULD BE MAINTAINED.

3. ALL DRAINAGE TO BE COLLECTED AND APPROPRIATELY CONTROLLED, TREATED, AND DISTRIBUTED AS PER CITY OF TORONTO STANDARDS.

4. CURRENTLY GRADING IS BASED ON LIDAR SURVEY. GRADES TO BE CONFIRMED WITH DETAIL SURVEY. GRADING TO FOLLOW CITY OF TORONTO STANDARDS.

5. FINAL SITE GRADING WILL BE AS PER TOC DESIGN DEVELOPMENT.

6. FIRST FLOOR ELEVATIONS (FFE) ARE SHOWN BASED ON CURRENT INFORMATION IN THE ARCHITECTURAL DRAWINGS. FFE SHOULD BE CONFIRMED DURING DETAILED DESIGN.

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NOT FOR CONSTRUCTION
DD MONTH YYYY

SCALE(S) 1:500 0 10 20m

STATUS

ONE TEAM
ONTARIO LINE TECHNICAL ADVISOR

DESIGNED T.KANG
DRAWN T.KANG
CHECKED H.ALKADHALLY
APPROVED J.SCHUMANN

ONTARIO LINE SUBWAY

TITLE THORNCLIFFE STATION TOC
GRADING PLAN
SHEET 2 OF 2

Plot Date: 1 September 2023

METROLINX
Infrastructure Ontario

Dwg. No. GR0500-05-SF001

Sheet No. 2

FILE: 10206938-gr0500-05-sf001.dwg
PLOTTED BY: KANG, TIAN

Appendix E. Overlea Blvd Advanced Works Sewer Capacity Analysis Report for Temporary Construction Dewatering

Ontario Line – Overlea Blvd Advanced Works

Sewer Capacity Analysis Report for Temporary Construction Dewatering

Ontario Line Technical Advisor

TORONTO, ONTARIO

June 23, 2023

Neda Fotouhi, P.Eng.: Water Resources Engineer
Jasmin Sidhu, P.Eng.: Water Resources Engineer
Dave Eadie, P.Eng.: Senior Water Resources Engineer

Disclaimer

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In preparing this report, OLTA relied, in whole or in part, on data and information provided by the Client and third parties that was current at the time of such usage, which information has not been independently verified by OLTA and which OLTA has assumed to be accurate, complete, reliable, and current. Therefore, while OLTA has utilized its best efforts in preparing this report, OLTA does not warrant or guarantee the conclusions set forth in this report which are dependent or based upon data, information or statements supplied by third parties or the client, or that the data and information have not changed since being provided in the report. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that OLTA shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party resulting from decisions made or actions taken based on this document.

Contents

Tables

Figures

Appendices

Abbreviations

BMP	Best Management Practice
BFPP	Basement Flooding Protection Program
CP	Canadian Pacific
CoT	City of Toronto
DFO	Fisheries and Ocean Canada
DRM	Design Requirements Manual
DWF	Dry Weather Flow
GIS	Geographic Information System
GWI	Groundwater Infiltration
HGL	Hydraulic Grade Line
HGRA	High Volume Groundwater Recharge Areas
IBC	Initial Business Case
IDF	Intensity-Duration-Frequency
IO	Infrastructure Ontario
LID	Low Impact Development
MECP	Ministry of the Environment, Conservation and Parks
MNRF	Ministry of Natural Resources and Forestry
MTO	Ministry of Transportation Ontario
OGS	Oil and Grit Separator
OMSF	Operations, Maintenance and Storage Facility
OL	Ontario Line
OLTA	Ontario Line Technical Adviser
PCo	Project Consultant
PLA	Permit, License and Approval
RCD	Reference Concept Design
RDII	Rainfall Derived Infiltration and Inflow
RSSOM	Rolling Stock, Systems, Operations and Maintenance
SCA	Sewer Capacity Analysis
SWM	Stormwater Management
TGS	Toronto Green Standard
TSS	Total Suspended Solids
TRCA	Toronto and Region Conservation Authority
WWF	Wet Weather Flow
WWFMG	Wet Weather Flow Management Guidelines

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1 Introduction

1.1 Overview and Purpose

Ontario Line Technical Adviser (OLTA) was retained by Metrolinx (MX), an agency of the Province of Ontario, to complete a Sewer Capacity Analysis (SCA) Report as part of the Sewer Discharge Approval (SDA) process for the Overlea Boulevard (Blvd) Advanced Works (AW) of the Ontario Line Project (the Project). The Ontario Line (OL) is a proposed 15.5 km rapid transit line from Exhibition Station to the Ontario Science Centre (Don Mills and Eglinton), through the downtown, east and north areas of Toronto as shown on **Figure 1.1**. The project is in the City of Toronto, Ontario, and forms part of the 2041 Regional Transportation Plan. Overlea AW are located within the elevated segment in the Thorncliffe Park area.

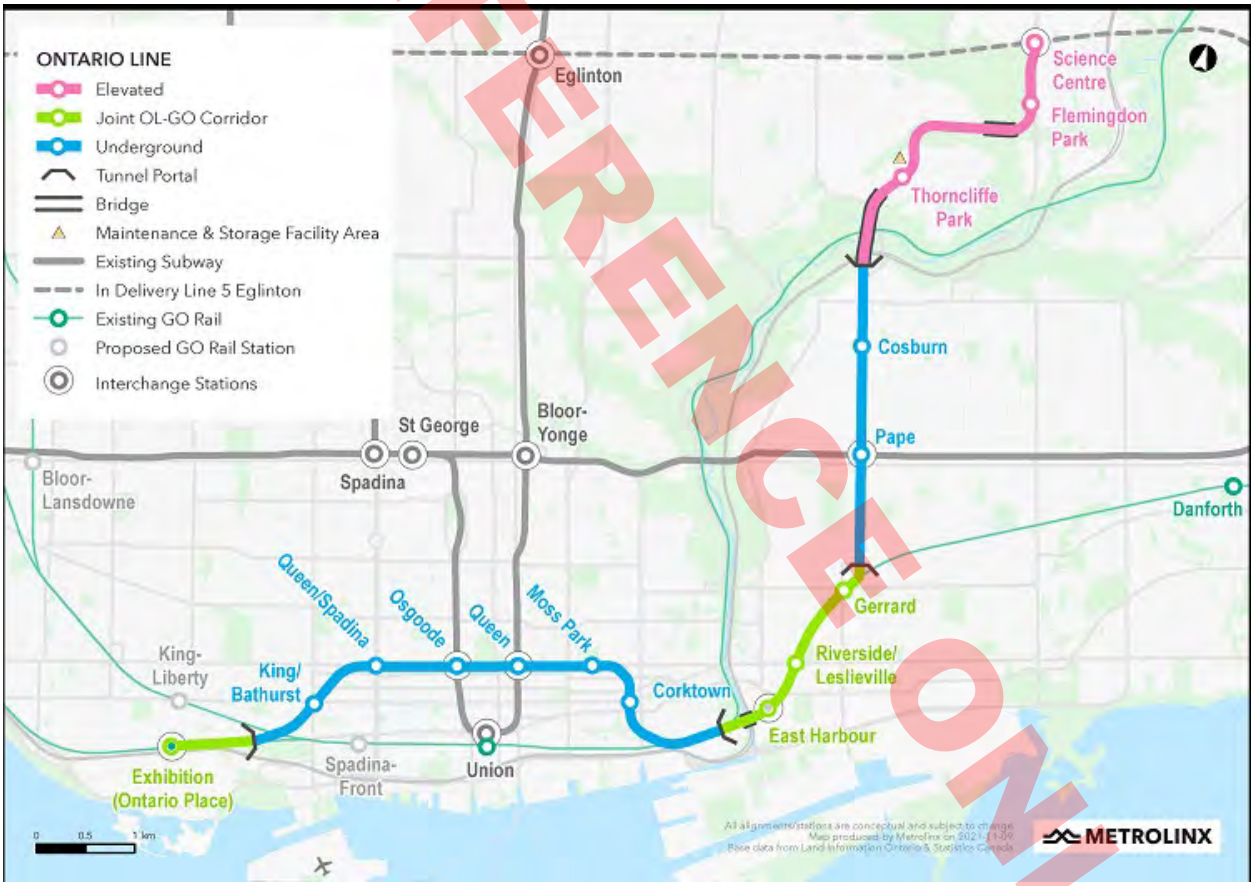


Figure 1.1 Ontario Line Segments

Metrolinx has commenced a Permit, License and Approval (PLA) enhancement initiative in collaboration with the City of Toronto (CoT). The PLA enhancement initiative is intended to minimize PLA risk and deliver on the provincial mandate to build transit projects faster. One identified

opportunity is the concept of a 2-stage SDA, which could de-risk this key permit for Project Consultant (PCo) and improve process efficiencies to the benefit of the CoT by shifting the preparation and review of certain technical information to an earlier project phase. The approach would entail MX initiating the application process based on preliminary investigations in order to achieve certainty prior to contract award that there is a feasible and cost-effective approach to temporary sewer discharge and to expedite a subsequent SDA application by PCo. This SCA Report represents Stage 1 of the PLA process for the Overlea Blvd AW.

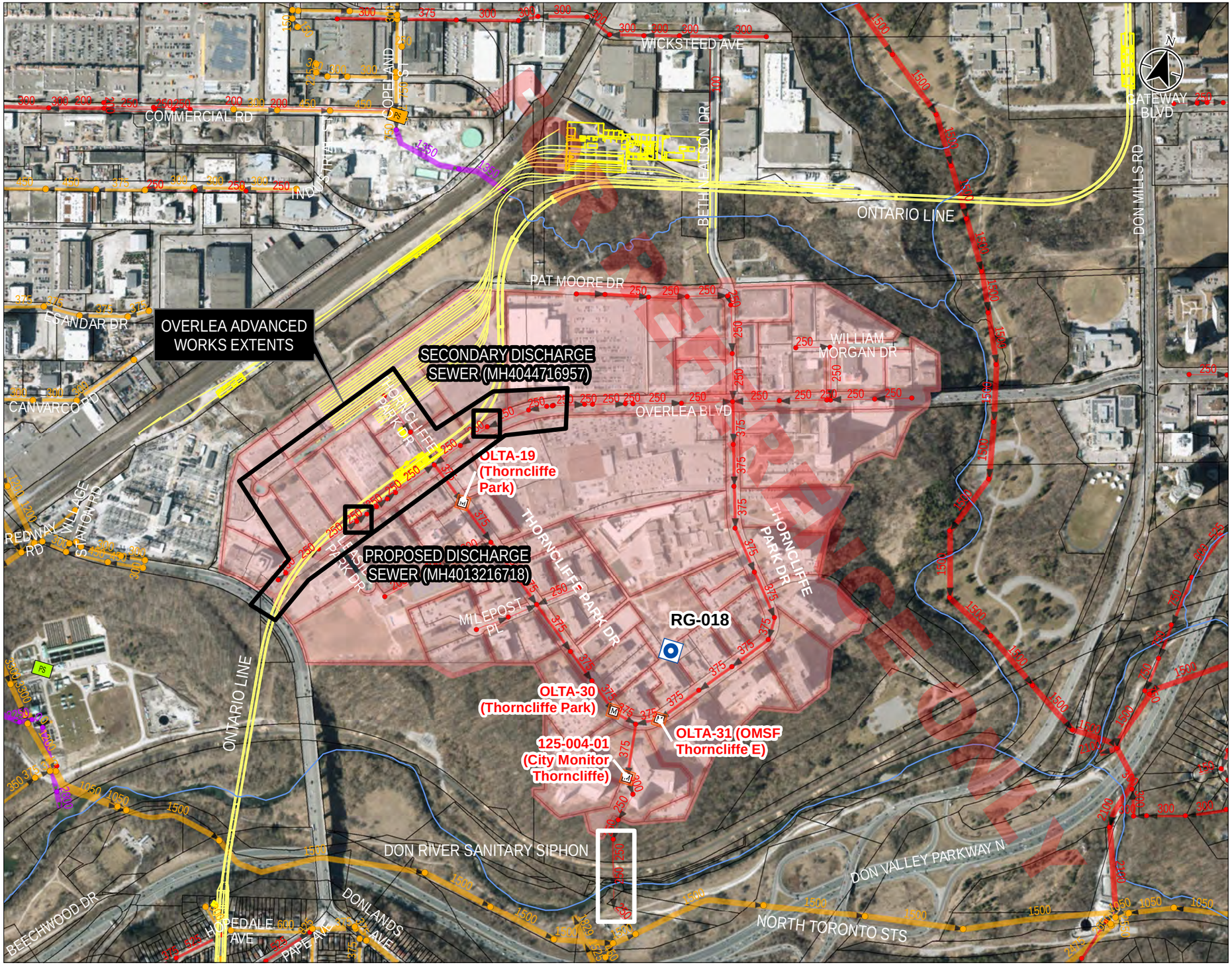
1.2 Background Review

As part of the background investigation, the following documents were reviewed. In this report, they are referred to by the abbreviated names given in brackets after the report details. Additional site-specific documents reviewed during the preparation of this report are noted in subsequent sections.

- Thurber Engineering Ltd, October 27, 2022. Draft Don Mills and Overlea Blvd AW Hydrogeological Data, [Hydrogeological Report];
- City of Toronto Sewer Use Permit or Discharge Agreement Application Checklist; City of Toronto, December 2, 2020;
- Proposed Process for Review and Issuance of 2-stage Sewer Discharge Approvals for Transit Projects in the City of Toronto, Metrolinx, November 29, 2021;
- Linear Segments Work Plan; Ontario Line Technical Advisors, March 2020 [Work Plan];
- Toronto Municipal Code Chapter 681, Sewers, City of Toronto. March 28, 2019 [Toronto Sewer By-Law];
- City of Toronto. January 2021. Design Criteria for Sewers and Watermains. Second Edition. [Toronto Sewer Guidelines];
- City of Toronto. June 2021. Sewer Capacity Assessment Guidelines. [Capacity Guidelines]
- City of Toronto. July 2020. InfoWorks Basement Flooding Model Studies Guideline. Version 5 [Model Guidelines];
- City of Toronto. 2006. Wet Weather Flow Management Guidelines. [WWFMG].

1.3 Study Area Overview

The study area focus is the Overlea AW site located within the elevated / surface segment of the OL with extents presented in Figure 1.2, which indicates the drainage areas, sanitary sewer system, connection to the trunk, and the location of the sewer flow monitors. AW requires relocation of utilities including a watermain in conflict with the proposed piers along the west side of Overlea Blvd, as well as the realignment of the Overlea Blvd roadway and construction of the new connector between Banigan Dr and Overlea Blvd, New City St. The sanitary sewer is not proposed to be relocated in AW. The dewatering activities are assumed to discharge to MH4013216718 on Overlea Blvd west of Leaside Park Dr. A secondary receiving sewer has been considered at MH4044716957 on Overlea, 123m east of Thorncliffe Park Dr.



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METROLINX | Infrastructure Ontario

Legend

- Ontario Line
- Sanitary Flow Monitor
- Subcatchments
- City Rain Gauge

Maintenance Holes

- Combined
- Sanitary
- SCSO
- Storm

Pump Station

- COMB
- SAN
- SCSO
- STM

TWAG Sewers

Combined

- <=250mm
- 275-900mm
- >900mm

Sanitary

- <=250mm
- 275-900mm
- >900mm

SCSO

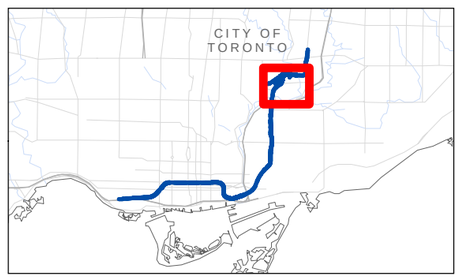
- <=250mm
- 275-900mm
- >900mm

0 220 440 m

1:7,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 CSRS MTM 10
2. Contains information made available under the Toronto and Region Conservation Authority Open Data Licence v 1.0, Open Government Licence – Toronto, and Open Government Licence – Ontario.



Project Location
City of Toronto

160560009 REVA
Prepared by KB on 2022-11-10

Client/Project
METROLINX
ONTARIO LINE TECHNICAL ADVISOR
-

Figure No.
1.2

Title
Overlea AW Sanitary Capacity Analysis Extents

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2 Water Discharge Plan

2.1 Required Information

PCo needs to utilize the following Stage 1 information in order to obtain the final approval:

- Discharge rates:
  - Maximum flow rate of peak discharge
  - Maximum hours of discharge per day
  - Maximum total discharge volume per day
- Proposed discharge point location(s) - multiple locations may need to be identified depending on the project footprint to provide options/flexibility for construction. In Stage 2, the contractor must identify the precise private water discharge point location into the existing municipal sewer;
- A sewer capacity analysis for each identified receiving municipal sewer, indicating that there is capacity for the proposed discharge. The sewer capacity analysis must be prepared in accordance with the City's Sewer Capacity Assessment Guidelines (City of Toronto, July 2021);
- Water quality analyses indicating that water quality meets criteria within the Sewer Use By-law, otherwise an indication that treatment options will be implemented by the contractor. It is understood that water quality data is typically valid for 9 months, but the contractor will be required to submit additional sampling results if requested by CoT during the Stage 1 review; and
- Discharge duration (start and end dates).

2.1 Construction Dewatering Rate

From the draft Hydrogeological data provided (Thurber, October 27, 2022), the estimated groundwater dewatering rate includes a factor of safety of 3.0 and surface water dewatering assumes 50 mm of rainfall over open excavations must be dewatered within 24 hours. **Table 2-1** presents the construction dewatering rate estimate.

Table 2-1 Construction Dewatering Rate Estimate

Utility Relocates	Base Groundwater Flow (without safety factor)	Peak Groundwater Flow (3 x Base Groundwater)	Perched Water in Fill Allowance	Stormwater Component[1]	Peak Total Discharge Value[2]
Storm Sewer (includes adjacent maintenance hole)	14,000 L/day	42,000 L/day	30,000 L/day	10,000 L/day	82,000 L/day
Watermain (includes adjacent maintenance hole)	12,000 L/day	36,000 L/day	30,000 L/day	10,000 L/day	76,000 L/day
Toronto Hydro Duct (including adjacent maintenance hole)	14,000 L/day	42,000 L/day	30,000 L/day	10,000 L/day	82,000 L/day
Totals	40,000 L/day	120,000 L/day	90,000 L/day	30,000 L/day	240,000 L/day
	0.5 L/s	1.4 L/s	1.0 L/s	0.3 L/s	2.8 L/s

1. Removal of 50 mm of rainfall in 24-hrs, assuming open excavation areas as indicated
2. Peak Groundwater Flow + Perched Fill + Stormwater Component

The peak groundwater flow rate estimate is 120,000 L/day assuming construction occurring simultaneously for each utility; however, the typical groundwater flow rate is expected to be much lower than the peak. Nonetheless, the capacity evaluation assumes the three times peaking factor is applied. The Hydrogeological Report also denotes that the pumping of 50 mm of rainfall over 24 hours would add another 30,000 L/day, based on the assumed excavation footprints of the relocated utilities, and another 90,000 L/day is assumed to be dewatered from the fill. It is assumed that all excavation will be open cut in sections of 50 m with a maximum width of 4 m and will extend into the Till material.

It is not intended for the contractor to perform bulk excavation or dewatering while it is raining; however, to be conservative the sum of the peak groundwater discharge estimate including the wet weather allowance of 240,000 L/day, or 2.8 L/s, has been applied to the capacity assessment.

A Category 3 Permit to Take Water (PTTW) is not required since water taking rate is less than the 400,000 L/d limit.

2.2 Groundwater Quality

Groundwater quality samples were collected from 5 monitoring wells along the alignment and near the AW construction limits for analysis, with the results compared to Toronto Sewer Bylaw for Sanitary/Combined Sewers and for Storm Sewer discharge. The Certificates of Analysis take precedence in the case of any discrepancies, but for convenience, **Table 2-2** summarizes the exceedances of the sanitary/combined sewer limits out of 7 samples included in the draft Hydrogeological Report.

Table 2-2 Water Quality

Parameter	Number of Limit Exceedances out of 7 Samples	
	Sanitary/Combined Sewer	Storm Sewer
Total Suspended Solids (TSS)	2	5
Manganese	0	4
Phosphorus	0	0
Zinc	0	0
Biochemical Oxygen Demand (BOD)	0	1

The quality of water to be discharged to the sanitary must meet the City's discharge requirements of the Municipal Code Chapter 681-Sewers. These results indicate the need for quality treatment for TSS before discharging into the municipal sanitary sewer, and discharge should only be proposed to the sanitary sewer.

Water quality observed during construction will vary from the results presented herein, and the extent of suspended solids in the groundwater or in water that is collected during construction dewatering (such as a sump in an open excavation) will significantly affect the concentrations of many parameters that may be regulated based on discharge location. As such, an experienced dewatering and water treatment contractor is recommended, along with implementation of a Monitoring and Contingency Plan to ensure compliance metrics are met, and that appropriate action, reporting and mitigations measures are enacted should results exceed the quality limits. Refer to the Hydrogeological Report for details.

3 Flow Monitoring Data Analysis

3.1 Overview

A flow monitoring program was initiated in the sewer system in February 2021 to provide supporting information for assessing sewer capacity and allowable dewatering rates during construction. The plan was conceptualized in October 2020 in consultation with Toronto Water, with proposed intention and initial monitoring sites shared with the CoT at a meeting held on December 3, 2020 for confirmation. The final sites were identified in the field and a shapefile of locations provided to Toronto Water on May 3, 2021. Additionally, CoT maintains a flow monitoring program with strategic monitors and rain gauges located throughout the City.

Data from the flow monitor OLTA-19 on Thorncliffe Park Drive (MH4029616953) and from CoT monitor 125-004-01 (MH3988917405) was used for this assessment. The sites provide coverage of the Thorncliffe area sanitary system, as shown in **Figure 1.2** and summarized in **Table 3-1**.

Table 3-1 Flow Monitoring Location Characteristics

Site Name	Street	Structure ID (Pipe ID)	Type	Location in MH	Pipe Diameter	Rain Gauge ID	Installed
OLTA-19	12 Thorncliffe Park Dr	MH4029616953 (SL3004268)	A/V	Inlet	375 mm	RG-018	Feb. 2021
125-004-01	47 Thorncliffe Park Dr	MH3988917405 (SL3002889)	A/V	Inlet	375 mm	RG-018	Aug. 2020
A/V = Area-Velocity Meter							

Monitor OLTA-19 is located on the west branch of Thorncliffe Park Drive upstream of 125-004-01 which is located downstream of the confluence of the east and west branches of Thorncliffe Park Dr, in the sewer that leads down into the valley. The sites observed free flow conditions with generally good data quality during dry and wet weather (DWF) periods, with the pipes never reaching surcharge conditions even in wet weather flow (WWF) conditions. The data is of sufficient coverage and quality to derive typical DWF and rainfall derived inflow and infiltration (RDII) response characteristics for the separated sewer system.

3.2 Rainfall Data Analysis

The collected rainfall data was analytically processed to establish the dry weather days from those with rain, and to characterize each rainfall event by duration, depth of rainfall, and intensity of the storm. Because sewer capacity is primarily dependent on how fast a given amount of rain falls on the sewer shed, a variety of rainfall events are sought to best inform the range of durations of wet weather flow to be expected. Rainfall data in 5-min time steps was obtained from the CoT nearby rain gauge RG-018, located immediately within the Thorncliffe sewer shed at the Thorncliffe Library (48 Thorncliffe Park Dr).

As per the CoT protocol (July 2021), the objective is to capture at least two rainfall events equal to or exceeding 20 mm of rainfall depth over less than 24 hours. Rain events with greater than 20 mm in a

24-hr period were recorded on March 25, June 25, June 29, July 8, September 7, and September 22, 2021. **Table 3-2** summarizes rainfall events greater than 5 mm captured in 2021.

Table 3-2 Significant 2021 Rainfall Characteristics at RG-018

Event Date	Duration (hr)	Total Rain (mm)	Peak Intensity (mm/hr)	Return Period
February 27, 2021	5.0	7.0	6.0	<2-yr
March 25, 2021	11.8	29.7	20.4	<2-yr
March 28, 2021	6.1	10.0	5.6	<2-yr
April 11, 2021	5.3	13.6	13.4	<2-yr
April 12, 2021	8.7	8.4	3.2	<2-yr
April 28, 2021	2.2	5.6	22.6	<2-yr
April 29, 2021	7.7	6.5	3.9	<2-yr
May 28, 2021	9.3	11.6	3.1	<2-yr
June 2, 2021	10.4	8.8	4.5	<2-yr
June 8, 2021	7.1	12.7	33.5	<2-yr
June 14, 2021	6.3	5.3	33.9	<2-yr
June 18, 2021	7.0	8.8	10.9	<2-yr
June 25, 2021	14.3	20.5	18.5	<2-yr
June 29, 2021	7.2	21.1	56.6	<2-yr
July 2, 2021	1.6	11.0	54.9	<2-yr
July 8, 2021	8.1	29.5	39.0	<2-yr
July 15, 2021	2.8	16.9	39.6	<2-yr
July 24, 2021	6.7	8.3	21.7	<2-yr
July 27, 2021	3.5	6.0	15.2	<2-yr
July 29, 2021	4.9	13.0	8.1	<2-yr
September 4, 2021	3.1	10.4	18.6	<2-yr
September 7, 2021	10.8	48.8	82.7	2 to 5-yr
September 14, 2021	1.1	18.7	44.2	<2-yr
September 21-22, 2021	37.7	57.0	13.1	2 to 5-yr
October 3, 2021	14.2	7.6	8.1	<2-yr
October 3-4, 2021	27.3	8.6	5.5	<2-yr
October 10, 2021	1.4	11.2	47.7	<2-yr
October 15, 2021	15.0	19.2	24.7	<2-yr
October 24-25, 2021	41.5	27.5	8.8	<2-yr
October 29-30, 2021	32.1	43.2	6.8	<2-yr

a. Duplicate dates indicate multiple storm events, based on definition of an event and inter-event time
b. Highlighted values were selected for WWF analysis, see Appendix A
c. Precipitation values in February and March may contain influence of snowmelt

The maximum rainfall depth captured during the monitoring period is ~57 mm. The peak 5-min intensity between storms varies, offering a range of long duration, low intensity versus short duration, high intensity characteristics.

Events with a duration greater than 24 hours are multi-peak and do not contain a lapse in rainfall of 12 hours or more. **Figure 3.1** presents the intensity-duration-frequency (IDF) curves for the two events categorized as a 2 to 5-year storm return period.

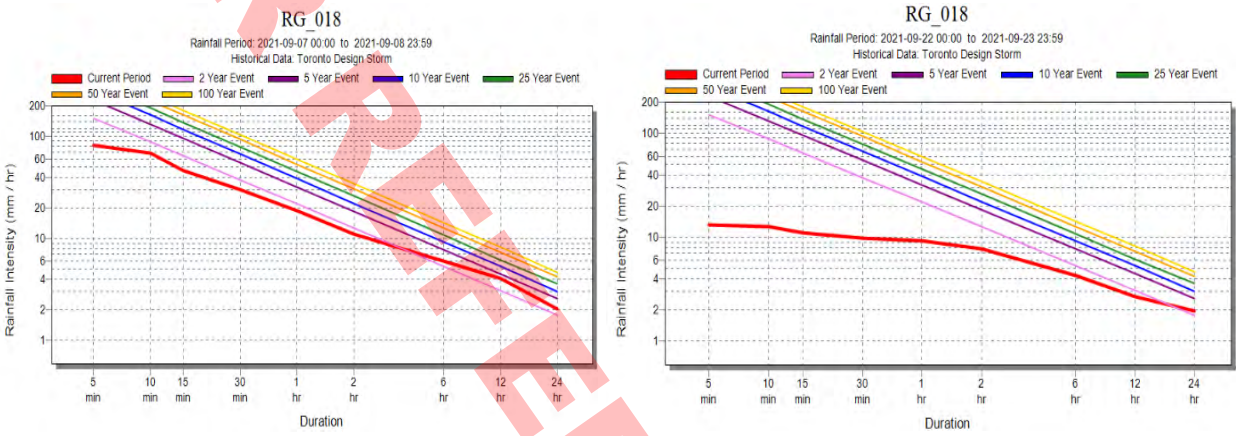


Figure 3.1 IDF Curve for Sept. 7 and 14th, 2021 Events

3.3 Dry Weather Flow Summary

The data analysis involved the use of software that was specifically designed for flow monitoring data collection, management, raw data processing, and analytical evaluation. An analysis was completed using population and sewershed area information, precipitation data, and depth-velocity monitoring results, considering the following:

- Scatterplot: A scatterplot was used to assess the data quality of the flow monitor by plotting each individual depth and velocity measurement independent of time on a single graph. Theoretically, the relationship should be consistent, thus when it is not, additional information about system performance can often be revealed based on the observations.
- Average Dry Weather Flow: The observed average dry weather flow pattern was developed from selecting dry days considered as those with less than 2.54 mm of rain. Per capita rates were computed based on estimated tributary population

Table 3-3 presents a summary of DWF characteristics, which consist of observed values averaged over multiple periods of four to five consecutive dry days. Also presented is the resulting per capita rate which is based on the average daily sewage flow alone, excluding the dry weather groundwater infiltration (GWI) (i.e., base flow, which was calculated using the Stevens-Schutzbach method). The DWF characteristics and diurnal pattern characterized in this section will help to differentiate normal dry weather flow from infiltration and inflow during wet weather events and establish RDII values, which will be outlined in the next section.

Table 3-3 DWF Summary

Monitor	Tributary Area (ha)	Population	Average DWF (L/s)	Peak DWF (L/s)	Minimum DWF (L/s)	Peaking Factor	Groundwater Infiltration (L/s/ha)	Avg. Wastewater Per Capita Rate (L/c/d)
OLTA-19	6.56	1,924	4.0	5.1	2.0	1.3	0.257	109
125-004-01	34.93	23,480	49.9	63.5	24.7	1.3	0.389	140

Dry weather flow is low, as expected based on the tributary drainage area comprising a mix of industrial-commercial usage and high-rise multi-family residential buildings. The resulting per capita rates are representative of the land use. Groundwater infiltration is relatively high in the area. This evaluation is used to interpret the relative flow characteristics, and potential for use in model calibration. The data quality for the main monitor 125-004-01 is of good quality for use in model calibration, as is OLTA-19 for the smaller western branch of sewer.

3.4 Wet Weather Flow Summary

For the purposes of relative evaluation, a process of hydrograph separation was applied by removing the average DWF that occurred on/around the day of an event from the total flow to generate the key wet weather flow characteristics. An estimate of the tributary area was established from available GIS data making broad assumptions on building connectivity, to generate a normalized RDII rate for reference purposes, and to help select adequate events for use in model calibration. Based on the available rainfall data, six significant events were selected for analysis. **Table 3-4** presents a summary of the wet weather flow analysis.

Table 3-4 WWF Analysis Summary

Flow Monitor	# of Rainfall Events > 5mm	# of Rainfall Events > 20mm	Max 24-hr Rainfall (mm)	Peak Intensity (mm/hr)	Peak WWF (L/s)	Peak Inst. RDII (L/s)	Peak Inst. RDII Rate (L/s/ha)
OLTA-19	30	6	57.0	82.7	10.0	7.6	1.14
125-004-01					114.2	61.8	1.76

The calculated WWF values are presented in **Table 3-5.**

Table 3-5 Significant Event WWF Summary

Monitor	Area (ha)	Event	Peak Flow (L/s)	Peak RDII Flow (L/s)	Peak RDII Rate (L/s/ha)	Total Rain (m^3)
OLTA-19	6.69	Jun 29	10.0	5.3	0.81	1,386
		Jul 2	6.7	2.3	0.35	722
		Jul 8	7.5	2.6	0.39	1,937
		Sep 7	9.5	7.6	1.16	3,201
		Sep 14	8.0	4.9	0.74	1,256
		Sep 22	8.9	4.1	0.62	3,742
125-004-01	35.06	Jun 29	114.2	52.8	1.51	7,377
		Jul 2	83.3	15.8	0.45	3,842
		Jul 8	95.2	29.7	0.85	10,310
		Sep 7	95.3	61.8	1.77	17,037
		Sep 14	94.0	56.2	1.61	6,528
		Sep 22	95.7	33.5	0.96	19,918

These interpreted values indicate there is relatively low wet weather flow contribution in the sewer shed, with RDII rates remaining well below CoT extreme values of 2 to 3 L/s/ha. The measured flow data becomes the basis for performing model calibration, independent of the metrics presented above. See **Section 4.0**.

Furthermore, the wet weather flow data provides a range of typical conditions that can be assumed to be normal operating conditions for the collection system, with events captured between a 2 and 5-yr event. The estimated RDII flow values for the selected events range from 15.8 to 61.8 L/s.

3.5 Monitored Dry Weather Depth Capacity Review

Dry weather depth data from the flow monitors was reviewed to determine the residual capacity in the sewer by depth. Using a histogram spreadsheet, depths were classified into categories including less than 25%, 25-50%, 50-75%, 75-100%, and greater than 100% (surcharge). Key values obtained from this analysis are summarized in **Table 3-6.**

Table 3-6 Residual Dry Weather Capacity Summary from Observed Depth Histogram Analysis

Monitor	Pipe Height (mm)	Avg. Peak DWF Depth / % Full (mm / %)	% Pipe <25% Full	% Pipe 25-50% Full	% Pipe <50% Full	% Surcharged	Max Wet Weather d/D (%)[a]	Date of Peak Wet Weather Depth	Duration >50% Full (min)
OLTA-19	375	97 / 26%	93%	7%	100%	0.0%	38%	7/7/2021 10:05	0
125-004-01	375	163 / 43%	5%	95%	99.9%	0.0%	56%	6/29/2021 14:40	45

a – d/D = water depth to pipe height (diameter) ratio, where 100% means the pipe is full, or surcharged

From the end of February to November 2021, the majority of measured depths were within one quarter of pipe full capacity approximately 92% of the time for OLTA-19. At 125-004-01, the majority of measured depths were between 25 and 50% full, and the pipe was less than 50% full for 99.9% of the time. As seen in the table, the depth never exceeded 38% of the pipe diameter at OLTA-19 and was greater than 50% of the pipe diameter for only 40 minutes at 125-004-01 throughout the 2021 monitoring period.

Under dry weather conditions alone, the average peak DWF depth at 125-004-01 is ~160 mm (43% pipe full). Thus, it can be concluded that during dry weather periods, OLTA-19 consistently shows residual capacity of 75% or greater by depth and 125-004-01 consistently shows residual capacity of 50% or more by depth.

3.6 Supplemental Flow Monitoring Sites

The CoT monitoring site 125-004-01 was removed at the end of November 2021.

Additional flow monitoring sites were installed in spring 2022 to supplement the available dataset. As shown in **Figure 1.2,** new on-going monitors OLTA-30 and OLTA-31, along with reinstatement of OLTA-19, are available through fall of 2022.

4 Sewer Capacity Analysis

4.1 Approach

The approach to this downstream analysis follows the principles of the CoT Capacity Assessment Guidelines, using a calibrated hydraulic model to assess the residual capacity. The downstream analysis has considered the following:

- The hydraulic model represents the most up-to-date sewer system based on available CoT data.
- Flow rates from existing near-term development sites are included based on data from the CoT Planning Portal.
- There are no known private water discharge agreements in the sewer shed.

Given the isolated nature of the separated sanitary sewer system, an independent hydraulic model was developed to evaluate the residual capacity of the downstream collection system to the trunk to accommodate the proposed temporary construction dewatering release rate. The CoT Capacity Assessment Guidelines list the following 3 over-arching criteria:

- Criterion 1 - "Design Function": No surcharge under Peak Design Flow; No surcharge deemed when HGL is below pipe obvert.
- Criterion 2 – "Basement Flooding Protection": Under Extreme Wet Weather Flow which includes rainfall-derived infiltration and inflow (RDII) generated under the May 12, 2000 storm event, hydraulic grade line (HGL) is less than 1.8 m below grade. The May 12, 2000 storm event is estimated to be equivalent to a 25-yr Design Storm.
- Criterion 3 – "Wet Weather Flow Mitigation": If Criterion 2 is not met, under Extreme Wet Weather Flow, ensure the proposed HGL will be no higher than the existing HGL. In this situation, there will be no increase in peak flow rate to the trunk sewer or pumping station under proposed conditions.

For this temporary construction dewatering assessment, Peak Design Flow is assumed to be equivalent to the Peak Dewatering Rate of 2.8 L/s, added to the existing system. Since dewatering is only permitted during DWF, Criterion 2 is only applicable if the increase in dry weather dewatering flow is greater than the RDII flow that which occurs in the May 12, 2000 event.

4.2 Hydraulic Model Development

The CoT provided the Sewer Asset Planning (SAP) sanitary dry weather flow model for use. Data was also leveraged from the Toronto Basement Flooding Protection Program (BFPP) Capacity Study for Area 46, which was completed in 2022. The sub-model extents are presented in **Figure 4.1**, which includes the entire Thorncliffe sewer shed which discharges to the North Toronto Trunk in the Don River valley. There is a large elevation drop from the Thorncliffe table lands into the valley of approximately 40 m, thus creating a hydraulic break. There is an inverted siphon under the Don River that has been included in the assessment, just upstream of the trunk connection. Here, the sewer is inverted with sealed maintenance holes given the as-designed elevated HGL that

is required to convey flows under the river to the trunk sewer. The siphon therefore is exempt from HGL basement flooding / surcharge criteria. Based on record drawing FP-228-1, the twin barrel siphon acts as a force main downstream of the inlet chamber (MH3976817415). **Figure 4.2** presents an excerpt of the record drawing profile, and more details are in **Appendix D**.

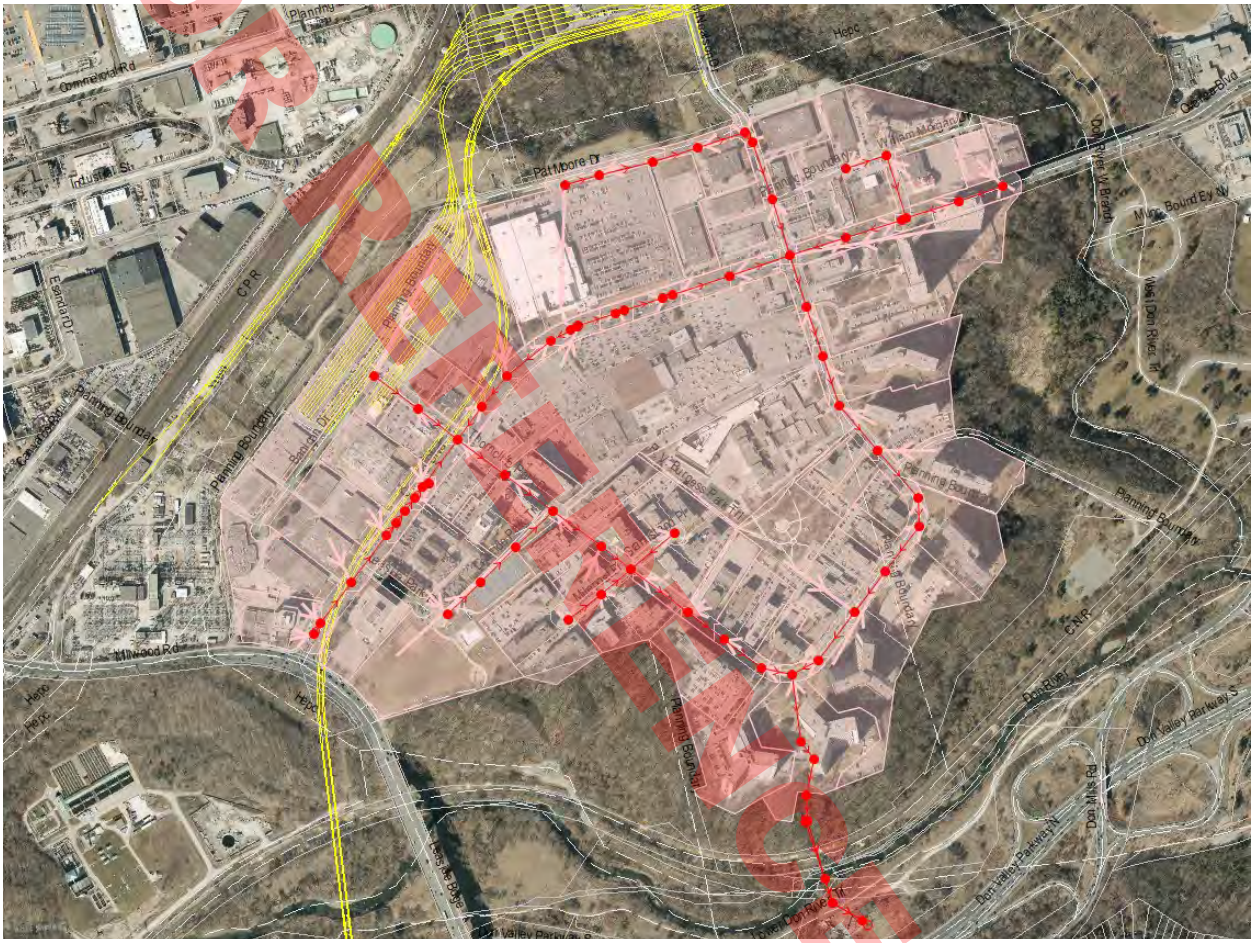


Figure 4.1 Hydraulic Model Extents

Development applications were reviewed in the sewershed, based on records available from the CoT Application Information Centre website (https://secure.toronto.ca/AIC/index.do). Only one site at 80 Overlea Blvd was identified, with a sanitary design flow of 2.75 L/s (Stormwater Management and Servicing Report – Don Mills Jamatkhana & Centre, LEA, May 18, 2021), and no indication of groundwater discharge application for long-term dewatering. The equivalent population value of 90 was applied to a new subcatchment in the model, with no modification to wet weather flow parameters (i.e., remains as existing). No other developments have been considered at this time.

Figure 4.2 presents the record drawing of the downstream siphon connection under the Don River. Through work for the OMSF site in this sewershed, CoT expressed concerns with the existing operation of the inverted siphon, given the steep approach sewers (twinned) of uncertain condition. Therefore, the Capacity Analysis includes an assessment of the relative impact resulting from

dewatering activities, since full condition assessment of the CoT infrastructure is outside the purview of this report. The design of the pressurized system does not allow for spill to the environment, as the pipes are like watermains in that they are valved and not open to the downstream maintenance holes. Therefore, there is no risk of spill to the environment.

Figure 4.2 City Record Drawing FP-228-1 of Don River Siphon

No boundaries conditions were required given the hydraulic break and contained nature of the sewershed. Nonetheless, the sensitivity of the boundary conditions was assessed by applying the 100-yr simulated water level boundary from the Area 46 Basement Flooding Capacity Study, at the trunk sewer connection point. Given the difference in timing of the 100-yr storm vs. the May 12, 2000 design storm to be applied to separated sanitary systems, a modified 100-yr boundary condition level with peak of 88.025 m coinciding with the peak of the May 2000 event, per **Figure 4.3**.

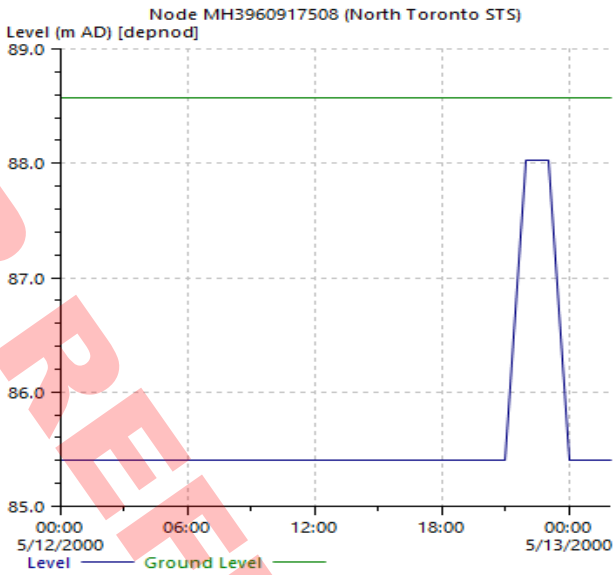


Figure 4.3 100-yr Trunk Level Boundary Condition Applied

4.3 Model Calibration

The model was calibrated under dry weather and wet weather conditions using the flow monitoring data discussed in Section 3.0. The following describes the general model calibration process and results, with detailed observed-vs-predicted plots provided in **Appendix B**.

4.4 Dry Weather Flow Generation

The characteristic per capita flow rates and weekday/weekend diurnal patterns from the flow monitoring data analysis are input into a Waste Water Group in InfoWorks per monitor, which is then applied against the subcatchment equivalent population to generate sanitary sewage flow in the model. GWI is applied as a constant baseflow per monitor. As the monitors are in series, the process of evaluation starts at the upstream monitor OLTA-19 with adjustments made to the GWI and per capita rates to match the observed data for flow, depth and velocity. Once a satisfactory observed vs. predicted match is achieved for peak flow, volume and general shape, then the process is repeated for the downstream monitor with focus on the incremental area only.

The resulting calibrated dry weather parameters are summarized in **Table 4-1**.

Table 4-1 Calibrated Dry Weather Input

Monitor	GWI (L/s/ha)	Per Capita Rate (L/c/d)
OLTA-19	0.26	105
125-004-01	0.40	142

Appendix B provides the observed versus predicted plot of the monitoring data and simulated calibrated model. There is a general match of hydrograph peaks and the volume matches well. It is

acknowledged that the downstream monitor provides a better match given the larger tributary area and more reliable monitoring results.

4.5 Wet Weather Flow Generation

The RDII in a sanitary system can be estimated using the RTK method, where the “R” is the percentage of rainfall in a given metershed that is observed in the sewer, the “T” is the time it takes to see the peak flow response to a rainfall occurrence (Time to Peak), and the “K” is the ratio of the Time to Peak to the recession time. **Figure 4.4** shows how these parameters work together to create three distinct unit hydrograph responses, representing the fast initial inflow response (R1, T1, K1), moderate inflow/infiltration response (R2, T2, K2) and slow infiltration response (R3, T3, K3).

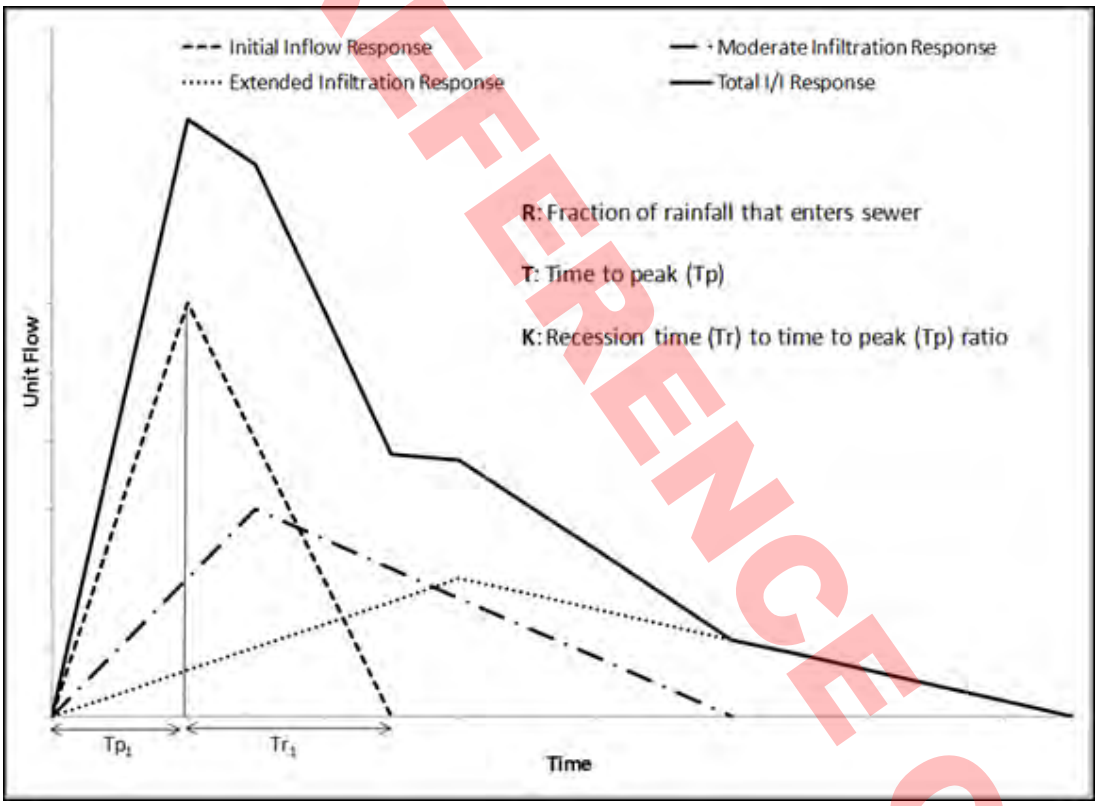


Figure 4.4 Definition of RTK Parameters

The fast response is attributed to cross-connections such as roof downspouts or catchbasins; the moderate response is associated with foundation drains or low-lying MHs; and the slow response is via migrating surface water through the ground into cracks and pipe/MH deficiencies. Together they combined to represent the total wet weather response to rainfall.

InfoWorks ICM requires these 9 RTK parameters to be applied to subcatchments. The rainfall applied on the contributing area associated to each subcatchment is used to generate the wet weather response. The RTK parameters were derived from the flow monitoring data per meter. Through hydrograph separation, the wet weather hydrograph is isolated per rain event. The volume

under the curve represents the wet weather volume, which is compared to the total rainfall depth over the effective tributary area to the monitor (i.e., total rainfall volume) to generate the Total R, or volumetric runoff coefficient. The value becomes the initial target for distributing the R1, R2 and R3 parameters per unit hydrograph. The combination of RTKs is adjusted within a range per unit hydrograph "triangle" to generate the overall characteristic RDII response to be applied to the design storm. Generally, the "R" values are adjusted to match the shape/volumes of the WWF events, and the "T" and "K" values adjusted to improve peak timing, attempting to best fit a single set of parameters to the range of selected observed wet weather events.

Separated sewer areas are expected to have Total R values typically below 4% to 6%, while partially separated areas are expected to have R values up to 20%, depending on the magnitude of the storm event. The calculated R-values for the two monitors reflect the separated nature of the subcatchment, with values less than 6%.

Four of the events were selected for wet weather calibration:

- WWF1: June 29, 2021
- WWF2: July 2, 2021
- WWF3: Sept. 7, 2021
- WWF4: Sept. 14, 2021

These events represent a range of short-duration, high intensity events with longer duration, lower intensity storms. The resulting wet weather calibration observed-versus-predicted plots are presented in **Appendix B** and the goodness-of-fit plots are presented in **Figure 4.5**, indicating a good match for peak flow and volume, despite some offset in peak timing.

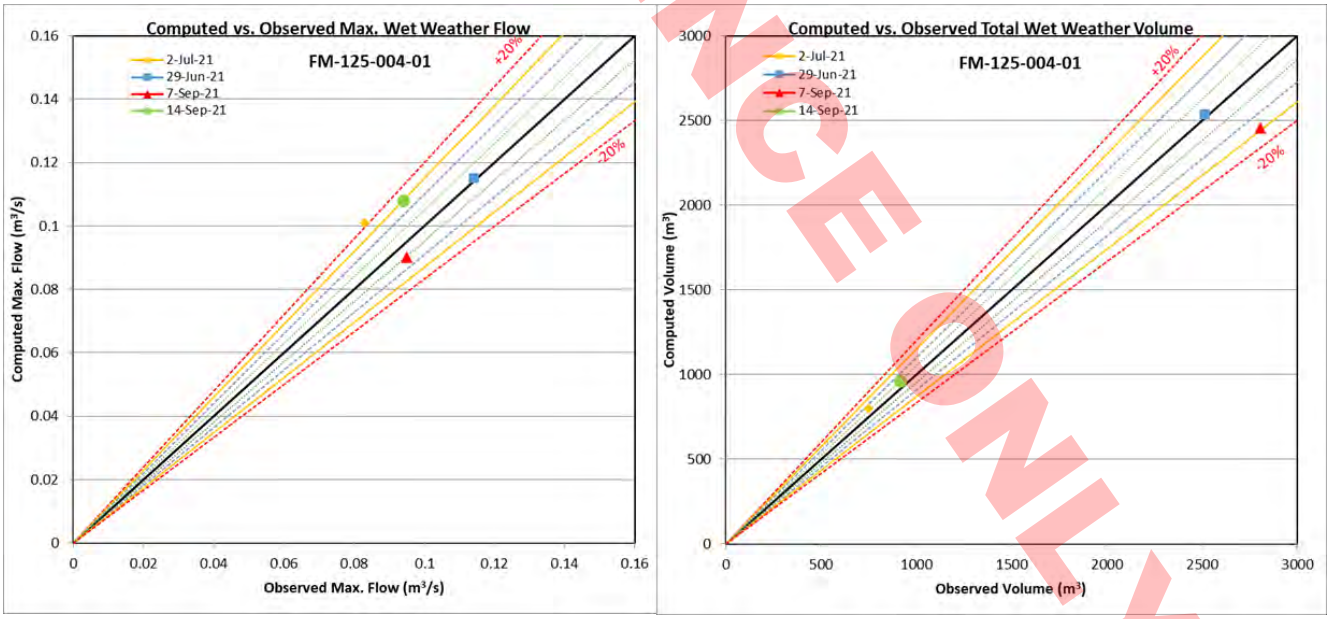


Figure 4.5 Model Calibration Goodness-of-Fit Plots

The wet weather calibration is deemed suitable for evaluating the system capacity for this report, especially given that dewatering will occur only during dry weather.

4.6 Modeling Scenarios

The following scenarios are considered, for this separated sewershed area:

- Scenario 1: Existing Conditions Dry Weather Flow
- Scenario 2: Existing Conditions Dry Weather Flow + Temporary Dewatering (Overlea-West)
- Scenario 3: Existing Conditions Extreme Wet Weather Flow (May 12, 2000)
- Scenario 4: Existing Conditions 2-yr Wet Weather Flow + Temporary Dewatering (Overlea-West)
- Scenario 5: Existing Conditions Dry Weather Flow + Temporary Dewatering (Overlea-East)
- Scenario 6: Existing Conditions 2-yr Wet Weather Flow + Temporary Dewatering (Overlea-East)

The temporary construction dewatering value of 2.8 L/s was applied as a constant inflow to sewer ID SL3001720 (MH4013216718) on Overlea Blvd, 272 m west of Thorncliffe Park Dr West, with the downstream sewer trace compared to existing conditions. Since dewatering will not occur during wet weather, a simulation with the extreme May 12, 2000 storm event was not performed with dewatering values. However, a simulation with the 2-yr storm was conducted to provide confidence in system capacity should the pump shut-off not exactly coincide with the onset of an everyday rainfall. Model simulation results are provided in **Appendix C** for each scenario. The existing and dewatering scenarios are presented together for comparison in the following sections.

4.7 Scenarios 1 & 2– Dry Weather Flow

Dry weather performance is the purview of Criterion 1 of the Capacity Assessment Guidelines. Scenario 1 represents dry weather for the existing sewershed conditions, with Scenario 2 indicating the impact of temporary construction dewatering. As noted in Section 2.2, the total groundwater dewatering maximum rate with safety factor is estimated at 1.4 L/s; however, the full potential dewatering rate of 2.8 L/s is assessed here including storm contributions, for conservatism. **Table 4-2** presents the resulting pipe capacity comparison by way of percent full by depth and pipe capacity, along the downstream profile from Overlea Blvd West. The values are taken from the model results at the upstream of the pipe.

Table 4-2 Comparison of Dry Weather Flow Results – Overlea West Discharge

From MH	To MH	Existing		Dewatering	
		Percent Full Flow (%)	Surcharge State (d/H Ratio)	Percent Full Flow (%)	Surcharge State (d/H Ratio)
MH4005316662	MH4007016673	2%	0.24	2%	0.24
MH4007016673	MH4013216718	3%	0.21	3%	0.33
MH4013216718	MH4020416772	8%	0.21	22%	0.33
MH4020416772	MH4020416772A	5%	0.17	13%	0.25
MH4020416772A	MH4020416772B	5%	0.17	13%	0.25
MH4020416772B	MH4026116815	5%	0.20	13%	0.29
MH4026116815	MH4027716827	7%	0.20	18%	0.29
MH4027716827	MH4034916882	8%	0.20	17%	0.29
MH4034916882	MH4029616953	11%	0.23	15%	0.27
MH4029616953	MH4024017027	11%	0.26	15%	0.29
MH4024017027	MH4018617100	23%	0.33	28%	0.36
MH4018617100	MH4015217145	19%	0.37	23%	0.40
MH4015217145	MH4008617232	35%	0.41	40%	0.44
MH4008617232	MH4004417288	27%	0.48	31%	0.50
MH4004417288	MH4000117345	47%	0.48	52%	0.50
MH4000117345	MH3999017391	40%	0.44	44%	0.46
MH3999017391	MH3988917405	85%	0.71	89%	0.72
MH3988917405	MH3986117426	44%	0.48	45%	0.49
MH3986117426	MH3980617413	43%	0.48	45%	0.49
MH3980617413	MH3976817415	30%	0.39	31%	0.39
MH3976817415	MH3968017442	25%	1.00	26%	1.00
MH3968017442	MH3964317453	-21%	1.00	-22%	1.00
MH3964317453	MH3961617499	-56%	1.00	-58%	1.00
MH3961617499	MH3960917508	19%	0.31	19%	0.32
JP103567	MH3968017442b	0%	1.00	0%	1.00
MH3968017442b	MH3964317453b	-21%	1.00	-22%	1.00
MH3964317453b	MH3961617499	-56%	1.00	-58%	1.00
Percent full results taken from Upstream side of pipe. See Appendix C for additional tabulated results.					
Slope of HGL > Pipe slope allowing more flow through than Mannings Pipe Full Capacity; Surcharge State (SS) indicates the pipe is not surcharged by depth. SS of 1 means pipe is surcharged due to downstream conditions. SS of 2 means the flow exceeds the pipe full capacity.					
Shaded cells are the inverted siphon pipes under pressure. Western barrel shown at bottom of table.					

Under dry weather flow conditions, the existing collection system downstream of the discharge location does increase water levels on Overlea Blvd West and down Thorncliffe Park Dr West;

however, the maximum depth is 72% along the profile with the majority of the downstream pipes operating between 15 and 45% full. The worst-case depth occurs at the confluence of the east and west branches of Thorncliffe Park Dr, in the sewer that leads down into the ravine; however, the depth of the water does not surcharge the pipe. Therefore, the collection system can handle dewatering at the maximum rate during dry weather without causing surcharge in the tablelands. Per Section 2.2 of City Capacity Guidelines, Table 1, Note 2: "No surcharge deemed when HGL is below pipe obvert". See Section 4.10 for impact assessment of the downstream inverted siphon.

4.8 Scenarios 3 & 4 –Wet Weather Flow

The City's extreme wet weather flow scenario is intended to evaluate potential basement flooding risk as part of Criterion 2. The existing collection system is categorized as "fully-separated", which is in keeping with the flow monitoring data results, suggesting the sanitary system primarily collects wastewater flow with minor groundwater infiltration and wet weather inflow. The City's design May 12, 2000 design storm (as measured at the Oriole rain gauge) was applied with the calibrated RTK parameters for the existing conditions, with the simulation results summarized in **Table 4-3**. Since dewatering is not permitted during wet weather, the extreme wet weather + dewatering is not presented. However, to address potential uncertainty with the timing of pump shutoff relative to onset of rainfall, the 2-yr storm was simulated with the dewatering flow of 2.8 L/s.

Table 4-3 Comparison of Wet Weather Flow Results – Overlea West Discharge

From MH	To MH	Existing (May 2000)		Dewatering (2-yr Test)	
		Max Surcharge State	US HGL Freeboard (m)	Max Surcharge State	US HGL Freeboard (m)
MH4005316662*	MH4007016673	0.32	1.23	0.31	1.23
MH4007016673*	MH4013216718	0.31	1.92	0.38	1.92
MH4013216718	MH4020416772	0.31	3.30	0.38	3.28
MH4020416772	MH4020416772A	0.26	3.00	0.30	2.99
MH4020416772A	MH4020416772B	0.26	3.28	0.30	3.27
MH4020416772B	MH4026116815	0.32	3.61	0.36	3.60
MH4026116815	MH4027716827	0.34	3.81	0.37	3.80
MH4027716827	MH4034916882	0.34	3.88	0.37	3.88
MH4034916882	MH4029616953	0.39	4.76	0.38	4.76
MH4029616953	MH4024017027	0.57	4.34	0.51	4.34
MH4024017027	MH4018617100	0.65	3.98	0.58	4.01
MH4018617100	MH4015217145	0.80	3.62	0.69	3.65
MH4015217145	MH4008617232	0.84	3.46	0.73	3.50
MH4008617232	MH4004417288	0.90	2.98	0.81	3.02
MH4004417288	MH4000117345	0.90	2.76	0.80	2.80
MH4000117345	MH3999017391	0.73	3.06	0.69	3.08
MH3999017391	MH3988917405	2.00	3.87	2.00	4.20

From MH	To MH	Existing (May 2000)		Dewatering (2-yr Test)	
		Max Surcharge State	US HGL Freeboard (m)	Max Surcharge State	US HGL Freeboard (m)
MH3988917405	MH3986117426	2.00	4.90	0.73	5.15
MH3986117426	MH3980617413	2.00	5.11	1.00	6.51
MH3980617413	MH3976817415	1.00	1.90	0.58	2.27
MH3976817415	MH3968017442	1.00	1.10	1.00	1.44
MH3968017442	MH3964317453	1.00	-5.41	1.00	-4.99
MH3964317453	MH3961617499	1.00	-1.15	1.00	-0.88
MH3961617499	MH3960917508	1.00	-0.44	1.00	-0.38
JP103567	MH3968017442b	1.00	1.33	1.00	1.33
MH3968017442b	MH3964317453b	1.00	-5.41	1.00	-4.99
MH3964317453b	MH3961617499	1.00	-1.15	1.00	-0.88
* Shallow sewer where pipe obvert is already within 1.8 m of the surface and cannot meet HGL criteria					
Shaded cells are the inverted siphon pipes under pressure. Western barrel shown at bottom of table.					

Under extreme wet weather flow conditions, the existing system already indicates surcharge throughout but maintains the HGL freeboard to within 1.8 m everywhere except at the siphon crossing and shallow pipes. Since dewatering is not permitted during wet weather, there is no increase to flood risk thus satisfying Criterion 2 of the Capacity Assessment Guidelines.

To provide further confirmation of no impact given the uncertainty with pump off time relative to rain onset, the dewatering at the full 2.8 L/s discharge rate applied during the 2-yr storm demonstrates that adequate HGL freeboard is maintained in the system with only minor downstream surcharge during this worst-case scenario.

4.9 Secondary Discharge Point Scenarios 5 & 6

Should the preferred discharge point on Overlea Blvd West not be feasible during specific construction activities, a secondary groundwater discharge location was assessed on the Overlea Blvd East system at MH4044716957 (flow added at SL3004271). As shown in Scenario 5 (DWF + Dewatering at Overlea East) in **Appendix C** and **Table 4-4**, the dry weather profile indicates that this system can handle the 2.8 L/s discharge during dry weather flow with no surcharge.

Table 4-4 Comparison of Dry Weather Flow Results –Overlea East Discharge

From MH	To MH	Existing		Dewatering	
		Percent Full Flow (%)	Max Surcharge State	Percent Full Flow (%)	Max Surcharge State
MH4052217063	MH4051717054	0%	0.12	0%	0.12
MH4051717054	MH4050117022	0%	0.09	0%	0.09
MH4050117022	MH4044716957	0%	0.11	0%	0.23
MH4044716957	MH4039916920	1%	0.12	11%	0.23
MH4039916920	MH4034916882	1%	0.12	5%	0.19
MH4034916882	MH4029616953	11%	0.23	15%	0.27
MH4029616953	MH4024017027	11%	0.26	15%	0.29
MH4024017027	MH4018617100	23%	0.33	28%	0.36
MH4018617100	MH4015217145	19%	0.37	23%	0.40
MH4015217145	MH4008617232	35%	0.41	40%	0.44
MH4008617232	MH4004417288	27%	0.48	31%	0.50
MH4004417288	MH4000117345	47%	0.48	52%	0.50
MH4000117345	MH3999017391	40%	0.44	44%	0.46
MH3999017391	MH3988917405	85%	0.71	89%	0.72
MH3988917405	MH3986117426	44%	0.48	45%	0.49
MH3986117426	MH3980617413	43%	0.48	45%	0.49
MH3980617413	MH3976817415	30%	0.39	31%	0.39
MH3976817415	MH3968017442	25%	1.00	26%	1.00
MH3968017442	MH3964317453	-21%	1.00	-22%	1.00
MH3964317453	MH3961617499	-56%	1.00	-58%	1.00
MH3961617499	MH3960917508	19%	0.31	19%	0.32
JP103567	MH3968017442	0%	1.00	0%	1.00
MH3968017442	MH3964317453	-21%	1.00	-22%	1.00
MH3964317453	MH3961617499	-56%	1.00	-58%	1.00

Slope of HGL > Pipe slope allowing more flow through than Mannings Pipe Full Capacity; Surcharge State (SS) indicates the pipe is not surcharged by depth.

Shaded cells are the inverted siphon pipes under pressure. Western barrel shown at bottom of table.

The Scenario 6 (2-yr WWF + Dewatering at Overlea East) result comparison is presented in **Table 4-5**.

Table 4-5 Comparison of Wet Weather Flow Results – Overlea East Discharge

From MH	To MH	Existing (May 2000)		Dewatering (2-yr Test)	
		Max Surcharge State	US HGL Freeboard (m)	Max Surcharge State	US HGL Freeboard (m)
MH4052217063	MH4051717054	0.29	2.64	0.24	2.65
MH4051717054	MH4050117022	0.15	2.68	0.13	2.68
MH4050117022	MH4044716957	0.20	3.03	0.27	3.03
MH4044716957	MH4039916920	0.20	3.84	0.27	3.82
MH4039916920	MH4034916882	0.18	3.59	0.22	3.59
MH4034916882	MH4029616953	0.39	4.76	0.38	4.76
MH4029616953	MH4024017027	0.57	4.34	0.51	4.34
MH4024017027	MH4018617100	0.65	3.98	0.57	4.01
MH4018617100	MH4015217145	0.80	3.62	0.69	3.65
MH4015217145	MH4008617232	0.84	3.46	0.73	3.50
MH4008617232	MH4004417288	0.90	2.98	0.81	3.02
MH4004417288	MH4000117345	0.90	2.76	0.80	2.80
MH4000117345	MH3999017391	0.73	3.06	0.68	3.08
MH3999017391	MH3988917405	2.00	3.87	2.00	4.20
MH3988917405	MH3986117426	2.00	4.90	0.73	5.15
MH3986117426	MH3980617413	2.00	5.11	0.79	6.60
MH3980617413	MH3976817415	1.00	1.90	1.00	2.44
MH3976817415	MH3968017442	1.00	1.10	1.00	1.12
MH3968017442	MH3964317453	1.00	-5.41	1.00	-4.99
MH3964317453	MH3961617499	1.00	-1.15	1.00	-0.88
MH3961617499	MH3960917508	1.00	-0.44	1.00	-0.38
JP103567	MH3968017442b	1.00	1.33	1.00	1.33
MH3968017442b	MH3964317453b	1.00	-5.41	1.00	-4.99
MH3964317453b	MH3961617499	1.00	-1.15	1.00	-0.88

Shaded cells are the inverted siphon pipes under pressure. Western barrel shown at bottom of table.

During extreme wet weather conditions, the existing system has sufficient HGL freeboard along Overlea East and the downstream system, which is also maintained during the 2-yr test simulation. Thus, this leg of sewer meets Criterion 2. It is noted that there is relief flow on Overlea Blvd east to the west at MH4052217063 during wet weather, which is a bifurcation (split) structure.

4.10 Inverted Siphon Impact Assessment

To address previous CoT concerns on impact of dewatering on the downstream inverted siphon, a review of the flow monitoring results was performed. Monitor 125-004-01 provides direct long-term measurement of the flow range that exists in the current system tributary to the inverted siphon, as it

is situated just downstream of the Thorncliffe Park Dr east and west sewer confluence. The flow data ranges are presented in **Figure 4.6**.

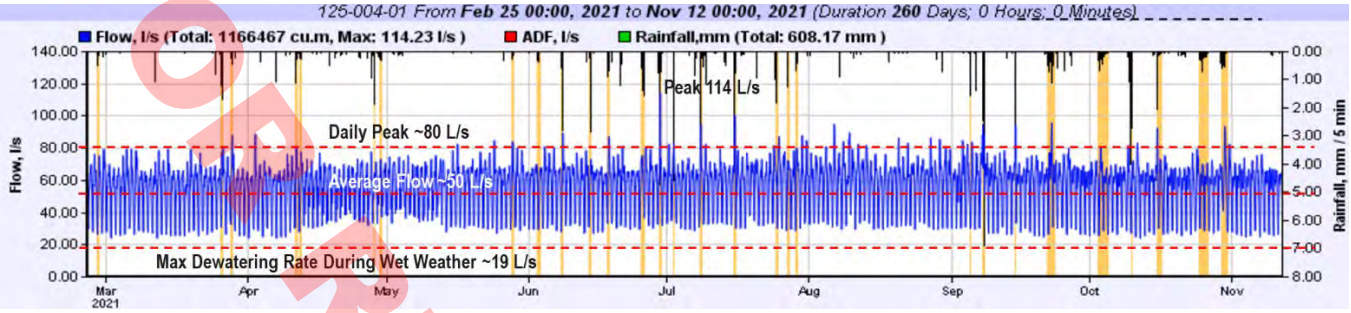


Figure 4.6 Monitored 2021 Flows Upstream of Inverted Siphon

The range in DWF is between 25 to 80 L/s, with a calculated average DWF of 49.9 L/s. The range in rainfall-derived infiltration and inflow added to DWF from **Table 3-5** is 16 to 62 L/s for the six 2021 measured events that represent your typical, frequent rainfall event. Since dewatering only occurs in DWF conditions, it follows that as long as the dewatering rate is less than typical RDII during frequent WWF, then there should be no relative impact to the everyday operation of the inverted siphon and downstream trunk.

The peak DWF dewatering rate of 2.8 L/s is well below the RDII range during frequent events (16 to 62 L/s); therefore, the proposed dewatering rate will not change the operational hydraulics experienced in the collection system and siphon. To provide further mitigation, the dewatering discharge pump(s) shall be controlled to minimize the potential for flow transients.

5 Conclusion and Recommendations

The following summarizes the main findings and recommendations from this SCA.

1. The dewatering activities are proposed to discharge to MH4013216718 on Overlea Blvd West. A secondary discharge point has been considered at MH4044716957 on Overlea Blvd East. Dewatering is only permitted during dry weather flow conditions.
2. The Hydrogeological data was reviewed to obtain the estimated peak groundwater discharge rate. The construction dewatering rate includes a factor of safety of 3.0 and surface water dewatering assumes that 50 mm of rainfall over an open excavation must be dewatered within 24 hours. The estimated peak construction dewatering rate for Overlea AW is a total of 120,000 L/day plus 90,000 L/day allowance for perched fill dewatering, and while it is not proposed to have bulk excavation and dewatering occur while it is raining, it is estimated that the pumping of 50 mm of rainfall over 24 hours would result in an additional 30,000 L/day for a total of 240,000 L/day, or 2.8 L/s potential dewatering rate. A Category 3 Permit to Take Water is not required for construction.
3. Groundwater quality was assessed based on analysis of 7 samples taken at different locations and dates. There were multiple exceedances against the storm sewer criteria and only two exceedances of TSS against the sanitary criteria, which indicates that groundwater from Overlea AW will require on-site treatment prior to discharge to the sanitary system to meet the City's discharge requirements of the Municipal Code Chapter 681-Sewers. The Contractor is required to have a Monitoring and Contingency Plan Monitoring and Contingency Plan to ensure compliance metrics are met, and that appropriate action, reporting and mitigations measures are enacted should results exceed the quality limits.
4. A rainfall and flow monitoring program within the Thorncliffe Park area was undertaken from February to September 2021 at site OLTA-19 to characterize the system and support the SCA process, and additional data was available from a City flow monitor (125-004-01) active since August 2020. Rainfall from City gauge RG-018 and the flow monitoring data were analyzed as follows:
    - Dry weather days were analyzed to determine a sewage generation rate of 109 to 140 L/c/d and a groundwater infiltration rate of 0.26 to 0.39 L/s/ha. The latter are at or above the 0.26 L/s/ha extraneous flow allowance rate outlined in the City's Capacity Assessment Guidelines.
    - Overall, there is moderate wet weather response in the 2021 dataset, with resulting maximum extreme WWF extraneous flow rates observed of 1.61 L/s/ha and 1.77 L/s/ha for monitoring OLTA-19 and 125-004-01, respectively.
    - The monitoring indicates that the pipes never surcharged during 2021 monitoring and have ample residual capacity in dry weather. The main site 125-004-01 during dry weather conditions indicates an average peak of 43% pipe full depth, with only 45 min

of collective duration where dry weather depths reach 51% full. The max recorded depth during wet weather at this monitor was 56% pipe full in 2021.

- Two additional flow monitors (OLTA-30, OLTA-31) along with reinstatement of OLTA-19 were installed in May 2022 and will continue through fall 2022, to provide supplemental monitoring data coverage for the east and west branches of Thorncliffe Park Dr, just before the confluence through the easement to the Don River valley.

5. A sewer capacity analysis for dewatering assessment was conducted by developing and calibrating an InfoWorks ICM model to 2021 flow monitoring data and simulating under the proposed DWF and DWF + Dewatering scenarios, factoring in conservative trunk boundary conditions.
    - Criterion 1: The analysis indicates that the local sanitary collection system has sufficient residual capacity during dry weather to safely convey treated construction dewatering at the peak discharge rate of 2.8 L/s when discharged to Overlea Blvd East or West without pipe surcharge, thus meeting Criterion 1 of the Sewer Capacity Assessment Guidelines.
    - Criterion 2: Since dewatering is not permitted during wet weather conditions, there is no increased flood risk thus meeting Criterion 2, in either discharge location. A test with the 2-yr storm during dewatering confirmed there was adequate HGL freeboard should the timing of shut-off not perfectly coincide with a rapid rainfall.
    - Since Criterion 2 is met, Criterion 3 is not applicable.
6. There is an existing inverted siphon at the downstream end of the collection system before connection to the trunk, that traverses a rail line and the Don River and is comprised of very steep approach sewers of uncertain condition. Drawings and field investigation data were reviewed (see Appendix D) indicating the pipe is a design pressurized system with valves preventing spill to the environment at the maintenance holes in the valley. An assessment of the impact resulting from dewatering was performed, to alleviate concerns of abnormal flow conditions that might cause transients, odour issues, and/or surcharge to the environment.
    - Monitor 125-004-01 provides direct long-term measurement of the existing flow range that exists in the current system tributary to the inverted siphon (there are no other connections downstream of the monitor).
    - The range in DWF is between 25 to 80 L/s, with a calculated average DWF of 49.9 L/s.
    - The range in rainfall-derived infiltration and inflow added to DWF from **Table 3-5** is 16 to 62 L/s for the six 2021 measured events used to represent typical, frequent rainfall events.
    - Since dewatering only occurs in DWF, as long as the dewatering rate is less than typical RDII during frequent WWF there should be no relative impact to the everyday operation of the inverted siphon and downstream trunk.

- The peak DWF dewatering rate of 2.8 L/s is well below the RDII range during frequent events (16 to 62 L/s); therefore, the proposed dewatering rate will not change the operational hydraulics of the collection system. In addition, the pumped discharge pumps shall be controlled to minimize the potential for flow transients, as a further mitigative measure.

7. Given the uncertainty in rainfall timing and establishing when a wet weather flow condition exists, the Contractor shall monitor the depth in the collection system at the existing monitor 125-004-01 (MH3988917405) during construction and pumping activities shall cease while the pipe depth to diameter ratio has exceeded 50%, per **Table 5-1**. Based on the 2021 flow monitoring data, the maximum duration in which the pipe depth exceeded 50% was 40 min, which would equate to a temporary dewatering storage volume of approximately 33 m^3.

Table 5-1 Temporary Flow Monitoring Threshold for Dewatering Activities

Site	Max. De-watering Rate (L/s)	Pipe Height (mm)	Avg. Peak DWF Depth (mm)	Depth Threshold to Cease Dewatering		
				Location	Max. Depth (mm)	Max. Total Pipe Flow (L/s)
Overlea AW	2.8	375	190	MH3988917405 (SL3002889)	190 mm (~50% Pipe Diameter)	43 L/s

8. It is recommended that the CoT receive and approve the findings of this report in support of the Stage 1 Sewer Discharge Approval process. The Contractor will be responsible for fulfilling the complete obligations for the Sewer Capacity Analysis as part of the Stage 2 SDA process, including compliance with the CoT Sewer Capacity Assessment Guidelines (July, 2021). If the proposed discharge point or flow rates substantially deviate from that outlined herein, the Contractor will be responsible for completing the full SDA process including hydraulic analysis based on the new information, as part of Stage 2 SDA, to the satisfaction of Toronto Water.

9. Only short-term private water discharge has been applied in this Stage 1 application. It is confirmed that this report does not include permanent discharge and will not be used for permanent private water discharge applications during wet weather. Permanent infrastructure and their associated permitting requirements will be coordinated by the Contractor.

APPENDICES

APPENDIX A FLOW MONITORING DATA REVIEW

160560009 - Ontario Line TA
Flow Monitoring Location Overview

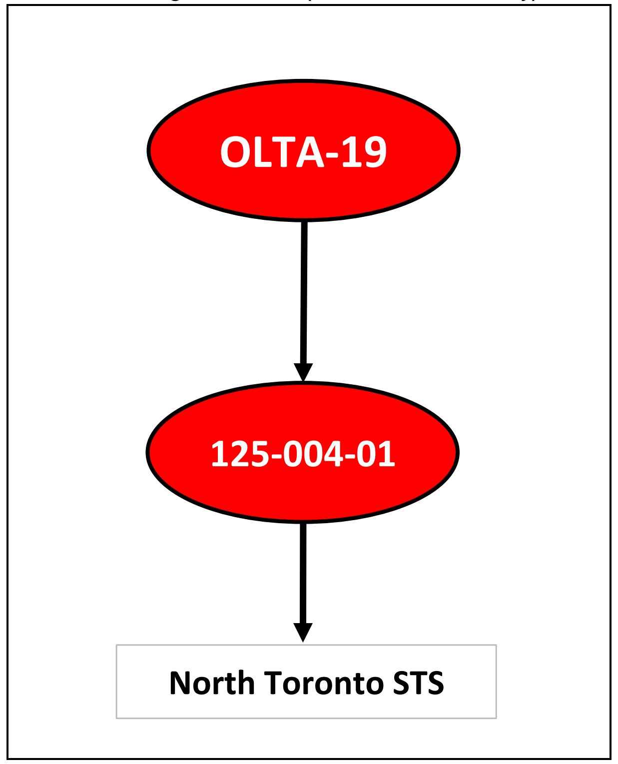
Monitor	125-004-01	MH ID	MH3988917405
Rain Gauge	RG-018	Pipe Asset ID	SL3002889

Drainage Area		
Total to FM	87.91	ha
Contributing Area	34.93	ha
Difference Basin	NA	

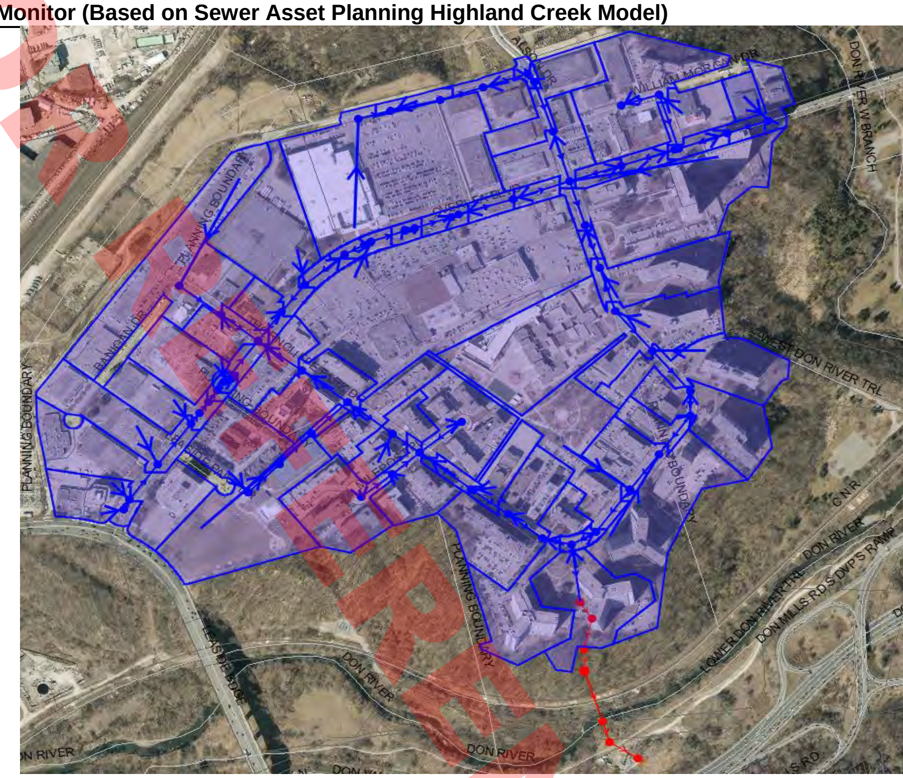
Population (RES+EMP)	RES	EMP	Total
Total to FM	19668	3812	23480
Diff Basin	NA	NA	NA

Model Link ID	MH3999017391.1
Shape	Circular
Diameter	390 mm
Confidence	Field Measured

Flow Monitoring Schematic (Meter Interconnectivity)



Drainage Area Tributary to Flow Monitor (Based on Sewer Asset Planning Highland Creek Model)



Comments

Downstream of OLTA-19. Installed from August 17, 2020 - present. Total tributary area, population, and flow data is used for analysis.

Monitor Pipe Profile (Based on Sewer Asset Planning Highland Creek Model)

Link	MH3999017391.1	MH3988917405.1
System type	Sanitary	Sanitary
length (m)	102.6	34.0
Shape ID	CIRC	CIRC
width (mm)	375	300
height (mm)	375	300
us inv (m AD)	120.744	120.299
ds inv (m AD)	120.450	119.074
grad (m/m)	0.00287	0.03603
pfc (m3/s)	0.087	0.170
Street Reference	THORNCLIFFE PARK DR*EAS	THORNCLIFFE PARK DR*EAS

Node	MH3999017391	MH3988917405	MH3986117426
ground (m AD)	125.940	125.990	125.704
Flood type	Stored	Stored	Stored
HD table			
Num gullies	1.000	1.000	1.000

160560009 - Ontario Line TA

Flow Monitoring Data Analysis: Dry Weather Flow

Monitor 125-004-01
Area 34.93 ha
Res Pop 19,668
Total Pop 23,480 (RES+ICI)

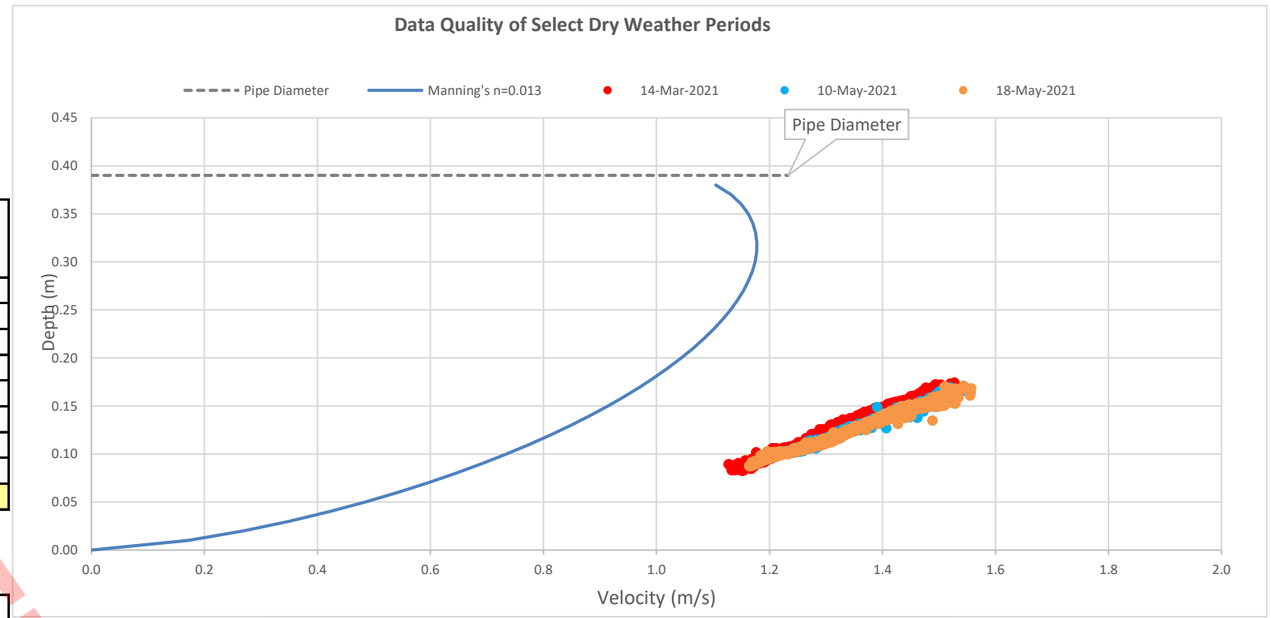
Year	Month	*Avg Sewage Flow (L/s)	Per Capita - Res (L/c/d)	Per Capita - Res + ICI (L/c/d)	*GWI (L/s)	Total DWF (L/s)	GWI (L/s/ha)
2020	April	37.86	166	139	11.92	49.8	0.341
2020	May	35.74	157	132	14.76	50.5	0.423
2020	June	37.76	166	139	13.96	51.7	0.400
2020	July	38.81	170	143	13.22	52.0	0.379
2020	August	37.23	164	137	15.52	52.8	0.444
2020	September	38.14	168	140	14.88	53.0	0.426
2020	October	39.53	174	145	12.22	51.8	0.350
2020	November	38.75	170	143	12.38	51.1	0.354
Overall Average of Above		**37.98**	**167**	**140**	**13.61**	**51.6**	**0.390**

* Output from SFM

Daily Patterns Exported from SFM 2/25/2021 to 11/11/2021

Average Weekday **Average Weekend**

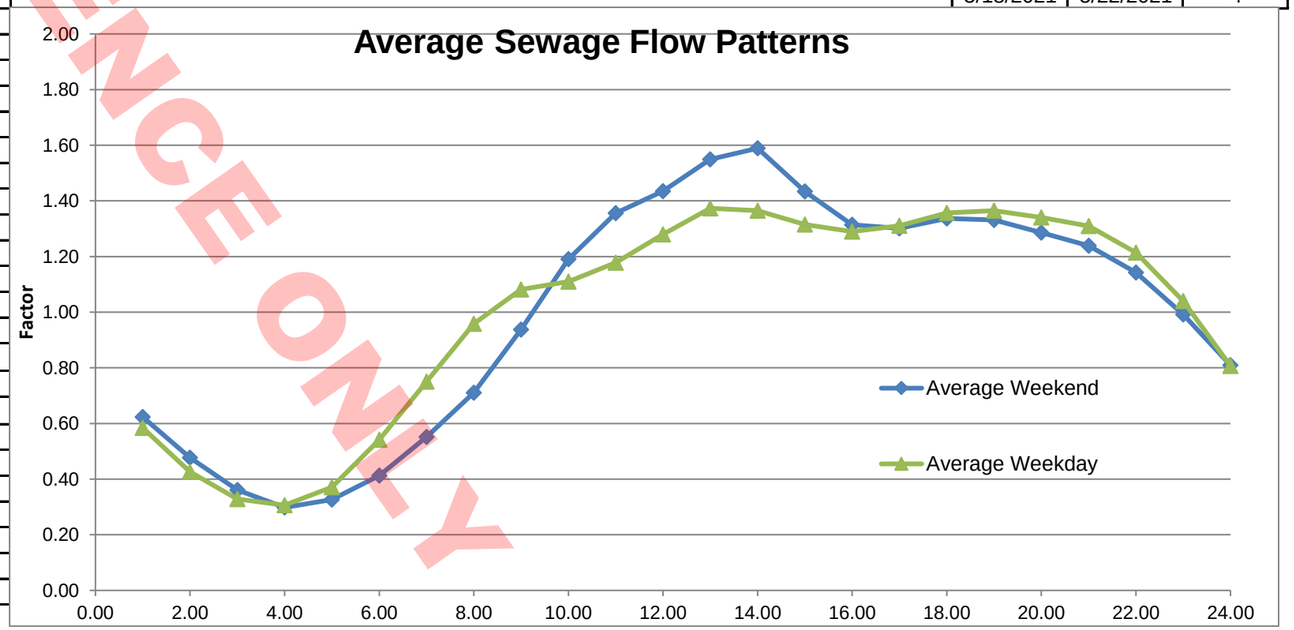
Time	DWF (L/s)	Avg Day Factor (Total Flow)	Avg Day Factor (Sewage)	Time	DWF (L/s)	Avg Day Factor (Total	Avg Day Factor (Sewage)
0.00	34.84	0.70	0.58	0.00	36.60	0.72	0.62
01:00:00	29.08	0.58	0.43	01:00:00	31.21	0.62	0.48
02:00:00	25.54	0.51	0.33	02:00:00	26.92	0.53	0.36
03:00:00	24.73	0.50	0.31	03:00:00	24.61	0.49	0.30
04:00:00	27.07	0.54	0.37	04:00:00	25.66	0.51	0.33
05:00:00	33.27	0.67	0.54	05:00:00	28.83	0.57	0.41
06:00:00	40.88	0.82	0.75	06:00:00	33.95	0.67	0.55
07:00:00	48.40	0.97	0.96	07:00:00	39.82	0.79	0.71
08:00:00	52.90	1.06	1.08	08:00:00	48.22	0.95	0.94
09:00:00	53.93	1.08	1.11	09:00:00	57.55	1.14	1.19
10:00:00	56.39	1.13	1.18	10:00:00	63.64	1.26	1.36
11:00:00	60.08	1.20	1.28	11:00:00	66.55	1.32	1.43
12:00:00	63.49	1.27	1.37	12:00:00	70.78	1.40	1.55
13:00:00	63.19	1.27	1.37	13:00:00	72.26	1.43	1.59
14:00:00	61.37	1.23	1.31	14:00:00	66.52	1.32	1.43
15:00:00	60.45	1.21	1.29	15:00:00	62.13	1.23	1.31
16:00:00	61.23	1.23	1.31	16:00:00	61.63	1.22	1.30
17:00:00	62.90	1.26	1.36	17:00:00	62.95	1.25	1.34
18:00:00	63.18	1.27	1.36	18:00:00	62.75	1.24	1.33
19:00:00	62.31	1.25	1.34	19:00:00	61.09	1.21	1.29
20:00:00	61.18	1.23	1.31	20:00:00	59.32	1.17	1.24
21:00:00	57.72	1.16	1.21	21:00:00	55.79	1.10	1.14
22:00:00	51.38	1.03	1.04	22:00:00	50.21	0.99	0.99
23:00:00	42.90	0.86	0.81	23:00:00	43.47	0.86	0.81
Average	49.9	1.00	1.00	Average	50.5	1.00	1.00



Comments

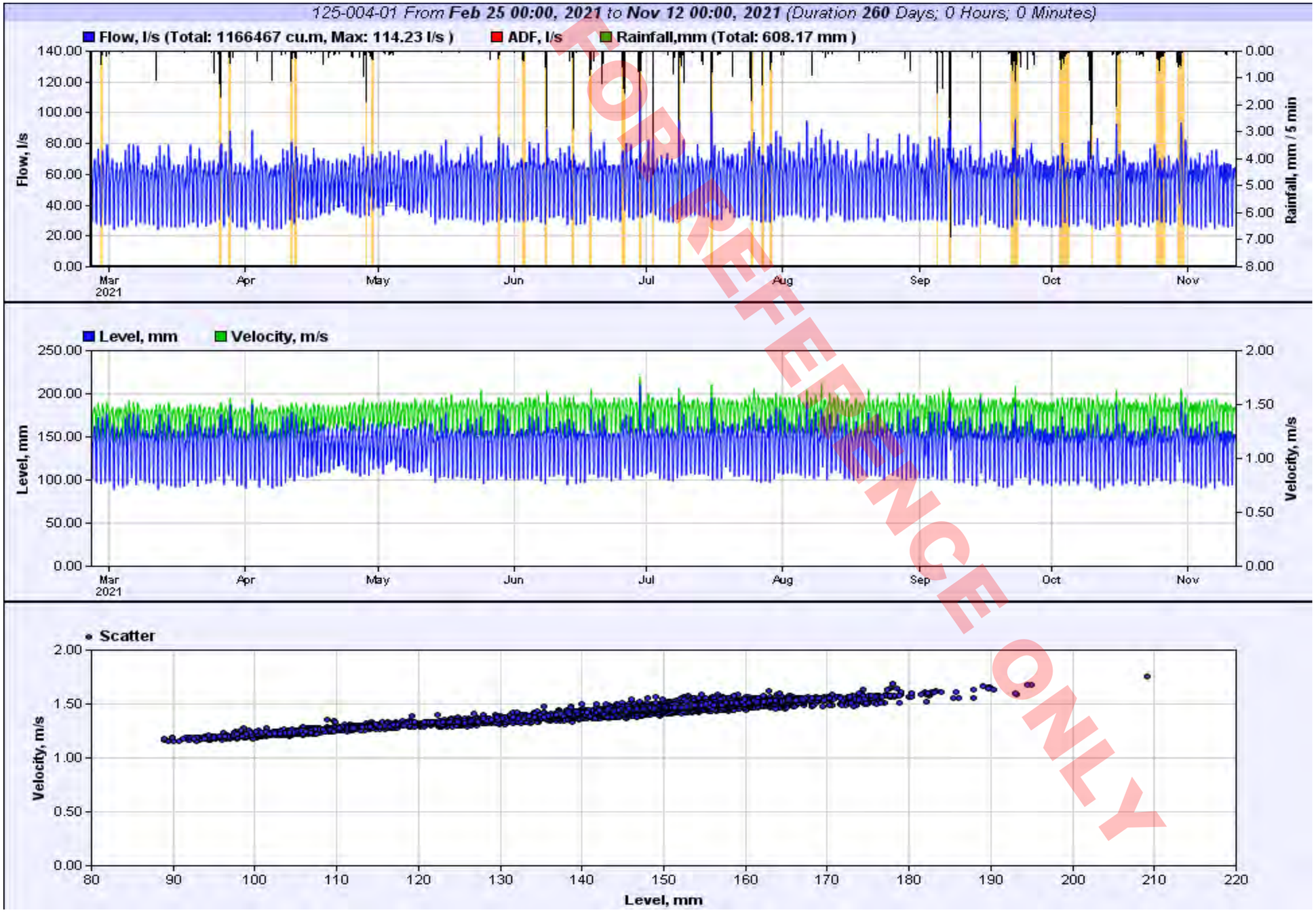
In general, data quality is good during dry weather conditions. The pipe is less than 45% full by depth during the selected periods.

DWF Periods shown on scatter		
From	To	# of Days
3/14/2021	3/18/2021	4
5/10/2021	5/14/2021	4
5/18/2021	5/22/2021	4



160560009 - Ontario Line TA

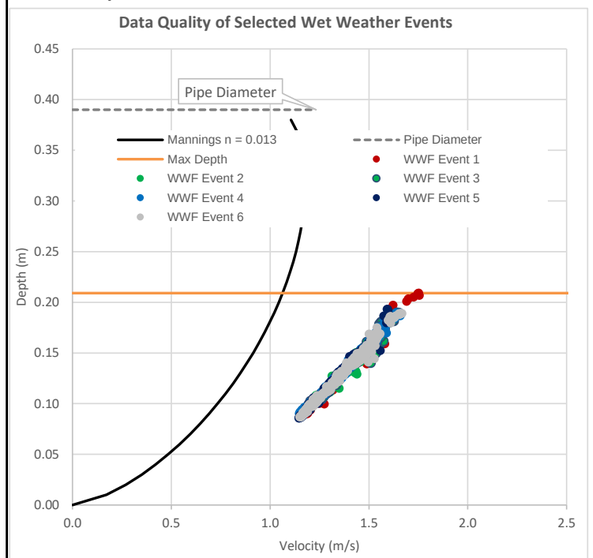
Tri-Plot Data View



160560009 - Ontario Line TA

Detailed Wet Weather Flow Hydrograph Separation

Monitor:	125-004-01		Mannings n = 0.013		
Shape:	Circular		R_h	0.0975	m
Diam.	0.39	m	A	0.119	m^2
Slope	0.00402	m/m	Q_{full}	0.123	m^3/s
n	0.013		v_{full}	1.033	m/s
Area	34.93	ha			
Max Depth	0.21	m	**Min Depth**	0.09	m
Max Velocity	1.76	m/s	Min Velocit	1.17	m/s



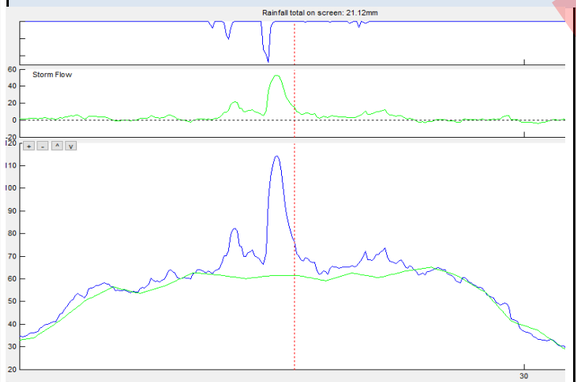
Comments

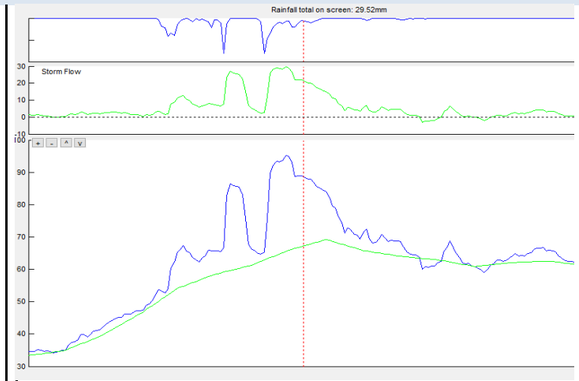
In general, data quality is good during wet weather conditions. Maximum recorded depth reached 54% of the pipe diameter during the June 29 event.

WWF Event 1			**WWF Event 2**			**WWF Event 3**		
Date	June 29, 2021	Storm ID	Date	July 2, 2021	Storm ID	Date	July 8, 2021	Storm ID
Duration	7.2 hrs	48	Duration	1.6 hrs	49	Duration	8.1 hrs	50
Rain	21.1 mm	RG ID	Rain	11.0 mm	RG ID	Rain	29.5 mm	RG ID
I_{peak}	56.6 mm/hr	RG-018	I_{peak}	54.9 mm/hr	RG-018	I_{peak}	39.0 mm/hr	RG-018
Rain Volume	7,376 m^3		Rain Volume	3,842 m^3		Rain Volume	10,310 m^3	
Prior 24hrs	0 mm		Prior 24hrs	1.5 mm		Prior 24hrs	0.5 mm	

SFM HYDROGRAPH REVIEW AND DEFINITION OF RAINFALL DURATION

STORM TOOLBOX - I/I ANALYSIS BY SCREEN





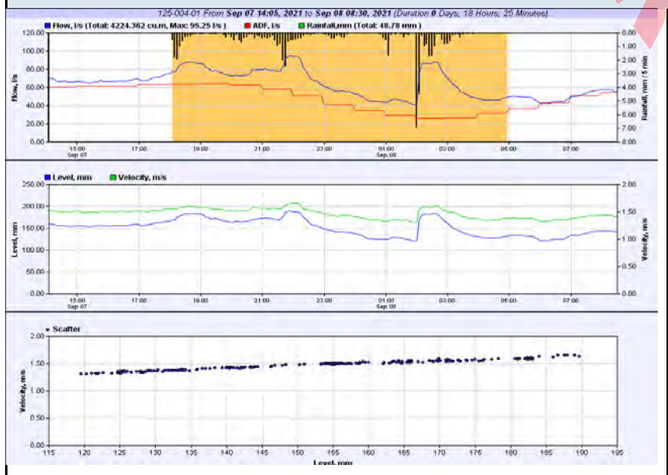
		Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)	Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)	Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)
	Total WWF	4412	114.2	99.31	356.5	4243	83.32	75.36	271.2	3351	95.21	91.65	329.7
Data from "I/I	**I/I ("Storm")**	355.6	52.76	37.88	135.4	30.38	15.84	9.251	32.51	319.8	29.7	26.09	93.04
Analysis by Screen"	**Sewage ("Daily")**	4056	65.06	64.47	232.1	4212	74.54	73.79	265.6	3032	69.17	68.34	246
	R-Factor & Unit Rate	4.8%	1.51	L/s/ha		0.8%	0.45	L/s/ha		3.1%	0.85	L/s/ha	

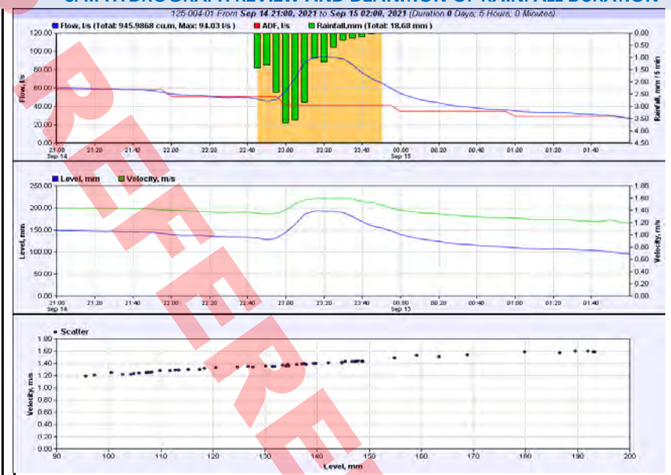
160560009 - Ontario Line TA

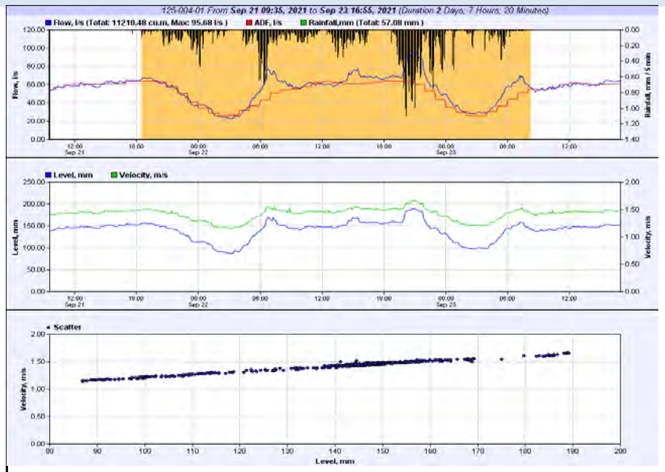
Detailed Wet Weather Flow Hydrograph Separation

	WWF Event 4		WWF Event 5		WWF Event 6	
Date	September 7, 2021	Storm ID	September 14, 2021	Storm ID	September 21, 2021	Storm ID
Duration	10.8 hrs	56	1.1 hrs	57	37.67 hrs	58
Rain	48.8 mm	RG ID	18.7 mm	RG ID	57.03 mm	RG ID
I_{peak}	82.7 mm/hr	RG-018	44.2 mm/hr	RG-018	13.12 mm/hr	RG-018
Rain Volume	17,036 m^3		6,527 m^3		19,918 m^3	
Prior 24hrs	2 mm		0 mm		mm	

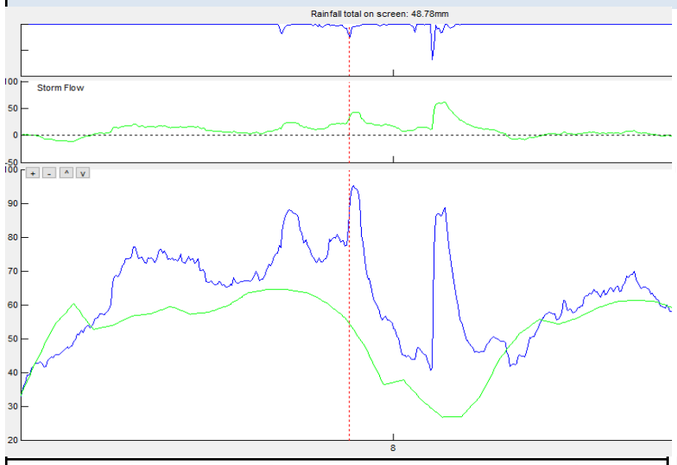
SFM HYDROGRAPH REVIEW AND DEFINITION OF RAINFALL DURATION

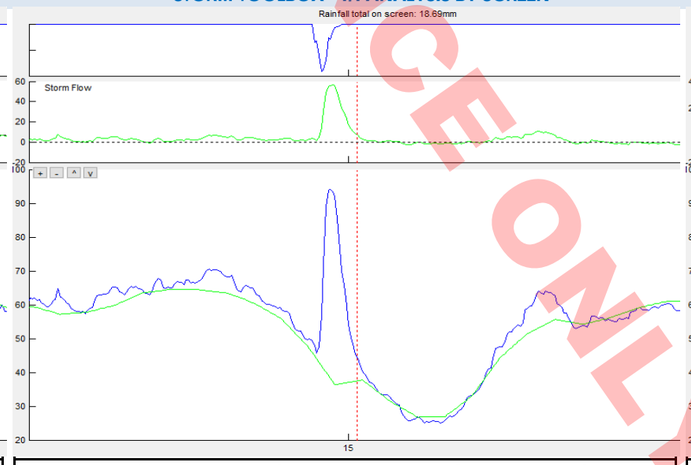


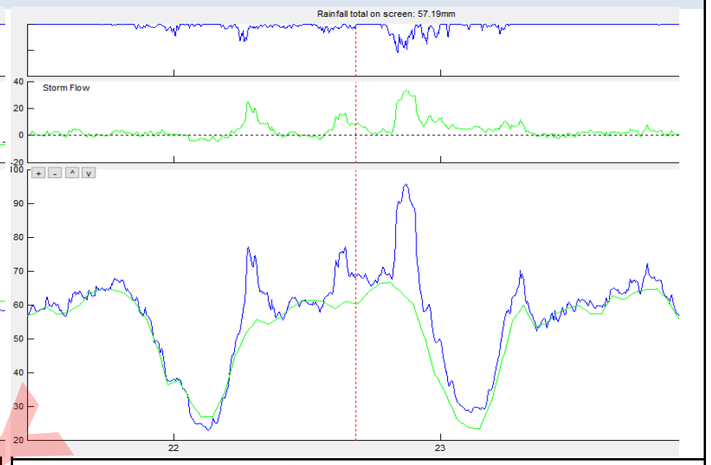




STORM TOOLBOX - I/I ANALYSIS BY SCREEN







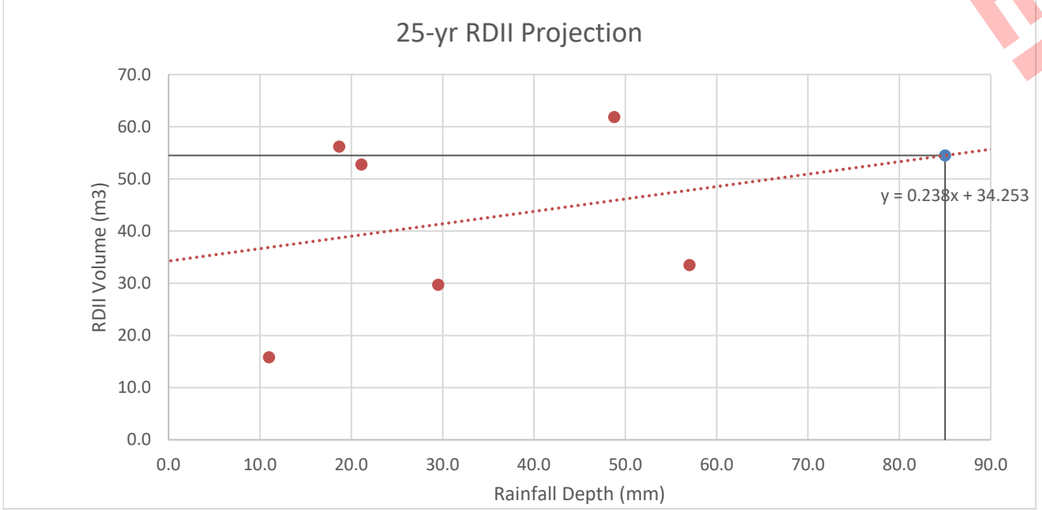
	Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)	Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)	Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)
Total WWF	7611	95.25	87.57	315.2	4703	94.03	79.01	284	1.21E+04	95.68	93.4	336.1
I/I ("Storm")	1249	61.84	55.27	197.8	312.4	56.19	41.07	147.5	844.7	33.48	31.41	113.1
Sewage ("Daily")	6362	64.52	64.48	232.1	4391	64.52	64.48	232.1	1.13E+04	66.62	66.46	239.2
R-Factor & Unit Rate	7.3%	1.77	L/s/ha		4.8%	1.61	L/s/ha		4.2%	0.96	L/s/ha	

160560009 - Ontario Line TA

RDII vs Rainfall Summary

Monitor 125-004-01

Rainfall Event	Total Rainfall (mm)	Peak Rainfall Intensity (mm/hr)	Average Monthly DWF (L/s)	Peak Inst. Total Flow (L/s)	Peak Inst. RDII (L/s)	Peak Inst. RDII Rate (L/s/ha)	Peaking Factor	RDII Volume(m3)	R-Factor (%)
June 29, 2021	21.1	56.6	51.7	114.2	52.8	1.51	2.2	356	4.8
July 2, 2021	11.0	54.9	52.0	83.3	15.8	0.45	1.6	30	0.8
July 8, 2021	29.5	39.0	52.8	95.2	29.7	0.85	1.8	320	3.1
September 7, 2021	48.8	82.7	52.8	95.3	61.8	1.77	1.8	1249	7.3
September 14, 2021	18.7	44.2	53.0	94.0	56.2	1.61	1.8	312	4.8
September 21, 2021	57.0	13.1	53.0	95.7	33.5	0.96	1.8	845	4.2
Projected using y=0.238x+34.253	85.0				54.5	1.56			



160560009 - Ontario Line TA
Flow Monitoring Location Overview

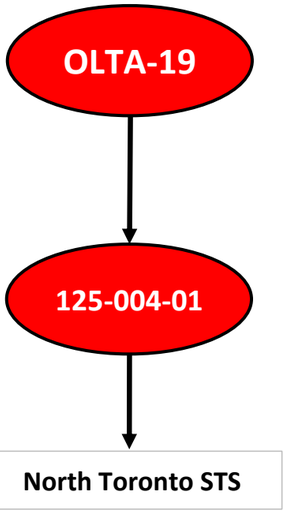
Monitor	OLTA-19	**MH ID**	**MH4029616953**
Rain Gauge	RG-018	**Pipe Asset ID**	**SL3004268**

Drainage Area		
Total to FM	18.00	ha
Contributing Area	6.56	ha
Difference Basin	NA	

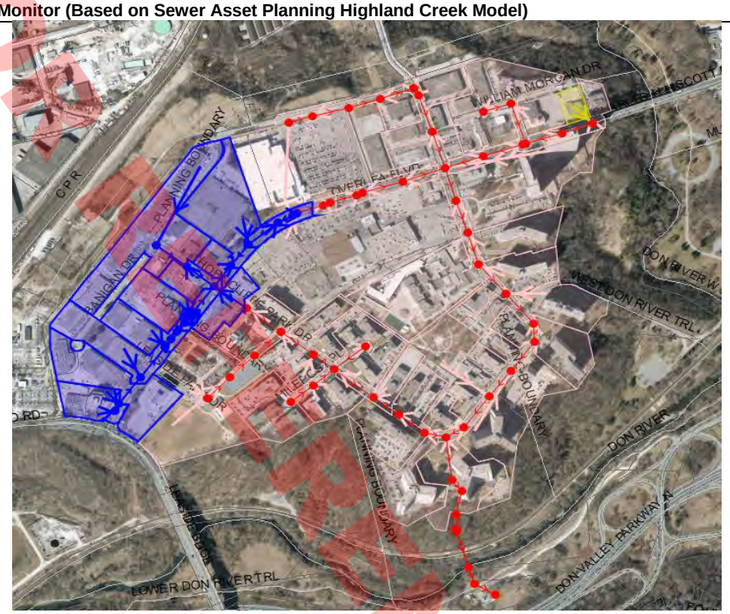
Population (RES+EMP)	RES	EMP	Total
Total to FM	386	1538	1924
Diff Basin	NA	NA	NA

Model Link ID	**MH4034916882.1**	
Shape	**Circular**	
Diameter	375	mm
Confidence	Field Measured	

Flow Monitoring Schematic (Meter Interconnectivity)



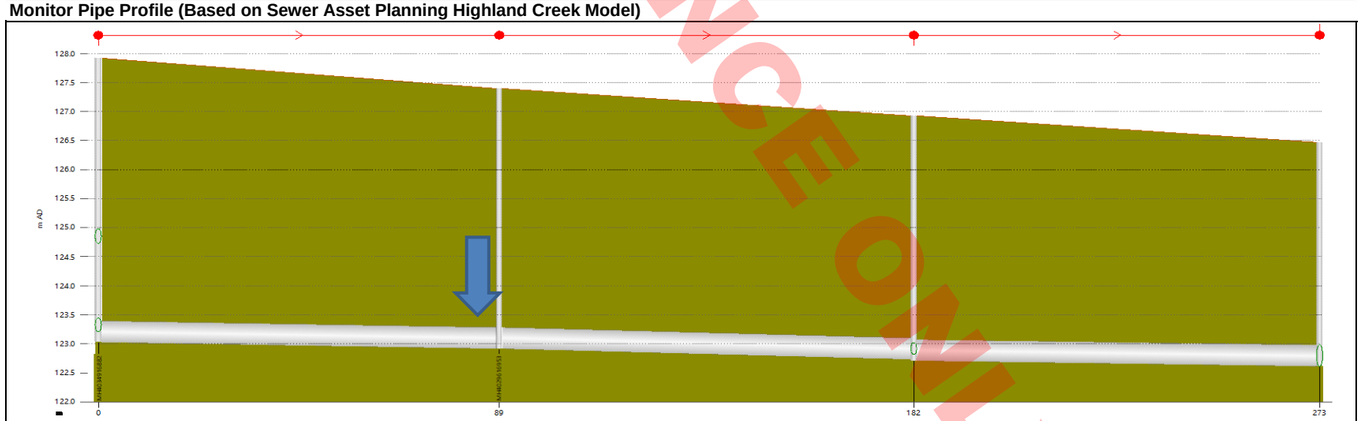
Drainage Area Tributary to Flow Monitor (Based on Sewer Asset Planning Highland Creek Model)



Comments

Upstream of 125-004-01. Installed from February 26 - November 11, 2021. Total tributary area, population, and flow data is used for analysis.

Monitor Pipe Profile (Based on Sewer Asset Planning Highland Creek Model)



Link	MH4034916882.1	MH4029616953.1	MH4024017027.1
System type	Sanitary	Sanitary	Sanitary
length (m)	89.4	92.6	90.6
Shape ID	CIRC	CIRC	CIRC
width (mm)	375	375	375
height (mm)	375	375	375
us inv (m AD)	123.023	122.911	122.703
ds inv (m AD)	122.911	122.728	122.609
grad (m/m)	0.00125	0.00198	0.00104
pfc (m3/s)	0.058	0.078	0.056
Node	MH4034916882	MH4029616953	MH4024017027	MH4018617100
ground (m AD)	127.917	127.394	126.925	126.469

160560009 - Ontario Line TA

Flow Monitoring Data Analysis: Dry Weather Flow

Monitor OLTA-19
Area 6.56 ha
Res Pop 386
Total Pop 1,924 (RES+ICI)

Year	Month	*Avg Sewage Flow (L/s)	Per Capita - Res (L/c/d)	Per Capita - Res + ICI (L/c/d)	*GWI (L/s)	Total DWF (L/s)	GWI (L/s/ha)
2020	April	2.43	544	109	1.66	4.1	0.253
2020	May	2.01	450	90	1.79	3.8	0.273
2020	June	2.18	488	98	1.57	3.8	0.239
2020	July	2.39	535	107	1.44	3.8	0.219
2020	August	2.32	520	104	1.65	4.0	0.251
2020	September	2.48	555	111	1.57	4.1	0.239
2020	October	2.36	529	106	1.67	4.0	0.255
2020	November	3.18	712	143	1.52	4.7	0.232
Overall Average of Above		**2.42**	**542**	**109**	**1.61**	**4.0**	**0.245**

* Output from SFM

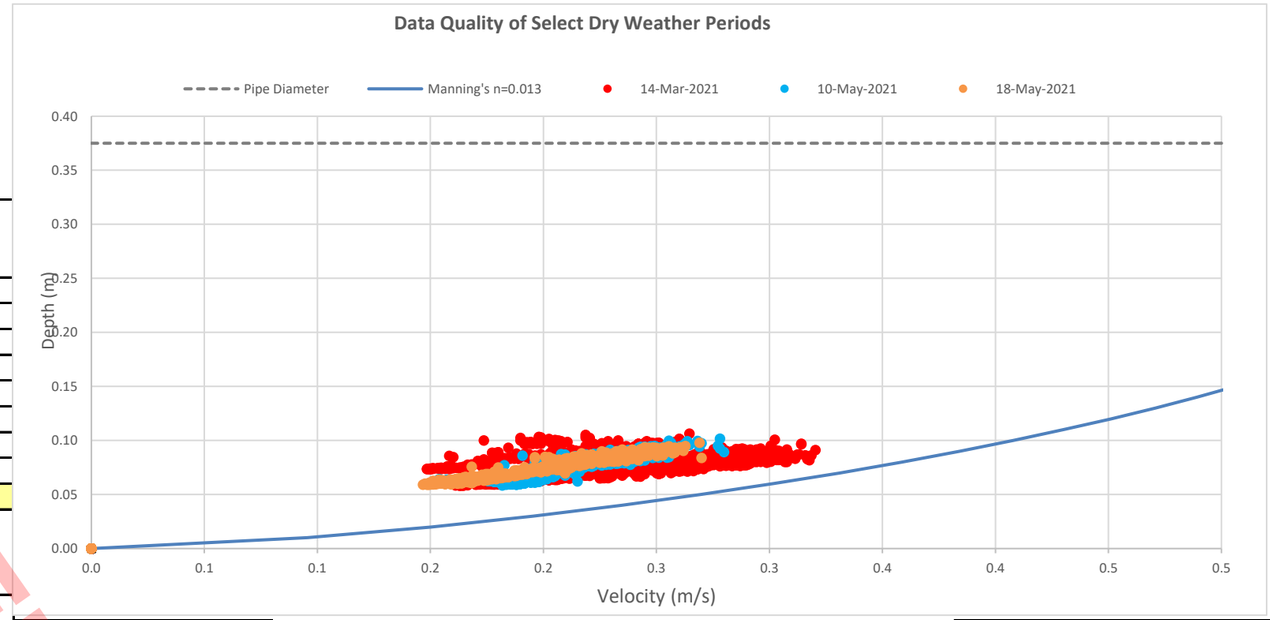
Daily Patterns Exported from SFM 2/26/2021 to 11/11/2021

Average Weekday

Time	DWF (L/s)	Avg Day Factor (Total Flow)	Avg Day Factor (Sewage)
0.00	2.61	0.66	0.43
01:00:00	2.28	0.58	0.29
02:00:00	2.07	0.52	0.20
03:00:00	2.02	0.51	0.18
04:00:00	2.00	0.51	0.17
05:00:00	2.52	0.64	0.39
06:00:00	3.25	0.82	0.70
07:00:00	4.05	1.02	1.04
08:00:00	4.56	1.15	1.26
09:00:00	4.56	1.15	1.26
10:00:00	4.68	1.18	1.31
11:00:00	4.94	1.25	1.42
12:00:00	5.06	1.28	1.47
13:00:00	4.99	1.26	1.44
14:00:00	4.86	1.23	1.39
15:00:00	4.68	1.18	1.31
16:00:00	4.64	1.17	1.29
17:00:00	4.92	1.24	1.41
18:00:00	5.07	1.28	1.47
19:00:00	5.02	1.27	1.45
20:00:00	4.85	1.23	1.38
21:00:00	4.61	1.16	1.28
22:00:00	3.59	0.91	0.85
23:00:00	3.09	0.78	0.63
Average	4.0	1.00	1.00

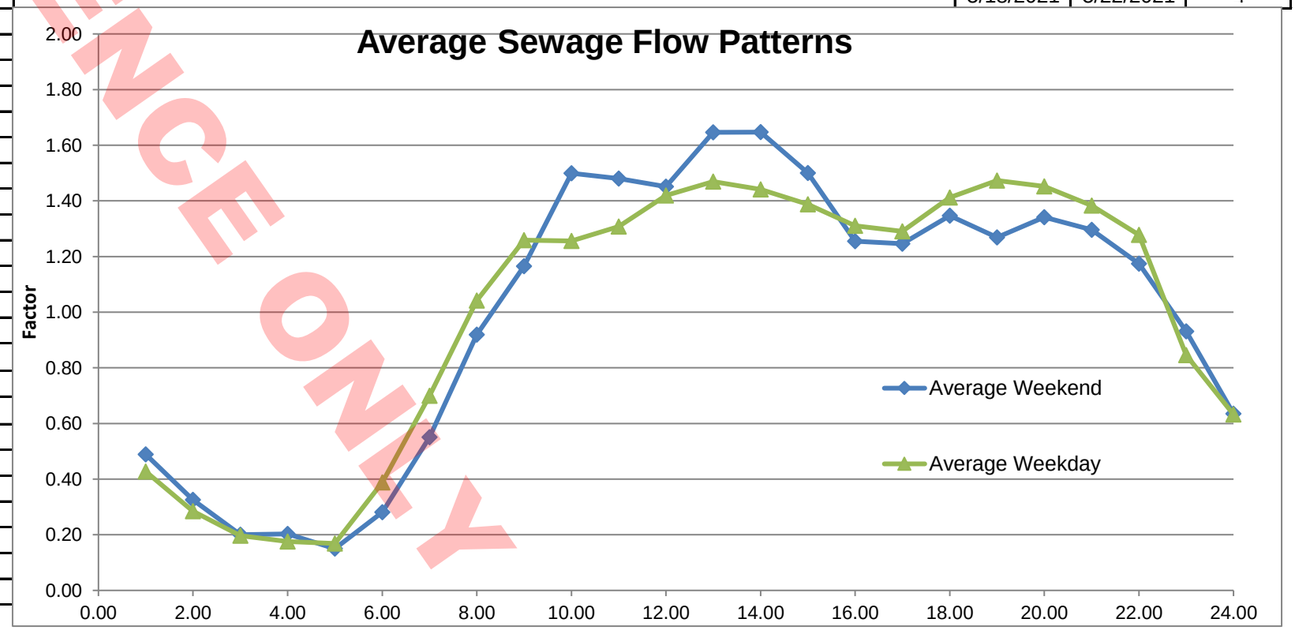
Average Weekend

Time	DWF (L/s)	Avg Day Factor (Total	Avg Day Factor (Sewage)
0.00	2.89	0.68	0.49
01:00:00	2.46	0.58	0.33
02:00:00	2.13	0.50	0.20
03:00:00	2.14	0.51	0.20
04:00:00	2.00	0.47	0.15
05:00:00	2.34	0.56	0.28
06:00:00	3.05	0.72	0.55
07:00:00	4.01	0.95	0.92
08:00:00	4.65	1.10	1.17
09:00:00	5.53	1.31	1.50
10:00:00	5.48	1.30	1.48
11:00:00	5.40	1.28	1.45
12:00:00	5.91	1.40	1.65
13:00:00	5.91	1.40	1.65
14:00:00	5.53	1.31	1.50
15:00:00	4.89	1.16	1.25
16:00:00	4.86	1.15	1.25
17:00:00	5.13	1.21	1.35
18:00:00	4.92	1.17	1.27
19:00:00	5.11	1.21	1.34
20:00:00	4.99	1.18	1.30
21:00:00	4.68	1.11	1.17
22:00:00	4.04	0.96	0.93
23:00:00	3.27	0.77	0.64
Average	4.2	1.00	1.00



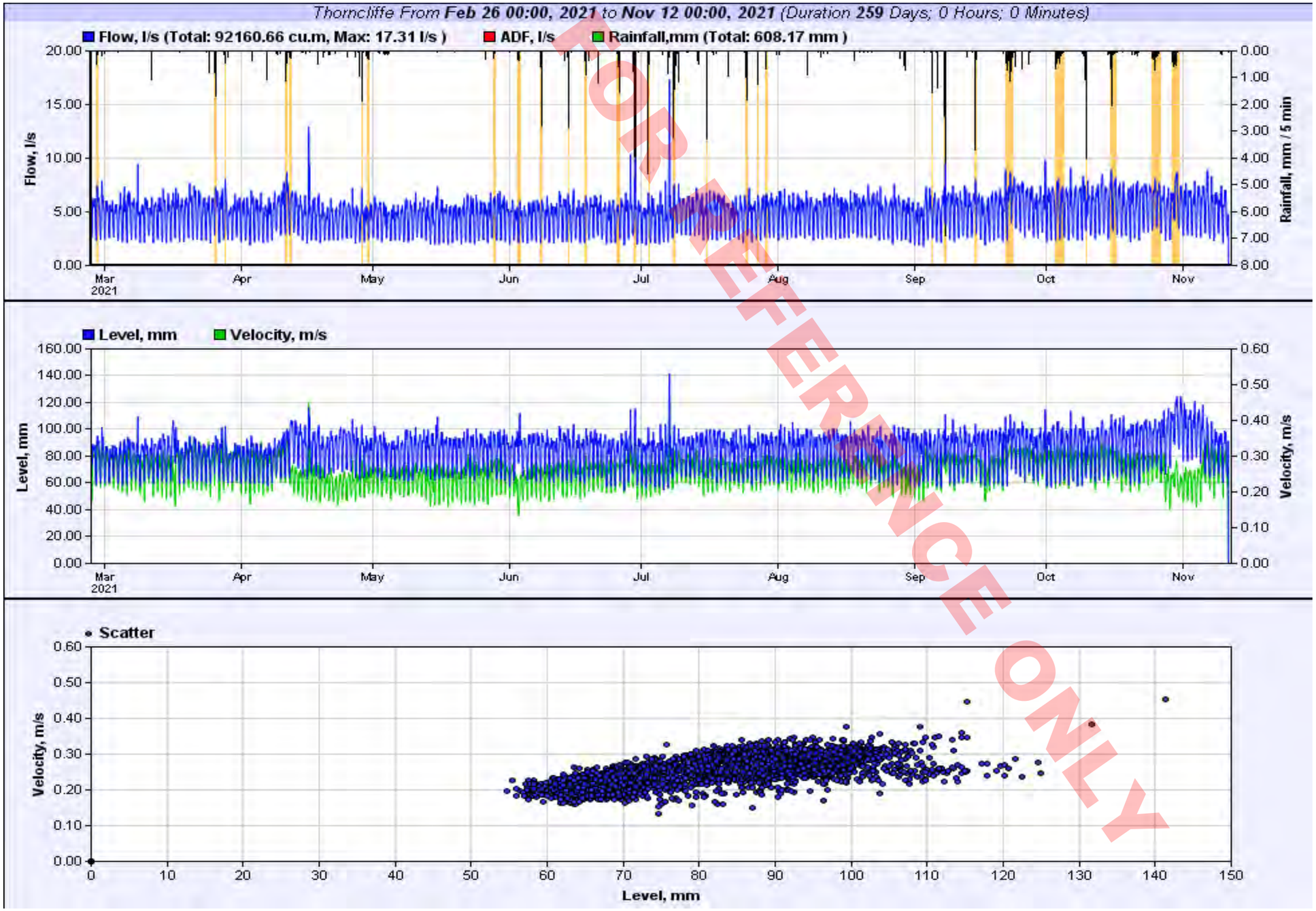
Comments
In general, data quality is good during dry weather conditions. The pipe is less than 30% full by depth during the selected periods.

DWF Periods shown on scatter		
From	To	# of Days
3/14/2021	3/18/2021	4
5/10/2021	5/14/2021	4
5/18/2021	5/22/2021	4



160560009 - Ontario Line TA

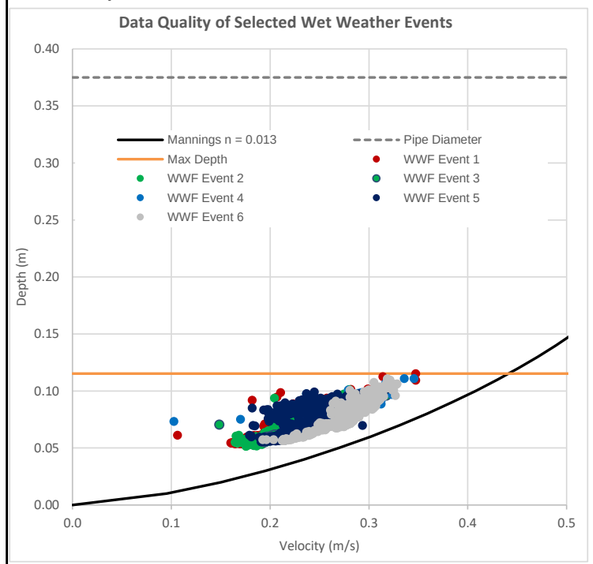
Tri-Plot Data View



160560009 - Ontario Line TA

Detailed Wet Weather Flow Hydrograph Separation

Monitor:	OLTA-19		Mannings n = 0.013		
Shape:	Circular		R_h	0.09375	m
Diam.	0.38	m	A	0.110	m^2
Slope	0.00125	m/m	Q_{full}	0.062	m^3/s
n	0.013		v_{full}	0.561	m/s
Area	6.56	ha			
Max Depth	0.12	m	**Min Depth**	0.05	m
Max Velocity	0.35	m/s	Min Velocit	0.15	m/s

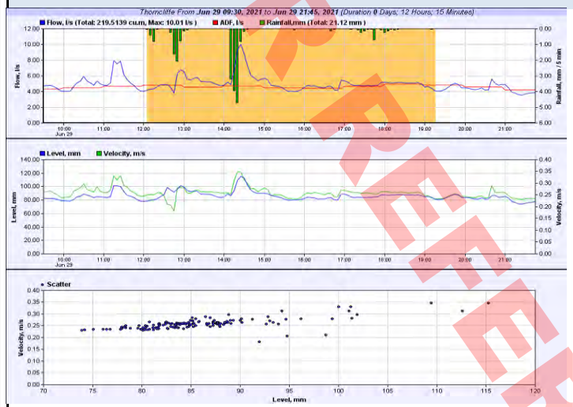


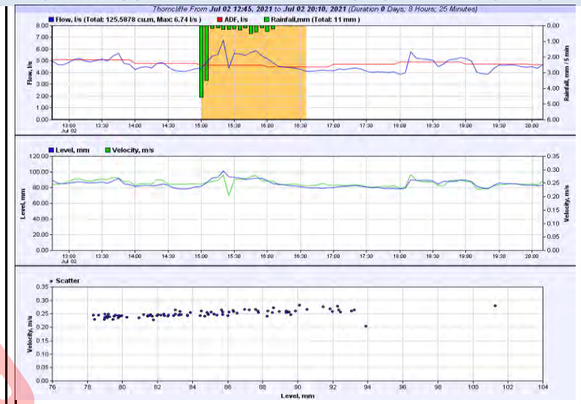
Comments

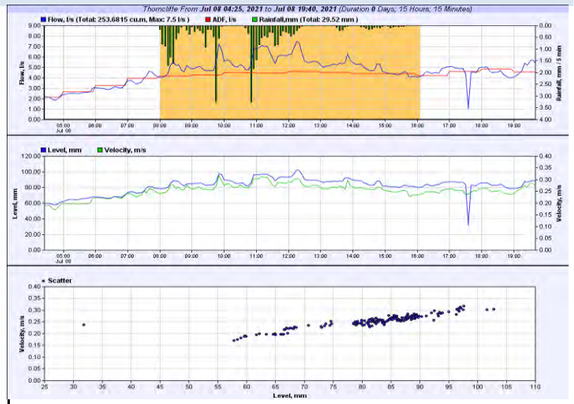
In general, data quality is good during wet weather conditions. Maximum recorded depth reached 31% of the pipe diameter during the June 29 event.

WWF Event 1			**WWF Event 2**			**WWF Event 3**		
Date	June 29, 2021	Storm ID	Date	July 2, 2021	Storm ID	Date	July 8, 2021	Storm ID
Duration	7.2 hrs	48	Duration	1.6 hrs	49	Duration	8.1 hrs	50
Rain	21.1 mm	RG ID	Rain	11.0 mm	RG ID	Rain	29.5 mm	RG ID
I_{peak}	56.6 mm/hr	RG-018	I_{peak}	54.9 mm/hr	RG-018	I_{peak}	39.0 mm/hr	RG-018
Rain Volume	1,386 m^3		Rain Volume	722 m^3		Rain Volume	1,937 m^3	
Prior 24hrs	0 mm		Prior 24hrs	1.5 mm		Prior 24hrs	0.5 mm	

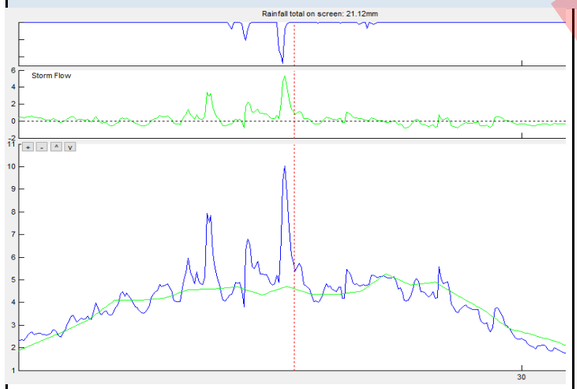
SFM HYDROGRAPH REVIEW AND DEFINITION OF RAINFALL DURATION

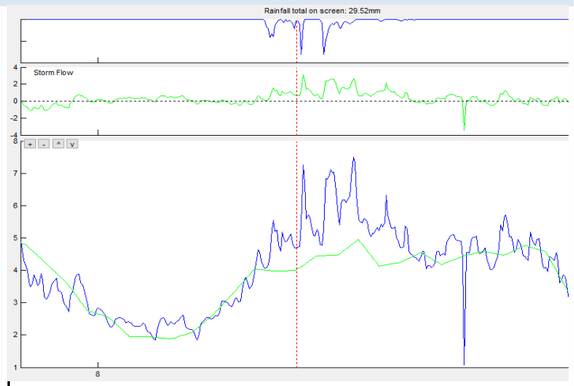






STORM TOOLBOX - I/I ANALYSIS BY SCREEN





		Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)
	Total WWF	362.8	10.01	6.751	24.29
Data from "I/I	**I/I ("Storm")**	17.9	5.326	2.132	7.672
Analysis by Screen"	**Sewage ("Daily")**	344.9	5.261	5.112	18.4
	R-Factor & Unit Rate	1.3%	0.81	L/s/ha	

	Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)
	243.3	6.737	5.498	19.79
	1.722	2.315	1.088	3.914
	241.5	4.855	4.804	17.29
	0.2%	0.35	L/s/ha	

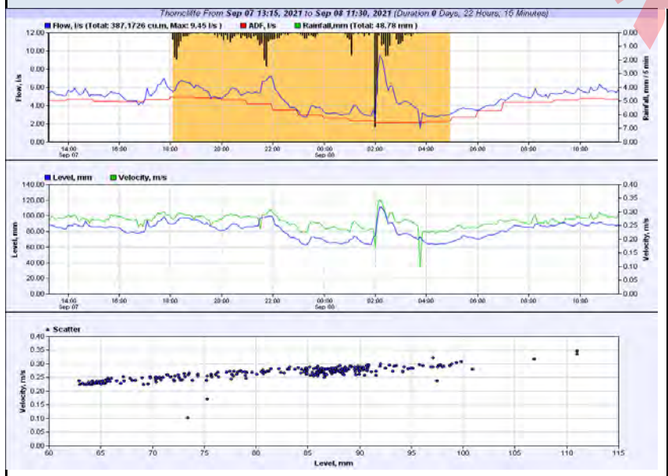
	Total (m^3)	Qp Instantaneous (L/s)	Qp 1-hr (L/s)	Qp 1-hr (m^3)
	358.8	7.503	6.489	23.25
	28.11	2.578	1.927	6.819
	330.7	5.156	5.011	18.04
	1.5%	0.39	L/s/ha	

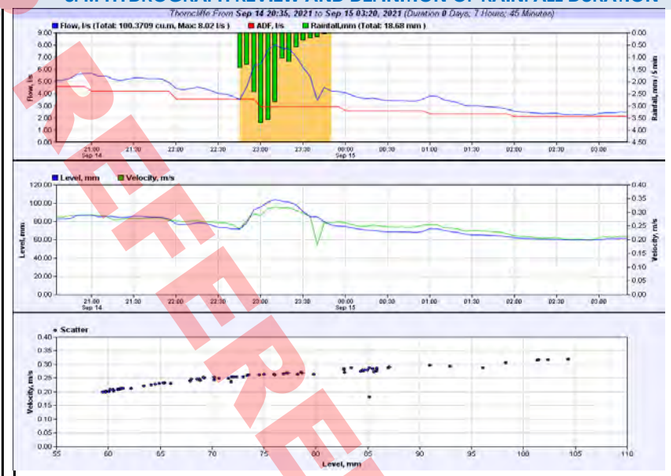
160560009 - Ontario Line TA

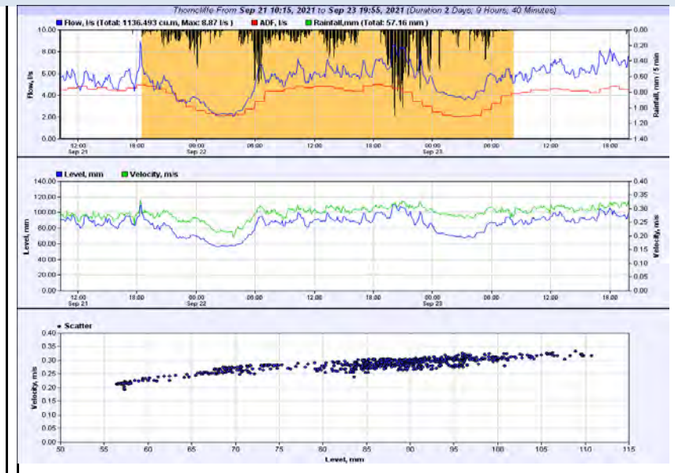
Detailed Wet Weather Flow Hydrograph Separation

	WWF Event 4		WWF Event 5		WWF Event 6	
Date	September 7, 2021	Storm ID	September 14, 2021	Storm ID	September 21, 2021	Storm ID
Duration	10.8 hrs	56	1.1 hrs	57	37.67 hrs	58
Rain	48.8 mm	RG ID	18.7 mm	RG ID	57.03 mm	RG ID
I_{peak}	82.7 mm/hr	RG-018	44.2 mm/hr	RG-018	13.12 mm/hr	RG-018
Rain Volume	3,200 m^3		1,226 m^3		3,742 m^3	
Prior 24hrs	2 mm		0 mm		0 mm	

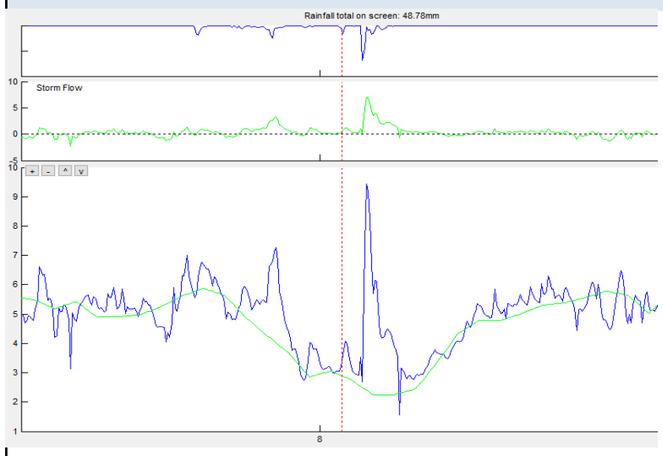
SFM HYDROGRAPH REVIEW AND DEFINITION OF RAINFALL DURATION

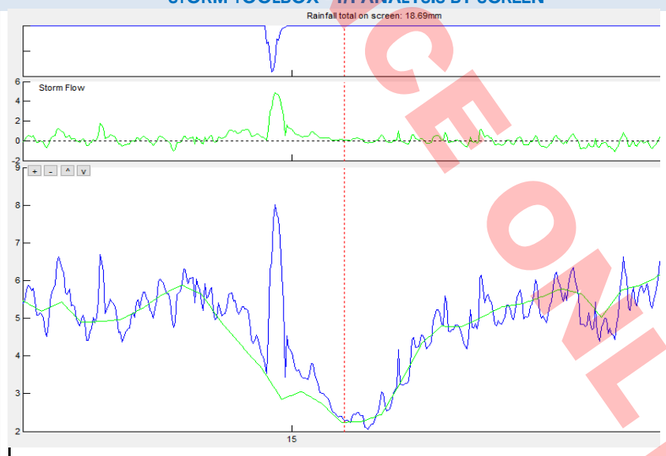


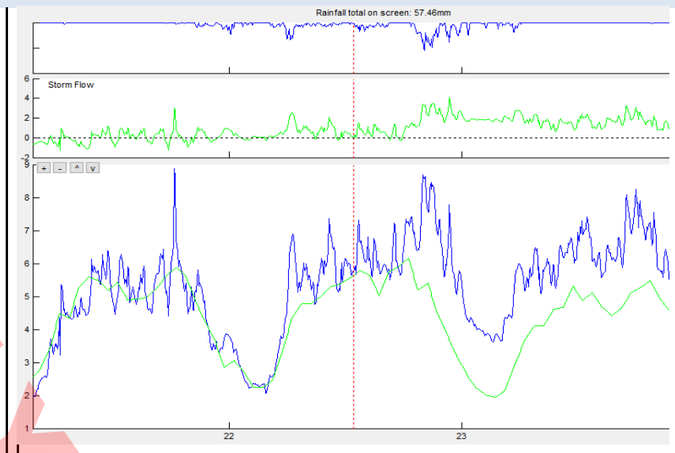




STORM TOOLBOX - I/I ANALYSIS BY SCREEN







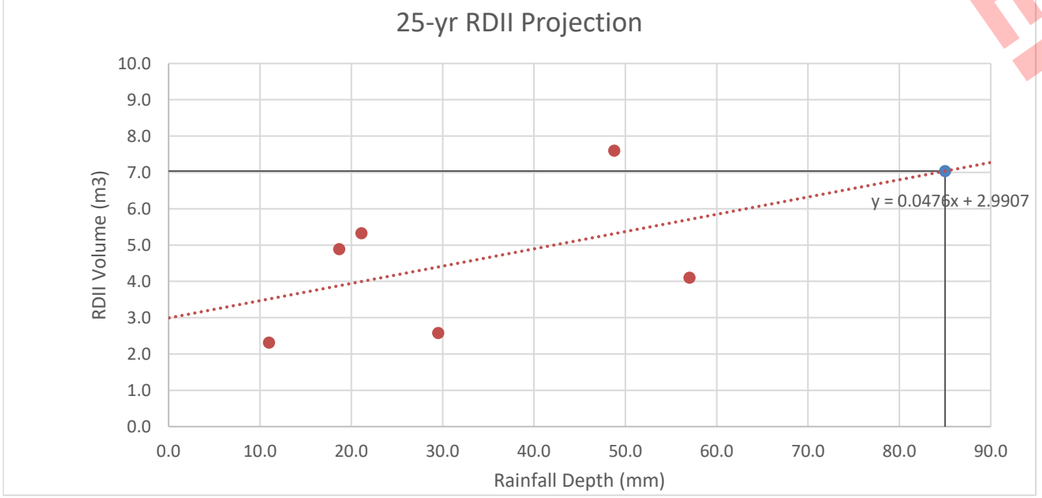
	WWF Event 4 Total (m^3)	WWF Event 4 Qp Instantaneous (L/s)	WWF Event 4 Qp 1-hr (L/s)	WWF Event 4 Qp 1-hr (m^3)	WWF Event 5 Total (m^3)	WWF Event 5 Qp Instantaneous (L/s)	WWF Event 5 Qp 1-hr (L/s)	WWF Event 5 Qp 1-hr (m^3)	WWF Event 6 Total (m^3)	WWF Event 6 Qp Instantaneous (L/s)	WWF Event 6 Qp 1-hr (L/s)	WWF Event 6 Qp 1-hr (m^3)
Total WWF	461.5	9.45	6.391	22.94	260.4	8.016	6.244	22.43	1271	8.867	8.217	29.54
I/I ("Storm")	97.74	7.596	4.572	16.21	23.67	4.886	3.187	11.45	220.2	4.1	3.037	10.92
Sewage ("Daily")	363.7	5.077	4.572	18.2	236.8	5.87	5.81	20.92	1051	6.161	6.056	21.8
R-Factor & Unit Rate	3.1%	1.16 L/s/ha			1.9%	0.74 L/s/ha			5.9%	0.62 L/s/ha		

160560009 - Ontario Line TA

RDII vs Rainfall Summary

Monitor OLTA-19

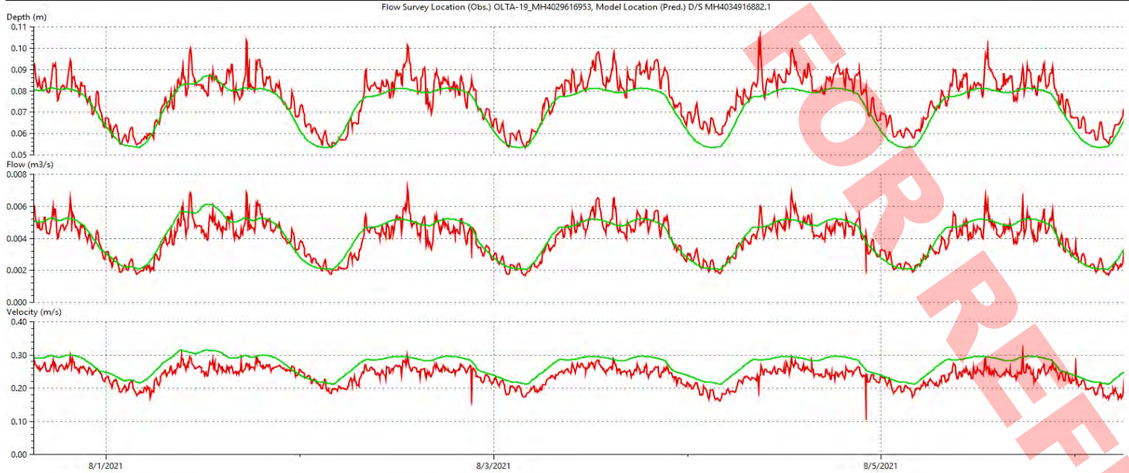
Rainfall Event	Total Rainfall (mm)	Peak Rainfall Intensity (mm/hr)	Average Monthly DWF (L/s)	Peak Inst. Total Flow (L/s)	Peak Inst. RDII (L/s)	Peak Inst. RDII Rate (L/s/ha)	Peaking Factor	RDII Volume(m3)	R-Factor (%)
June 29, 2021	21.1	56.6	3.8	10.0	5.3	0.81	2.7	17.9	1.3
July 2, 2021	11.0	54.9	3.8	6.7	2.3	0.35	1.8	1.7	0.2
July 8, 2021	29.5	39.0	4.0	7.5	2.6	0.39	1.9	28.1	1.5
September 7, 2021	48.8	82.7	4.0	9.5	7.6	1.16	2.4	97.7	3.1
September 14, 2021	18.7	44.2	4.1	8.0	4.9	0.74	2.0	23.7	1.9
September 21, 2021	57.0	13.1	4.1	8.9	4.1	0.62	2.2	220.2	5.9
Projected using y=0.0476x+2.9907	85.0				7.0	1.07			



APPENDIX B MODEL CALIBRATION RESULTS

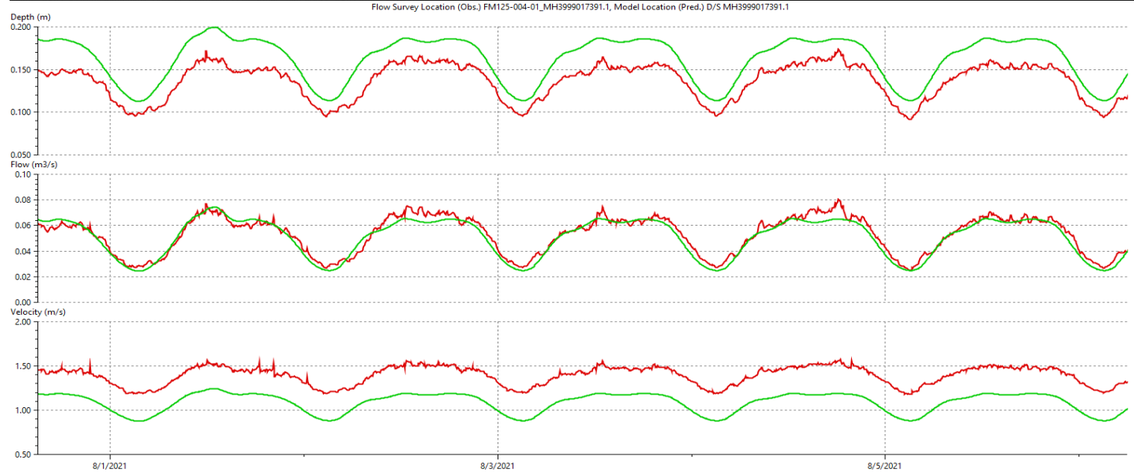
Model Calibration Observed-vs-Predicted Results , DWF-1

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:05:14 PM) Page 1 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>DWF (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_DWF_Trial2>OMSF_calib_RTK2 DWF (7/7/2022 3:04:30 PM)



	Depth		Flow			Velocity	
	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Observed	0.053	0.105	0.002	0.007	1906.926	0.123	0.309
...Trial2>OMSF_calib_RTK2 DWF	0.053	0.087	0.002	0.006	1991.593	0.212	0.315

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:05:14 PM) Page 2 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>DWF (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_DWF_Trial2>OMSF_calib_RTK2 DWF (7/7/2022 3:04:30 PM)



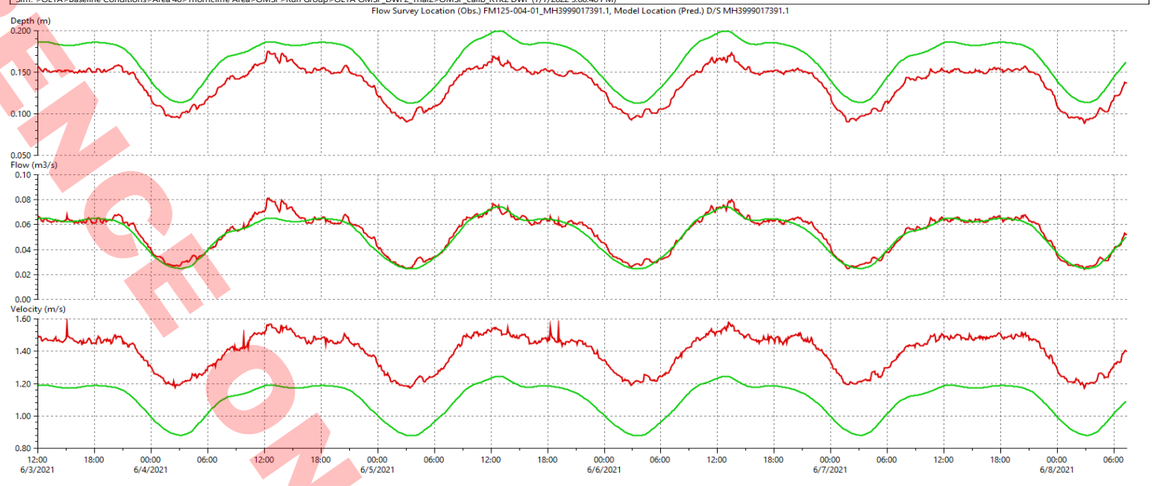
	Depth		Flow			Velocity	
	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Observed	0.091	0.174	0.025	0.081	25739.329	1.182	1.572
...Trial2>OMSF_calib_RTK2 DWF	0.113	0.200	0.025	0.074	24667.280	0.877	1.244

DWF-2

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:06:20 PM) Page 1 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>DWF_2 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_DWF2_Trial2>OMSF_calib_RTK2 DWF (7/7/2022 5:00:40 PM)

	Depth		Flow			Velocity	
	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Observed	0.056	0.098	0.002	0.006	1531.919	0.143	0.277
...Trial2>OMSF_calib_RTK2 DWF	0.053	0.087	0.002	0.006	1729.404	0.212	0.315

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:06:20 PM) Page 2 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>DWF_2 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_DWF2_Trial2>OMSF_calib_RTK2 DWF (7/7/2022 5:00:40 PM)



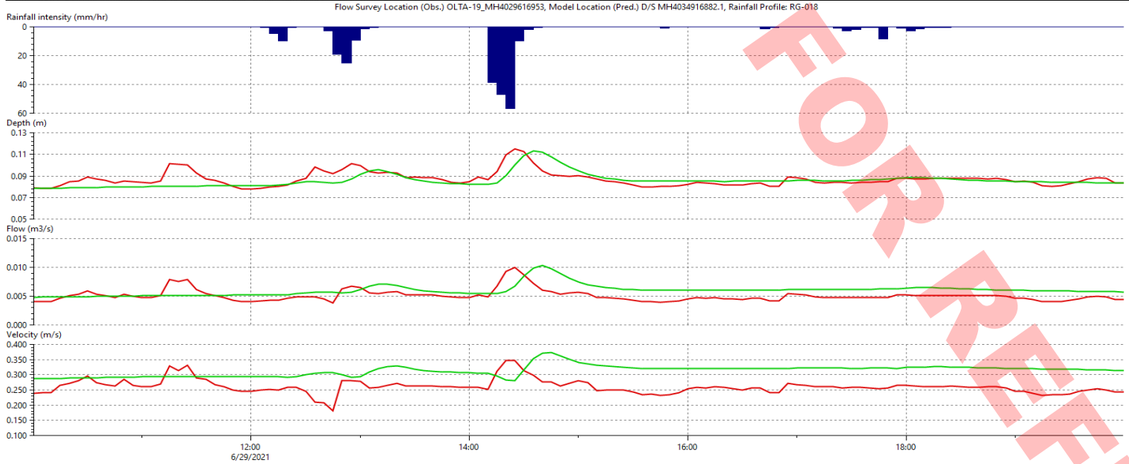
	Depth		Flow			Velocity	
	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Observed	0.089	0.175	0.024	0.081	21942.623	1.174	1.578
...Trial2>OMSF_calib_RTK2 DWF	0.113	0.200	0.025	0.074	21227.703	0.877	1.244

Ontario Line - Overlea AW Sewer Capacity Analysis for Stage
1 SDA Model Calibration Observed-vs-Predicted Results

WWF-1

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:11:34 PM) Page 1 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>Event_1 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_Event1_Trial2!>OMSF_calib_RTK2 RG-018 (7/7/2022 3:11:21 PM)

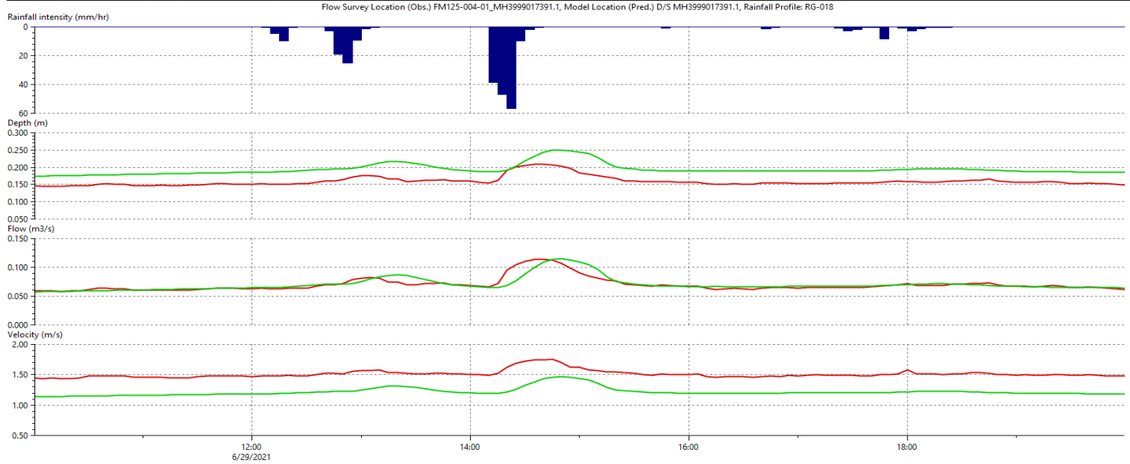
Flow Survey Location (Obs.) OLTA-19_MH4029616953, Model Location (Pred.) D/S MH4034916882.1, Rainfall Profile: RG-018



	Rainfall			Depth		Flow			Velocity	
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Rain	21.120	56.556	2.130							
Observed				0.078	0.115	0.004	0.010	183.904	0.182	0.347
...SF_calib_RTK2 RG-018				0.079	0.113	0.005	0.010	216.039	0.282	0.373

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:11:34 PM) Page 2 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>Event_1 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_Event1_Trial2!>OMSF_calib_RTK2 RG-018 (7/7/2022 3:11:21 PM)

Flow Survey Location (Obs.) FM125-004-01_MH3999017391.1, Model Location (Pred.) D/S MH3999017391.1, Rainfall Profile: RG-018

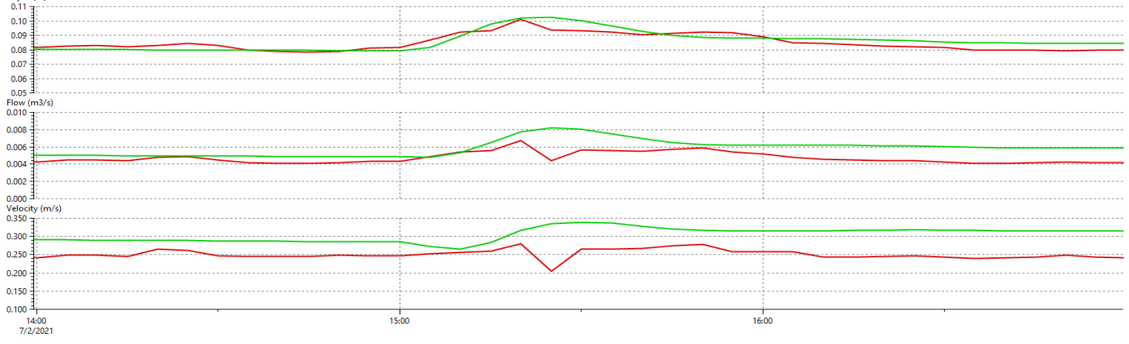


	Rainfall			Depth		Flow			Velocity	
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Rain	21.120	56.556	2.130							
Observed				0.145	0.209	0.058	0.114	2513.668	1.441	1.755
...SF_calib_RTK2 RG-018				0.175	0.250	0.058	0.115	2538.500	1.142	1.469

WWF-2

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:07:11 PM) Page 1 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>Event_2 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_Event2_Trial2!>OMSF_calib_RTK2 RG-018 (7/7/2022 3:13:54 PM)

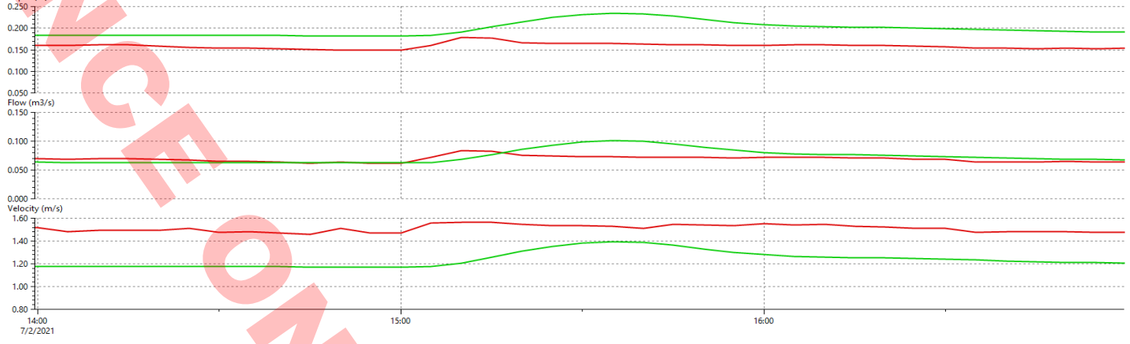
Flow Survey Location (Obs.) OLTA-19_MH4029616953, Model Location (Pred.) D/S MH4034916882.1, Rainfall Profile: RG-018



	Rainfall			Depth		Flow			Velocity	
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Rain	11.002	54.888	3.667							
Observed				0.078	0.101	0.004	0.007	51.306	0.204	0.280
...SF_calib_RTK2 RG-018				0.079	0.103	0.005	0.008	63.475	0.265	0.340

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:07:11 PM) Page 2 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>Event_2 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_Event2_Trial2!>OMSF_calib_RTK2 RG-018 (7/7/2022 3:13:54 PM)

Flow Survey Location (Obs.) FM125-004-01_MH3999017391.1, Model Location (Pred.) D/S MH3999017391.1, Rainfall Profile: RG-018

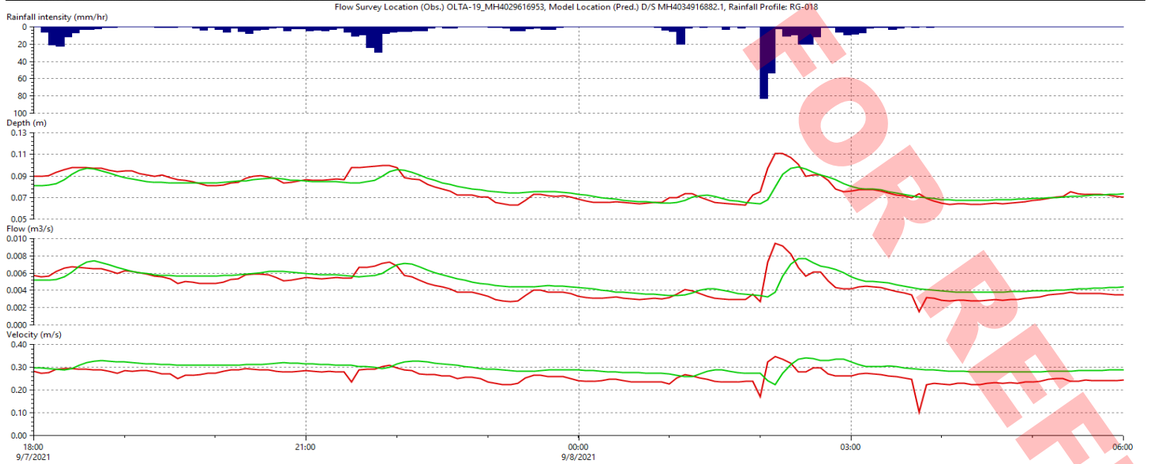


	Rainfall			Depth		Flow			Velocity	
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Rain	11.002	54.888	3.667							
Observed				0.149	0.178	0.062	0.083	748.292	1.460	1.567
...SF_calib_RTK2 RG-018				0.182	0.234	0.062	0.101	798.853	1.172	1.393

Ontario Line - Overlea Sewer Capacity Analysis for Stage 1
SDA Model Calibration Observed-vs-Predicted Results

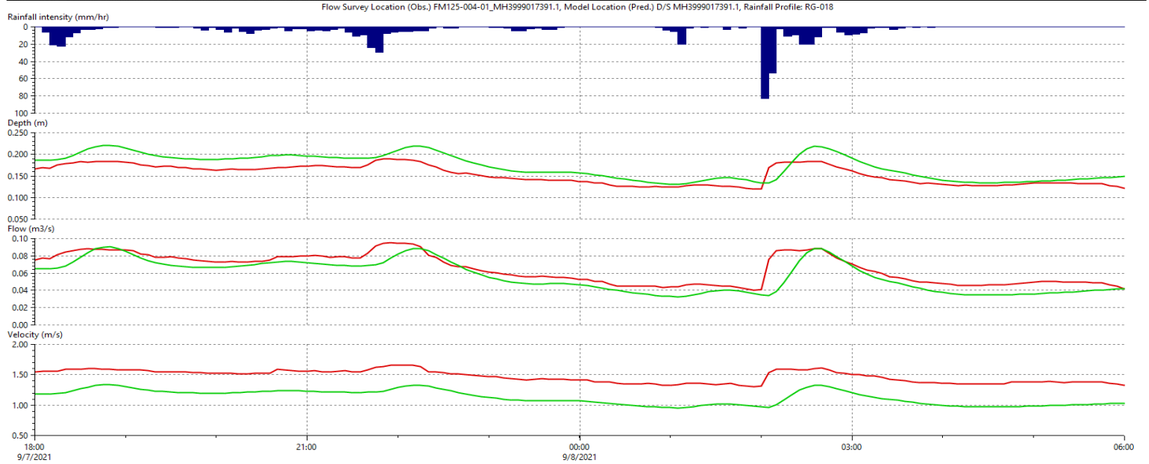
WWF-3

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:07:51 PM) Page 1 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>Event_3 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_Event3_Trial2!>OMSF_calib_RTK2 RG-018 (7/7/2022 3:13:07 PM)



	Rainfall			Depth		Flow			Velocity	
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Rain	48.784	82.668	4.065							
Observed				0.063	0.111	0.002	0.009	194.896	0.103	0.346
...SF_calib_RTK2 RG-018				0.064	0.098	0.003	0.008	218.385	0.222	0.343

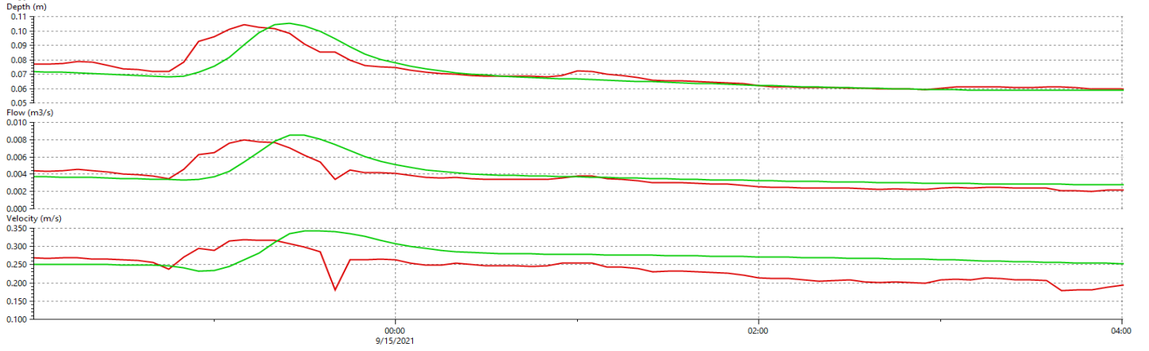
Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:07:51 PM) Page 2 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>Event_3 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_Event3_Trial2!>OMSF_calib_RTK2 RG-018 (7/7/2022 3:13:07 PM)



	Rainfall			Depth		Flow			Velocity	
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Rain	48.784	82.668	4.065							
Observed				0.120	0.190	0.041	0.095	2807.757	1.308	1.660
...SF_calib_RTK2 RG-018				0.131	0.221	0.033	0.090	2454.829	0.957	1.335

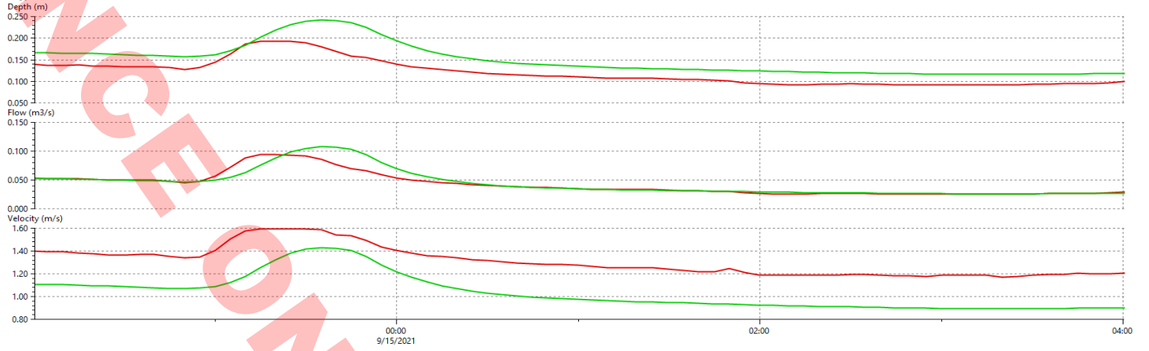
WWF-4

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:08:25 PM) Page 1 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>Event_4 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_Event4_Trial2!>OMSF_calib_RTK2 RG-018 (7/7/2022 3:14:58 PM)



	Rainfall			Depth		Flow			Velocity	
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Rain	18.685	44.232	3.114							
Observed				0.059	0.104	0.002	0.008	78.397	0.179	0.319
...SF_calib_RTK2 RG-018				0.059	0.105	0.003	0.008	85.296	0.232	0.343

Observed / Predicted Report Produced by nfotouhi (7/7/2022 9:08:25 PM) Page 2 of 2
Flow survey: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>Flow Survey Group>Event_4 (6/11/2022 1:17:37 AM)
Sim: >OLTA>Baseline Conditions>Area 46>Thorncliffe Area>OMSF>Run Group>OLTA OMSF_Event4_Trial2!>OMSF_calib_RTK2 RG-018 (7/7/2022 3:14:58 PM)

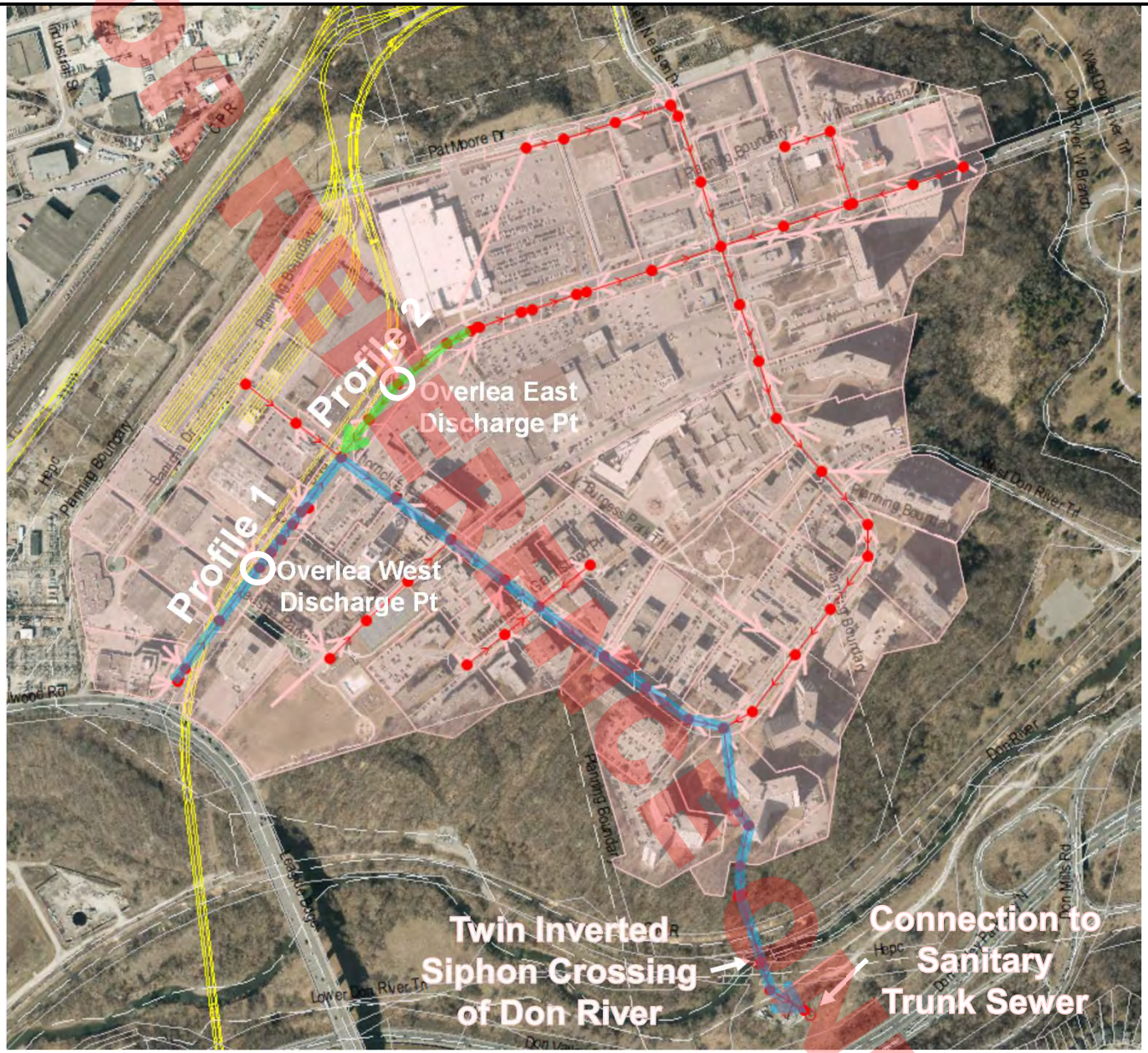


	Rainfall			Depth		Flow			Velocity	
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (m)	Max (m)	Min (m3/s)	Max (m3/s)	Volume (m3)	Min (m/s)	Max (m/s)
Rain	18.685	44.232	3.114							
Observed				0.091	0.193	0.025	0.094	917.877	1.173	1.597
...SF_calib_RTK2 RG-018				0.116	0.242	0.026	0.108	961.204	0.892	1.429

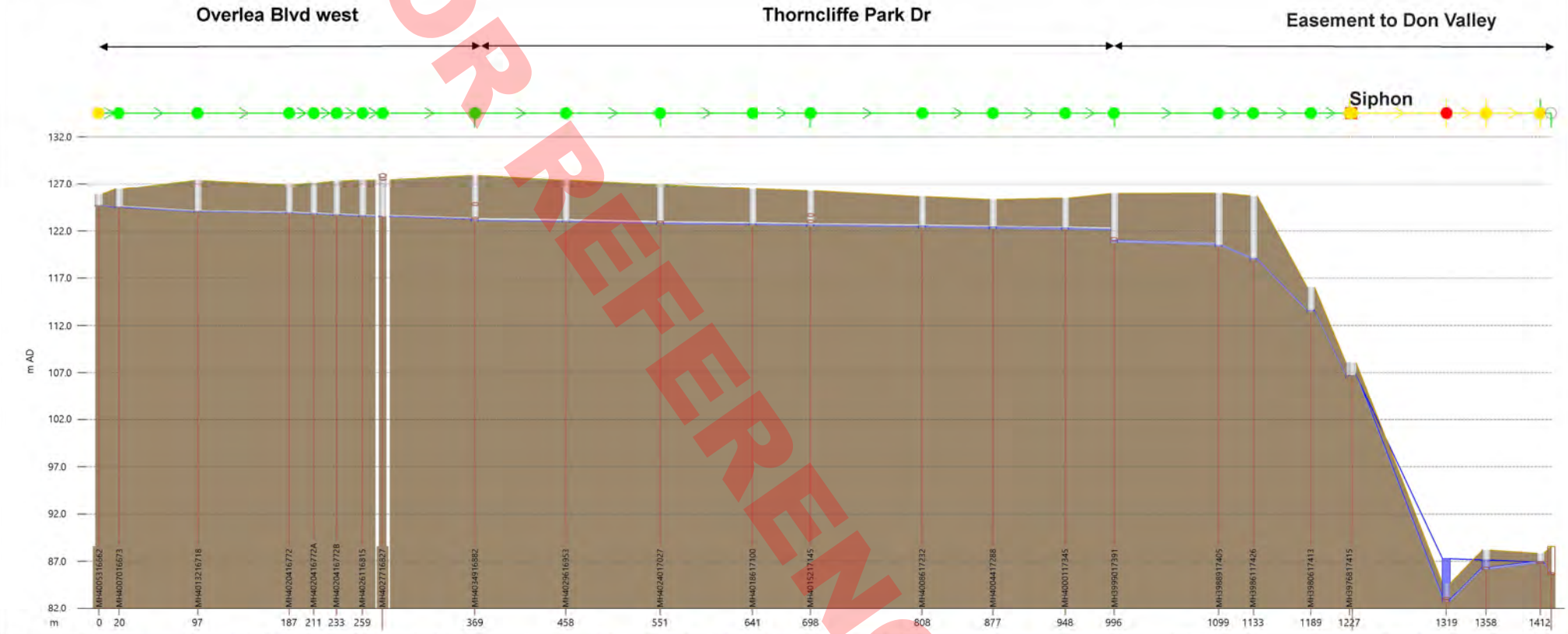
APPENDIX C MODEL SIMULATION RESULTS

Ontario Line – Overlea AW
Sanitary Sewer Downstream Analysis

Model Results Summary
November 2022



Stantec	Ontario Line – Overlea Sanitary Sewer Analysis Appendix C InfoWorks Model Results	SCENARIO: All Scenarios RESULT: Plan View LOCATION: Overlea	Date: November 2022	Figure: Page: 2



Link	-	-	MH4013216718.1	-	-	-	-	MH4027716827.1	MH4034916882.1	MH4029616953.1	MH4024017027.1	-	MH4015217145.1	-	-	-	MH3999017391.1	-	-	-	JP103567.1	-	-	-
System type	-	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	-	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	-	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	-
length (m)	-	77.2	89.6	23.9	22.5	25.5	-	90.6	89.4	92.6	90.6	56.8	109.5	69.5	71.1	48.0	102.6	34.0	56.4	38.0	92.0	39.0	53.3	-
Shape ID	-	CIRC	CIRC	CIRC	-	CIRC	-	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	-
width (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	-
height (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	-
us inv (m AD)	-	124.462	123.983	-	-	-	-	123.474	123.023	122.911	122.703	122.609	122.487	122.353	122.213	122.130	120.744	-	118.921	113.456	106.680	82.693	86.106	-
ds inv (m AD)	-	123.983	123.849	-	-	-	-	123.203	122.911	122.728	122.609	122.502	122.353	122.213	122.130	122.033	120.450	-	113.456	106.619	82.906	86.106	86.761	-
grad (m/m)	-	0.00620	0.00150	-	-	-	-	0.00299	0.00125	0.00198	0.00104	0.00188	0.00122	0.00201	0.00117	0.00202	0.00287	-	0.09687	0.17996	0.25842	-	-0.01228	-
pfc (m3/s)	-	0.047	0.021	-	-	-	-	0.030	0.058	0.078	0.056	0.076	0.061	0.079	0.060	0.079	0.087	0.170	0.172	0.252	0.302	-0.176	-0.066	-
surc	-	0.21	0.21	0.17	0.17	0.20	-	0.20	0.23	0.26	0.33	0.37	0.41	0.48	0.48	0.44	0.71	0.48	0.48	0.39	1.00	1.00	1.00	-
DS flow (m3/s)	-	0.00151	0.00176	-	-	-	-	0.00225	0.00610	0.00891	0.01273	0.01449	0.02133	0.02147	0.02811	0.03197	0.07437	-	0.07437	0.07437	-0.00003	0.03724	0.03718	-
Node	-	-	MH4013216718	-	-	-	-	-	MH4034916882	MH4029616953	MH4024017027	-	MH4015217145	MH4008617232	-	-	-	-	-	-	-	-	-	-
ground (m AD)	-	126.432	127.364	126.910	-	-	-	127.443	127.917	127.394	126.925	126.469	126.258	125.627	125.314	125.469	125.940	125.990	125.704	116.041	-	108.039	84.617	88.178	-
exprHGL	-	-	3.328539	3.017803	-	-	-	3.918410	4.810158	4.395976	4.099385	3.746908	3.616475	3.137628	2.921079	3.175093	4.916837	5.546747	-	-	-	-2.648144	-	-	-

LEGEND

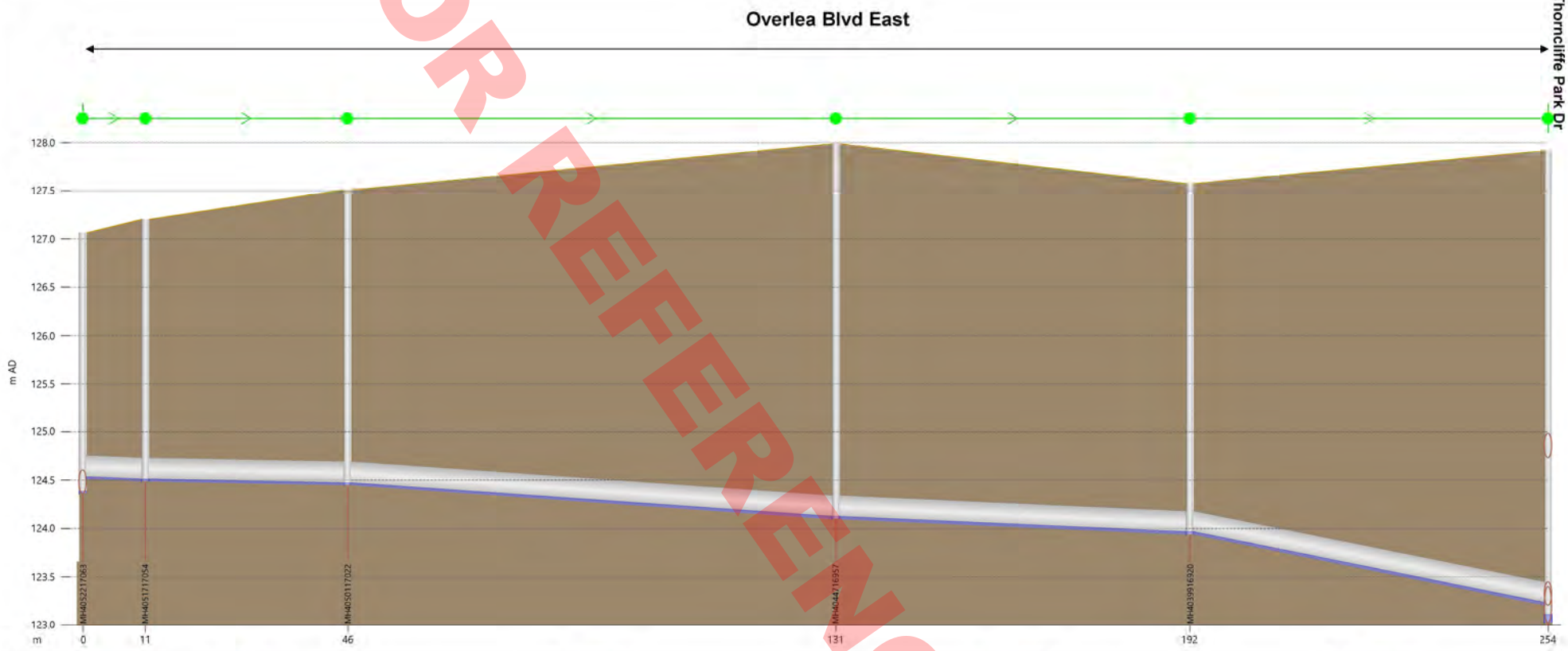
HGL Freeboard (m)

- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 1 (DWF) - Profile 1



Link	-	MH4051717054.1	MH4050117022.1	MH4044716957.1	MH4039916920.1
System type	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary
length (m)	10.8	35.0	84.7	61.4	62.1
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250
height (mm)	250	250	250	250	250
us inv (m AD)	124.511	124.486	124.447	124.096	123.935
ds inv (m AD)	124.486	124.447	124.096	123.935	123.203
grad (m/m)	0.00231	0.00111	0.00415	0.00262	0.01179
pfc (m3/s)	0.029	0.020	0.036	0.028	0.060
surc	0.09	0.09	0.11	0.12	0.12
DS flow (m3/s)	-0.00000	0.00008	0.00014	0.00027	0.00040

Node	-	MH4051717054	MH4050117022	MH4044716957	MH4039916920	MH4034916882
ground (m AD)		127.291	127.509	127.967	127.576	127.917
exprHGL	-	2.692180	3.039113	3.864594	3.612125	4.810158

LEGEND

HGL Freeboard (m)

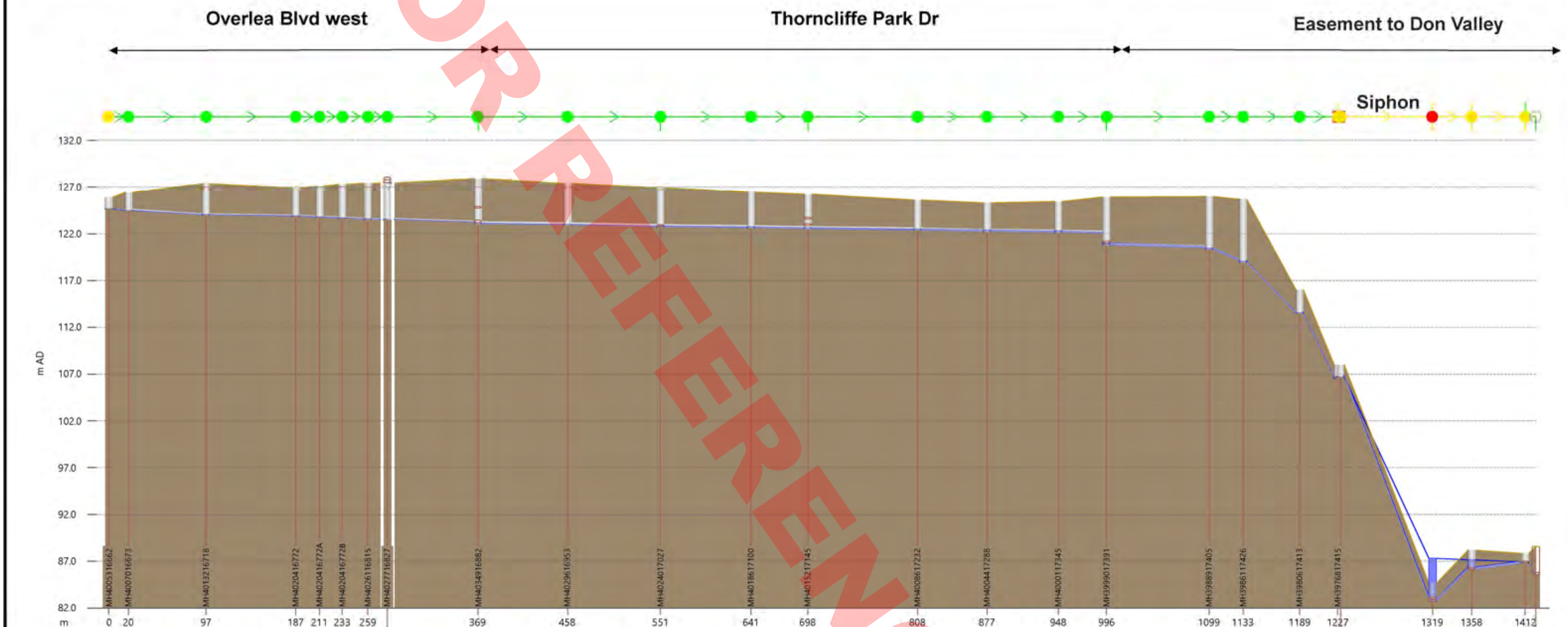
- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 1 (DWF) - Profile 2

Stantec	Ontario Line – Overlea Sanitary Sewer Analysis Appendix C InfoWorks Model Results	SCENARIO: Existing Conditions RESULT: DWF LOCATION: Overlea Blvd East	Date: November 2022
			Figure: Page: 4



Link	-	-	MH4013216718.1	-	-	-	-	MH4027716827.1	MH4034916882.1	MH4029616953.1	MH4024017027.1	-	MH4015217145.1	-	-	-	MH3999017391.1	-	-	-	JP103567.1	-	-	-
System type	-	Sanitary	Sanitary	-	-	-	-	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	-	Sanitary	-	Sanitary	Sanitary	Sanitary	-
length (m)	-	77.2	89.6	23.9	22.5	25.5	-	90.6	89.4	92.6	90.6	56.8	109.5	69.5	71.1	48.0	102.6	34.0	56.4	38.0	92.0	39.0	53.3	-
Shape ID	-	CIRC	CIRC	-	-	CIRC	-	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	-
width (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	-
height (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	-
us inv (m AD)	-	124.462	123.983	-	-	-	-	123.474	123.023	122.911	122.703	122.609	122.487	122.353	122.213	122.130	120.744	-	118.921	-	106.680	82.693	86.106	-
ds inv (m AD)	-	123.983	123.849	-	-	-	-	123.203	122.911	122.728	122.609	122.502	122.353	122.213	122.130	122.033	120.450	-	113.456	-	82.906	86.106	86.761	-
grad (m/m)	-	0.00620	0.00150	-	-	-	-	0.00299	0.00125	0.00198	0.00104	0.00188	0.00122	0.00201	0.00117	0.00202	0.00287	-	0.09687	-	0.25842	-	-0.01228	-
pfc (m3/s)	-	0.047	0.021	-	-	-	-	0.030	0.058	0.078	0.056	0.076	0.061	0.079	0.060	0.079	0.087	0.170	0.172	0.252	0.302	-0.176	-0.066	-
surc	-	0.33	0.33	0.25	0.25	0.29	-	0.29	0.27	0.29	0.36	0.40	0.44	0.50	0.50	0.46	0.72	0.49	0.49	0.39	1.00	1.00	1.00	-
DS flow (m3/s)	-	0.00151	0.00456	-	-	-	-	0.00505	0.00890	0.01171	0.01553	0.01729	0.02413	0.02428	0.03092	0.03477	0.07718	-	0.07717	-	-0.00002	0.03865	0.03859	-

Node	-	MH4013216718	-	-	-	-	-	MH4034916882	MH4029616953	MH4024017027	-	MH4015217145	MH4008617232	-	-	-	-	-	-	-	-	-	-	-
ground (m AD)	126.432	127.364	126.910	-	-	-	127.443	127.917	127.394	126.925	126.469	126.258	125.627	125.314	125.469	125.940	125.990	-	116.041	-	108.039	84.617	88.178	-
expr:HGL	-	3.299699	2.997466	-	-	-	3.897178	4.791817	4.382144	4.086972	3.734892	3.607571	3.127122	2.912099	3.167685	4.910848	5.543772	-	-	-	-	-2.678532	-	-

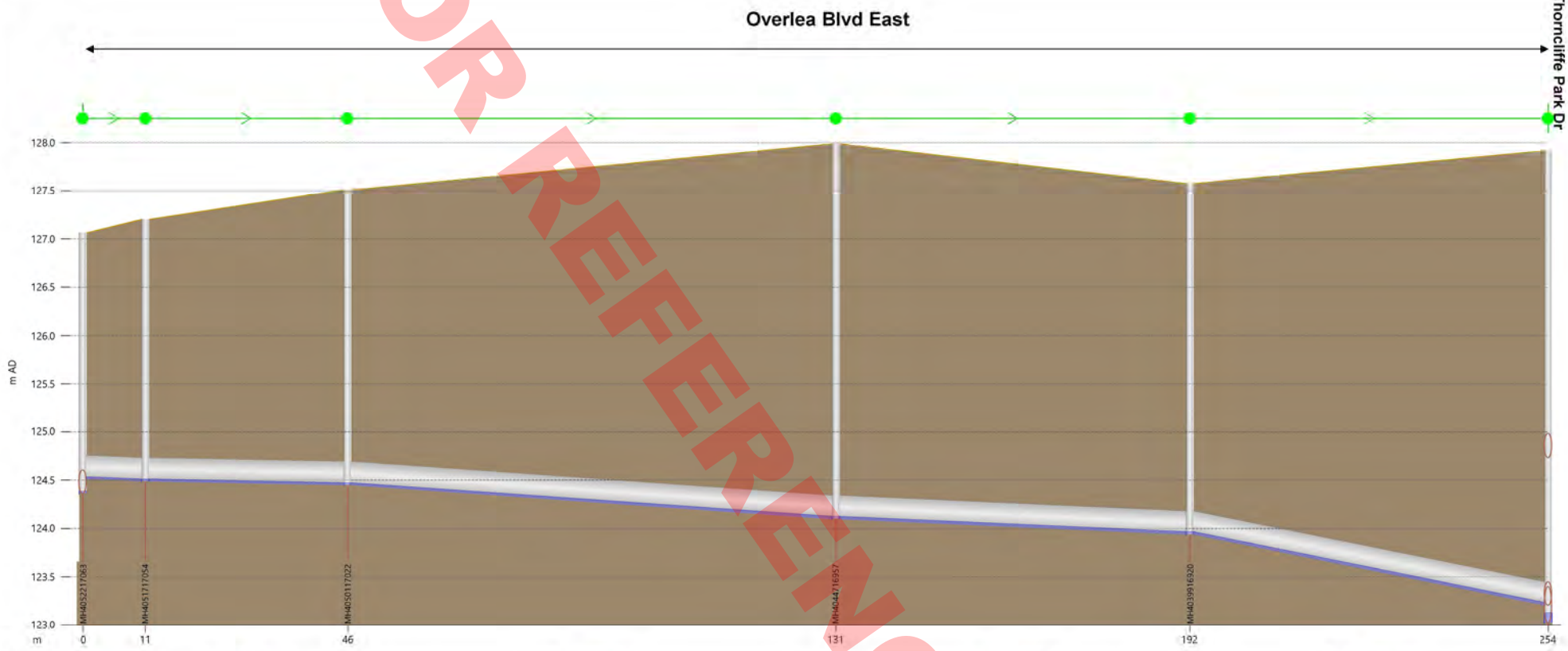
LEGEND

HGL Freeboard (m)
- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State
- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 2 (DWF + 2.8 L/s Overlea-West Dewatering) - Profile 1

Stantec	Ontario Line – Overlea Sanitary Sewer Analysis Appendix C InfoWorks Model Results	SCENARIO: Existing + Overlea West Dewatering RESULT: DWF LOCATION: Overlea Blvd West	Date: November 2022	Figure: Page: 5



Link	-	MH4051717054.1	MH4050117022.1	MH4044716957.1	MH4039916920.1
System type	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary
length (m)	10.8	35.0	84.7	61.4	62.1
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250
height (mm)	250	250	250	250	250
us inv (m AD)	124.511	124.486	124.447	124.096	123.935
ds inv (m AD)	124.486	124.447	124.096	123.935	123.203
grad (m/m)	0.00231	0.00111	0.00415	0.00262	0.01179
pfc (m3/s)	0.029	0.020	0.036	0.028	0.060
surc	0.09	0.09	0.11	0.12	0.12
DS flow (m3/s)	-0.00000	0.00008	0.00014	0.00027	0.00040
Node	-	MH4051717054	MH4050117022	MH4044716957	MH4039916920	MH4034916882
ground (m AD)	-	127.291	127.509	127.967	127.576	127.917
exprHGL	-	2.692180	3.039113	3.864594	3.612125	4.791817

LEGEND

HGL Freeboard (m)

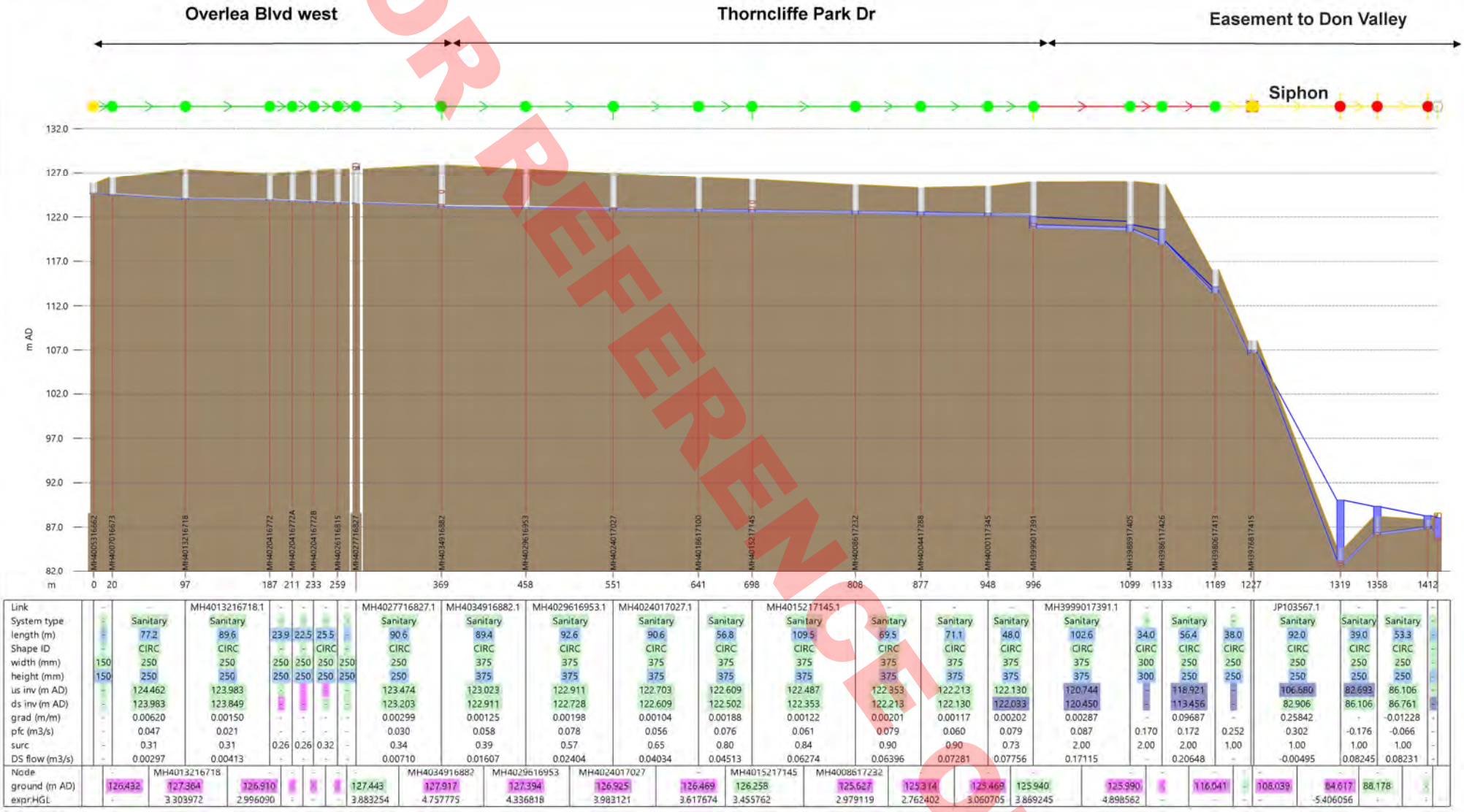
- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 2 (DWF + 2.8 L/s Overlea-West Dewatering) - Profile 2

Stantec	Ontario Line – Overlea Sanitary Sewer Analysis Appendix C InfoWorks Model Results	SCENARIO: Existing + Overlea West Dewatering RESULT: DWF LOCATION: Overlea Blvd East	Date: November 2022
			Figure: Page: 6



Link				MH4013216718.1					MH4027716827.1	MH4034916882.1	MH4029616953.1	MH4024017027.1		MH4015217145.1				MH3999017391.1				JP103567.1			
System type		Sanitary	Sanitary					Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary		Sanitary		Sanitary	Sanitary	Sanitary	
length (m)		77.2	89.6	23.9	22.5	25.5		90.6	89.4	92.6	90.6	56.8	109.5	69.5	71.1	48.0	102.6	34.0	56.4	38.0	92.0	39.0	53.3	
Shape ID		CIRC	CIRC			CIRC		CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	
width (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	
height (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	
us inv (m AD)		124.462	123.983					123.474	123.023	122.911	122.703	122.609	122.487	122.353	122.213	122.130	120.744		118.921		106.680	82.693	86.106	
ds inv (m AD)		123.983	123.849					123.203	122.911	122.728	122.609	122.502	122.353	122.213	122.130	122.033	120.450		113.456		82.906	86.106	86.761	
grad (m/m)		0.00620	0.00150					0.00299	0.00125	0.00198	0.00104	0.00188	0.00122	0.00201	0.00117	0.00202	0.00287		0.09687		0.25842		-0.01228	
pfc (m3/s)		0.047	0.021					0.030	0.058	0.078	0.056	0.076	0.061	0.079	0.060	0.079	0.087	0.170	0.172	0.252	0.302	-0.176	-0.066	
surc		0.31	0.31	0.26	0.26	0.32		0.34	0.39	0.57	0.65	0.80	0.84	0.90	0.90	0.73	2.00	2.00	2.00	1.00	1.00	1.00	1.00	
DS flow (m3/s)		0.00297	0.00413					0.00710	0.01607	0.02404	0.04034	0.04513	0.06274	0.06396	0.07281	0.07756	0.17115		0.20648		-0.00495	0.08245	0.08231	
Node			MH4013216718						MH4034916882	MH4029616953	MH4024017027		MH4015217145	MH4008617232											
ground (m AD)		126.432	127.364	126.910				127.443	127.917	127.394	126.925	126.469	126.258	125.627	125.314	125.469	125.940	125.990		116.041		108.039	84.617	88.178	
exprHGL			3.303972	2.996090				3.883254	4.757775	4.336818	3.983121	3.617674	3.455762	2.979119	2.762402	3.060705	3.869245	4.898562					-5.406056		

LEGEND

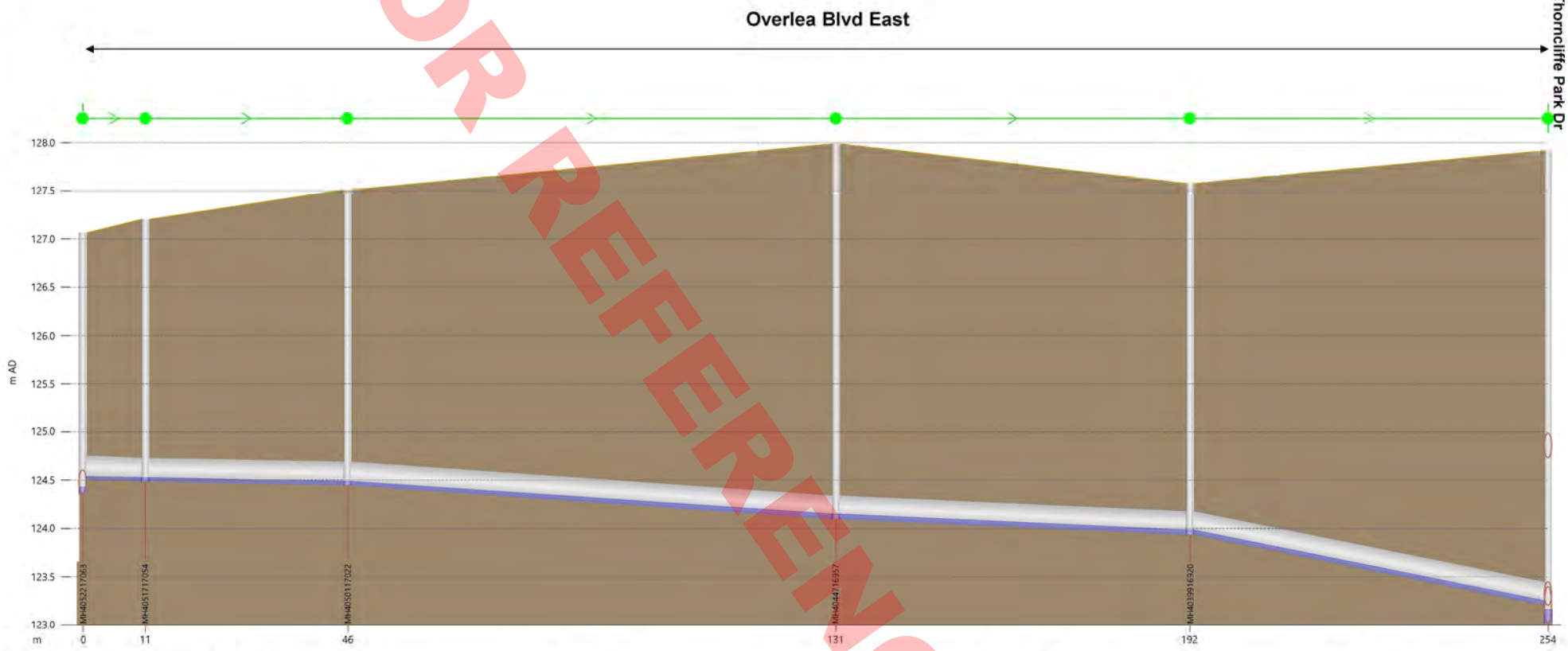
HGL Freeboard (m)

- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 3 (Ex. WWF May 12, 2000) - Profile 1



Link	-	MH4051717054.1	MH4050117022.1	MH4044716957.1	MH4039916920.1
System type	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary
length (m)	10.8	35.0	84.7	61.4	62.1
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250
height (mm)	250	250	250	250	250
us inv (m AD)	124.511	124.486	124.447	124.096	123.935
ds inv (m AD)	124.486	124.447	124.096	123.935	123.203
grad (m/m)	0.00231	0.00111	0.00415	0.00262	0.01179
pfc (m3/s)	0.029	0.020	0.036	0.028	0.060
surc	0.15	0.15	0.20	0.20	0.18
DS flow (m3/s)	-0.00002	0.00064	0.00119	0.00216	0.00313

Node	-	MH4051717054	MH4050117022	MH4044716957	MH4039916920	MH4034916882
ground (m AD)		127.291	127.509	127.967	127.576	127.917
exprHGL	-	2.678669	3.025357	3.839928	3.594921	4.757775

LEGEND

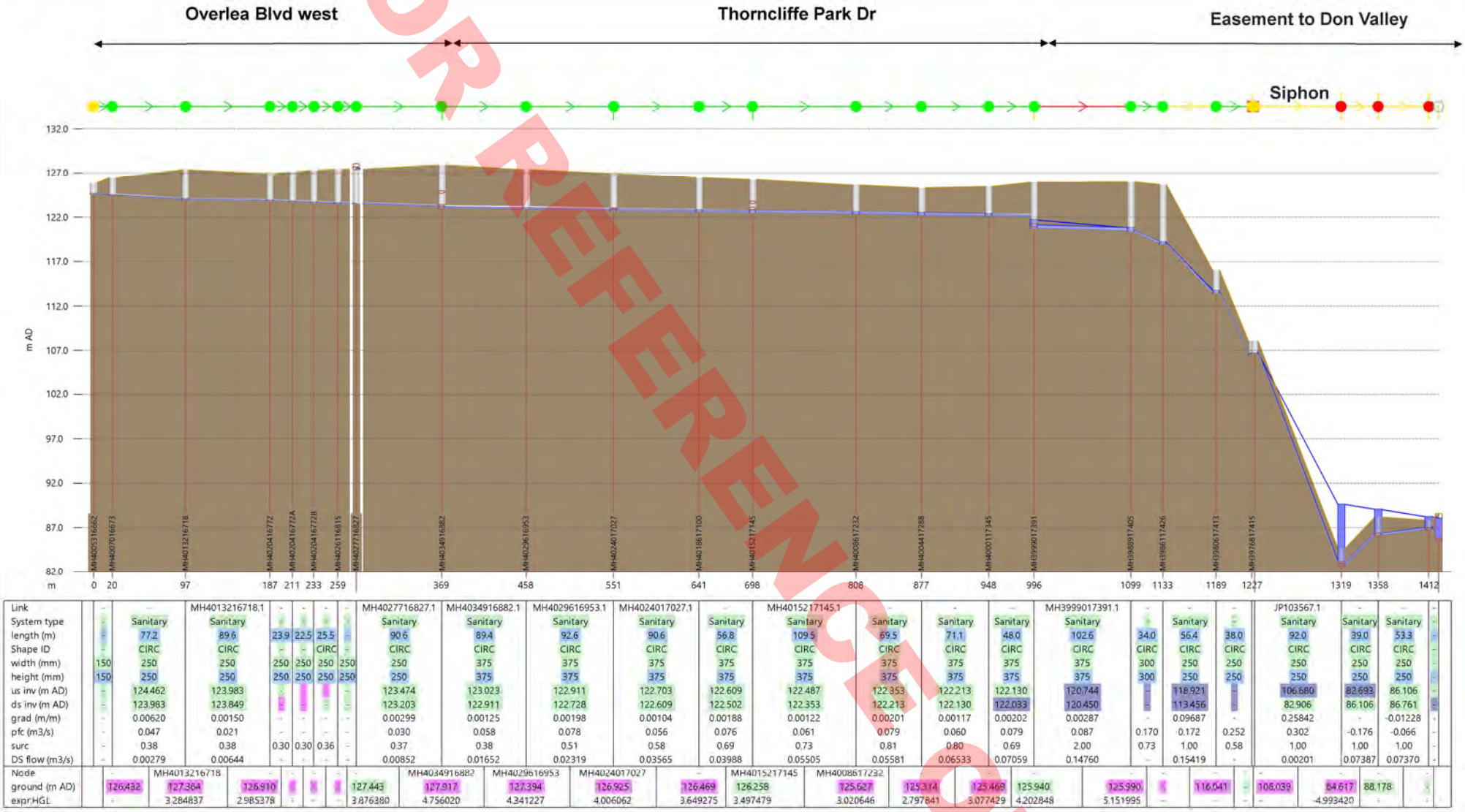
HGL Freeboard (m)

< 0	Above Surface
>= 0	Within Basements
>= 1.8	No Flood Risk

Pipe Surcharge State

< 1	No Surcharge
>= 1	Backwater
>= 2	Bottleneck

Scenario 3 (Ex. WWF May 12, 2000) - Profile 2



Link	-	-	MH4013216718.1	-	-	-	-	MH4027716827.1	MH4034916882.1	MH4029616953.1	MH4024017027.1	-	MH4015217145.1	-	-	-	-	MH3999017391.1	-	-	-	JP103567.1	-	-	-
System type	-	Sanitary	Sanitary	-	-	-	-	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	-	Sanitary	Sanitary	-	-	Sanitary	Sanitary	Sanitary	-
length (m)	-	77.2	89.6	23.9	22.5	25.5	-	90.6	89.4	92.6	90.6	56.8	109.5	69.5	71.1	48.0	102.6	34.0	56.4	38.0	92.0	39.0	53.3	-
Shape ID	-	CIRC	CIRC	-	-	CIRC	-	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	-
width (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	-
height (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	-
us inv (m AD)	-	124.462	123.983	-	-	-	-	123.474	123.023	122.911	122.703	122.609	122.487	122.353	122.213	122.130	120.744	-	118.921	-	106.680	82.693	86.106	-
ds inv (m AD)	-	123.983	123.849	-	-	-	-	123.203	122.911	122.728	122.609	122.502	122.353	122.213	122.130	122.033	120.450	-	113.456	-	82.906	86.106	86.761	-
grad (m/m)	-	0.00620	0.00150	-	-	-	-	0.00299	0.00125	0.00198	0.00104	0.00188	0.00122	0.00201	0.00117	0.00202	0.00287	-	0.09687	-	0.25842	-	-0.01228	-
pfc (m3/s)	-	0.047	0.021	-	-	-	-	0.030	0.058	0.078	0.056	0.076	0.061	0.079	0.060	0.079	0.087	0.170	0.172	0.252	0.302	-0.176	-0.066	-
surc	-	0.38	0.38	0.30	0.30	0.36	-	0.37	0.38	0.51	0.58	0.69	0.73	0.81	0.80	0.69	2.00	0.73	1.00	0.58	1.00	1.00	1.00	-
DS flow (m3/s)	-	0.00279	0.00644	-	-	-	-	0.00852	0.01652	0.02319	0.03565	0.03988	0.05505	0.05581	0.06533	0.07059	0.14760	-	0.15419	-	0.00201	0.07387	0.07370	-
Node	-	-	MH4013216718	-	-	-	-	-	MH4034916882	MH4029616953	MH4024017027	-	MH4015217145	MH4008617232	-	-	-	-	-	-	-	-	-	-	-
ground (m AD)	-	126.432	127.364	126.910	-	-	-	127.443	127.917	127.394	126.925	126.469	126.258	125.627	125.314	125.469	125.940	125.990	-	116.041	-	108.039	84.617	88.178	-
exprHGL	-	-	3.284837	2.985378	-	-	-	3.876380	4.756020	4.341227	4.006062	3.649275	3.497479	3.020646	2.797841	3.077429	4.202848	5.151995	-	-	-	-	-4.993420	-	-	-

LEGEND

HGL Freeboard (m)

- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 4 (2yr WWF + 2.8 L/s Overlea West Dewatering) - Profile 1

Stantec	Ontario Line – Overlea Sanitary Sewer Analysis Appendix C InfoWorks Model Results	SCENARIO: Existing + Overlea West Dewatering RESULT: WWF LOCATION: Overlea Blvd West	Date: November 2022
			Figure: Page: 9

Link	-	MH4051717054.1	MH4050117022.1	MH4044716957.1	MH4039916920.1
System type	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary
length (m)	10.8	35.0	84.7	61.4	62.1
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250
height (mm)	250	250	250	250	250
us inv (m AD)	124.511	124.486	124.447	124.096	123.935
ds inv (m AD)	124.486	124.447	124.096	123.935	123.203
grad (m/m)	0.00231	0.00111	0.00415	0.00262	0.01179
pfc (m3/s)	0.029	0.020	0.036	0.028	0.060
surc	0.13	0.13	0.17	0.17	0.16
DS flow (m3/s)	-0.00001	0.00042	0.00078	0.00141	0.00204

Node	-	MH4051717054	MH4050117022	MH4044716957	MH4039916920	MH4034916882
ground (m AD)		127.291	127.509	127.967	127.576	127.917
exprHGL	-	2.682667	3.029454	3.848328	3.601581	4.756020

LEGEND

HGL Freeboard (m)

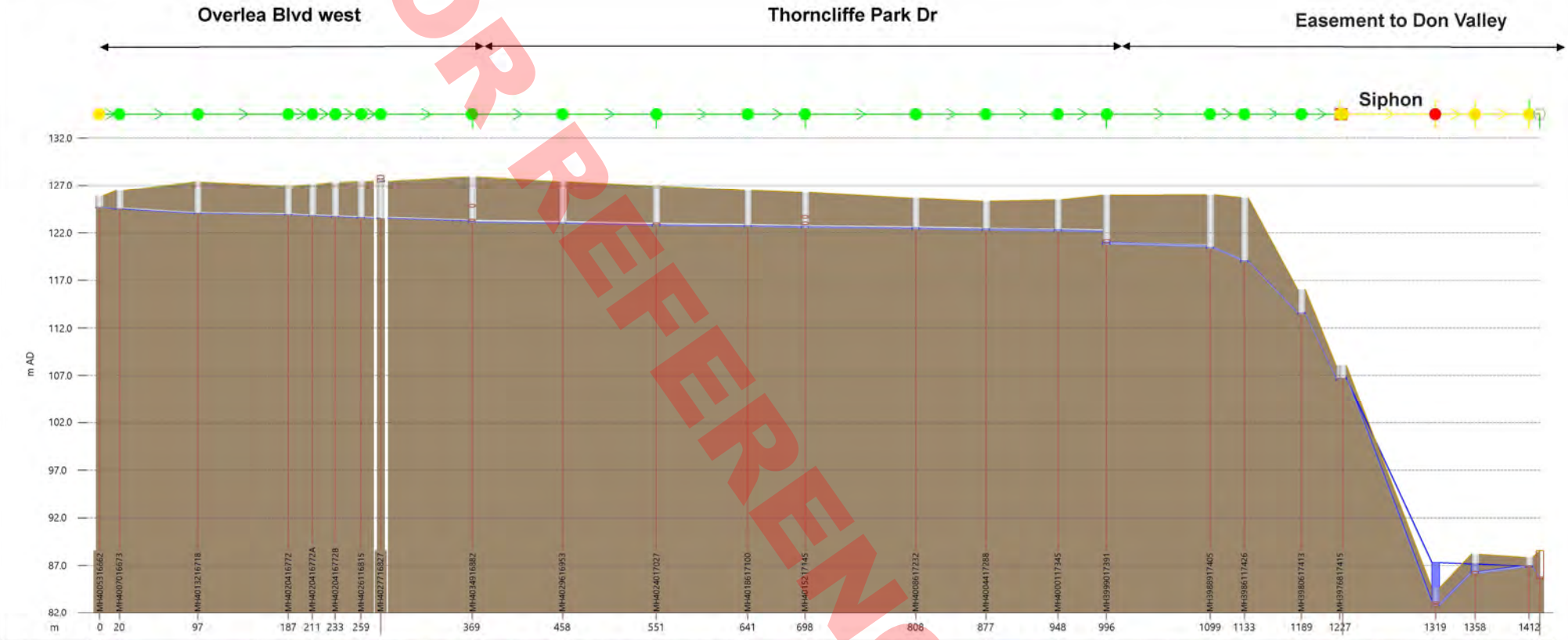
- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 4 (2yr WWF + 2.8 L/s Overlea West Dewatering) - Profile 2

Stantec	Ontario Line – Overlea Sanitary Sewer Analysis Appendix C InfoWorks Model Results	SCENARIO: Existing + Overlea West Dewatering RESULT: WWF LOCATION: Overlea Blvd East	Date: November 2022
			Figure: Page: 10



Link				MH4013216718.1					MH4027716827.1	MH4034916882.1	MH4029616953.1	MH4024017027.1		MH4015217145.1				MH3999017391.1				JP103567.1			
System type		Sanitary		Sanitary					Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary		Sanitary		Sanitary	Sanitary	Sanitary	
length (m)		77.2		89.6	23.9	22.5	25.5		90.6	89.4	92.6	90.6	56.8	109.5	69.5	71.1	48.0	102.6	34.0	56.4	38.0	92.0	39.0	53.3	
Shape ID		CIRC		CIRC			CIRC		CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	
width (mm)	150	250		250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	
height (mm)	150	250		250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	
us inv (m AD)		124.462		123.983					123.474	123.023	122.911	122.703	122.609	122.487	122.353	122.213	122.130	120.744		118.921		106.680	82.693	86.106	
ds inv (m AD)		123.983		123.849					123.203	122.911	122.728	122.609	122.502	122.353	122.213	122.130	122.033	120.450		113.456		82.906	86.106	86.761	
grad (m/m)		0.00620		0.00150					0.00299	0.00125	0.00198	0.00104	0.00188	0.00122	0.00201	0.00117	0.00202	0.00287		0.09687		0.25842		-0.01228	
pfc (m3/s)		0.047		0.021					0.030	0.058	0.078	0.056	0.076	0.061	0.079	0.060	0.079	0.087	0.170	0.172	0.252	0.302	-0.176	-0.066	
surc		0.21		0.21	0.17	0.17	0.20		0.20	0.27	0.29	0.36	0.40	0.44	0.50	0.50	0.46	0.72	0.49	0.49	0.39	1.00	1.00	1.00	
DS flow (m3/s)		0.00151		0.00176					0.00225	0.00890	0.01171	0.01553	0.01729	0.02413	0.02428	0.03092	0.03477	0.07718		0.07717		-0.00002	0.03865	0.03859	
Node				MH4013216718						MH4034916882	MH4029616953	MH4024017027		MH4015217145	MH4008617232										
ground (m AD)		126.432		127.364	126.910				127.443	127.917	127.394	126.925	126.469	126.258	125.627	125.314	125.469	125.940	125.990		116.041	108.039	84.617	88.178	
exprHGL				3.328539	3.017803				3.918410	4.791817	4.382144	4.086972	3.734892	3.607571	3.127122	2.912099	3.167685	4.910848	5.543772				-2.678532		

LEGEND

HGL Freeboard (m)

- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 5 (DWF+ 2.8 L/s Overlea East Dewatering) - Profile 1

Link	-	MH4051717054.1	MH4050117022.1	MH4044716957.1	MH4039916920.1
System type	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary
length (m)	10.8	35.0	84.7	61.4	62.1
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250
height (mm)	250	250	250	250	250
us inv (m AD)	124.511	124.486	124.447	124.096	123.935
ds inv (m AD)	124.486	124.447	124.096	123.935	123.203
grad (m/m)	0.00231	0.00111	0.00415	0.00262	0.01179
pfc (m3/s)	0.029	0.020	0.036	0.028	0.060
surc	0.09	0.09	0.23	0.23	0.19
DS flow (m3/s)	-0.00000	0.00008	0.00014	0.00307	0.00320

Node	-	MH4051717054	MH4050117022	MH4044716957	MH4039916920	MH4034916882
ground (m AD)		127.291	127.509	127.967	127.576	127.917
expr:HGL	-	2.692180	3.039113	3.832329	3.594532	4.791817

LEGEND

HGL Freeboard (m)

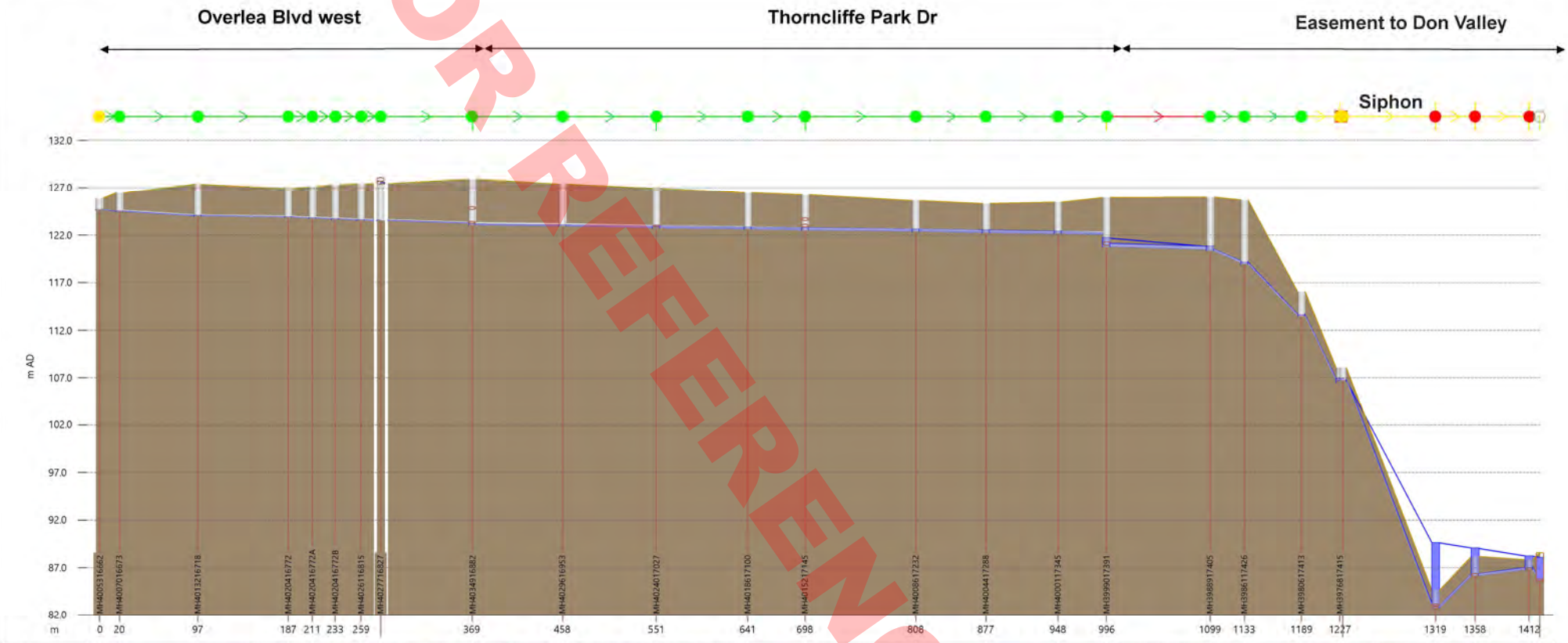
- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 5 (DWF+ 2.8 L/s Overlea East Dewatering) - Profile 2

Stantec	Ontario Line – Overlea Sanitary Sewer Analysis Appendix C InfoWorks Model Results	SCENARIO: Existing + Overlea East Dewatering RESULT: DWF LOCATION: Overlea Blvd East	Date: November 2022
			Figure: Page: 12



Link	-	-	MH4013216718.1	-	-	-	-	MH4027716827.1	MH4034916882.1	MH4029616953.1	MH4024017027.1	-	MH4015217145.1	-	-	-	MH3999017391.1	-	-	-	JP103567.1	-	-	-
System type	-	Sanitary	Sanitary	-	-	-	-	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary	-	Sanitary	-	Sanitary	Sanitary	Sanitary	-
length (m)	-	77.2	89.6	23.9	22.5	25.5	-	90.6	89.4	92.6	90.6	56.8	109.5	69.5	71.1	48.0	102.6	34.0	56.4	38.0	92.0	39.0	53.3	-
Shape ID	-	CIRC	CIRC	-	-	CIRC	-	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	-
width (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	-
height (mm)	150	250	250	250	250	250	250	250	375	375	375	375	375	375	375	375	375	300	250	250	250	250	250	-
us inv (m AD)	-	124.462	123.983	-	-	-	-	123.474	123.023	122.911	122.703	122.609	122.487	122.353	122.213	122.130	120.744	-	118.921	-	106.680	82.693	86.106	-
ds inv (m AD)	-	123.983	123.849	-	-	-	-	123.203	122.911	122.728	122.609	122.502	122.353	122.213	122.130	122.033	120.450	-	113.456	-	82.906	86.106	86.761	-
grad (m/m)	-	0.00620	0.00150	-	-	-	-	0.00299	0.00125	0.00198	0.00104	0.00188	0.00122	0.00201	0.00117	0.00202	0.00287	-	0.09687	-	0.25842	-	-0.01228	-
pfc (m3/s)	-	0.047	0.021	-	-	-	-	0.030	0.058	0.078	0.056	0.076	0.061	0.079	0.060	0.079	0.087	0.170	0.172	0.252	0.302	-0.176	-0.066	-
surc	-	0.29	0.29	0.24	0.24	0.29	-	0.30	0.38	0.51	0.57	0.69	0.73	0.81	0.80	0.68	2.00	0.73	0.79	1.00	1.00	1.00	1.00	-
DS flow (m3/s)	-	0.00280	0.00365	-	-	-	-	0.00573	0.01647	0.02308	0.03548	0.03972	0.05486	0.05565	0.06516	0.07042	0.14757	-	0.14988	-	0.00246	0.07386	0.07378	-
Node	-	-	MH4013216718	-	-	-	-	-	MH4034916882	MH4029616953	MH4024017027	-	MH4015217145	MH4008617232	-	-	-	-	-	-	-	-	-	-
ground (m AD)	-	126.432	127.364	126.910	-	-	-	127.443	127.917	127.394	126.925	126.469	126.258	125.627	125.374	125.469	125.940	125.990	-	116.041	-	108.039	84.617	88.178	-
exprHGL	-	-	3.308511	3.001080	-	-	-	3.892921	4.756264	4.341662	4.006490	3.649824	3.498044	3.021402	2.798550	3.077910	4.203229	5.153414	-	-	-	-	-4.994725	-	-	-

LEGEND

HGL Freeboard (m)

- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 6 (2yr WWF + 2.8 L/s Overlea East Dewatering) - Profile 1

Link	-	MH4051717054.1	MH4050117022.1	MH4044716957.1	MH4039916920.1
System type	Sanitary	Sanitary	Sanitary	Sanitary	Sanitary
length (m)	10.8	35.0	84.7	61.4	62.1
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
width (mm)	250	250	250	250	250
height (mm)	250	250	250	250	250
us inv (m AD)	124.511	124.486	124.447	124.096	123.935
ds inv (m AD)	124.486	124.447	124.096	123.935	123.203
grad (m/m)	0.00231	0.00111	0.00415	0.00262	0.01179
pfc (m3/s)	0.029	0.020	0.036	0.028	0.060
surc	0.13	0.13	0.27	0.27	0.22
DS flow (m3/s)	-0.00001	0.00042	0.00078	0.00421	0.00486
Node	-	MH4051717054	MH4050117022	MH4044716957	MH4039916920	MH4034916882
ground (m AD)	-	127.291	127.509	127.967	127.576	127.917
exprHGL	-	2.682667	3.029454	3.822320	3.587223	4.756264

LEGEND

HGL Freeboard (m)

- < 0 Above Surface
- >= 0 Within Basements
- >= 1.8 No Flood Risk

Pipe Surcharge State

- < 1 No Surcharge
- >= 1 Backwater
- >= 2 Bottleneck

Scenario 6 (2yr WWF + 2.8 L/s Overlea East Dewatering) - Profile 2

Ontario Line – Overlea AW

Sanitary Sewer Downstream Analysis

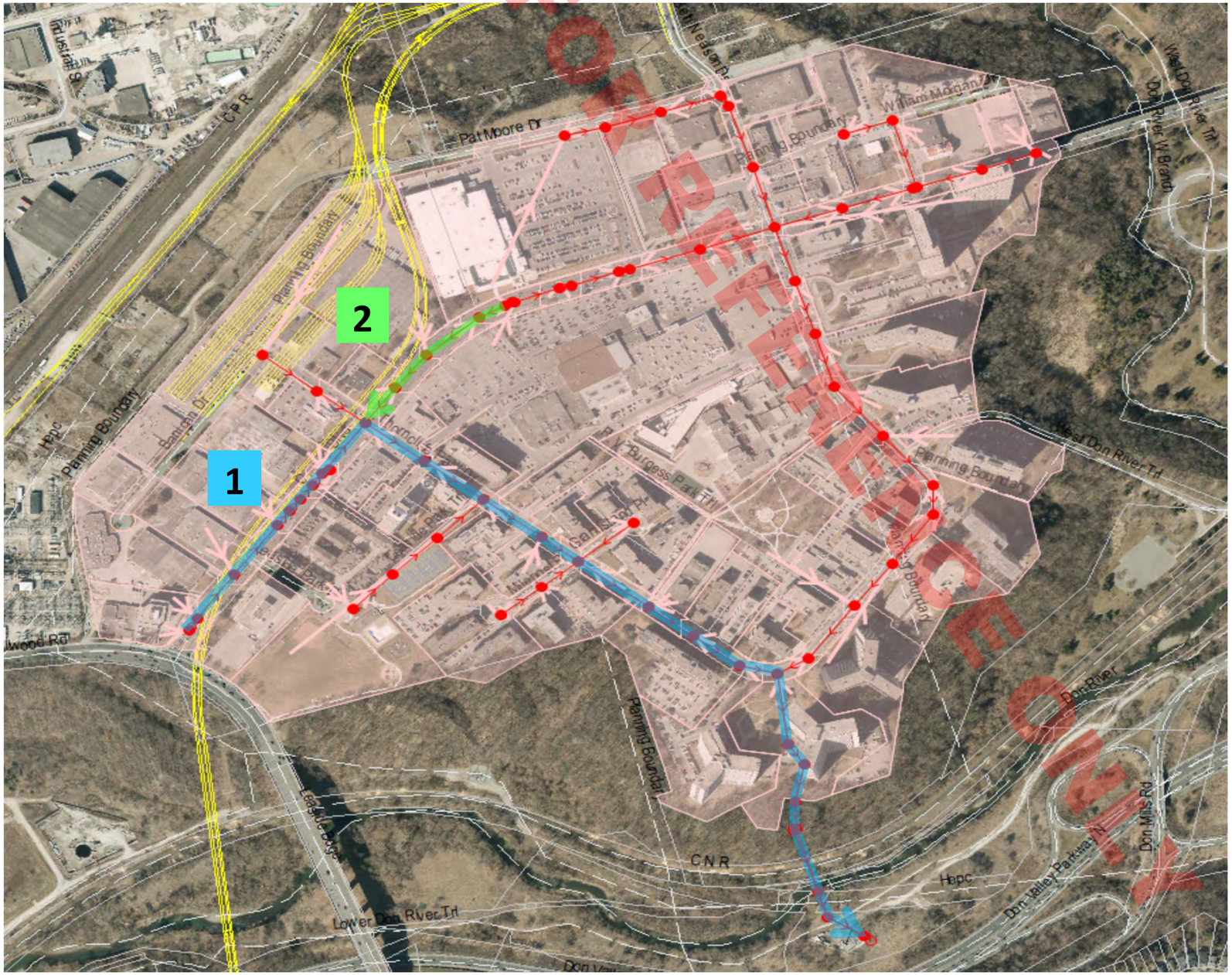
Model Results Summary- Tabular Results
November 2022

Stantec

PLAN VIEW
Overlea AW

FILE NUMBER: 1605-60009

DATE: November 2022



Profile 1: Overlea West

Profile 2: Overlea East

-3.305

Stantec

Sewer Capacity Analysis

FILE NUMBER: 1605-60009
DATE: November 2022
ANALYZED BY: NF
CHECKED BY: DFE

Station: Overlea AW

Basement Flooding Model: Modified SAP/Area 46

Scenario 1: Existing Conditions: Dry Weather Flow

Street/ Location	Manhole		MODEL HYDRAULIC RESULTS Profile 1: Overlea													
	From	To	Pipe Shape	Diameter, Height (mm)	Width (mm)	Slope (%)	Pipe Length (m)	Capacity (L/s)	Peak US Flow (L/s)	Percent Flow/ Capacity (%)	Peak US Depth (m)	Max Surcharge State	Residual Capacity (L/s)	Peak Velocity (m/s)	US HGL Freeboard (m)	DS HGL Freeboard (m)
Profile 1: Overlea West																
OVERLEA BLVD WEST	MH4005316662	MH4007016673	CIRC	150	150	0.89	19.8	14.0	0.3	2%	0.03	0.24	13.7	0.10	1.2	1.9
OVERLEA BLVD WEST	MH4007016673	MH4013216718	CIRC	250	250	0.62	77.2	47.0	1.5	3%	0.04	0.21	45.5	0.20	1.9	3.3
OVERLEA BLVD WEST	MH4013216718	MH4020416772	CIRC	250	250	0.15	89.6	21.0	1.8	8%	0.05	0.21	19.2	0.31	3.3	3.0
OVERLEA BLVD WEST	MH4020416772	MH4020416772A	CIRC	250	250	0.46	23.9	37.0	1.9	5%	0.04	0.17	35.1	0.34	3.0	3.3
OVERLEA BLVD WEST	MH4020416772A	MH4020416772B	CIRC	250	250	0.46	22.5	37.0	1.9	5%	0.04	0.17	35.1	0.34	3.3	3.6
OVERLEA BLVD WEST	MH4020416772B	MH4026116815	CIRC	250	250	0.46	25.5	37.0	1.9	5%	0.04	0.20	35.1	0.27	3.6	3.8
OVERLEA BLVD WEST	MH4026116815	MH4027716827	CIRC	250	250	0.23	19.6	27.0	2.0	7%	0.05	0.20	25.0	0.28	3.8	3.9
OVERLEA BLVD WEST	MH4027716827	MH4034916882	CIRC	250	250	0.30	90.6	30.0	2.3	8%	0.05	0.20	27.8	0.44	3.9	4.8
THORNCLIFFE PARK DR	MH4034916882	MH4029616953	CIRC	375	375	0.13	89.4	58.0	6.1	11%	0.08	0.23	51.9	0.32	4.8	4.4
THORNCLIFFE PARK DR	MH4029616953	MH4024017027	CIRC	375	375	0.20	92.6	78.0	8.9	11%	0.09	0.26	69.1	0.40	4.4	4.1
THORNCLIFFE PARK DR	MH4024017027	MH4018617100	CIRC	375	375	0.10	90.6	56.0	12.7	23%	0.12	0.33	43.3	0.45	4.1	3.7
THORNCLIFFE PARK DR	MH4018617100	MH4015217145	CIRC	375	375	0.19	56.8	76.0	14.5	19%	0.11	0.37	61.5	0.39	3.7	3.6
THORNCLIFFE PARK DR	MH4015217145	MH4008617232	CIRC	375	375	0.12	109.5	61.0	21.3	35%	0.16	0.41	39.7	0.59	3.6	3.1
THORNCLIFFE PARK DR	MH4008617232	MH4004417288	CIRC	375	375	0.20	69.5	79.0	21.5	27%	0.14	0.48	57.5	0.41	3.1	2.9
THORNCLIFFE PARK DR	MH4004417288	MH4000117345	CIRC	375	375	0.12	71.1	60.0	28.1	47%	0.18	0.48	31.9	0.61	2.9	3.2
THORNCLIFFE PARK DR	MH4000117345	MH3999017391	CIRC	375	375	0.20	48	79.0	32.0	40%	0.16	0.44	47.0	0.95	3.2	4.9
THORNCLIFFE PARK DR*EAS	MH3999017391	MH3988917405	CIRC	375	375	0.29	102.6	87.0	74.4	85%	0.27	0.71	12.6	1.24	4.9	5.5
THORNCLIFFE PARK DR*EAS	MH3988917405	MH3986117426	CIRC	300	300	3.60	34	170.0	74.4	44%	0.14	0.48	95.6	2.23	5.5	6.7
THORNCLIFFE PARK DR*EAS	MH3986117426	MH3980617413	CIRC	250	250	9.69	56.4	172.0	74.4	43%	0.12	0.48	97.6	3.23	6.7	2.5
LOWER DON RIVER TRL*EAS	MH3980617413	MH3976817415	CIRC	250	250	18.00	38	252.0	74.4	30%	0.10	0.39	177.6	4.27	2.5	1.5
Siphon (East)	MH3976817415	MH3968017442	CIRC	250	250	25.77	92.3	302.0	74.4	25%	0.09	1.00	227.6	1.03	1.5	-2.6
Siphon (East)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	37.2	-21%	4.57	1.00	-213.2	0.68	-2.6	1.0
Siphon (East)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	37.2	-56%	1.02	1.00	-103.2	1.07	1.0	1.0
Siphon (East) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	37.2	19%	0.08	0.31	160.8	2.89	1.0	0.0
Siphon (West)	JP103567	MH3968017442	CIRC	250	250	25.84	92	302.0	0.0	0%	0.03	1.00	302.0	0.00	1.3	-2.6
Siphon (West)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	37.2	-21%	4.57	1.00	-213.2	0.68	-2.6	1.0
Siphon (West)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	37.2	-56%	1.02	1.00	-103.2	1.07	1.0	1.0
Siphon (West) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	37.2	19%	0.08	0.31	160.8	2.89	1.0	0.0
Profile 2: Overlea East																
OVERLEA BLVD East	MH4052217063	MH4051717054	CIRC	250	250	0.43	2.1	39.0	0.0	0%	0.02	0.12	39.0	0.00	2.7	2.7
OVERLEA BLVD East	MH4051717054	MH4050117022	CIRC	250	250	0.11	35	20.0	0.1	0%	0.02	0.09	19.9	0.04	2.7	3.0
OVERLEA BLVD East	MH4050117022	MH4044716957	CIRC	250	250	0.42	84.7	36.0	0.1	0%	0.02	0.11	35.9	0.05	3.0	3.9
OVERLEA BLVD East	MH4044716957	MH4039916920	CIRC	250	250	0.26	61.4	28.0	0.3	1%	0.03	0.12	27.7	0.09	3.9	3.6
OVERLEA BLVD East	MH4039916920	MH4034916882	CIRC	250	250	1.18	62.1	60.0	0.4	1%	0.03	0.12	59.6	0.13	3.6	4.8

Siphon **Shallow Sewers**

Surcharge State is from InfoWorks ICM Output; SS<1 means the pipe is not surcharged. SS=1 means the surcharge is caused by downstream water levels. SS=2 means the flow through the pipe is greater than pipe full capacity

Stantec

Sewer Capacity Analysis

FILE NUMBER: 1605-60009
DATE: November 2022
ANALYZED BY: NF
CHECKED BY: DFE

Station: Overlea AW

Basement Flooding Model: Modified SAP/Area 46

Scenario 2: Dewatering Conditions: Dry Weather Flow + 2.8 L/s at Overlea Blvd West

Street/ Location	Manhole		MODEL HYDRAULIC RESULTS Profile 1: Overlea													
	From	To	Pipe Shape	Diameter, Height (mm)	Width (mm)	Slope (%)	Pipe Length (m)	Capacity (L/s)	Peak US Flow (L/s)	Percent Flow/ Capacity (%)	Peak US Depth (m)	Max Surcharge State	Residual Capacity (L/s)	Peak Velocity (m/s)	US HGL Freeboard (m)	DS HGL Freeboard (m)
Profile 1: Overlea West																
OVERLEA BLVD WEST	MH4005316662	MH4007016673	CIRC	150	150	0.89	19.8	14.0	0.3	2%	0.03	0.24	13.7	0.10	1.2	1.9
OVERLEA BLVD WEST	MH4007016673	MH4013216718	CIRC	250	250	0.62	77.2	47.0	1.5	3%	0.04	0.33	45.5	0.11	1.9	3.3
OVERLEA BLVD WEST (Dewatering MH)	MH4013216718	MH4020416772	CIRC	250	250	0.15	89.6	21.0	4.6	22%	0.08	0.33	16.4	0.46	3.3	3.0
OVERLEA BLVD WEST	MH4020416772	MH4020416772A	CIRC	250	250	0.46	23.9	37.0	4.7	13%	0.06	0.25	32.3	0.48	3.0	3.3
OVERLEA BLVD WEST	MH4020416772A	MH4020416772B	CIRC	250	250	0.46	22.5	37.0	4.7	13%	0.06	0.25	32.3	0.48	3.3	3.6
OVERLEA BLVD WEST	MH4020416772B	MH4026116815	CIRC	250	250	0.46	25.5	37.0	4.7	13%	0.06	0.29	32.3	0.39	3.6	3.8
OVERLEA BLVD WEST	MH4026116815	MH4027716827	CIRC	250	250	0.23	19.6	27.0	4.8	18%	0.07	0.29	22.2	0.41	3.8	3.9
OVERLEA BLVD WEST	MH4027716827	MH4034916882	CIRC	250	250	0.30	90.6	30.0	5.1	17%	0.07	0.29	25.0	0.59	3.9	4.8
THORNCLIFFE PARK DR	MH4034916882	MH4029616953	CIRC	375	375	0.13	89.4	58.0	8.9	15%	0.10	0.27	49.1	0.38	4.8	4.4
THORNCLIFFE PARK DR	MH4029616953	MH4024017027	CIRC	375	375	0.20	92.6	78.0	11.7	15%	0.10	0.29	66.3	0.44	4.4	4.1
THORNCLIFFE PARK DR	MH4024017027	MH4018617100	CIRC	375	375	0.10	90.6	56.0	15.5	28%	0.14	0.36	40.5	0.48	4.1	3.7
THORNCLIFFE PARK DR	MH4018617100	MH4015217145	CIRC	375	375	0.19	56.8	76.0	17.3	23%	0.13	0.40	58.7	0.43	3.7	3.6
THORNCLIFFE PARK DR	MH4015217145	MH4008617232	CIRC	375	375	0.12	109.5	61.0	24.1	40%	0.16	0.44	36.9	0.60	3.6	3.1
THORNCLIFFE PARK DR	MH4008617232	MH4004417288	CIRC	375	375	0.20	69.5	79.0	24.3	31%	0.15	0.50	54.7	0.44	3.1	2.9
THORNCLIFFE PARK DR	MH4004417288	MH4000117345	CIRC	375	375	0.12	71.1	60.0	30.9	52%	0.19	0.50	29.1	0.63	2.9	3.2
THORNCLIFFE PARK DR	MH4000117345	MH3999017391	CIRC	375	375	0.20	48	79.0	34.8	44%	0.17	0.46	44.2	0.98	3.2	4.9
THORNCLIFFE PARK DR*EAS	MH3999017391	MH3988917405	CIRC	375	375	0.29	102.6	87.0	77.2	89%	0.27	0.72	9.8	1.26	4.9	5.5
THORNCLIFFE PARK DR*EAS	MH3988917405	MH3986117426	CIRC	300	300	3.60	34	170.0	77.2	45%	0.15	0.49	92.8	2.25	5.5	6.7
THORNCLIFFE PARK DR*EAS	MH3986117426	MH3980617413	CIRC	250	250	9.69	56.4	172.0	77.2	45%	0.12	0.49	94.8	3.26	6.7	2.5
LOWER DON RIVER TRL*EAS	MH3980617413	MH3976817415	CIRC	250	250	18.00	38	252.0	77.2	31%	0.10	0.39	174.8	4.29	2.5	1.5
Siphon (East)	MH3976817415	MH3968017442	CIRC	250	250	25.77	92.3	302.0	77.2	26%	0.09	1.00	224.8	1.06	1.5	-2.7
Siphon (East)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	38.7	-22%	4.60	1.00	-214.7	0.71	-2.7	1.0
Siphon (East)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	38.6	-58%	1.03	1.00	-104.6	1.09	1.0	1.0
Siphon (East) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	38.6	19%	0.08	0.32	159.4	2.91	1.0	0.0
Siphon (West)	JP103567	MH3968017442	CIRC	250	250	25.84	92	302.0	0.0	0%	0.03	1.00	302.0	0.00	1.3	-2.7
Siphon (West)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	38.7	-22%	4.60	1.00	-214.7	0.71	-2.7	1.0
Siphon (West)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	38.6	-58%	1.03	1.00	-104.6	1.09	1.0	1.0
Siphon (West) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	38.6	19%	0.08	0.32	159.4	2.91	1.0	0.0
Profile 2: Overlea East																
OVERLEA BLVD East	MH4052217063	MH4051717054	CIRC	250	250	0.43	2.1	39.0	0.0	0%	0.02	0.12	39.0	0.00	2.7	2.7
OVERLEA BLVD East	MH4051717054	MH4050117022	CIRC	250	250	0.11	35	20.0	0.1	0%	0.02	0.09	19.9	0.04	2.7	3.0
OVERLEA BLVD East	MH4050117022	MH4044716957	CIRC	250	250	0.42	84.7	36.0	0.1	0%	0.02	0.11	35.9	0.05	3.0	3.9
OVERLEA BLVD East	MH4044716957	MH4039916920	CIRC	250	250	0.26	61.4	28.0	0.3	1%	0.03	0.12	27.7	0.09	3.9	3.6
OVERLEA BLVD East	MH4039916920	MH4034916882	CIRC	250	250	1.18	62.1	60.0	0.4	1%	0.03	0.12	59.6	0.13	3.6	4.8

Siphon **Shallow Sewers**

Surcharge State is from InfoWorks ICM Output; SS<1 means the pipe is not surcharged. SS=1 means the surcharge is caused by downstream water levels. SS=2 means the flow through the pipe is greater than pipe full capacity

Stantec

Sewer Capacity Analysis

FILE NUMBER: 1605-60009
DATE: November 2022
ANALYZED BY: NF
CHECKED BY: DFE

Station: Overlea AW

Basement Flooding Model: Modified SAP/Area 46

Scenario 3: Existing Conditions: Wet Weather Flow (May 12, 2000)

Street/ Location	Manhole		MODEL HYDRAULIC RESULTS Profile 1: Overlea													
	From	To	Pipe Shape	Diameter, Height (mm)	Width (mm)	Slope (%)	Pipe Length (m)	Capacity (L/s)	Peak US Flow (L/s)	Percent Flow/ Capacity (%)	Peak US Depth (m)	Max Surcharge State	Residual Capacity (L/s)	Peak Velocity (m/s)	US HGL Freeboard (m)	DS HGL Freeboard (m)
Profile 1: Overlea West																
OVERLEA BLVD WEST	MH4005316662	MH4007016673	CIRC	150	150	0.89	19.8	14.0	1.0	7%	0.03	0.32	13.0	0.21	1.2	1.9
OVERLEA BLVD WEST	MH4007016673	MH4013216718	CIRC	250	250	0.62	77.2	47.0	3.0	6%	0.05	0.31	44.0	0.23	1.9	3.3
OVERLEA BLVD WEST	MH4013216718	MH4020416772	CIRC	250	250	0.15	89.6	21.0	4.2	20%	0.08	0.31	16.8	0.41	3.3	3.0
OVERLEA BLVD WEST	MH4020416772	MH4020416772A	CIRC	250	250	0.46	23.9	37.0	4.9	13%	0.07	0.26	32.1	0.49	3.0	3.3
OVERLEA BLVD WEST	MH4020416772A	MH4020416772B	CIRC	250	250	0.46	22.5	37.0	4.9	13%	0.07	0.26	32.1	0.49	3.3	3.6
OVERLEA BLVD WEST	MH4020416772B	MH4026116815	CIRC	250	250	0.46	25.5	37.0	4.9	13%	0.07	0.32	32.1	0.37	3.6	3.8
OVERLEA BLVD WEST	MH4026116815	MH4027716827	CIRC	250	250	0.23	19.6	27.0	5.3	19%	0.08	0.34	21.8	0.35	3.8	3.9
OVERLEA BLVD WEST	MH4027716827	MH4034916882	CIRC	250	250	0.30	90.6	30.0	7.1	24%	0.09	0.34	22.9	0.65	3.9	4.8
THORNCLIFFE PARK DR	MH4034916882	MH4029616953	CIRC	375	375	0.13	89.4	58.0	16.0	28%	0.14	0.39	42.0	0.42	4.8	4.3
THORNCLIFFE PARK DR	MH4029616953	MH4024017027	CIRC	375	375	0.20	92.6	78.0	24.1	31%	0.15	0.57	53.9	0.42	4.3	4.0
THORNCLIFFE PARK DR	MH4024017027	MH4018617100	CIRC	375	375	0.10	90.6	56.0	41.0	73%	0.24	0.65	15.1	0.55	4.0	3.6
THORNCLIFFE PARK DR	MH4018617100	MH4015217145	CIRC	375	375	0.19	56.8	76.0	45.6	60%	0.24	0.80	30.4	0.49	3.6	3.5
THORNCLIFFE PARK DR	MH4015217145	MH4008617232	CIRC	375	375	0.12	109.5	61.0	64.4	106%	0.31	0.84	-3.4	0.72	3.5	3.0
THORNCLIFFE PARK DR	MH4008617232	MH4004417288	CIRC	375	375	0.20	69.5	79.0	64.2	81%	0.29	0.90	14.8	0.61	3.0	2.8
THORNCLIFFE PARK DR	MH4004417288	MH4000117345	CIRC	375	375	0.12	71.1	60.0	72.9	121%	0.34	0.90	-12.9	0.83	2.8	3.1
THORNCLIFFE PARK DR	MH4000117345	MH3999017391	CIRC	375	375	0.20	48	79.0	77.6	98%	0.27	0.73	1.4	1.26	3.1	3.9
THORNCLIFFE PARK DR*EAS	MH3999017391	MH3988917405	CIRC	375	375	0.29	102.6	87.0	167.8	193%	1.24	2.00	-80.8	1.75	3.9	4.9
THORNCLIFFE PARK DR*EAS	MH3988917405	MH3986117426	CIRC	300	300	3.60	34	170.0	208.6	123%	0.81	2.00	-38.6	2.90	4.9	5.1
THORNCLIFFE PARK DR*EAS	MH3986117426	MH3980617413	CIRC	250	250	9.69	56.4	172.0	455.0	265%	0.30	2.00	-283.0	4.47	5.1	1.9
LOWER DON RIVER TRL*EAS	MH3980617413	MH3976817415	CIRC	250	250	18.00	38	252.0	199.3	79%	0.16	1.00	52.7	5.65	1.9	1.1
Siphon (East)	MH3976817415	MH3968017442	CIRC	250	250	25.77	92.3	302.0	184.4	61%	0.14	1.00	117.6	1.92	1.1	-5.4
Siphon (East)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	82.5	-47%	7.32	1.00	-258.5	1.26	-5.4	-1.1
Siphon (East)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	82.3	-125%	3.17	1.00	-148.3	1.44	-1.1	-0.4
Siphon (East) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	82.3	42%	1.50	1.00	115.7	3.37	-0.4	0.5
Siphon (West)	JP103567	MH3968017442	CIRC	250	250	25.84	92	302.0	0.0	0%	0.03	1.00	302.0	-0.06	1.3	-5.4
Siphon (West)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	82.5	-47%	7.32	1.00	-258.5	1.26	-5.4	-1.1
Siphon (West)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	82.3	-125%	3.17	1.00	-148.3	1.44	-1.1	-0.4
Siphon (West) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	82.3	42%	1.50	1.00	115.7	3.37	-0.4	0.5
Profile 2: Overlea East																
OVERLEA BLVD East	MH4052217063	MH4051717054	CIRC	250	250	0.43	2.1	39.0	0.0	0%	0.06	0.29	39.0	-0.01	2.6	2.7
OVERLEA BLVD East	MH4051717054	MH4050117022	CIRC	250	250	0.11	35	20.0	0.7	3%	0.04	0.15	19.4	0.15	2.7	3.0
OVERLEA BLVD East	MH4050117022	MH4044716957	CIRC	250	250	0.42	84.7	36.0	1.2	3%	0.04	0.20	34.8	0.17	3.0	3.8
OVERLEA BLVD East	MH4044716957	MH4039916920	CIRC	250	250	0.26	61.4	28.0	2.2	8%	0.05	0.20	25.8	0.35	3.8	3.6
OVERLEA BLVD East	MH4039916920	MH4034916882	CIRC	250	250	1.18	62.1	60.0	3.1	5%	0.05	0.18	56.9	0.50	3.6	4.8

Siphon **Shallow Sewers**

Surcharge State is from InfoWorks ICM Output; SS<1 means the pipe is not surcharged. SS=1 means the surcharge is caused by downstream water levels. SS=2 means the flow through the pipe is greater than pipe full capacity

Stantec

Sewer Capacity Analysis

FILE NUMBER: 1605-60009
DATE: November 2022
ANALYZED BY: NF
CHECKED BY: DFE

Station: Overlea AW

Basement Flooding Model: Modified SAP/Area 46

Scenario 4: Dewatering Conditions: 2-yr Wet Weather Flow + 2.8 L/s at Overlea Blvd West

Street/ Location	Manhole		MODEL HYDRAULIC RESULTS Profile 1: Overlea													
	From	To	Pipe Shape	Diameter, Height (mm)	Width (mm)	Slope (%)	Pipe Length (m)	Capacity (L/s)	Peak US Flow (L/s)	Percent Flow/ Capacity (%)	Peak US Depth (m)	Max Surcharge State	Residual Capacity (L/s)	Peak Velocity (m/s)	US HGL Freeboard (m)	DS HGL Freeboard (m)
Profile 1: Overlea West																
OVERLEA BLVD WEST	MH4005316662	MH4007016673	CIRC	150	150	0.89	19.8	14.0	0.8	6%	0.03	0.31	13.2	0.18	1.2	1.9
OVERLEA BLVD WEST	MH4007016673	MH4013216718	CIRC	250	250	0.62	77.2	47.0	2.8	6%	0.05	0.38	44.2	0.16	1.9	3.3
OVERLEA BLVD WEST (Dewatering MH)	MH4013216718	MH4020416772	CIRC	250	250	0.15	89.6	21.0	6.5	31%	0.10	0.38	14.5	0.51	3.3	3.0
OVERLEA BLVD WEST	MH4020416772	MH4020416772A	CIRC	250	250	0.46	23.9	37.0	7.0	19%	0.08	0.30	30.0	0.56	3.0	3.3
OVERLEA BLVD WEST	MH4020416772A	MH4020416772B	CIRC	250	250	0.46	22.5	37.0	7.0	19%	0.08	0.30	30.0	0.56	3.3	3.6
OVERLEA BLVD WEST	MH4020416772B	MH4026116815	CIRC	250	250	0.46	25.5	37.0	7.0	19%	0.08	0.36	30.0	0.43	3.6	3.8
OVERLEA BLVD WEST	MH4026116815	MH4027716827	CIRC	250	250	0.23	19.6	27.0	7.2	27%	0.09	0.37	19.8	0.44	3.8	3.9
OVERLEA BLVD WEST	MH4027716827	MH4034916882	CIRC	250	250	0.30	90.6	30.0	8.5	28%	0.09	0.37	21.5	0.69	3.9	4.8
THORNCLIFFE PARK DR	MH4034916882	MH4029616953	CIRC	375	375	0.13	89.4	58.0	16.5	28%	0.14	0.38	41.5	0.44	4.8	4.3
THORNCLIFFE PARK DR	MH4029616953	MH4024017027	CIRC	375	375	0.20	92.6	78.0	23.2	30%	0.14	0.51	54.8	0.44	4.3	4.0
THORNCLIFFE PARK DR	MH4024017027	MH4018617100	CIRC	375	375	0.10	90.6	56.0	35.8	64%	0.22	0.58	20.2	0.56	4.0	3.6
THORNCLIFFE PARK DR	MH4018617100	MH4015217145	CIRC	375	375	0.19	56.8	76.0	40.0	53%	0.21	0.69	36.0	0.49	3.6	3.5
THORNCLIFFE PARK DR	MH4015217145	MH4008617232	CIRC	375	375	0.12	109.5	61.0	55.7	91%	0.27	0.73	5.3	0.70	3.5	3.0
THORNCLIFFE PARK DR	MH4008617232	MH4004417288	CIRC	375	375	0.20	69.5	79.0	56.0	71%	0.25	0.81	23.0	0.58	3.0	2.8
THORNCLIFFE PARK DR	MH4004417288	MH4000117345	CIRC	375	375	0.12	71.1	60.0	65.4	109%	0.30	0.80	-5.4	0.79	2.8	3.1
THORNCLIFFE PARK DR	MH4000117345	MH3999017391	CIRC	375	375	0.20	48	79.0	70.6	89%	0.26	0.69	8.4	1.22	3.1	4.2
THORNCLIFFE PARK DR*EAS	MH3999017391	MH3988917405	CIRC	375	375	0.29	102.6	87.0	147.6	170%	0.92	2.00	-60.6	1.61	4.2	5.2
THORNCLIFFE PARK DR*EAS	MH3988917405	MH3986117426	CIRC	300	300	3.60	34	170.0	147.6	87%	0.22	0.73	22.4	2.70	5.2	6.5
THORNCLIFFE PARK DR*EAS	MH3986117426	MH3980617413	CIRC	250	250	9.69	56.4	172.0	154.8	90%	0.20	1.00	17.3	5.17	6.5	2.3
LOWER DON RIVER TRL*EAS	MH3980617413	MH3976817415	CIRC	250	250	18.00	38	252.0	155.8	62%	0.15	0.58	96.2	5.23	2.3	1.4
Siphon (East)	MH3976817415	MH3968017442	CIRC	250	250	25.77	92.3	302.0	151.3	50%	0.13	1.00	150.7	1.78	1.4	-5.0
Siphon (East)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	74.0	-42%	6.91	1.00	-250.0	1.15	-5.0	-0.9
Siphon (East)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	73.7	-112%	2.91	1.00	-139.7	1.37	-0.9	-0.4
Siphon (East) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	96.5	49%	1.44	1.00	101.5	3.80	-0.4	0.5
Siphon (West)	JP103567	MH3968017442	CIRC	250	250	25.84	92	302.0	0.0	0%	0.03	1.00	302.0	0.03	1.3	-5.0
Siphon (West)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	74.0	-42%	6.91	1.00	-250.0	1.15	-5.0	-0.9
Siphon (West)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	73.7	-112%	2.91	1.00	-139.7	1.37	-0.9	-0.4
Siphon (West) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	96.5	49%	1.44	1.00	101.5	3.80	-0.4	0.5
Profile 2: Overlea East																
OVERLEA BLVD East	MH4052217063	MH4051717054	CIRC	250	250	0.43	2.1	39.0	0.0	0%	0.05	0.24	39.0	-0.01	2.7	2.7
OVERLEA BLVD East	MH4051717054	MH4050117022	CIRC	250	250	0.11	35	20.0	0.4	2%	0.03	0.13	19.6	0.11	2.7	3.0
OVERLEA BLVD East	MH4050117022	MH4044716957	CIRC	250	250	0.42	84.7	36.0	0.8	2%	0.03	0.17	35.2	0.14	3.0	3.8
OVERLEA BLVD East	MH4044716957	MH4039916920	CIRC	250	250	0.26	61.4	28.0	1.4	5%	0.04	0.17	26.6	0.28	3.8	3.6
OVERLEA BLVD East	MH4039916920	MH4034916882	CIRC	250	250	1.18	62.1	60.0	2.0	3%	0.04	0.16	58.0	0.41	3.6	4.8

Siphon **Shallow Sewers**

Surcharge State is from InfoWorks ICM Output; SS<1 means the pipe is not surcharged. SS=1 means the surcharge is caused by downstream water levels. SS=2 means the flow through the pipe is greater than pipe full capacity

Stantec

Sewer Capacity Analysis

FILE NUMBER: 1605-60009
DATE: November 2022
ANALYZED BY: NF
CHECKED BY: DFE

Station: Overlea AW

Basement Flooding Model: Modified SAP/Area 46

Scenario 5: Dewatering Conditions: Dry Weather Flow + 2.8 L/s at Overlea Blvd East

Street/ Location	Manhole		MODEL HYDRAULIC RESULTS Profile 1: Overlea													
	From	To	Pipe Shape	Diameter, Height (mm)	Width (mm)	Slope (%)	Pipe Length (m)	Capacity (L/s)	Peak US Flow (L/s)	Percent Flow/ Capacity (%)	Peak US Depth (m)	Max Surcharge State	Residual Capacity (L/s)	Peak Velocity (m/s)	US HGL Freeboard (m)	DS HGL Freeboard (m)
Profile 1: Overlea West																
OVERLEA BLVD WEST	MH4005316662	MH4007016673	CIRC	150	150	0.89	19.8	14.0	0.3	2%	0.03	0.24	13.7	0.10	1.2	1.9
OVERLEA BLVD WEST	MH4007016673	MH4013216718	CIRC	250	250	0.62	77.2	47.0	1.5	3%	0.04	0.21	45.5	0.20	1.9	3.3
OVERLEA BLVD WEST	MH4013216718	MH4020416772	CIRC	250	250	0.15	89.6	21.0	1.8	8%	0.05	0.21	19.2	0.31	3.3	3.0
OVERLEA BLVD WEST	MH4020416772	MH4020416772A	CIRC	250	250	0.46	23.9	37.0	1.9	5%	0.04	0.17	35.1	0.34	3.0	3.3
OVERLEA BLVD WEST	MH4020416772A	MH4020416772B	CIRC	250	250	0.46	22.5	37.0	1.9	5%	0.04	0.17	35.1	0.34	3.3	3.6
OVERLEA BLVD WEST	MH4020416772B	MH4026116815	CIRC	250	250	0.46	25.5	37.0	1.9	5%	0.04	0.20	35.1	0.27	3.6	3.8
OVERLEA BLVD WEST	MH4026116815	MH4027716827	CIRC	250	250	0.23	19.6	27.0	2.0	7%	0.05	0.20	25.0	0.28	3.8	3.9
OVERLEA BLVD WEST	MH4027716827	MH4034916882	CIRC	250	250	0.30	90.6	30.0	2.3	8%	0.05	0.20	27.8	0.44	3.9	4.8
THORNCLIFFE PARK DR	MH4034916882	MH4029616953	CIRC	375	375	0.13	89.4	58.0	8.9	15%	0.10	0.27	49.1	0.38	4.8	4.4
THORNCLIFFE PARK DR	MH4029616953	MH4024017027	CIRC	375	375	0.20	92.6	78.0	11.7	15%	0.10	0.29	66.3	0.44	4.4	4.1
THORNCLIFFE PARK DR	MH4024017027	MH4018617100	CIRC	375	375	0.10	90.6	56.0	15.5	28%	0.14	0.36	40.5	0.48	4.1	3.7
THORNCLIFFE PARK DR	MH4018617100	MH4015217145	CIRC	375	375	0.19	56.8	76.0	17.3	23%	0.13	0.40	58.7	0.43	3.7	3.6
THORNCLIFFE PARK DR	MH4015217145	MH4008617232	CIRC	375	375	0.12	109.5	61.0	24.1	40%	0.16	0.44	36.9	0.60	3.6	3.1
THORNCLIFFE PARK DR	MH4008617232	MH4004417288	CIRC	375	375	0.20	69.5	79.0	24.3	31%	0.15	0.50	54.7	0.44	3.1	2.9
THORNCLIFFE PARK DR	MH4004417288	MH4000117345	CIRC	375	375	0.12	71.1	60.0	30.9	52%	0.19	0.50	29.1	0.63	2.9	3.2
THORNCLIFFE PARK DR	MH4000117345	MH3999017391	CIRC	375	375	0.20	48	79.0	34.8	44%	0.17	0.46	44.2	0.98	3.2	4.9
THORNCLIFFE PARK DR*EAS	MH3999017391	MH3988917405	CIRC	375	375	0.29	102.6	87.0	77.2	89%	0.27	0.72	9.8	1.26	4.9	5.5
THORNCLIFFE PARK DR*EAS	MH3988917405	MH3986117426	CIRC	300	300	3.60	34	170.0	77.2	45%	0.15	0.49	92.8	2.25	5.5	6.7
THORNCLIFFE PARK DR*EAS	MH3986117426	MH3980617413	CIRC	250	250	9.69	56.4	172.0	77.2	45%	0.12	0.49	94.8	3.26	6.7	2.5
LOWER DON RIVER TRL*EAS	MH3980617413	MH3976817415	CIRC	250	250	18.00	38	252.0	77.2	31%	0.10	0.39	174.8	4.29	2.5	1.5
Siphon (East)	MH3976817415	MH3968017442	CIRC	250	250	25.77	92.3	302.0	77.2	26%	0.09	1.00	224.8	1.06	1.5	-2.7
Siphon (East)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	38.7	-22%	4.60	1.00	-214.7	0.71	-2.7	1.0
Siphon (East)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	38.6	-58%	1.03	1.00	-104.6	1.09	1.0	1.0
Siphon (East) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	38.6	19%	0.08	0.32	159.4	2.91	1.0	0.0
Siphon (West)	JP103567	MH3968017442	CIRC	250	250	25.84	92	302.0	0.0	0%	0.03	1.00	302.0	0.00	1.3	-2.7
Siphon (West)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	38.7	-22%	4.60	1.00	-214.7	0.71	-2.7	1.0
Siphon (West)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	38.6	-58%	1.03	1.00	-104.6	1.09	1.0	1.0
Siphon (West) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	38.6	19%	0.08	0.32	159.4	2.91	1.0	0.0
Profile 2: Overlea East																
OVERLEA BLVD East	MH4052217063	MH4051717054	CIRC	250	250	0.43	2.1	39.0	0.0	0%	0.02	0.12	39.0	0.00	2.7	2.7
OVERLEA BLVD East	MH4051717054	MH4050117022	CIRC	250	250	0.11	35	20.0	0.1	0%	0.02	0.09	19.9	0.04	2.7	3.0
OVERLEA BLVD East	MH4050117022	MH4044716957	CIRC	250	250	0.42	84.7	36.0	0.1	0%	0.02	0.23	35.9	0.02	3.0	3.8
OVERLEA BLVD East (Dewatering MH)	MH4044716957	MH4039916920	CIRC	250	250	0.26	61.4	28.0	3.1	11%	0.06	0.23	24.9	0.49	3.8	3.6
OVERLEA BLVD East	MH4039916920	MH4034916882	CIRC	250	250	1.18	62.1	60.0	3.2	5%	0.05	0.19	56.8	0.51	3.6	4.8

Siphon **Shallow Sewers**

Surcharge State is from InfoWorks ICM Output; SS<1 means the pipe is not surcharged. SS=1 means the surcharge is caused by downstream water levels. SS=2 means the flow through the pipe is greater than pipe full capacity

Stantec

Sewer Capacity Analysis

FILE NUMBER: 1605-60009
DATE: November 2022
ANALYZED BY: NF
CHECKED BY: DFE

Station: Overlea AW

Basement Flooding Model: Modified SAP/Area 46

Scenario 6: Dewatering Conditions: 2-yr Wet Weather Flow + 2.8 L/s at Overlea Blvd East

Street/ Location	Manhole		MODEL HYDRAULIC RESULTS Profile 1: Overlea													
	From	To	Pipe Shape	Diameter, Height (mm)	Width (mm)	Slope (%)	Pipe Length (m)	Capacity (L/s)	Peak US Flow (L/s)	Percent Flow/ Capacity (%)	Peak US Depth (m)	Max Surcharge State	Residual Capacity (L/s)	Peak Velocity (m/s)	US HGL Freeboard (m)	DS HGL Freeboard (m)
Profile 1: Overlea West																
OVERLEA BLVD WEST	MH4005316662	MH4007016673	CIRC	150	150	0.89	19.8	14.0	0.8	6%	0.03	0.31	13.2	0.18	1.2	1.9
OVERLEA BLVD WEST	MH4007016673	MH4013216718	CIRC	250	250	0.62	77.2	47.0	2.8	6%	0.05	0.29	44.2	0.24	1.9	3.3
OVERLEA BLVD WEST	MH4013216718	MH4020416772	CIRC	250	250	0.15	89.6	21.0	3.7	17%	0.07	0.29	17.3	0.40	3.3	3.0
OVERLEA BLVD WEST	MH4020416772	MH4020416772A	CIRC	250	250	0.46	23.9	37.0	4.2	11%	0.06	0.24	32.8	0.47	3.0	3.3
OVERLEA BLVD WEST	MH4020416772A	MH4020416772B	CIRC	250	250	0.46	22.5	37.0	4.2	11%	0.06	0.24	32.8	0.47	3.3	3.6
OVERLEA BLVD WEST	MH4020416772B	MH4026116815	CIRC	250	250	0.46	25.5	37.0	4.2	11%	0.06	0.29	32.8	0.36	3.6	3.8
OVERLEA BLVD WEST	MH4026116815	MH4027716827	CIRC	250	250	0.23	19.6	27.0	4.5	16%	0.07	0.30	22.6	0.35	3.8	3.9
OVERLEA BLVD WEST	MH4027716827	MH4034916882	CIRC	250	250	0.30	90.6	30.0	5.7	19%	0.08	0.30	24.3	0.61	3.9	4.8
THORNCLIFFE PARK DR	MH4034916882	MH4029616953	CIRC	375	375	0.13	89.4	58.0	16.5	28%	0.14	0.38	41.6	0.44	4.8	4.3
THORNCLIFFE PARK DR	MH4029616953	MH4024017027	CIRC	375	375	0.20	92.6	78.0	23.1	30%	0.14	0.51	54.9	0.44	4.3	4.0
THORNCLIFFE PARK DR	MH4024017027	MH4018617100	CIRC	375	375	0.10	90.6	56.0	35.7	64%	0.22	0.57	20.3	0.56	4.0	3.6
THORNCLIFFE PARK DR	MH4018617100	MH4015217145	CIRC	375	375	0.19	56.8	76.0	39.8	52%	0.21	0.69	36.2	0.49	3.6	3.5
THORNCLIFFE PARK DR	MH4015217145	MH4008617232	CIRC	375	375	0.12	109.5	61.0	55.5	91%	0.27	0.73	5.5	0.70	3.5	3.0
THORNCLIFFE PARK DR	MH4008617232	MH4004417288	CIRC	375	375	0.20	69.5	79.0	55.8	71%	0.25	0.81	23.2	0.58	3.0	2.8
THORNCLIFFE PARK DR	MH4004417288	MH4000117345	CIRC	375	375	0.12	71.1	60.0	65.3	109%	0.30	0.80	-5.3	0.79	2.8	3.1
THORNCLIFFE PARK DR	MH4000117345	MH3999017391	CIRC	375	375	0.20	48	79.0	70.4	89%	0.26	0.68	8.6	1.22	3.1	4.2
THORNCLIFFE PARK DR*EAS	MH3999017391	MH3988917405	CIRC	375	375	0.29	102.6	87.0	147.6	170%	0.92	2.00	-60.6	1.61	4.2	5.2
THORNCLIFFE PARK DR*EAS	MH3988917405	MH3986117426	CIRC	300	300	3.60	34	170.0	147.6	87%	0.22	0.73	22.4	2.72	5.2	6.6
THORNCLIFFE PARK DR*EAS	MH3986117426	MH3980617413	CIRC	250	250	9.69	56.4	172.0	154.4	90%	0.20	0.79	17.6	4.15	6.6	2.4
LOWER DON RIVER TRL*EAS	MH3980617413	MH3976817415	CIRC	250	250	18.00	38	252.0	152.3	60%	0.14	1.00	99.8	5.19	2.4	1.1
Siphon (East)	MH3976817415	MH3968017442	CIRC	250	250	25.77	92.3	302.0	149.4	49%	0.13	1.00	152.6	1.76	1.1	-5.0
Siphon (East)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	73.9	-42%	6.91	1.00	-249.9	1.15	-5.0	-0.9
Siphon (East)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	73.8	-112%	2.91	1.00	-139.8	1.37	-0.9	-0.4
Siphon (East) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	96.5	49%	1.44	1.00	101.5	3.80	-0.4	0.5
Siphon (West)	JP103567	MH3968017442	CIRC	250	250	25.84	92	302.0	0.0	0%	0.03	1.00	302.0	0.04	1.3	-5.0
Siphon (West)	MH3968017442	MH3964317453	CIRC	250	250	-8.74	39	-176.0	73.9	-42%	6.91	1.00	-249.9	1.15	-5.0	-0.9
Siphon (West)	MH3964317453	MH3961617499	CIRC	250	250	-1.23	53.3	-66.0	73.8	-112%	2.91	1.00	-139.8	1.37	-0.9	-0.4
Siphon (West) Connection to Trunk	MH3961617499	MH3960917508	CIRC	250	250	11.08	10.7	198.0	96.5	49%	1.44	1.00	101.5	3.80	-0.4	0.5
Profile 2: Overlea East																
OVERLEA BLVD East	MH4052217063	MH4051717054	CIRC	250	250	0.43	2.1	39.0	0.0	0%	0.05	0.24	39.0	-0.01	2.7	2.7
OVERLEA BLVD East (Dewatering MH)	MH4051717054	MH4050117022	CIRC	250	250	0.11	35	20.0	0.4	2%	0.03	0.13	19.6	0.11	2.7	3.0
OVERLEA BLVD East	MH4050117022	MH4044716957	CIRC	250	250	0.42	84.7	36.0	0.8	2%	0.03	0.27	35.2	0.07	3.0	3.8
OVERLEA BLVD East	MH4044716957	MH4039916920	CIRC	250	250	0.26	61.4	28.0	4.2	15%	0.07	0.27	23.8	0.54	3.8	3.6
OVERLEA BLVD East	MH4039916920	MH4034916882	CIRC	250	250	1.18	62.1	60.0	4.9	8%	0.05	0.22	55.1	0.63	3.6	4.8

Siphon **Shallow Sewers**

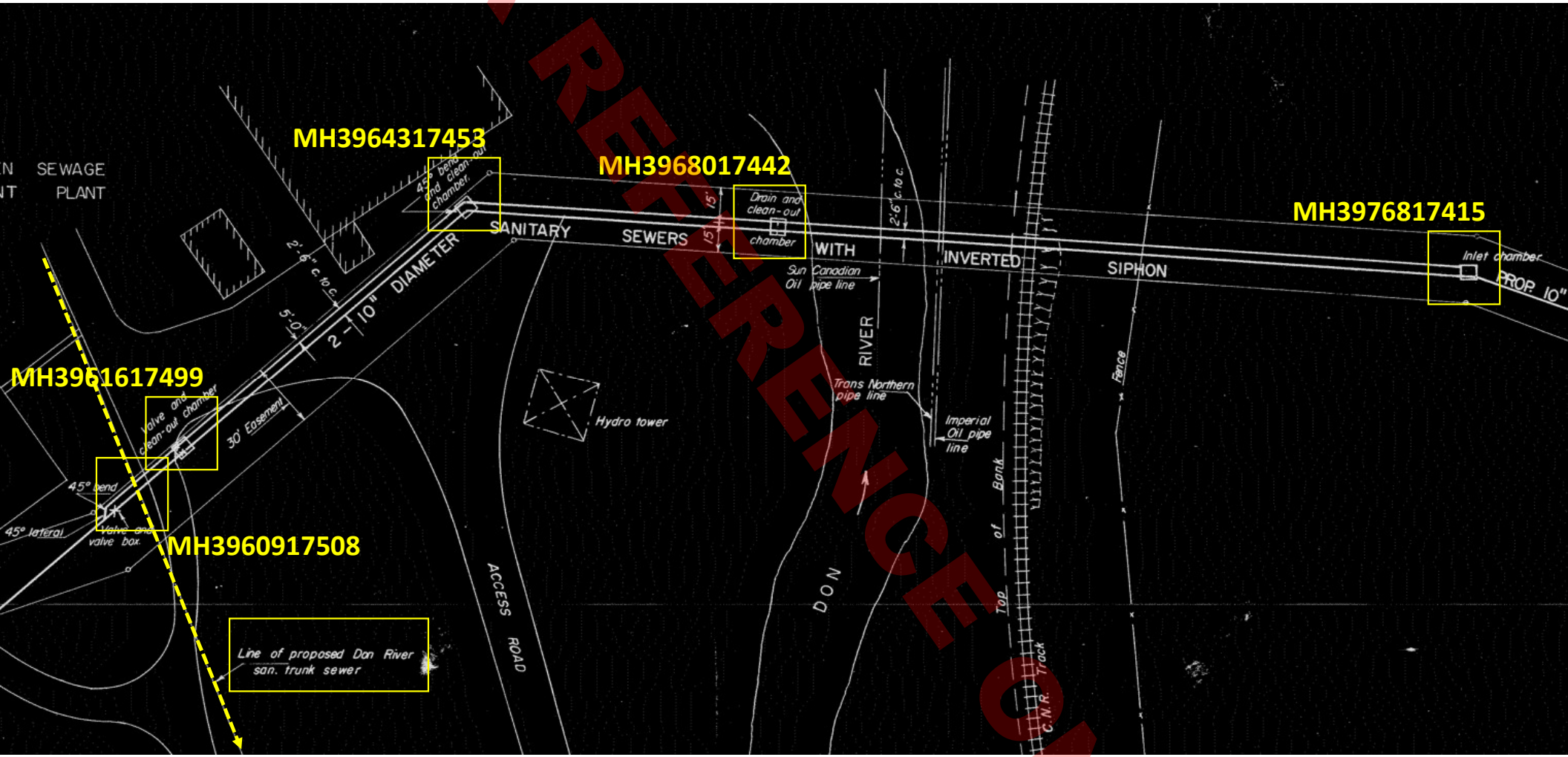
Surcharge State is from InfoWorks ICM Output; SS<1 means the pipe is not surcharged. SS=1 means the surcharge is caused by downstream water levels. SS=2 means the flow through the pipe is greater than pipe full capacity

APPENDIX D INVERTED SIPHON INFORMATION

Ontario Line – Overlea AW
Sanitary Sewer Downstream Analysis

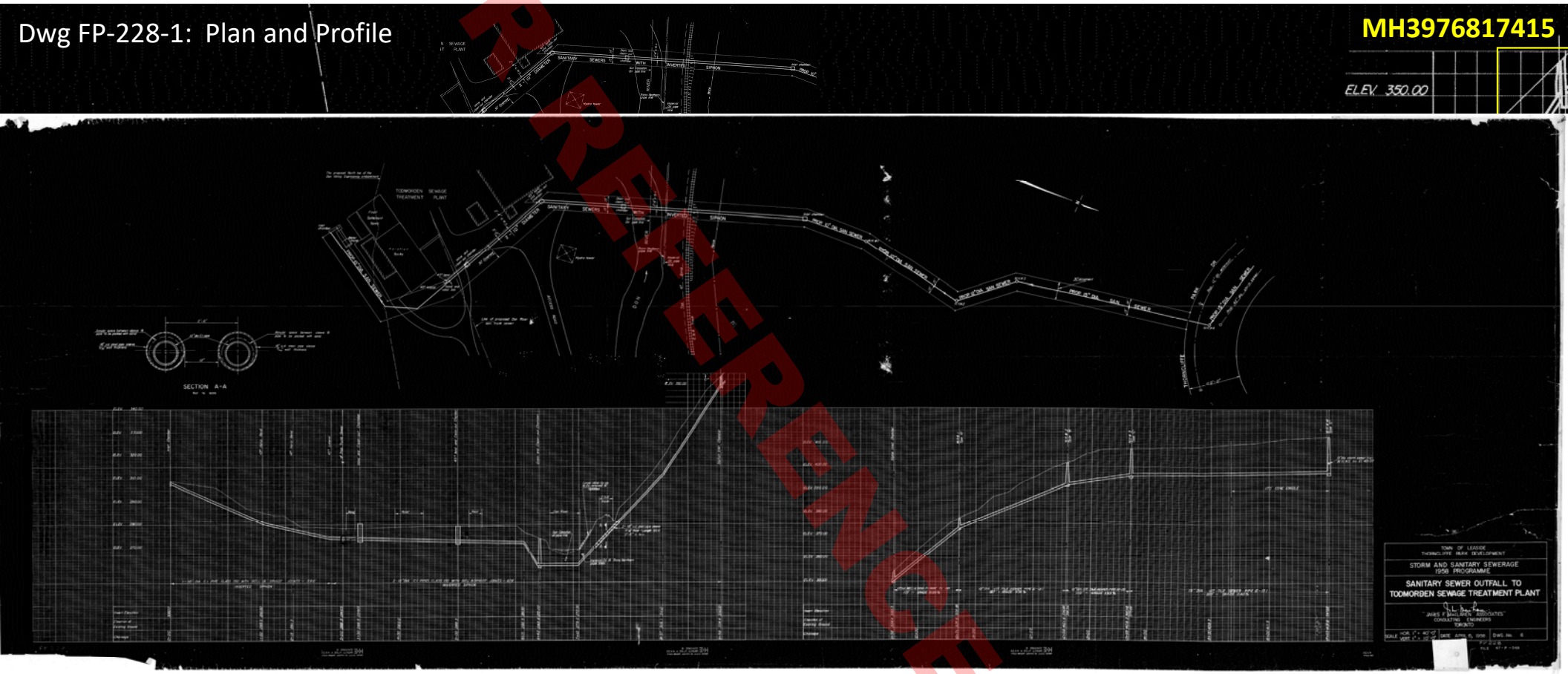
Appendix D – Inverted Siphon Information

Dwg FP-228-1: Plan and Profile



Dwg FP-228-1: Plan and Profile

MH3976817415



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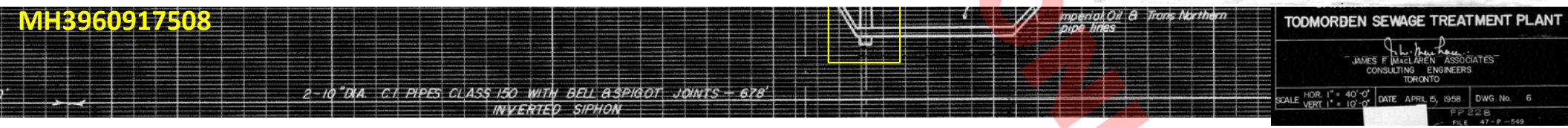
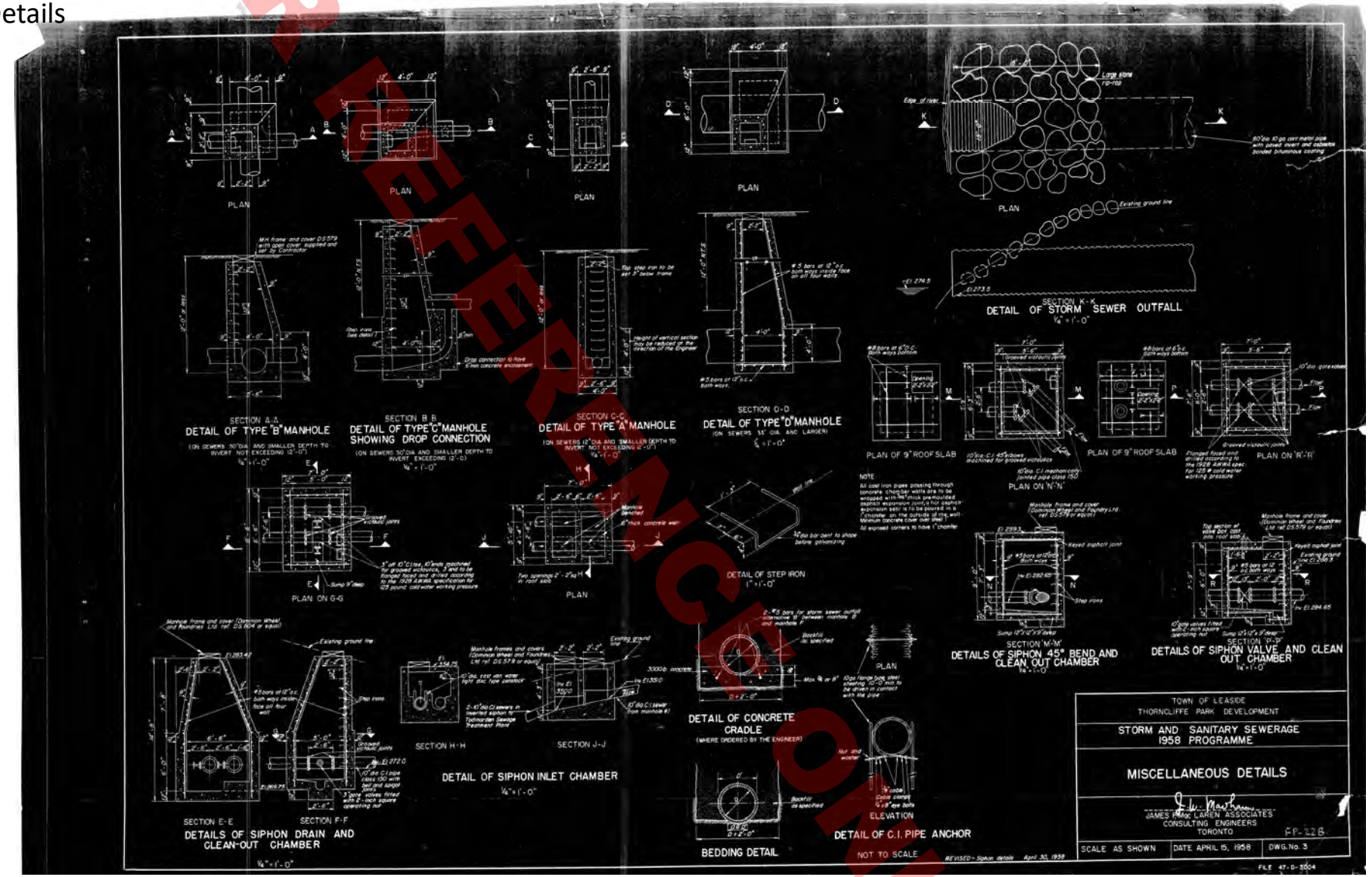
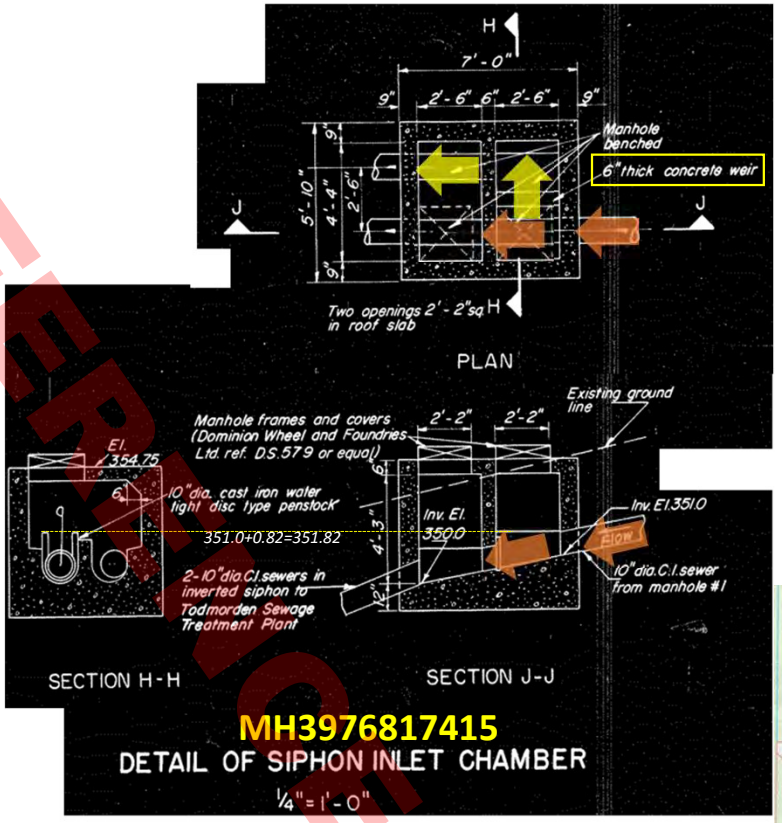


Dwg FP-228-2: Details

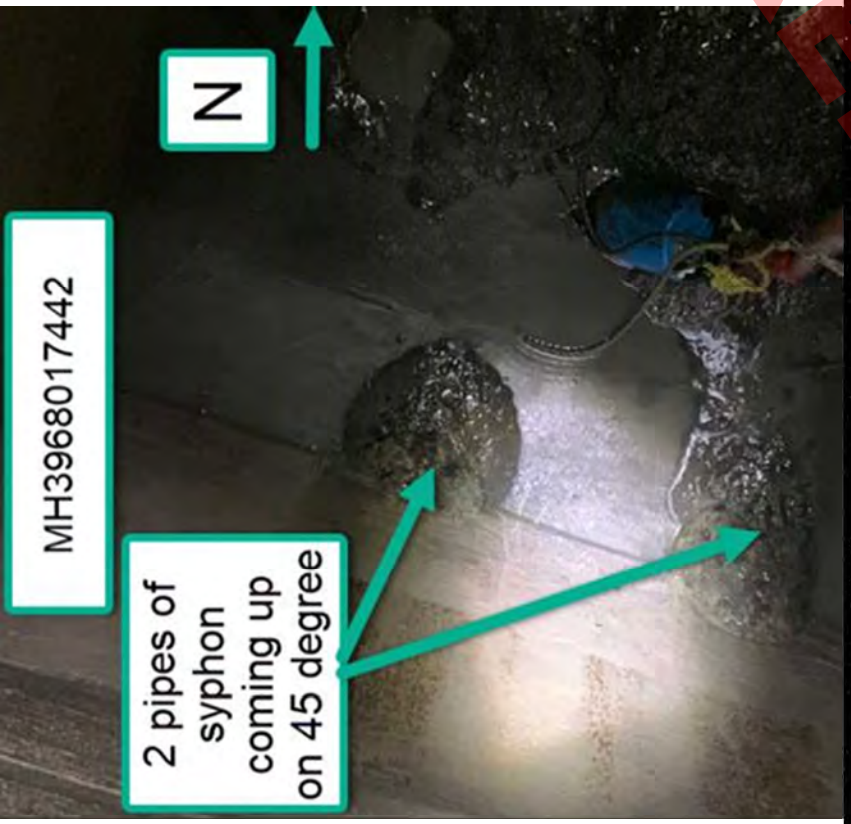


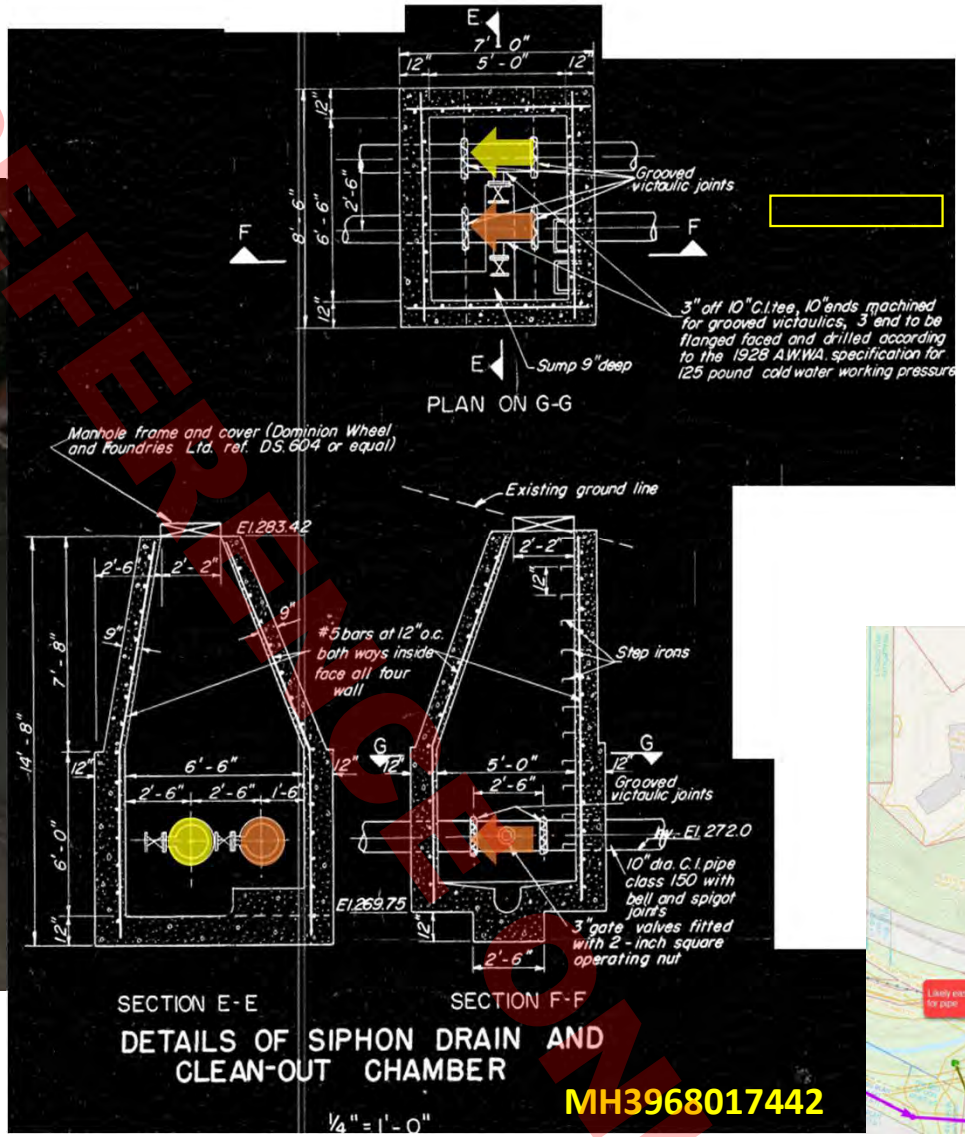
Inlet Chamber



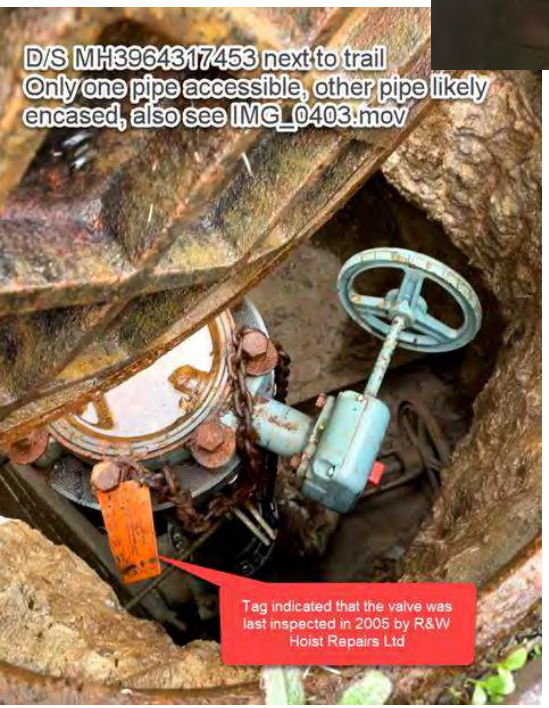
Inverted Siphon is two separate pressurized pipes

MH3968017442
Drain and Clean-out Chamber
(2 separate pressurized pipes)

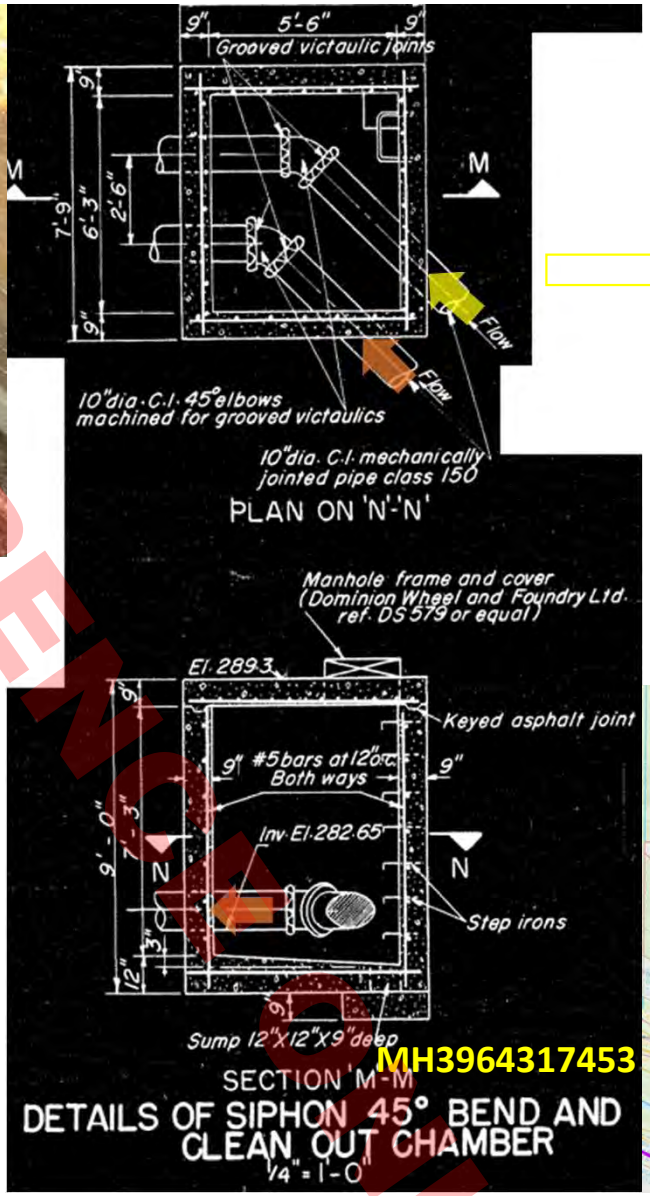




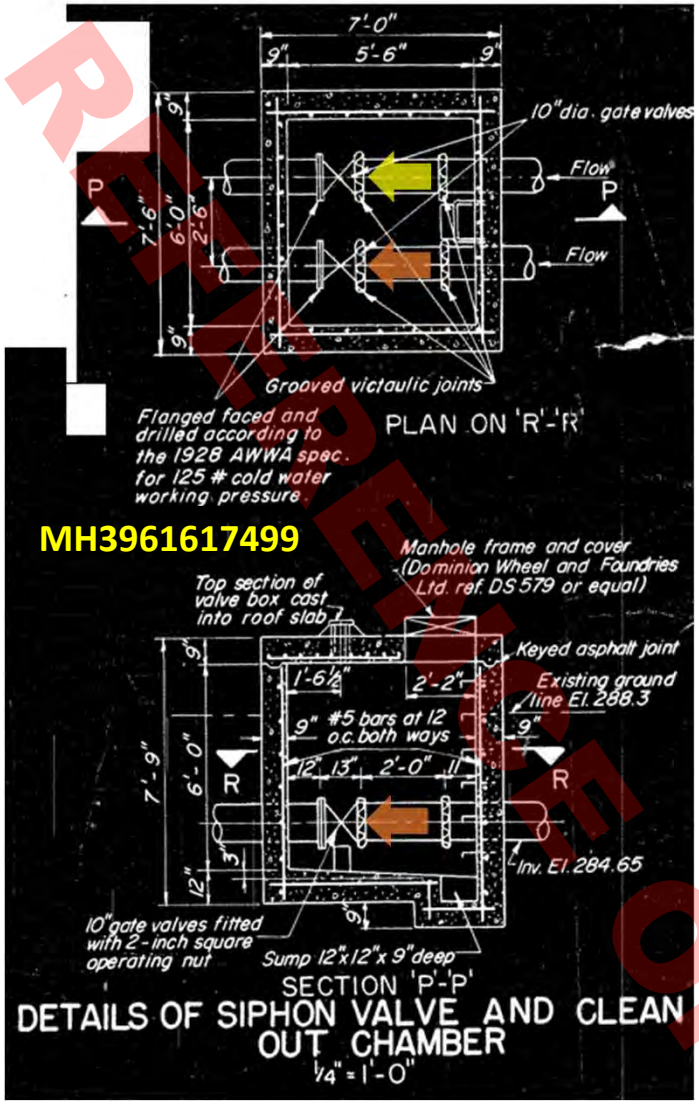
MH3964317453
Bend and Clean-out Chamber
(2 separate pressurized pipes)



Something did change with the valving, but there is no spill happening here. The chambers requiring draining likely filled with rain/river water since no drain.



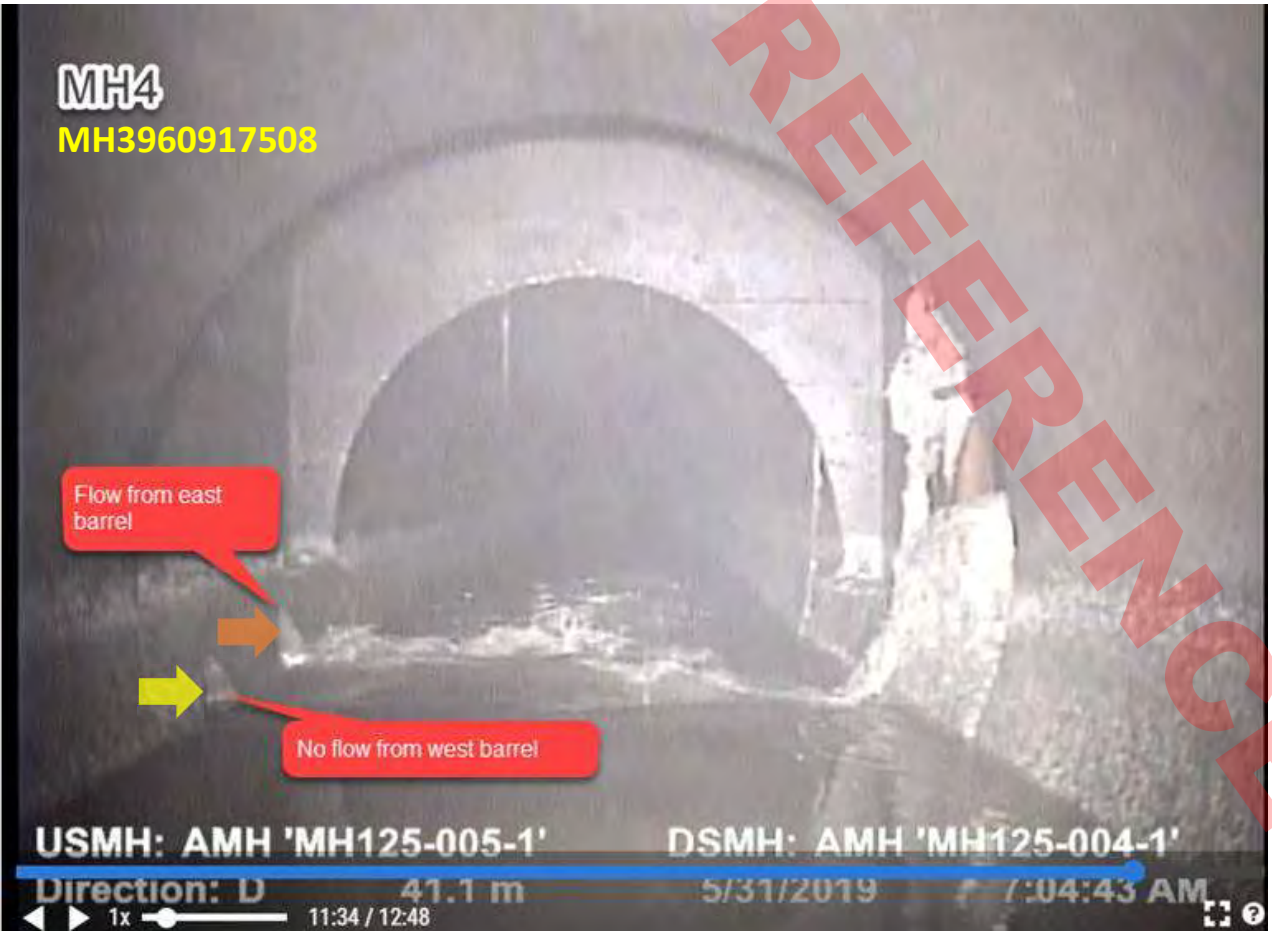
MH3961617499
Valve and Clean-out Chamber
(2 separate pressurized pipes)

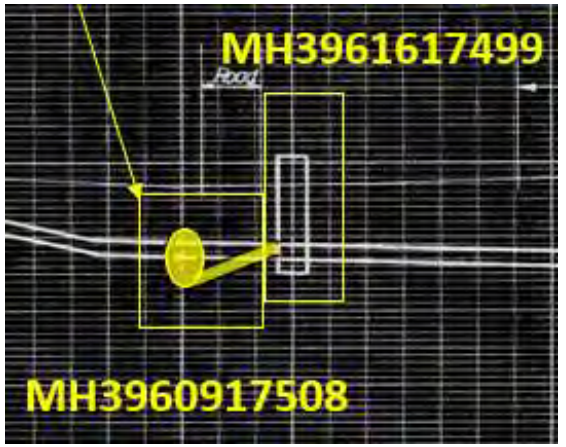


Inverted Siphon Modifications Made to Area 46 Model

MH3960917508

Connection to Trunk (2 separate discharge pipes)





Connection was sketched on to record drawing

Appendix F. Water Demand Calculations

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Water Demand and Fire Flow Demand

Location: Thorncliffe TOC
Block D

Items	Water Demand Calculation		Remark
Site Parameters			
Average Day Water Consumption Rate	190	l/capita/day	Multi-unit high-rise = 190 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	13957	Sq.m	
Total GFA	Residential	Non-Residential	
	0	18147	Sq.m
Residential Units	0	n/a	
Residential/Non-Residential	0	200	

Peaking Factor	Residential	Non-Residential	
Minimum hour	0.84	0.84	
Peak Hour	2.5	1.2	
Maximum Day Factor	1.3	1.1	

	Residential	Non-Residential	
Average Consumption Rate	0L/s	0.4L/s	Population x Average consumption
Maximum Day Flow Rate	0L/s	0.5L/s	Population x Average consumption x Maximum Day Factor
Peak Hour Flow Rate	0L/s	0.5L/s	Population x Average consumption x Peak Hour Factor

Items	Fire Flow Demand Calculation		Remark
Fire Flow Requirement	23709.1	L/min	*F=220 C *A $^{0.5}$ (Fire Underwriter's Survey Guidelines)* F= the required fire flow in L/min C= the coefficient related to the type of construction A= the total floor area in square metres Coefficient related to Construction=0.8 (Type II Non Combustible Construction)
Fire Flow (F)	23709.1	L/min	

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Water Demand and Fire Flow Demand

Location: Thorncliffe TOC
Block D1

Items	Water Demand Calculation		Remark
Site Parameters			
Average Day Water Consumption Rate	190	l/capita/day	Multi-unit high-rise = 190 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	13961	Sq.m	
Total GFA	Residential	Non-Residential	
	30866	193	Sq.m
Residential Units	426	n/a	
Residential/Non-Residential	1151	3	

Peaking Factor	Residential	Non-Residential	
Minimum hour	0.84	0.84	
Peak Hour	2.5	1.2	
Maximum Day Factor	1.3	1.1	

	Residential	Non-Residential	
Average Consumption Rate	2.5L/s	0L/s	Population x Average consumption
Maximum Day Flow Rate	3.3L/s	0L/s	Population x Average consumption x Maximum Day Factor
Peak Hour Flow Rate	6.3L/s	0L/s	Population x Average consumption x Peak Hour Factor

Items	Fire Flow Demand Calculation		Remark
Fire Flow Requirement	31017.5	L/min	$F=220\ C\ *A^{0.5}$ *(Fire Underwriter's Survey Guidelines)* F= the required fire flow in L/min C= the coefficient related to the type of construction A= the total floor area in square metres Coefficient related to Construction=0.8 (Type II Non Combustible Construction)
Fire Flow (F)	31017.5	L/min	

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Water Demand and Fire Flow Demand

Location: Thorncliffe TOC
Block E1

Items	Water Demand Calculation		Remark
Site Parameters			
Average Day Water Consumption Rate	190	l/capita/day	Multi-unit high-rise = 190 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	5389	Sq.m	
Total GFA	Residential	Non-Residential	
	47370	1718	Sq.m
Residential Units	663	n/a	
Residential/Non-Residential Population	1791	19	

Peaking Factor	Residential	Non-Residential	
Minimum hour	0.84	0.84	
Peak Hour	2.5	1.2	
Maximum Day Factor	1.3	1.1	

	Residential	Non-Residential	
Average Consumption Rate	3.9L/s	0L/s	Population x Average consumption
Maximum Day Flow Rate	5.1L/s	0L/s	Population x Average consumption x Maximum Day Factor
Peak Hour Flow Rate	9.8L/s	0.1L/s	Population x Average consumption x Peak Hour Factor

Items	Fire Flow Demand Calculation	Remark
Fire Flow Requirement	38994.2 L/min	$F=220\ C\ *A^{0.5}$ *(Fire Underwriter's Survey Guidelines)* F= the required fire flow in L/min C= the coefficient related to the type of construction A= the total floor area in square metres Coefficient related to Construction=0.8 (Type II Non Combustible Construction)
Fire Flow (F)	38994.2 L/min	

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Water Demand and Fire Flow Demand

Location: Thorncliffe TOC
Block E3

Items	Water Demand Calculation		Remark
Site Parameters			
Average Day Water Comsumption Rate	190	l/capita/day	Multi-unit high-rise = 190 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	6082	Sq.m	
Total GFA	Residential	Non-Residential	
	55926	2000	Sq.m
Residential Units	761	n/a	
Residential/Non-Residential Population	2055	22	

Peaking Factor	Residential	Non-Residential	
Minimum hour	0.84	0.84	
Peak Hour	2.5	1.2	
Maximum Day Factor	1.3	1.1	

	Residential	Non-Residential	
Average Comsumption Rate	4.5L/s	0L/s	Population x Average consumption
Maximum Day Flow Rate	5.9L/s	0.1L/s	Population x Average consumption x Maximum Day Factor
Peak Hour Flow Rate	11.3L/s	0.1L/s	Population x Average consumption x Peak Hour Factor

Items	Fire Flow Demand Calculation	Remark
Fire Flow Requirement	42359.4 L/min	$F=220\ C\ *A^{0.5}$ *(Fire Underwriter's Survey Guidelines)* F= the required fire flow in L/min C= the coefficient related to the type of construction A= the total floor area in square metres Coefficient related to Construction=0.8 (Type II Non Combustible Construction)
Fire Flow (F)	42359.4 L/min	

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Water Demand and Fire Flow Demand

Location: Thorncliffe TOC
Block E4 & E5

Items	Water Demand Calculation		Remark
Site Parameters			
Average Day Water Comsumption Rate	190	l/capita/day	Multi-unit high-rise = 190 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	11864	Sq.m	
Total GFA	Residential	Non-Residential	
	59349	843	Sq.m
Residential Units	805	n/a	
Residential/Non-Residential Population	2174	10	

Peaking Factor	Residential	Non-Residential	
Minimum hour	0.84	0.84	
Peak Hour	2.5	1.2	
Maximum Day Factor	1.3	1.1	

	Residential	Non-Residential	
Average Comsumption Rate	4.8L/s	0L/s	Population x Average consumption
Maximum Day Flow Rate	6.2L/s	0L/s	Population x Average consumption x Maximum Day Factor
Peak Hour Flow Rate	12L/s	0L/s	Population x Average consumption x Peak Hour Factor

Items	Fire Flow Demand Calculation	Remark
Fire Flow Requirement	43179.9 L/min	$F=220\ C\ *A^{0.5}$ *(Fire Underwriter's Survey Guidelines)* F= the required fire flow in L/min C= the coefficient related to the type of construction A= the total floor area in square metres Coefficient related to Construction=0.8 (Type II Non Combustible Construction)
Fire Flow (F)	43179.9 L/min	

Appendix G. Thorncliffe Park Watermain Replacement Hydraulic Analysis

OLTA – Thorncliffe Park Watermain Replacement Hydraulic Analysis

Ontario Line Technical Advisor

TORONTO, ONTARIO

May 25, 2023

Alexandre Mineault-Guitard, ing., P.Eng.
Jasmin Sidhu, P.Eng

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Abbreviations

ADD	Average Day Demands
MDD	Maximum Day Demands
MHD	Minimum Hour Demands
PF	Peaking Factor
PHD	Peak Hour Demands
NFPA	National Fire Protection Association
RSSOM	Rolling Stock, Systems, Operations and Maintenance
TWAG	Toronto Water Asset Geodatabase

1 Introduction

As part of the Ontario Line subway project, elevated railway tracks and Rolling Stock, Systems, Operations and Maintenance (RSSOM) facilities will be built in Toronto, from the Ontario Science Centre to Thorncliffe Park. The proposed works will impact the existing watermains in Thorncliffe Park. The layout and sizing of the replacement watermains is to be confirmed, to verify that the level of service can be maintained in the study area. Additionally, the capacity of the proposed watermains to supply additional demands is to be assessed.

This report presents the hydraulic analysis of the proposed works, to maintain water servicing in the study area. The analysis is based on the coordination roll plots provided for reference (dated October 5th, 2022), attached in **Appendix A**.

2 Methodology

2.1 Water Demands & Fire Flows

2.1.1 Water Demands

Water demands for the study area are estimated based on water consumption data provided by the City of Toronto and on the *Design Criteria for Sewers and Watermains* (January 2021).

Average day demands (ADD) are calculated based on the annual total consumption (m^3) converted into a daily consumption rate (m^3/d).

Minimum hour demands (MHD) are obtained by multiplying the ADD by a peaking factor of 0.80 to 0.84 from the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021), depending on land-use. Based on water consumption by land use, the average MHD peaking factor in Thorncliffe Park is 0.84.

Maximum day demands (MDD) are obtained by multiplying the ADD by a peaking factor of 1.10 to 1.50 from the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021), depending on land-use. Based on water consumption by land use, the average MDD peaking factor in Thorncliffe Park is 1.27.

The peak hour demands (PHD) are calculated by multiplying the MDD by a factor of 1.20 to 2.50 from the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021), depending on land-use. Based on water consumption by land use, the average PHD peaking factor in Thorncliffe Park is 2.29.

In the absence of requested boundary conditions and typical watermain flows from the Toronto Water Asset Geodatabase (TWAG), flows in each watermain under the different demand conditions cannot be completely modelled. Therefore, it is assumed that flows through local watermains are equivalent to the demands in the study area. This approach can be used, as this hydraulic analysis is a comparison of existing and future (watermain replacement) conditions, where the performance of the watermain replacement is compared to the existing watermain under the same boundary and demand conditions.

2.1.2 Fire Flows

Available Fire Flows

Multiple hydrant flow tests were conducted within the study area on May 9th, 2022 and on June 21st, 2022. Test results are summarized in **Table 2-1**. The corresponding available fire flow at a residual pressure of 20 psi is calculated as per the National Fire Protection Association (NFPA) 291 *Recommended Practice for Water Flow Testing and Marking of Hydrants,* whereby:

$$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)

Q_f= total flow measured during test (USGPM)

h_r = pressure drop to desired residual pressure (psi)

h_f = pressure drop measured during test (psi)

Resulting available fire flows at a residual pressure of 20 psi are also provided in **Table 2-1**. Detailed hydrant flow test reports and available fire flow calculations are provided in **Appendix B.**

As seen from the hydrant test reports, the drop in pressure from static conditions during the hydrant flow tests was minimal (less than 5 psi). This insufficient drop in pressure limits the accuracy of the projected available fire flows at a residual pressure of 20 psi. The existing watermains likely cannot convey the projected fire flows without experiencing high head losses and velocities.

Therefore, for this analysis, design fire flows outlined in the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021) are used to compare projected available fire flows in the existing and proposed (watermain replacement) conditions.

Table 2-1: Hydrant Flow Test Results

Hydrant Test #	Date	Hydrant Test Location	Test Fire Flow	Available Fire Flow at Residual 20 psi
1	2022-05-09	In front of 14 Banigan Dr (north side of street)	96 L/s (6,000 L/min; 1,519 USGPM)	913 L/s (55,000 L/min; 14,472 USGPM)
2	2022-05-09	S/W corner of Leaside Park and Overlea Blvd	96 L/s (6,000 L/min; 1,529 USGPM)	520 L/s (31,000 L/min; 8,247 USGPM)
3	2022-05-09	N/W Corner of Millwood Rd and Overlea Blvd	96 L/s (6,000 L/min; 1,519 USGPM)	643 L/s (39,000 L/min; 10,199 USGPM)
4	2022-05-09	In front of 36 Overlea (north side of street)	96 L/s (6,000 L/min; 1,529 USGPM)	919 L/s (55,000 L/min; 14,567 USGPM)
5	2022-05-09	West of 28 Overlea (north side of street)	96 L/s (6,000 L/min; 1,529 USGPM)	919 L/s (55,000 L/min; 14,567 USGPM)
6	2022-05-09	In front of 20 Overlea (north side of street)	97 L/s (6,000 L/min; 1,538 USGPM)	646 L/s (39,000 L/min; 10,244 USGPM)
7	2022-05-09	6 Pine St (West side of street)	96 L/s (6,000 L/min; 1,529 USGPM)	919 L/s (55,000 L/min; 14,567 USGPM)
8	2022-06-21	50 Beth Nealson Dr	92 L/s (6,000 L/min; 1,453 USGPM)	575 L/s (35,000 L/min; 9,118 USGPM)
9	2022-06-21	50 Overlea Blvd. (Front)	90 L/s (5,000 L/min; 1,434 USGPM)	795 L/s (48,000 L/min; 12,606 USGPM)
10	2022-06-21	100 Thorncliffe Park Dr	91 L/s (5,000 L/min; 1,443 USGPM)	561 L/s (34,000 L/min; 8,891 USGPM)
11	2022-06-21	OMSF - Banigan Dr Access	91 L/s (5,000 L/min; 1,443 USGPM)	816 L/s (49,000 L/min; 12,928 USGPM)
12	2022-06-21	OMSF - Thorncliffe Park Dr Entrance	90 L/s (5,000 L/min; 1,434 USGPM)	788 L/s (47,000 L/min; 12,484 USGPM)
13	2022-06-21	Pat Moore Dr. (Cul de Sac)	91 L/s (5,000 L/min; 1,443 USGPM)	808 L/s (48,000 L/min; 12,807 USGPM)
14	2022-06-21	Village Station Road	85 L/s (5,000 L/min; 1,353 USGPM)	N/A(1)

Notes:
(1) No pressure drop observed; available fire flow cannot be projected

Design Fire Flows

The City of Toronto *Design Criteria for Sewers and Watermains* (January 2021) outline fire flows which should be used to assess the hydraulic capacity of the water distribution system, based on land-use.

Along with the maximum day demand, these fire flows are applied as fire flow demands in the hydraulic model (MDD+FF scenario), where the available fire flow at a residual pressure of 20 psi is then calculated, and compared under existing and proposed conditions. **Table 2-2** lists the different fire flows from the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021).

Table 2-2: Design Fire Flows based on Land-Use (from City of Toronto *Design Criteria for Sewers and Watermains* (January 2021))

Land-Use Type	Design Fire Flow
Single-Family and Two-Family Dwellings	3,800 L/min (63 L/s; 1,000 USGPM)
Community Facilities	5,680 L/min (95 L/s; 1,500 USGPM)
Multi-Family – One and Two Stories – and Closely Built Residential	7,570 L/min (126 L/s; 2,000 USGPM)
Multi-Family – Three Stories or More – and Closely Built Residential	9,460 L/min (158 L/s; 2,500 USGPM)
Multi-Family Attached Residential and Commercial – Up to Two Stories	11,360 L/min (189 L/s; 3,000 USGPM)
Commercial – Over Two Stories; High-Rise Residential and Industrial Park	19,000 L/min (317 L/s; 5,000 USGPM)
Shopping Centre	22,700 L/min (378 L/s; 6,000 USGPM)

2.2 Design Criteria and Level of Service

2.2.1 System Pressure Requirements

As per the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021), normal operating pressures in a distribution system range from 350 to 550 kPa (50 to 80 psi) and not less than 275 kPa (40 psi). The maximum pressure in the distribution system should not exceed 700 kPa (100 psi). Under MDD+FF demand, pressures are not to be less than 140 kPa (20 psi). **Table 2-3** provides a summary of the pressure scenarios and the corresponding recommended pressures.

Table 2-3: Recommended Operating Pressures

Pressure Scenario	Pressure	
	kPa	psi
Minimum MDD+FF	140	20
Minimum - PHD	275	40
Minimum - MDD	350	50
Maximum - ADD	550	80
Maximum - MHD	700	100

In the absence of requested boundary conditions and typical watermain flows from the TWAG, and with the limitations in the hydrant tests carried out, absolute pressures cannot be accurately modelled under existing and proposed conditions. Nonetheless, a comparative analysis of existing and future (watermain replacement) conditions can be carried out. The performance of the watermain replacement is compared to the existing watermain under the same boundary and demand conditions, in terms of pressure differences and differences in available fire flow at a residual pressure of 20 psi.

2.2.2 Watermain Velocity and Head Loss Requirements

The following velocity criteria are outlined in the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021):

- Maximum velocity during normal operating conditions: 2 m/s
- Maximum velocity during fire flow conditions: 3 m/s

The following head loss criteria are outlined in the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021):

- Maximum head loss during peak hour conditions (excluding fire flow situations): 2 to 5 m/km.

2.2.3 Watermain Design Criteria

Watermain Sizing

The following watermain sizing criteria are outlined in the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021):

- Minimum diameter for single family residential subdivisions: 150 mm
- Minimum diameter on a new street for high density residential, industrial, and commercial developments: 300 mm
- Standard diameters for distribution watermains: 150 mm, 200 mm, 300 mm, and 400 mm
- Diameter for transmission watermains: 600 mm in diameter and larger (in general)
    - Service connections to transmission watermains are not allowed

Watermain C-Factor

The City of Toronto *Design Criteria for Sewers and Watermains* (January 2021) specify the Hazen-Williams roughness coefficients (C-factors) to be used for the design of new water distribution systems. The C-factors are listed in **Table 2-4** and vary by watermain size, regardless of pipe material.

Table 2-4: Hazen-Williams Coefficients (C-Factors) for New Watermains, by Watermain Size

Watermain Diameter (mm)	Coefficient
150	100
200 or 250	110
300 - 600	120
> 600	130

For the evaluation of existing systems, the guidelines recommend using values from field tests if possible. In the absence of field test data, existing watermains' C-factors were allocated based on pipe material, diameter and age, using reference values from Walski, et al. (2003), and are summarized in **Table 2-5**.

Table 2-5: Hazen-Williams Coefficients (C-Factors) for Existing Watermains, by Watermain Size, Age and Material

Year	Material	Watermain Nominal Diameter (mm)						Comments
		150	200	250	300	350	400	
1925	Unknown	70	70					Assumed Cast Iron; C-factor for 100-year old pipe with Moderate Attack
1958	Cast Iron		85		85		85	C-factor for 60-year old pipe with Moderate Attack
	Unknown		85				85	Assumed Cast Iron; C-factor for 60-year old pipe with Moderate Attack
1959	Cast Iron				85		85	C-factor for 60-year old pipe with Moderate Attack
	Unknown		85					Assumed Cast Iron; C-factor for 60-year old pipe with Moderate Attack
1963	Cast Iron				85			C-factor for 60-year old pipe with Moderate Attack
1964	Cast Iron		85	85				C-factor for 60-year old pipe with Moderate Attack
1966	Cast Iron		85					C-factor for 60-year old pipe with Moderate Attack
1968	Cast Iron		85					C-factor for 60-year old pipe with Moderate Attack
	Unknown			85				Assumed Cast Iron; C-factor for 60-year old pipe with Moderate Attack
1992	Ductile Iron Concrete Lined					145		C-factor for Coated Steel Pipe
2003	PVC				147			C-factor for PVC (wavy, clean)
2020	PVC				147			C-factor for PVC (wavy, clean)
	Unknown		147					Assume PVC; C-factor for PVC (wavy, clean)

2.3 Hydraulic Modelling

Innovyze's InfoWater (Suite 12.4, Update #9) was used to create a stand-alone hydraulic model of the water distribution system within the study area for this analysis. The model was developed using TWAG GIS and water consumption data to model existing conditions, and the roll plan provided to model proposed conditions (watermain replacement). The hydraulic model setup is illustrated in **Appendix C**.

2.3.1 Watermain Layout

The existing 400 mm diameter watermain along Overlea Blvd, east of Thorncliffe Park Dr, will be replaced with a 600 mm diameter watermain, and re-aligned to circumvent proposed railway infrastructure. Furthermore, a new 400 mm diameter watermain will be installed parallel to the new 600 mm to allow for service connections. Existing services along Overlea Blvd will be replaced. The configuration of the interconnection between the Overlea Blvd and Thorncliffe Park Dr watermains will be modified. The existing Thorncliffe Park Dr watermains (300 mm diameter) within the Overlea Blvd right-of-way will be replaced with 400 mm diameter watermains.

The existing 300 mm diameter watermain along Thorncliffe Park Dr currently extends to Banigan Dr. To accommodate future RSSOM facilities, a portion of this watermain will be abandoned. A new 300 mm diameter watermain will connect Thorncliffe Park Dr to the existing 250 mm diameter watermain on Banigan Dr. A section of the watermain on Banigan Dr will be abandoned as well.

A new 300 mm diameter watermain is also being proposed along the new Leaside Park Dr extension, which would loop with the existing 250 mm diameter watermain along Banigan Dr. This analysis will confirm the need for this new additional looping.

2.3.2 Boundary Conditions

Based on the extent of the TWAG GIS data provided, boundary conditions were applied at 3 different locations:

1) At the intersection of Millwood Rd and Overlea Blvd;

2) At Beth Nealson Dr and Wicksteed Ave; and,

3) Along Overlea Blvd, east of Thorncliffe Park Dr.

In the absence of requested boundary conditions and typical watermain flows from the TWAG, fixed hydraulic gradeline (HGL) values based on the nearest hydrant tests were applied at these locations. As previously noted (see **Section 2.1.2**), there are limitations with the hydrant tests carried out, as they did not have sufficient pressure loss to accurately project high flows. The hydrant data provided thus only captured static conditions at the time of the tests, and are not representative of different flow conditions. The hydrant data tests could therefore not be used to calibrate the hydraulic model.

Boundary conditions values are summarized in **Table 2-6**, and have been simulated in the hydraulic model using fixed head reservoirs to which HGLs have been applied. Due to the limitations in the hydrant test data, the same static HGLs were applied under all demand conditions. Nonetheless, a comparative analysis of existing and proposed

conditions can still be carried out since the same boundary conditions will be maintained to model pressures and flows within the existing and replacement watermains.

Table 2-6: Boundary Conditions Based on Hydrant Tests

Boundary Condition	Location	HGL (m)
1	Intersection of Millwood Rd and Overlea Blvd	178.40
2	At Beth Nealson Dr and Wicksteed Ave	180.50
3	Along Overlea Blvd, east of Thorncliffe Park Dr	182.50

3 Results

3.1 Normal Demand Conditions

The pressure differences between future (watermain replacement) and existing conditions are illustrated in **Figure 3-1** (proposed conditions with looping along Banigan Dr, from Leaside Park Dr to Thorncliffe Park Dr) and **Figure 3-2** (proposed conditions without looping). Pressure differences are shown for the normal demand scenarios of ADD, MHD, MDD and PHD. **Figure 3-1** and **Figure 3-2** show that the proposed watermain replacement will have minimal impact on pressures in the study area, with pressure decreases remaining within -1.0 psi from existing conditions.

ADD along Thorncliffe Park Dr and Banigan Dr is 1.11 L/s (96 m^3/d). Per typical industry standards (e.g., City of Ottawa), areas with ADD of 50 m^3/d or greater serviced by a single watermain constitute vulnerable service areas (VSAs). To eliminate this VSA, the secondary feed along Leaside Park Dr and resulting looping, as illustrated in **Figure 3-1**, is therefore recommended.

With the proposed watermain interconnection configuration at Overlea Blvd and Thorncliffe Park Dr, flows in the upstream sections of the Overlea Blvd watermains (east of Thorncliffe Park Dr) will increase. This, along with the smaller internal diameter in the new PVC watermain, results in an increase in velocity. Peak PHD velocity along Overlea Blvd increases from 0.75 m/s to 0.96 m/s (a +0.21 m/s increase). However, PHD velocities remain below the maximum limit of 2 m/s stated in the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021). It is noted that this velocity assessment only considers the buildings being serviced in the study area and does not account for the flows that are passing through to downstream areas and services.

Head losses within the Overlea Blvd watermain slightly decrease with the new pipe (increased C-factors). Peak PHD head losses along Overlea Blvd decrease from 3.09 m/km to 2.74 m/km (a -0.35 m/km decrease). PHD head losses remain below the maximum limit of 2 to 5 m/km stated in the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021).

Note that similar hydraulic conditions are observed along Overlea Blvd without upsizing the watermain east of Thorncliffe Park Dr to 600 mm diameter. Hence, a single 400 mm watermains would result in similar hydraulic conditions, in comparison to a 600 mm transmission main, and a parallel 400 mm diameter distribution main.

Detailed results are provided in **Appendix C**.

3.2 Maximum Day & Fire Flow

The relative difference in available fire flow (AFF) under MDD conditions between future and existing conditions is illustrated in **Figure 3-3**, with and without the proposed looping along Banigan Dr.

The proposed watermain replacement along Overlea Blvd will result in an increase in available fire flows, with increased C-factors in the newer watermain. No decrease in fire flows is observed along Banigan Dr. With the additional looping, fire flows along Banigan Dr increase. It is therefore recommended that looping be implemented, to improve fire flows along Banigan Dr and compensate for the additional head losses due to the increased watermain length along Thorncliffe Park Dr and Banigan Dr.

In absolute terms, the modelled AFF along Thorncliffe Park Dr and Banigan Dr are 180 L/s to 525 L/s. This is less than the calculated AFF based on the hydrant tests (561 L/s to 816 L/s), showing the limitations of using the hydrant tests to predict high flows.

Watermain velocities along the Overlea Blvd watermain (existing & replaced) were also evaluated under MDD+FF conditions, using a design fire flow of 317 L/s (for commercial areas, per the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021)). As observed under PHD conditions, with the proposed watermain interconnection configuration at Overlea Blvd and Thorncliffe Park Dr, flows in the upstream sections of the Overlea Blvd watermains (east of Thorncliffe Park Dr) will increase. This, along with the smaller internal diameter in the new PVC watermain, results in an increase in velocity. Peak MDD+FF velocity along Overlea Blvd increases from 1.45 m/s to 1.69 m/s (a +0.24 m/s increase). However, MDD+FF velocities remain below the maximum limit of 3 m/s stated in the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021). It is noted that this velocity assessment only considers the buildings being serviced in the study area and does not account for the MDD flows that are passing through to downstream areas and services.

Detailed results are provided in **Appendix C**.

3.3 Capacity for Future Developments

Considering potential future developments in Thorncliffe Park, the capacity of the proposed Overlea Blvd watermain to accommodate additional demands was assessed. Based on calculated water demands for the study area, PHD flows in the proposed Overlea Blvd watermain replacement are 108.1 L/s in the upstream section east of the Thorncliffe Park Dr intersection. This watermain section was considered as it represents the primary feed to the study area. Considering a maximum PHD velocity of 2 m/s per the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021), an additional PHD flow of +118.1 L/s could theoretically be accommodated in the watermain. As shown in **Table 3-1**, this is equivalent to approximately 16,527 people.

However, this assessment only considers flows due to the demands in the study area and does not consider additional flows conveyed by the Overlea Blvd watermains downstream of the study area. Typical flows and boundary conditions from the TWAG would be needed to confirm and refine this estimate.

Table 3-1: Estimated Overlea Blvd Watermain Residual Capacity

Parameter	Value	Units
Watermain Internal Diameter	379.5	mm
Maximum PHD Velocity	2	m/s
Maximum Pipe Capacity	226	L/s
Future PHD Flow (Watermain Replacement Conditions)	108.1	L/s
Additional PHD Flow Capacity	118.1	L/s
	10,205	m^3/d
PHD Peaking Factor	2.5	-
Additional MDD Flow Capacity	4,082	m^3/d
MDD Peaking Factor	1.3	-
Additional ADD Flow Capacity	3,140	m^3/d
Residential per Capita Demand	190	L/c/d
Additional Equivalent Population Capacity	16,527	ppl

3.4 Additional Loop Along Leaside Park Drive Extension

As discussed in Sections 3.2 and 3.3, a new 300 mm diameter watermain along the new Leaside Park Dr extension would provide additional looping to network. This new loop would eliminate the VSA, allowing water servicing from a second feed in that part of the network. Furthermore, this new loop will provide additional fire flow capacity along Banigan Dr.

This new watermain will connect to the existing 250 mm diameter watermain on Banigan Dr. As 250 mm diameter watermain is no longer a standard size for watermains within the City of Toronto, a 300 mm diameter pipe is recommended for the new watermain.

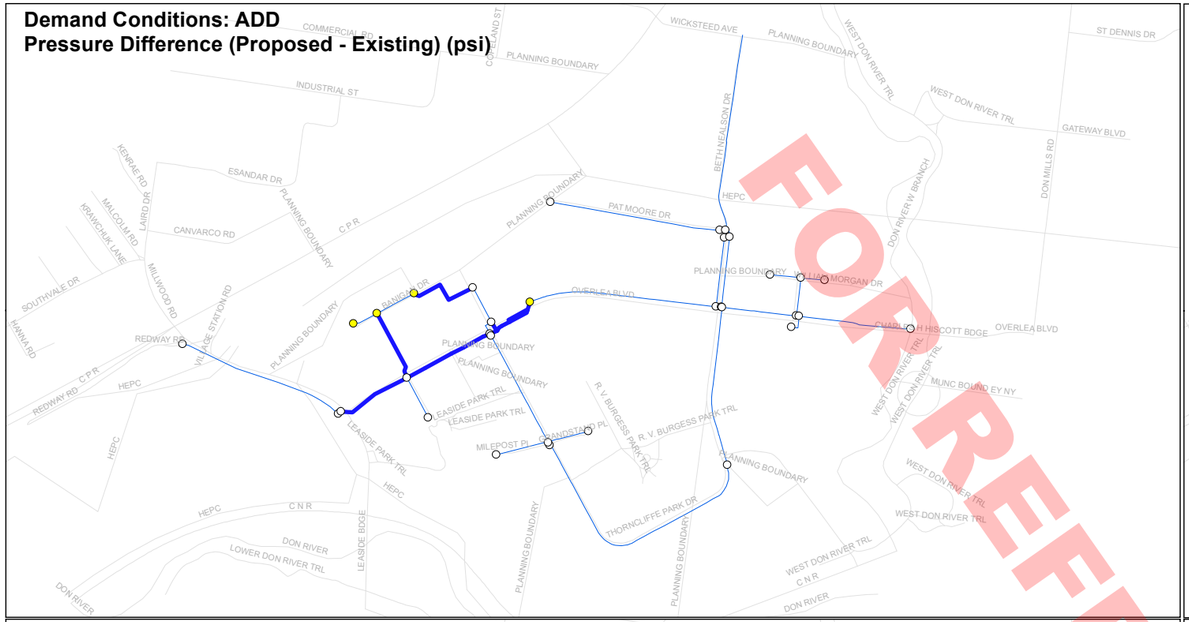
To assess the hydraulic performances of the proposed watermain, velocity under MDD+FF conditions were analyzed, using a design fire flow of 317 L/s (for commercial areas, per the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021)). For this analysis, the fire flow was distributed upon several hydrants along Banigan Dr, as per the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021).

Peak MDD+FF velocity along the proposed 300 mm diameter pipe is estimated to be 1.83 m/s, which is below the maximum limit of 3 m/s stated in the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021). Under similar MDD+FF conditions and without the recommended 300 mm diameter watermain, peak velocity north of 4.4 m/s would occur in the existing 300 mm diameter along Thorncliffe Park Dr, as flow will be conveyed through a single fed. It is noted that this velocity assessment only considers the buildings being serviced in the study area and does not account for the MDD flows that are passing through to downstream areas and services.

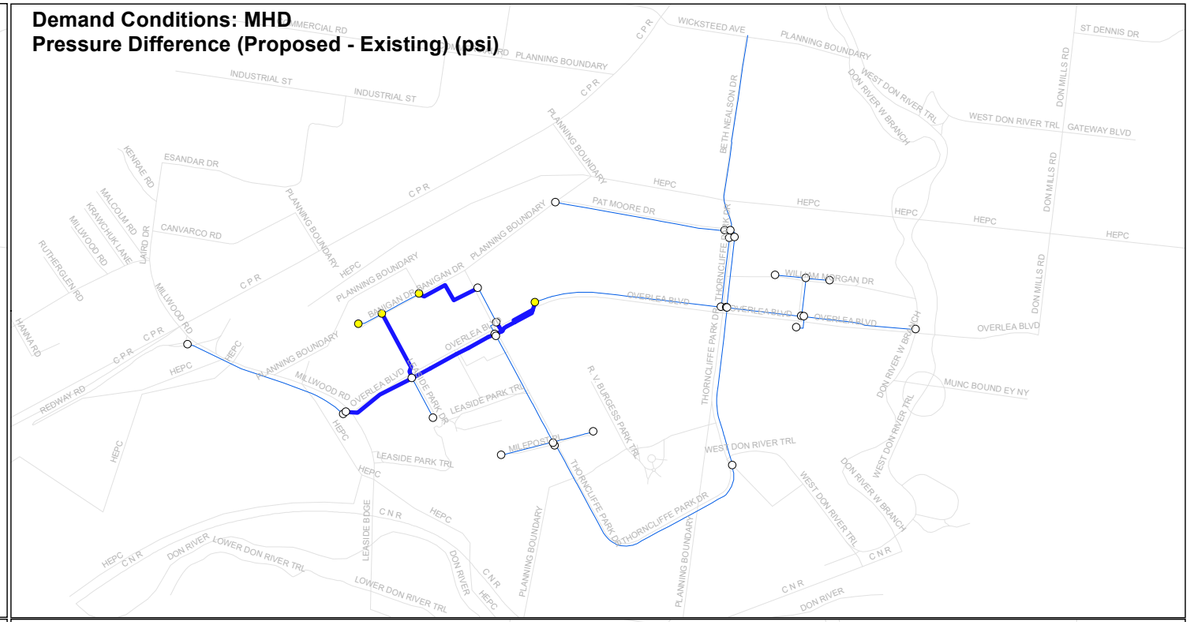
In addition to improving the fire flow capacity along Banigan Dr, the proposed watermain along the new Leaside Park Dr extension would improve water circulation through this area of the water distribution network. Without this additional loop, water to Banigan Dr is fed only via the existing 300 mm diameter along Thorncliffe Park Dr. Water age at the dead-end along Banigan Dr is thus expected to be lowered (i.e., improved) with the additional looping.

Lastly, with water demands coming from the numerous service connections to the watermains along Banigan Dr and Overlea Bld, no stagnant water is expected in the new watermain along Leaside Park Dr extension.

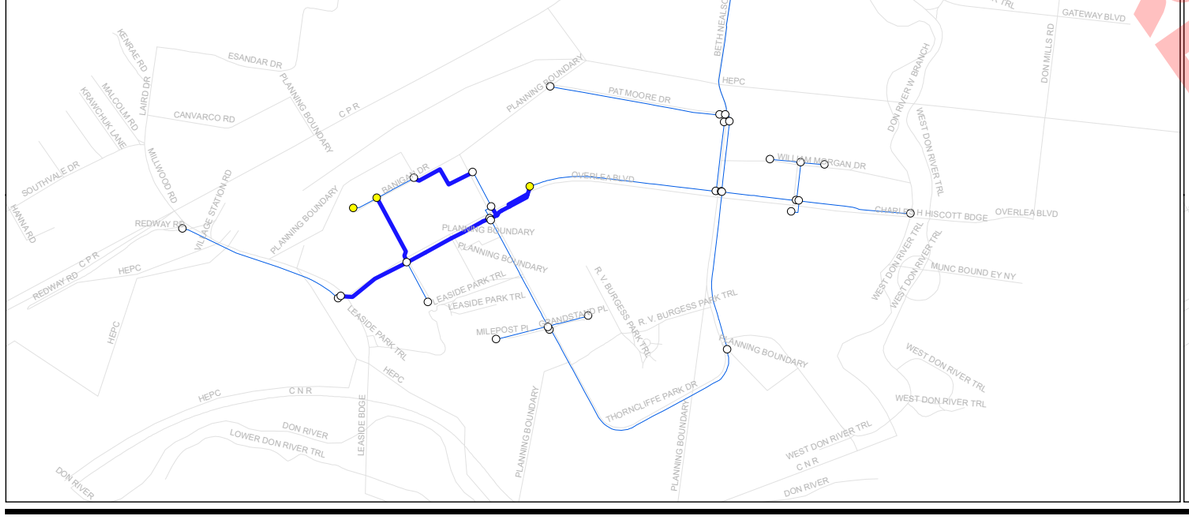
Demand Conditions: ADD
Pressure Difference (Proposed - Existing) (psi)



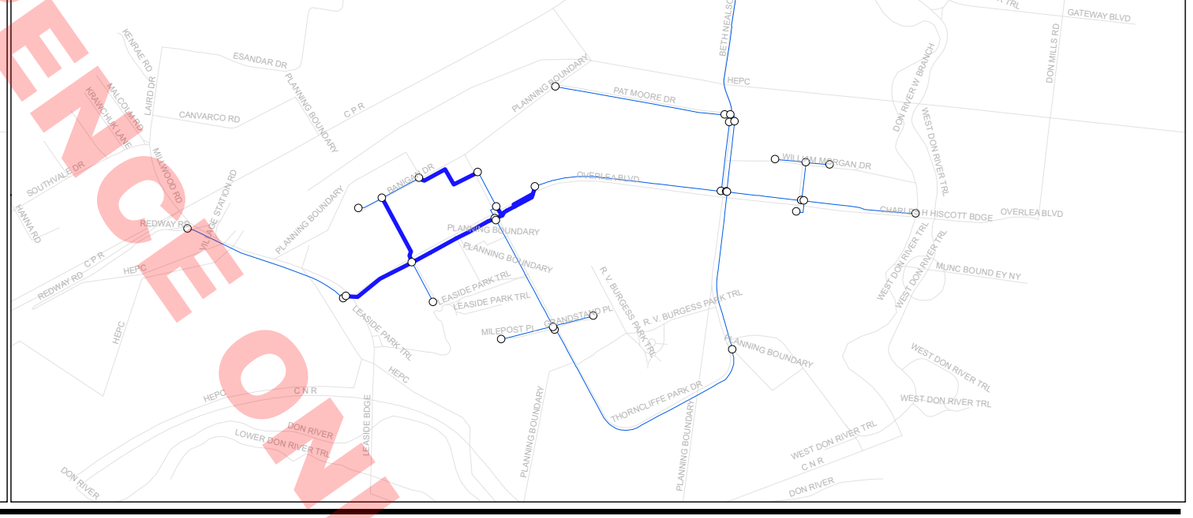
Demand Conditions: MHD
Pressure Difference (Proposed - Existing) (psi)



Demand Conditions: MDD
Pressure Difference (Proposed - Existing) (psi)



Demand Conditions: PHD
Pressure Difference (Proposed - Existing) (psi)



OLTA - Thorncliffe Park Utilities Relocation

Figure 3-1: Pressure Difference (Proposed - Existing) under ADD, MHD, MDD and PHD Conditions

Legend

Pressure Difference (Δ = Proposed - Existing) (psi)

- -4.0 psi < Δ ≤ -2.0 psi
- -2.0 psi < Δ ≤ -1.0 psi
- -1.0 psi < Δ ≤ -0.5 psi
- -0.5 psi < Δ ≤ -0.5 psi
- 0.5 psi < Δ ≤ 1.0 psi
- 1.0 psi < Δ ≤ 2.0 psi
- 2.0 psi < Δ ≤ 4.0 psi

Proposed Watermains

Existing Watermains

Notes

1. Coordinate System: NAD 1983 CSRS MTM 10

2. Data Sources: Background layers from the Toronto Water Asset Geodatabase; hydraulic modelling results

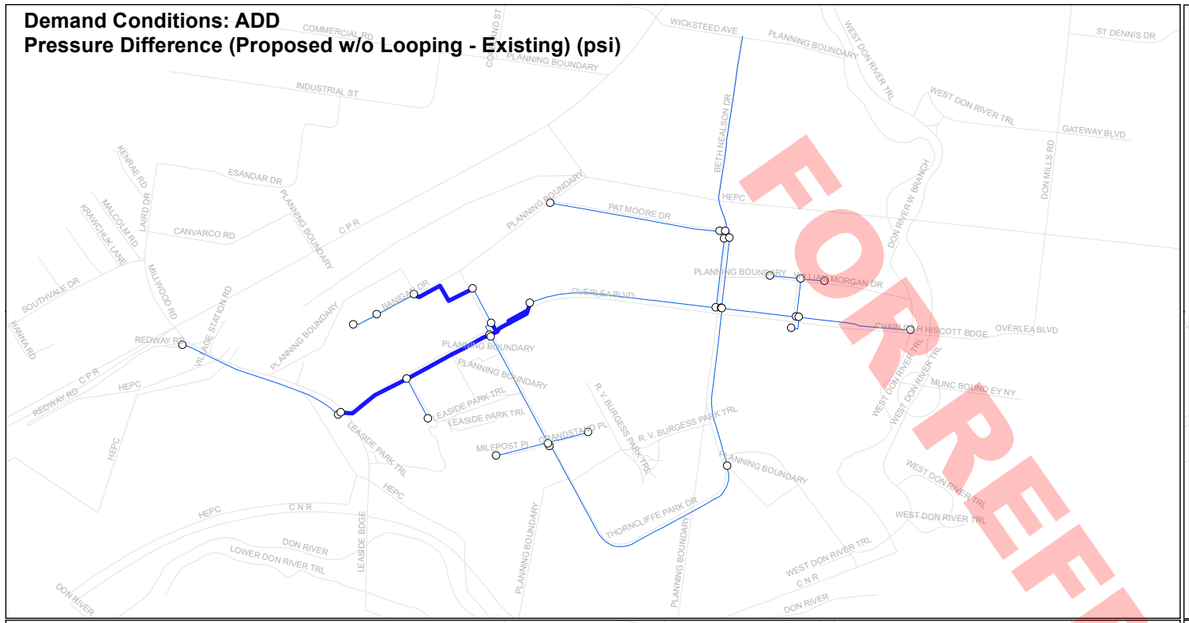
3. Abbreviations: ADD = Average Day Demand; MDD = Maximum Day Demand; MHD = Minimum Hour Demand; PHD = Peak Hour Demand

N

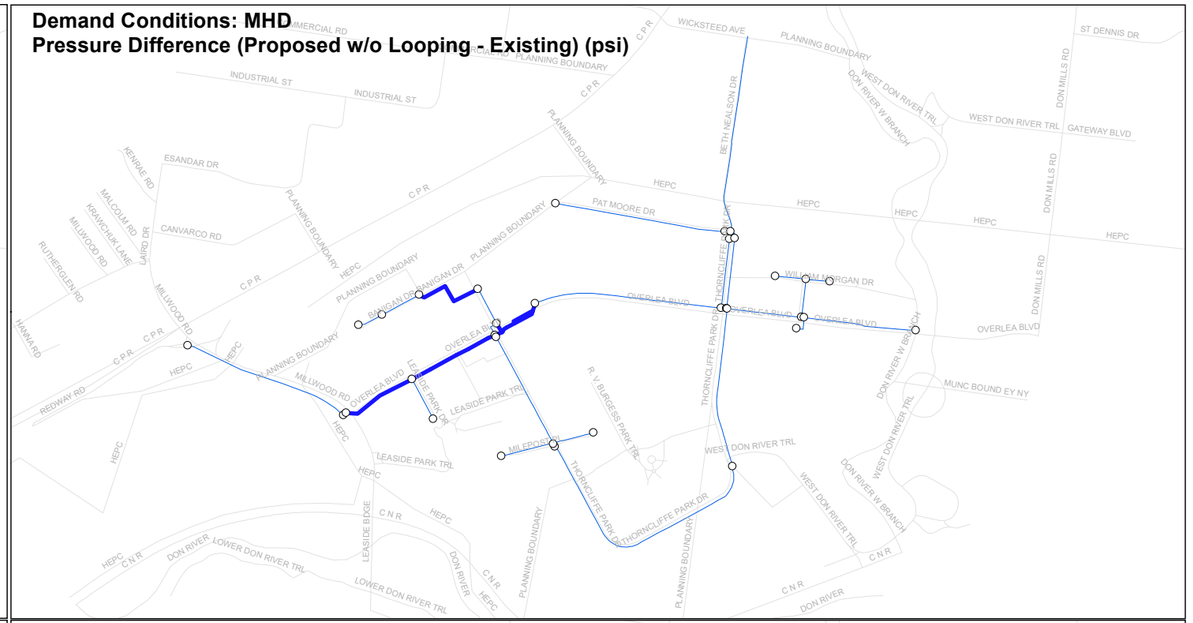
0 0.25 0.5 Kilometers

(At original document size of 11x17)
1:15,000

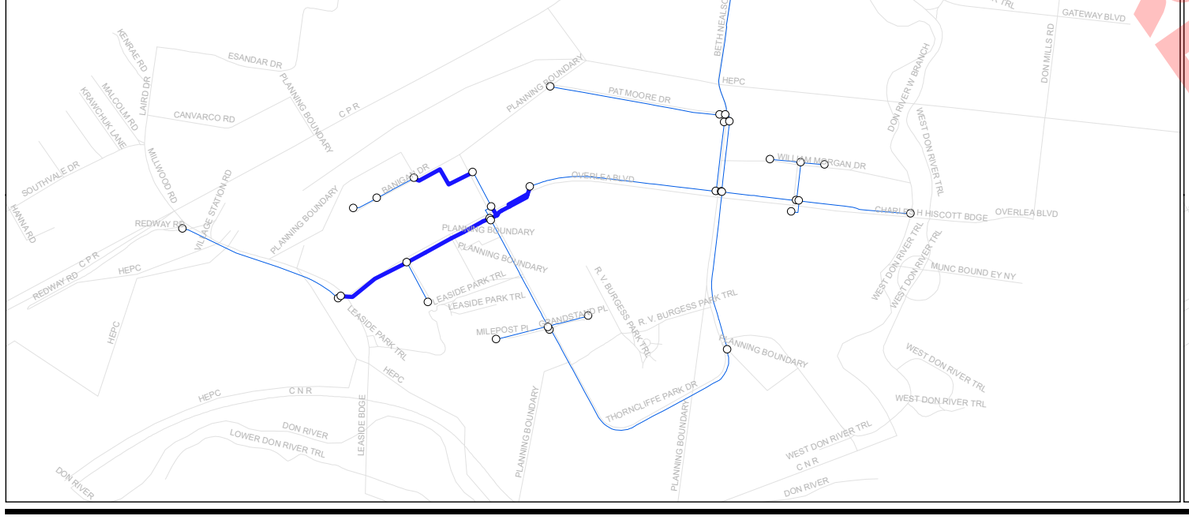
Demand Conditions: ADD
Pressure Difference (Proposed w/o Looping - Existing) (psi)



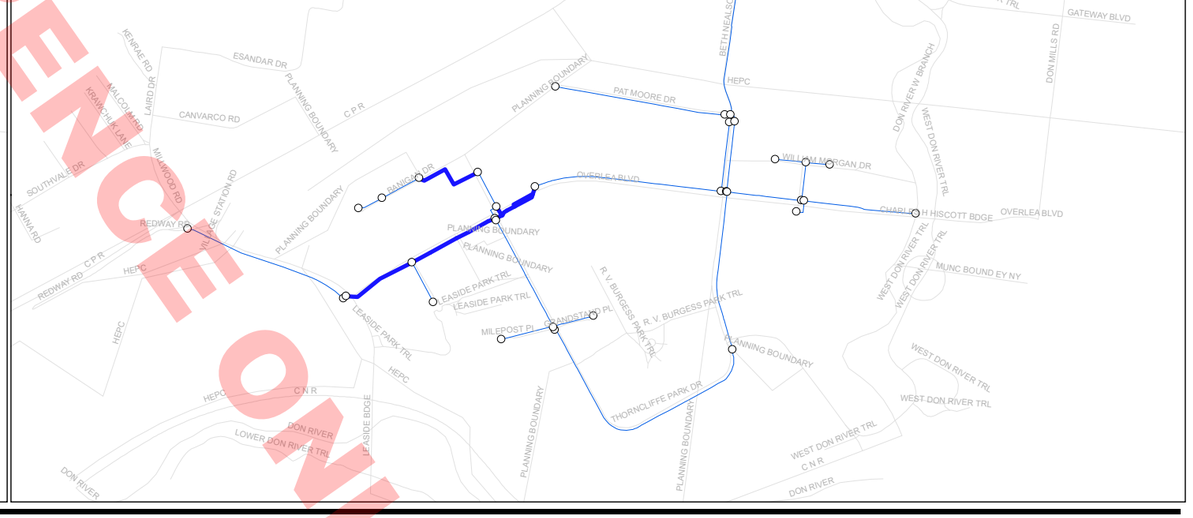
Demand Conditions: MHD
Pressure Difference (Proposed w/o Looping - Existing) (psi)



Demand Conditions: MDD
Pressure Difference (Proposed w/o Looping - Existing) (psi)



Demand Conditions: PHD
Pressure Difference (Proposed w/o Looping - Existing) (psi)



OLTA - Thorncliffe Park Utilities Relocation

Figure 3-2: Pressure Difference (Proposed w/o Looping - Existing) under ADD, MHD, MDD and PHD Conditions

Legend

Pressure Difference (Δ = Proposed w/o Looping - Existing) (psi)

- -4.0 psi < Δ ≤ -2.0 psi
- -2.0 psi < Δ ≤ -1.0 psi
- -1.0 psi < Δ ≤ -0.5 psi
- -0.5 psi < Δ ≤ -0.5 psi
- 0.5 psi < Δ ≤ 1.0 psi
- 1.0 psi < Δ ≤ 2.0 psi
- 2.0 psi < Δ ≤ 4.0 psi

- Proposed Watermains
- Existing Watermains

Notes

1. Coordinate System: NAD 1983 CSRS MTM 10
2. Data Sources: Background layers from the Toronto Water Asset Geodatabase; hydraulic modelling results
3. Abbreviations: ADD = Average Day Demand; MDD = Maximum Day Demand; MHD = Minimum Hour Demand; PHD = Peak Hour Demand

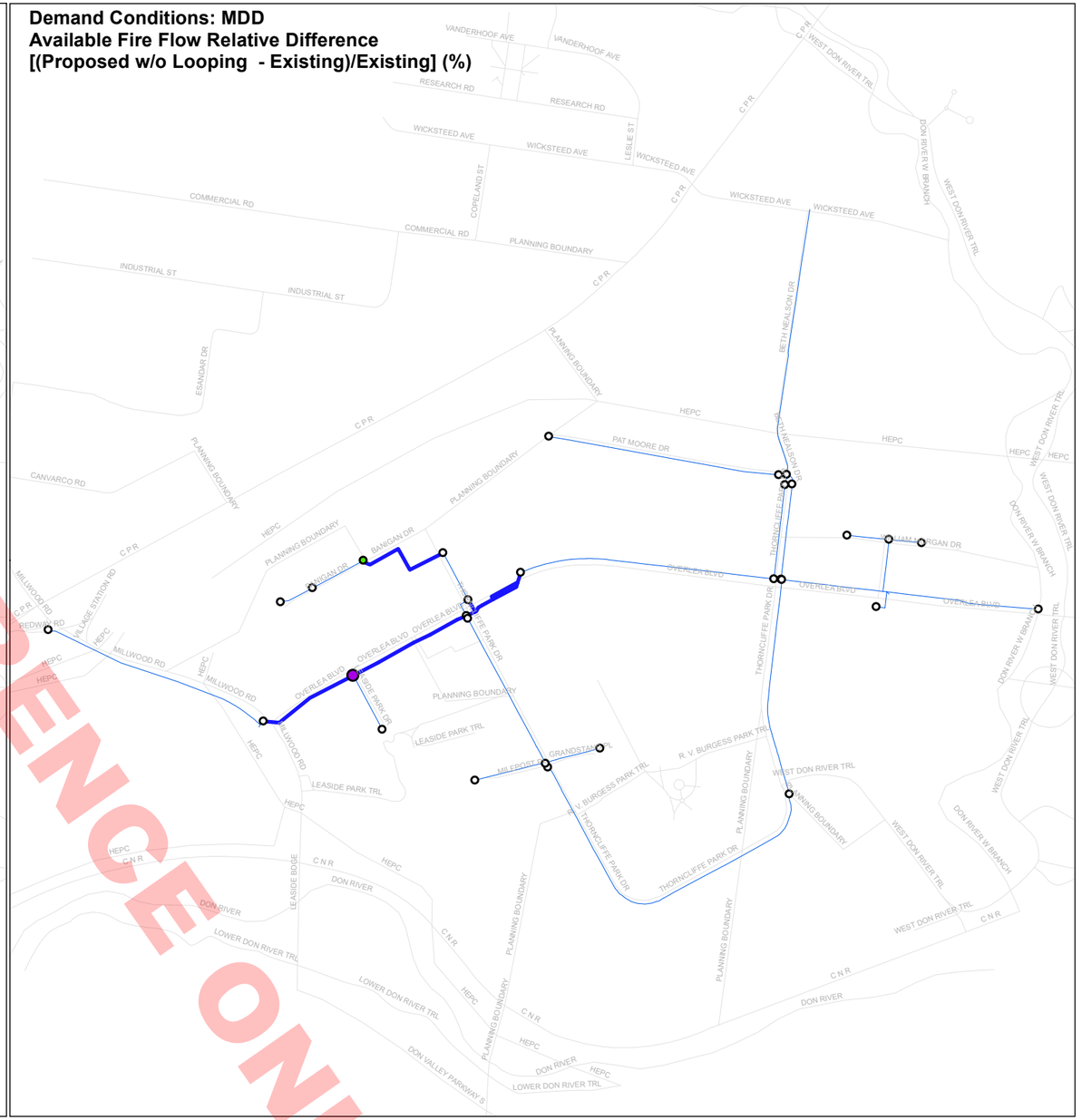
N

0 0.25 0.5 Kilometers

(At original document size of 11x17)
1:15,000

Demand Conditions: MDD
Available Fire Flow Relative Difference
[(Proposed - Existing)/Existing] (%)

Demand Conditions: MDD
Available Fire Flow Relative Difference
[(Proposed w/o Looping - Existing)/Existing] (%)



OLTA - Thorncliffe Park Utilities Relocation

Figure 3-3: Available Fire Flow Relative Difference under MDD Conditions - Proposed vs Proposed w/o Looping

Legend

Available Fire Flow Relative Difference (Δ% = Proposed - Existing) (%)

- -100% < Δ% ≤ -50%
- -50% < Δ% ≤ +50%
- +50% < Δ% ≤ +100%
- +100% < Δ% ≤ +200%
- +200% < Δ%
- Proposed Watermains
- Existing Watermains

Notes

1. Coordinate System: NAD 1983 CSRS MTM 10
2. Data Sources: Background layers from the Toronto Water Asset Geodatabase; hydraulic modelling results
3. Abbreviations: ADD = Average Day Demand; MDD = Maximum Day Demand; MHD = Minimum Hour Demand; PHD = Peak Hour Demand

N

0 0.25 0.5 Kilometers

(At original document size of 11x17)
1:10,017

4 Conclusions and Recommendations

The following proposed watermain works in Thorncliffe Park were evaluated:

1) Re-alignment of the existing 400 mm diameter watermain along Overlea Blvd, including a new 600 mm watermain east of Thorncliffe Park Dr, and modified interconnection to the existing 300 mm diameter watermain along Thorncliffe Park Dr;
2) Re-alignment of the existing 300 mm diameter watermain along Thorncliffe Park Dr and 300 mm diameter watermain connecting to the existing 250 mm diameter watermain along Banigan Dr; and,
3) Addition of a new 300 mm diameter watermain along the new Leaside Park Dr extension, looping with the existing 250 mm diameter watermain along Banigan Dr.

Due to limitations in the hydrant tests conducted, the hydraulic model used for this analysis could not be calibrated. Furthermore, requested boundary conditions were not available for the analysis. Although the absolute results may not be reflective of existing conditions, a comparative analysis of existing conditions and future conditions could be conducted to assess the impact of the proposed watermain replacements.

The proposed watermain works can maintain the level of service in Thorncliffe Park, based on a comparative analysis of pressures under normal demand conditions and available fire flows.

The proposed 400 mm diameter watermain re-alignment along Overlea Blvd, including a new 600 mm watermain east of Thorncliffe Park Dr, can maintain the level of service. It is noteworthy that similar hydraulic conditions are observed along Overlea Blvd without upsizing the watermain east of Thorncliffe Park Dr to 600 mm diameter. Hence, a single 400 mm watermains would result in similar hydraulic conditions.

As service lines will be connected to this watermain, it is recommended that the existing diameter of 400 mm, excluding the re-aligned east of Thorncliffe Park Dr to circumvent proposed railway infrastructure, be maintained, as it is the largest standard diameter for distribution watermains, per the City of Toronto *Design Criteria for Sewers and Watermains* (January 2021).

It is recommended that the new 300 mm diameter watermain along the new Leaside Park Dr extension be built, to add looping to maintain and improve the level of service (pressures, available fire flows) and eliminate the existing vulnerable service area. Additionally, the recommended watermain will also improve water circulation along Banigan Dr, especially around the dead-end watermain along that street.

The residual capacity of the proposed Overlea Blvd watermain was assessed. In addition to existing demands within the study area, it can accommodate an additional population of approximately 16,527 people. Typical flows and boundary conditions from the TWAG would be needed to confirm and refine this estimate.

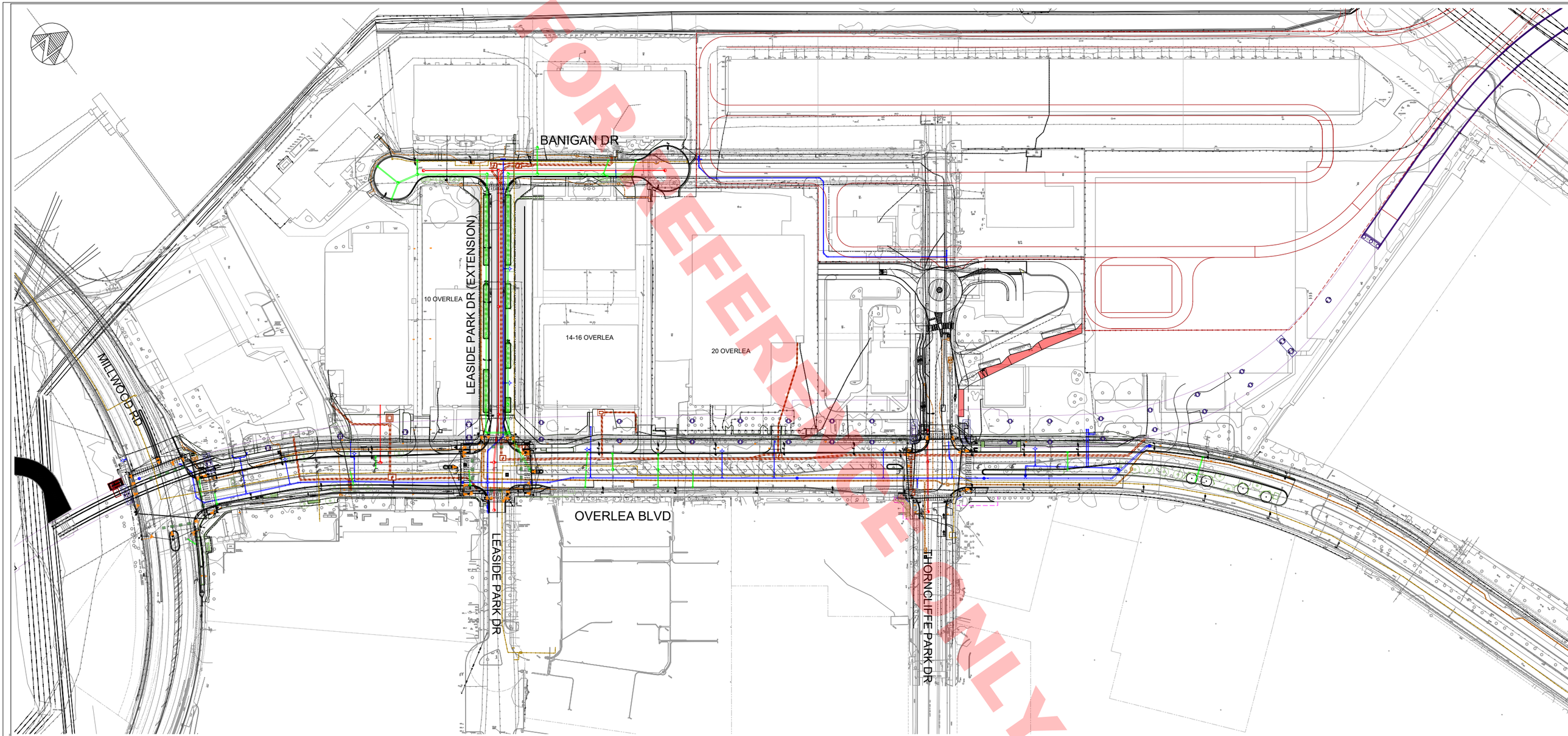
Table 4-1: Summary of Thorncliffe Park Watermain Replacement Assessment

Watermain Section	Demand Condition	Range of Differences in Pressures/Available Fire Flows	Impact of Proposed Works
With Additional Watermain Looping along Leaside Park Dr and Banigan Dr	ADD	-1.0 psi to +0.5 psi	Minor impact to improvement
	MHD	-1.0 psi to +0.5 psi	
	MDD	-1.0 psi to +0.5 psi	
	PHD	-0.5 psi to +0.5 psi	
	AFF	-10% to >+200%	
Without Additional Watermain Looping along Leaside Park Dr and Banigan Dr	ADD	-0.5 psi to +0.5 psi	
	MHD	-0.5 psi to +0.5 psi	
	MDD	-0.5 psi to +0.5 psi	
	PHD	-0.5 psi to +0.5 psi	
	AFF	-10% to >+200%	

5 References

Walski, T. M., Chase, D. V., Savic, D. A., Grayman, W., Beckwith, S., & and Koelle, E. (2003). *Advanced Water Distribution Modeling and Management.* Haestead Press.

Appendix A. Existing Utilities and Proposed Watermain Coordination Roll Plots



FOR REFERENCE ONLY | PREPARED March 30, 2023

HDR | TEAR

OVERLEA BLVD
COORDINATION ROLL PLOT
ALL DISCIPLINES

ONTAR

BANIGAN DR

LEASIDE PARK DR (EXTENSION)

10 OVERLEA

14-16 OVERLEA

20 OVERLEA

MILLWOOD RD

OVERLEA BLVD

LEASIDE PARK DR

THORNCLIFFE PARK DR

FOR REFERENCE ONLY

PREPARED March 30, 2023

OVERLEA BLVD
COORDINATION ROLL PLOT
ROADWAY AND LANDSCAPE

BANIGAN DR

LEASIDE PARK DR (EXTENSION)

10 OVERLEA

14-16 OVERLEA

20 OVERLEA

MILLWOOD RD

OVERLEA BLVD

LEASIDE PARK DR

THORNCLIFFE PARK DR

FOR REFERENCE ONLY

PREPARED March 30, 2023

OVERLEA BLVD
COORDINATION ROLL PLOT

Appendix B. Hydrant Flow Test Results

Appendix B.1. Hydrant Test Reports

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: Banigan Drive
Toronto ON

Contact: Raul or Steven
Phone: (403) 581-9769/(647) 277-3046

Date: May 9, 2022

Hydrant Location: In front of 14 Banigan Dr (north side of street)
Manufacturer: Darling
Model #: B-50 B-24
Key Valve Location: N/A

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?			✓

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
85 psi	2.5”	84 psi	82 psi	1,519 GPM

Comments/Remarks/Recommendations

Name of Tech: Brett Mahony

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: Leaside Park Dr & Overlea Blvd.
Toronto ON

Contact: Raul or Steven
Phone: (403) 581-9769/(647) 277-3046

Date: May 9, 2022

Hydrant Location: S/W corner of Leaside Park and Overlea Blvd
Manufacturer: McAvity
Model #: M-67
Key Valve Location: N/A

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?			✓

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
88 psi	2.5”	85 psi	83 psi	1,529 GPM

Comments/Remarks/Recommendations

Name of Tech: Brett Mahony

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address:
Toronto ON

Contact: Raul or Steven
Phone: (403) 581-9769/(647) 277-3046

Date: May 9, 2022

Hydrant Location: N/W Corner of Millwood Rd and Overlea Blvd
Manufacturer: Darling
Model #: B-50 B-24
Key Valve Location: N/A

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?	✓		
Does key valve open and close easily?			✓

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
88 psi	2.5”	86 psi	85 psi	1,519 GPM

Comments/Remarks/Recommendations

- Top cap of hydrant leaks when flowed. Requires repair.
- Hydrant requires painting.

Name of Tech: Brett Mahony

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: Overlea Blvd.
Toronto ON

Contact: Raul or Steven
Phone: (403) 581-9769/(647) 277-3046

Date: May 9, 2022

Hydrant Location: In front of 36 Overlea (north side of street)
Manufacturer: Darling
Model #: B-52
Key Valve Location: N/A

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?			✓

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
85 psi	2.5”	84 psi	83 psi	1,529 GPM

Comments/Remarks/Recommendations

Name of Tech: Brett Mahony

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: Overlea Blvd.
Toronto ON

Contact: Raul or Steven
Phone: (403) 581-9769/(647) 277-3046

Date: May 9, 2022

Hydrant Location: West of 28 Overlea (north side of street)
Manufacturer: Darling
Model #: B-52
Key Valve Location: N/A

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?			✓

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
85 psi	2.5”	84 psi	83 psi	1,529 GPM

Comments/Remarks/Recommendations

Name of Tech: Brett Mahony

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: Overlea Blvd.
Toronto ON

Contact: Raul or Steven
Phone: (403) 581-9769/(647) 277-3046

Date: May 9, 2022

Hydrant Location: In front of 20 Overlea (north side of street)
Manufacturer: Darling
Model #: B-52
Key Valve Location: South of hydrant

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?			✓

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
87 psi	2.5”	85 psi	84 psi	1,538 GPM

Comments/Remarks/Recommendations

Name of Tech: Brett Mahony

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: Pine Street
(between Banigan Dr & Overlea Blvd)
Toronto ON

Date: May 9, 2022

Hydrant Location: 6 Pine St (West side of street)
Manufacturer: Darling
Model #: B-50 B-18
Key Valve Location: West of hydrant

Contact: Raul or Steven
Phone: (403) 581-9769/(647) 277-3046

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?			✓

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
85 psi	2.5”	84 psi	83 psi	1,529 GPM

Comments/Remarks/Recommendations

- Hydrant leaks from top of hydrant when flowed. Requires repairs (unable to get pressure readings).

Name of Tech: Brett Mahony

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: 50 Beth Nealson Drive
Toronto ON

Contact: Ayla Pakravan
Phone: (289) 695-4628

Date: June 21, 2022

Hydrant Location:
Manufacturer: McCavity
Model #: M67B
Key Valve Location: By hydrant on road

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?	✓		

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
80 psi	2.5”	78 psi	75 psi	1,453 GPM

Comments/Remarks/Recommendations

Name of Tech: J. Nakayama

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: 50 Overlea Blvd. (Front)
Toronto ON

Contact: Ayla Pakravan
Phone: (289) 695-4628

Date: June 21, 2022

Hydrant Location:
Manufacturer: Canada Valve
Model #:
Key Valve Location: By hydrant

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?		✓	
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?	✓		
Does key valve open and close easily?	✓		

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
76 psi	2.5”	75 psi	73 psi	1,434 GPM

Comments/Remarks/Recommendations

Name of Tech: J. Nakayama

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: 100 Thorncliffe Park Dr.
Toronto ON

Contact: Ayla Pakravan
Phone: (289) 695-4628

Date: June 21, 2022

Hydrant Location:
Manufacturer:
Model #: B-50-B-18
Key Valve Location: By valve

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?		✓	
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?	✓		
Does key valve open and close easily?	✓		

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
78 psi	2.5”	76 psi	74 psi	1,443 GPM

Comments/Remarks/Recommendations

Name of Tech: J. Nakayama

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: OMSF- Banigan Dr Access
Toronto ON

Contact: Ayla Pakravan
Phone: (289) 695-4628

Date: June 21, 2022

Hydrant Location:
Manufacturer: Canada Valve
Model #: Centurian (2001)
Key Valve Location: By hydrant

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?		✓	
Are all fire hydrant caps free of any rust?		✓	
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?	✓		

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
78 psi	2.5”	77 psi	74 psi	1,443 GPM

Comments/Remarks/Recommendations

Name of Tech: J. Nakayama

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: OMSF- Thorncliffe Park Dr Entrance
Toronto ON

Contact: Ayla Pakravan
Phone: (289) 695-4628

Date: June 21, 2022

Hydrant Location:
Manufacturer: Darling
Model #: B-50-B-18
Key Valve Location: By hydrant

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?		✓	
Are all fire hydrant caps free of any rust?		✓	
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?	✓		

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
75 psi	2.5”	74 psi	73 psi	1,434 GPM

Comments/Remarks/Recommendations

Name of Tech: J. Nakayama

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: Pat Moore Dr. (Cul de Sac)
Toronto ON

Contact: Ayla Pakravan
Phone: (289) 695-4628

Date: June 21, 2022

Hydrant Location:
Manufacturer: Canada Valve Centurian
Model #:
Key Valve Location: By hydrant

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?		✓	
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?	✓		
Does key valve open and close easily?	✓		

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
77 psi	2.5”	76 psi	74 psi	1,443 GPM

Comments/Remarks/Recommendations

Name of Tech: J. Nakayama

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FIRE HYDRANT TEST & INSPECTION REPORT

Building Name: Metrolinx
Address: Village Station Road
Toronto ON

Contact: Ayla Pakravan
Phone: (289) 695-4628

Date: June 21, 2022

Hydrant Location:
Manufacturer: AVR
Model #: 27-80 (2019)
Key Valve Location: By valve (in concrete)

TEST RESULTS – (EVERY LINE MUST HAVE THE APPROPRIATE MARKING IN THE SPACE PROVIDED)

	YES	NO	N/A
Was there any accumulation of water in the barrel since the last inspection?		✓	
Was the fire hydrant flushed with the main valve and any outlet valves fully opened this inspection?	✓		
Is the fire hydrant readily accessible and unobstructed?	✓		
Is the fire hydrant self draining?	✓		
Is the self drain working?	✓		
Does the fire hydrant need to be drained manually?		✓	
Was the fire hydrant properly drained this inspection?	✓		
Were all stems, caps, plugs and threads lubricated at the time of inspection?	✓		
Are all fire hydrant caps in place?	✓		
Are all fire hydrant caps free of any wear?	✓		
Are all fire hydrant caps free of any rust?	✓		
Were all fire hydrant caps easily removed?	✓		
Does the fire hydrant require painting?		✓	
Does key valve open and close easily?		✓	

WATER SUPPLY

Static Pressure	Orifice Size	Residual Pressure	Pitot Reading	GPM
68 psi	2.5”	68 psi	65 psi	1,353 GPM

Comments/Remarks/Recommendations

Name of Tech: J. Nakayama

24 Hour Emergency Service

Appendix B.2. Available Fire Flow Calculations

160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #1

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

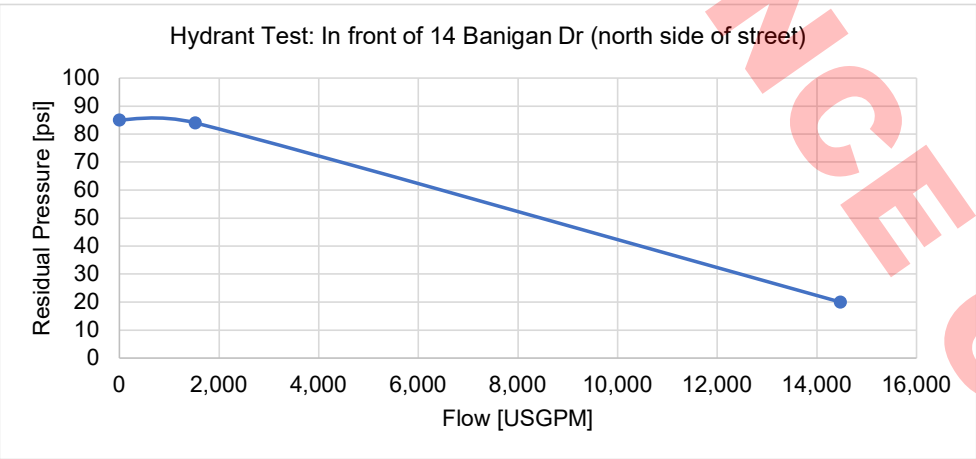
Location: In front of 14 Banigan Dr (north side of street)
Date: 5/9/2022

Static Pressure: 85 psi
Orifice Size: 2.5 "
Residual Pressure: 84 psi
Pitot Reading: 82 psi
Q_f : 1,519 GPM
95.8 L/s

$$Qr = 1{,}519 \times \frac{85 - 20^{0.54}}{85 - 84^{0.54}}$$

Qr= 14,472 USGPM
Qr= 913 L/s
Qr= 54,783 L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
In front of 14 Banigan Dr (north side of street)	14,472	913



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #2

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

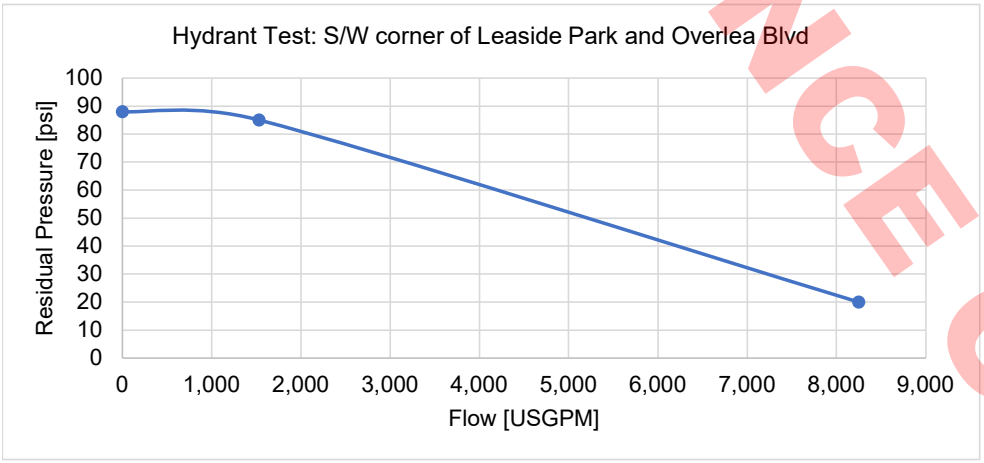
Location: S/W corner of Leaside Park and Overlea Blvd
Date: 5/9/2022

Static Pressure:	88	psi
Orifice Size:	2.5	"
Residual Pressure:	85	psi
Pitot Reading:	83	psi
Q_f :	1,529	GPM
	96.5	L/s

$$Qr = 1{,}529 \times \frac{88 - 20^{0.54}}{88 - 85^{0.54}}$$

Qr= 8,247 USGPM
Qr= 520 L/s
Qr= 31,220 L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
S/W corner of Leaside Park and Overlea Blvd	8,247	520



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #3

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

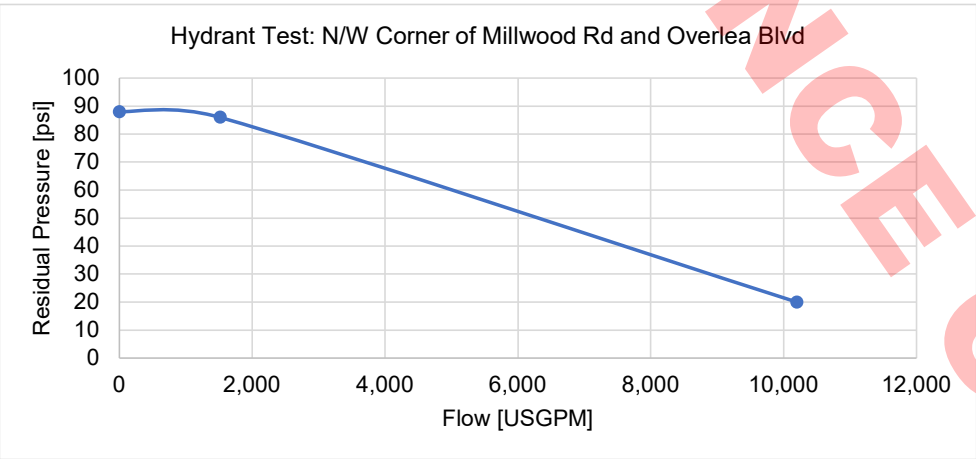
Location: N/W Corner of Millwood Rd and Overlea Blvd
Date: 5/9/2022

Static Pressure:	88	psi
Orifice Size:	2.5	"
Residual Pressure:	86	psi
Pitot Reading:	85	psi
Q_f :	1,519	GPM
	95.8	L/s

$$Qr = 1{,}519 \times \frac{88 - 20^{0.54}}{88 - 86^{0.54}}$$

Qr=	10,199	USGPM
Qr=	643	L/s
Qr=	38,607	L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
N/W Corner of Millwood Rd and Overlea Blvd	10,199	643



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #4

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

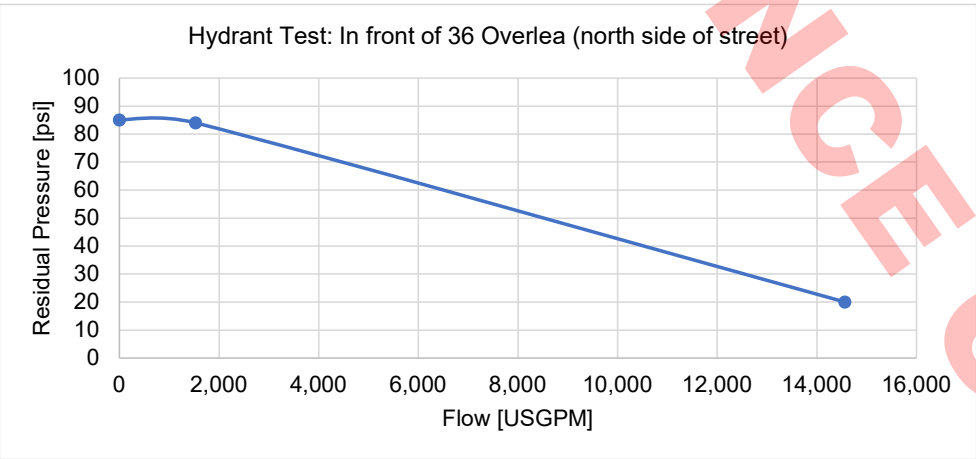
Location: In front of 36 Overlea (north side of street)
Date: 5/9/2022

Static Pressure:	85	psi
Orifice Size:	2.5	"
Residual Pressure:	84	psi
Pitot Reading:	83	psi
Q_f :	1,529	GPM
	96.5	L/s

$$Qr = 1{,}529 \times \frac{85 - 20^{0.54}}{85 - 84^{0.54}}$$

Qr= 14,567 USGPM
Qr= 919 L/s
Qr= 55,143 L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
In front of 36 Overlea (north side of street)	14,567	919



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #5

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

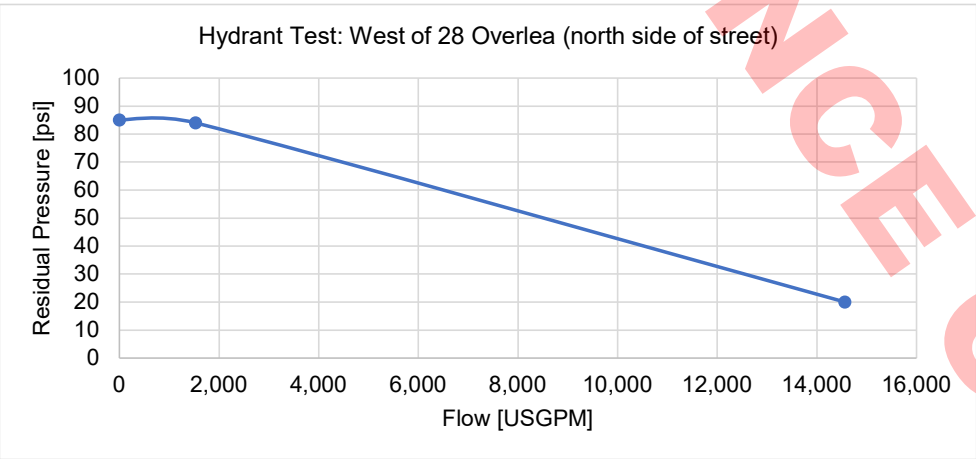
Location: West of 28 Overlea (north side of street)
Date: 5/9/2022

Static Pressure: 85 psi
Orifice Size: 2.5 "
Residual Pressure: 84 psi
Pitot Reading: 83 psi
Q_f : 1,529 GPM
96.5 L/s

$$Qr = 1{,}529 \times \frac{85 - 20^{0.54}}{85 - 84^{0.54}}$$

Qr= 14,567 USGPM
Qr= 919 L/s
Qr= 55,143 L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
West of 28 Overlea (north side of street)	14,567	919



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #6

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

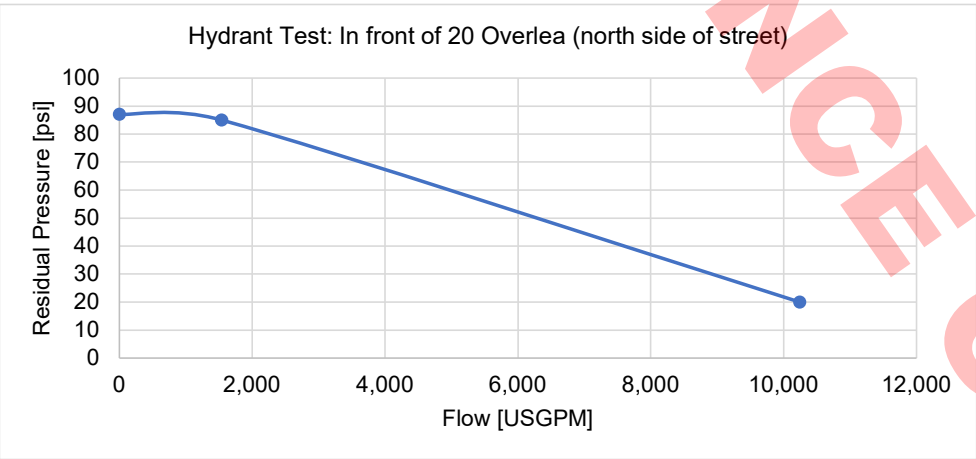
Location: In front of 20 Overlea (north side of street)
Date: 5/9/2022

Static Pressure:	87	psi
Orifice Size:	2.5	"
Residual Pressure:	85	psi
Pitot Reading:	84	psi
Q_f :	1,538	GPM
	97.0	L/s

$$Qr = 1{,}538 \times \frac{87 - 20^{0.54}}{87 - 85^{0.54}}$$

Qr=	10,244	USGPM
Qr=	646	L/s
Qr=	38,779	L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
In front of 20 Overlea (north side of street)	10,244	646



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #7

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

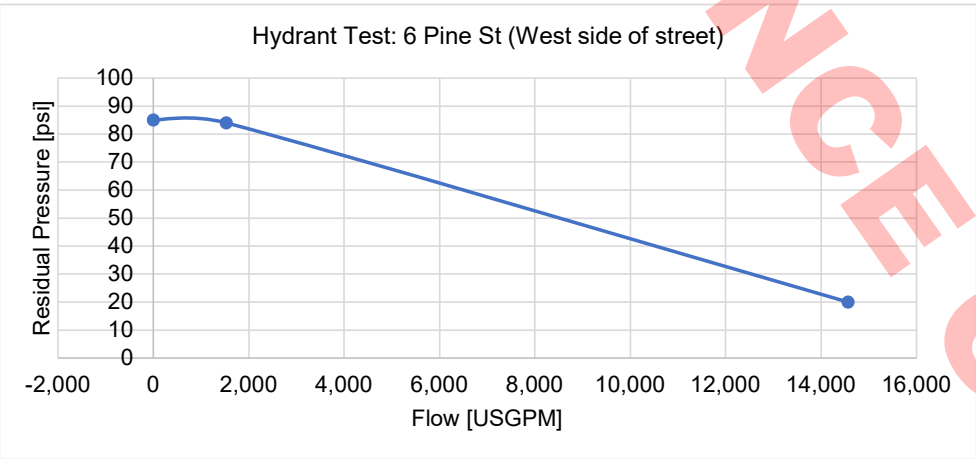
Location: 6 Pine St (West side of street)
Date: 5/9/2022

Static Pressure:	85	psi
Orifice Size:	2.5	"
Residual Pressure:	84	psi
Pitot Reading:	83	psi
Q_f :	1,529	GPM
	96.5	L/s

$$Qr = 1{,}529 \times \frac{85 - 20^{0.54}}{85 - 84^{0.54}}$$

Qr=	14,567	USGPM
Qr=	919	L/s
Qr=	55,143	L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
6 Pine St (West side of street)	14,567	919



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #8

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

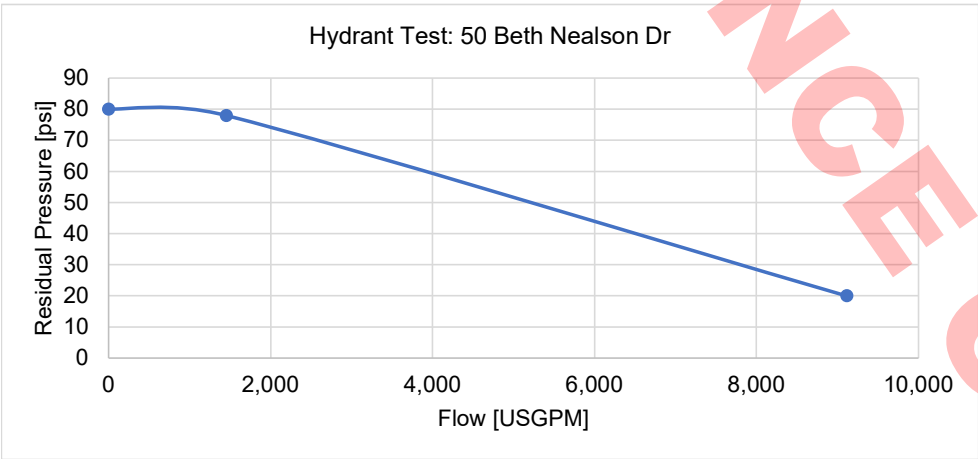
Location: 50 Beth Nealson Dr
Date: 6/21/2022

Static Pressure:	80	psi
Orifice Size:	2.5	"
Residual Pressure:	78	psi
Pitot Reading:	75	psi
Q_f :	1,453	GPM
	91.7	L/s

$$Qr = 1{,}453 \times \frac{80 - 20^{0.54}}{80 - 78^{0.54}}$$

Qr=	9,118	USGPM
Qr=	575	L/s
Qr=	34,516	L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
50 Beth Nealson Dr	9,118	575



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #9

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

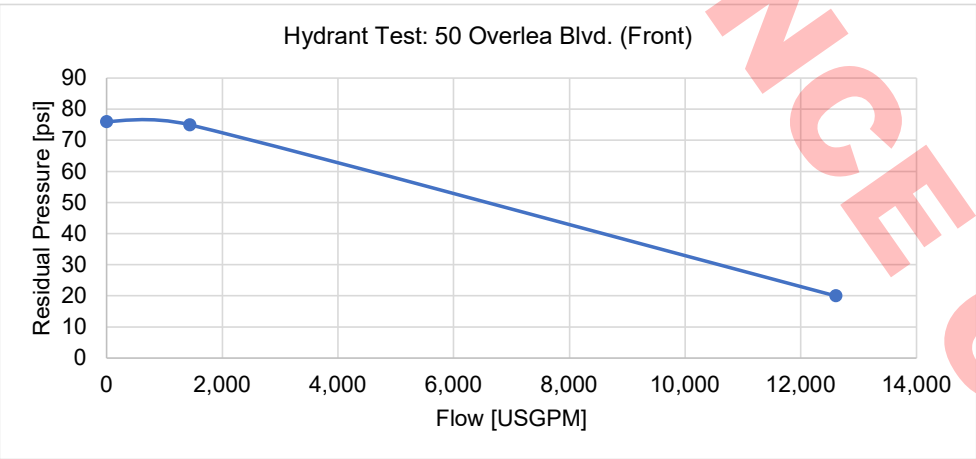
Location: 50 Overlea Blvd. (Front)
Date: 6/21/2022

Static Pressure:	76	psi
Orifice Size:	2.5	"
Residual Pressure:	75	psi
Pitot Reading:	73	psi
Q_f :	1,434	GPM
	90.5	L/s

$$Qr = 1{,}434 \times \frac{76 - 20^{0.54}}{76 - 75^{0.54}}$$

Qr= 12,606 USGPM
Qr= 795 L/s
Qr= 47,718 L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
50 Overlea Blvd. (Front)	12,606	795



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #10

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

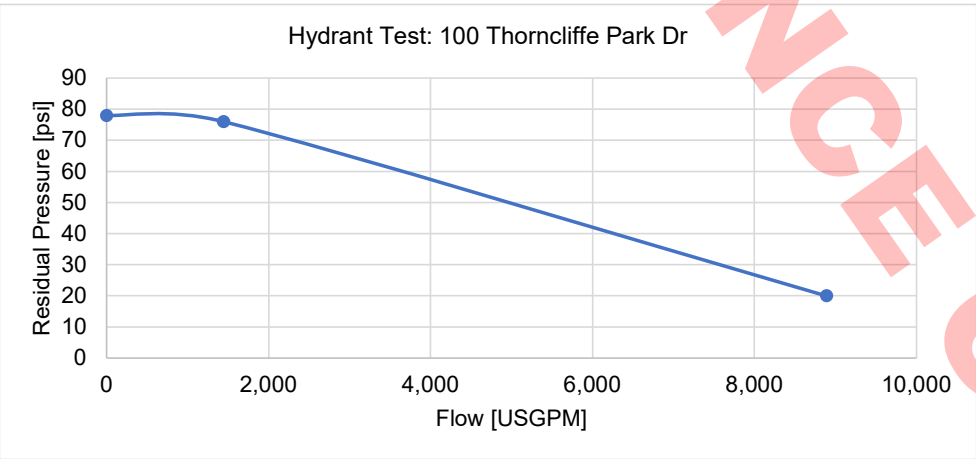
Location: 100 Thorncliffe Park Dr
Date: 6/21/2022

Static Pressure:	78	psi
Orifice Size:	2.5	"
Residual Pressure:	76	psi
Pitot Reading:	74	psi
Q_f :	1,443	GPM
	91.0	L/s

$$Qr = 1{,}443 \times \frac{78 - 20^{0.54}}{78 - 76^{0.54}}$$

Qr=	8,891	USGPM
Qr=	561	L/s
Qr=	33,657	L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
100 Thorncliffe Park Dr	8,891	561



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #11

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

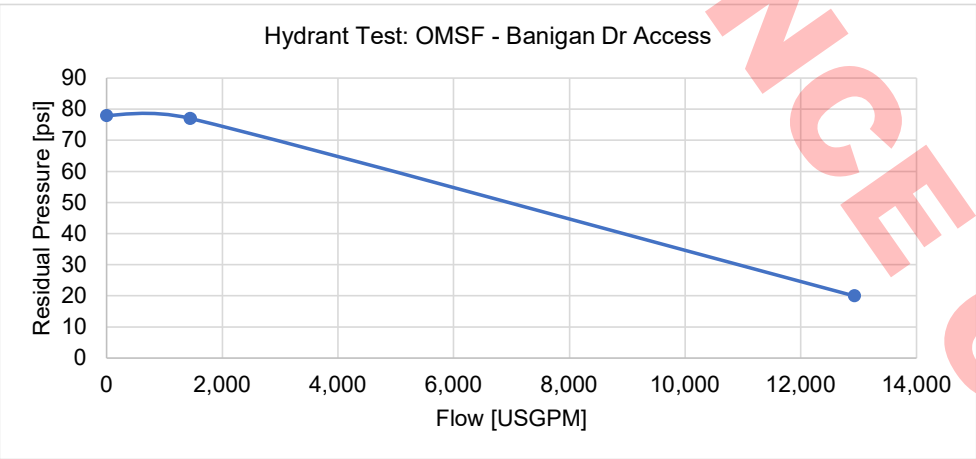
Location: OMSF - Banigan Dr Access
Date: 6/21/2022

Static Pressure:	78	psi
Orifice Size:	2.5	"
Residual Pressure:	77	psi
Pitot Reading:	74	psi
Q_f :	1,443	GPM
	91.0	L/s

$$Qr = 1{,}443 \times \frac{78 - 20^{0.54}}{78 - 77^{0.54}}$$

Qr= 12,928 USGPM
Qr= 816 L/s
Qr= 48,936 L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
OMSF - Banigan Dr Access	12,928	816



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #12

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

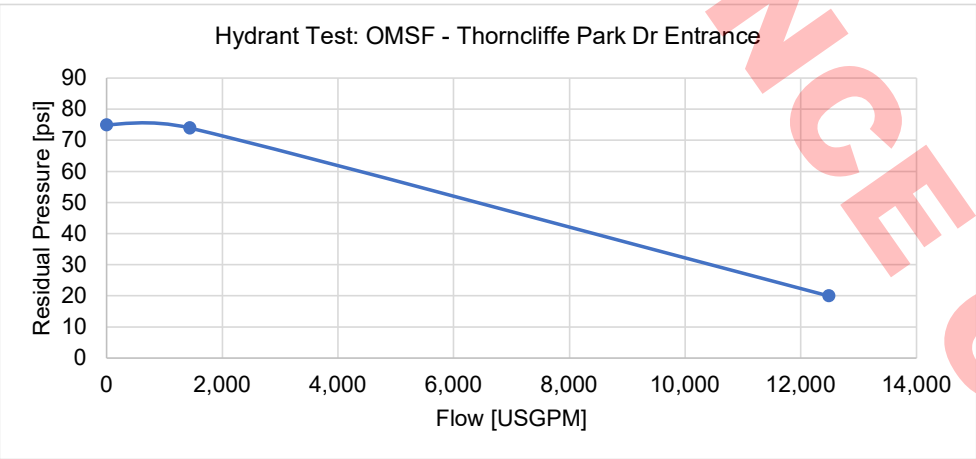
Location: OMSF - Thorncliffe Park Dr Entrance
Date: 6/21/2022

Static Pressure:	75	psi
Orifice Size:	2.5	"
Residual Pressure:	74	psi
Pitot Reading:	73	psi
Q_f :	1,434	GPM
	90.5	L/s

$$Qr = 1{,}434 \times \frac{75 - 20^{0.54}}{75 - 74^{0.54}}$$

Qr=	12,484	USGPM
Qr=	788	L/s
Qr=	47,256	L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
OMSF - Thorncliffe Park Dr Entrance	12,484	788



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #13

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

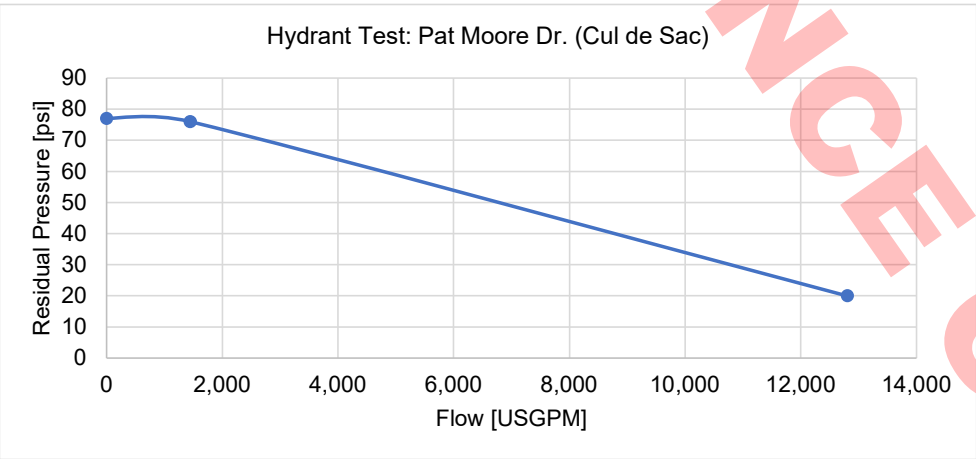
Location: Pat Moore Dr. (Cul de Sac)
Date: 6/21/2022

Static Pressure:	77	psi
Orifice Size:	2.5	"
Residual Pressure:	76	psi
Pitot Reading:	74	psi
Q_f :	1,443	GPM
	91.0	L/s

$$Qr = 1{,}443 \times \frac{77 - 20^{0.54}}{77 - 76^{0.54}}$$

Qr=	12,807	USGPM
Qr=	808	L/s
Qr=	48,479	L/min

Location	Available Fire Flow @ 20 psi	
	USGPM	L/s
Pat Moore Dr. (Cul de Sac)	12,807	808



160560009 - OLTA Overlea

Available Fire Flow - Hydrant Test #14

Equations

Available Fire Flow: $$Q_r = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}}$$

where:

Q_r = flow predicted at desired residual pressure (USGPM)
Q_f = total flow measured during test (USGPM)
h_r = pressure drop to desired residual pressure (psi)
h_f = pressure drop measured during test (psi)

Location: Village Station Road
Date: 6/21/2022

Static Pressure:	68	psi
Orifice Size:	2.5	"
Residual Pressure:	68	psi
Pitot Reading:	65	psi
Q_f :	1,353	GPM
	85.4	L/s

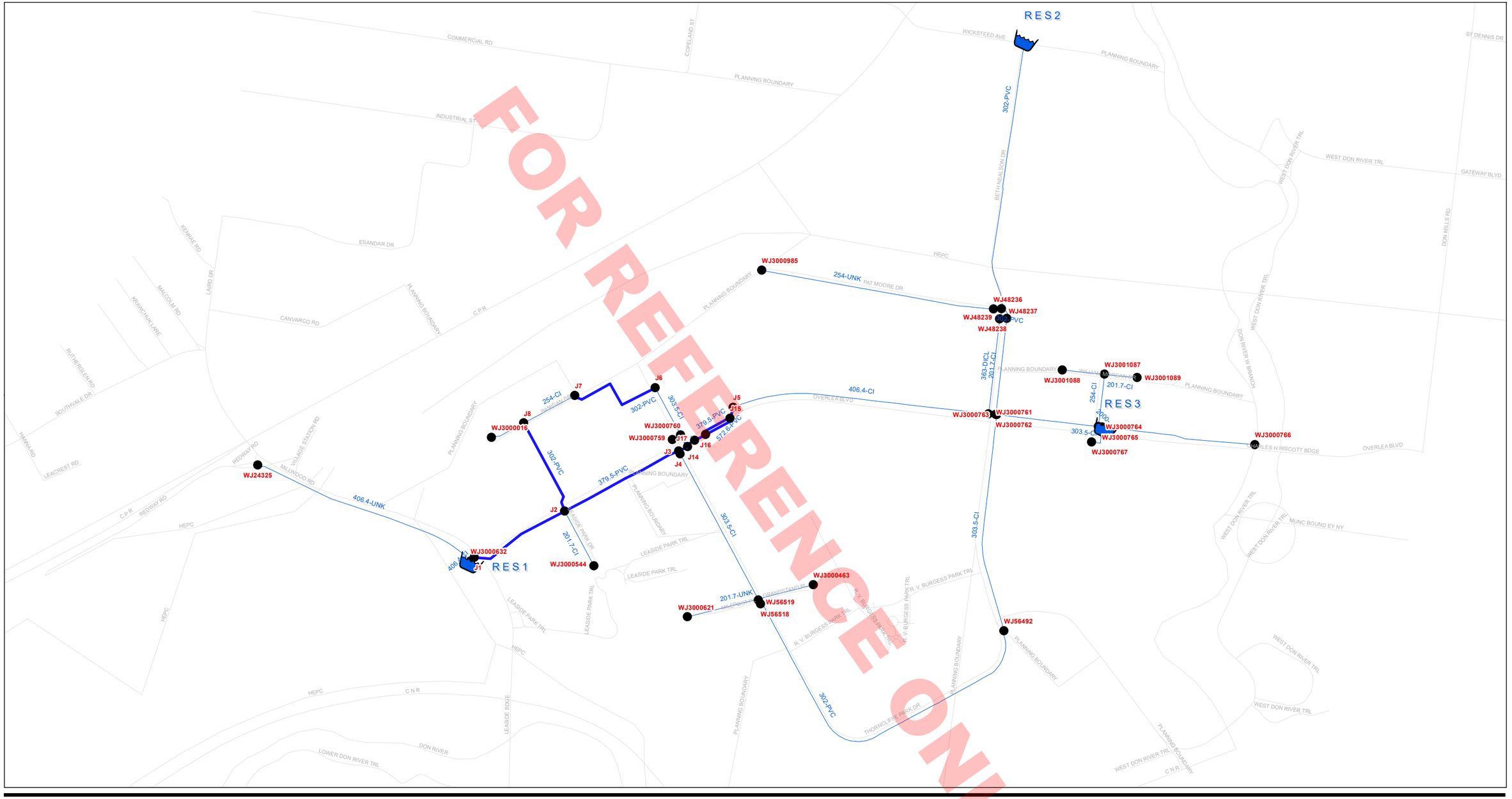
$$Qr = 1{,}353 \times \frac{68 - 20^{0.54}}{68 - 68^{0.54}}$$

Qr= No pressure drop; available fire flow cannot be calculated
Qr=
Qr=

Location	Available Fire Flow @ 20 psi USGPM	L/s
Village Station Road	No pressure drop; available fire flow cannot be calculated	

Appendix C. Hydraulic Modelling

Appendix C.1. Hydraulic Model Setup



OLTA - Thorncliffe Park Utilities Relocation

Figure C-1: Hydraulic Model Setup

Legend

- Model Boundary Conditions
- Model Junctions
- Proposed Watermains
- Existing Watermains

Notes

1. Coordinate System: NAD 1983 CSRS MTM 10

2. Data Sources: Background layers from the Toronto Water Asset Geodatabase; hydraulic modelling results

3. Abbreviations: ADD = Average Day Demand; MDD = Maximum Day Demand; MHD = Minimum Hour Demand; PHD = Peak Hour Demand

N

0 0.25 0.5 Kilometers

(At original document size of 11x17)

1:7,000

Appendix C.2. Hydraulic Modelling Results

160560009 - OLTA Overlea
Hydraulic Modelling Results - Junctions

EX_ADD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.15	125.02	178.42	75.91
J2	0.74	127.12	178.86	73.55
J3	0	127.62	179.42	73.64
J4	1.75	127.56	179.42	73.72
J5	0.41	127.44	179.72	74.32
J6	0.53	128	179.46	73.15
J7	0.26	128.02	179.46	73.13
J8	0	127.88	179.46	73.33
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.17	127.79	179.46	73.45
WJ3000463	4.28	126.32	179.39	75.45
WJ3000544	0.24	126.61	178.86	74.27
WJ3000621	1.81	125.46	179.42	76.7
WJ3000632	0	124.91	178.4	76.04
WJ3000758	0	127.23	178.86	73.4
WJ3000759	0	127.73	179.42	73.49
WJ3000760	0.15	127.67	179.46	73.62
WJ3000761	0.13	126.43	180.86	77.38
WJ3000762	0	126.59	180.91	77.22
WJ3000763	0.74	126.59	180.92	77.23
WJ3000764	0	126.39	182.44	79.69
WJ3000765	0.11	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	8.44	126.37	182.49	79.79
WJ3000982	0	128.2	179.46	72.87
WJ3000985	0	126.57	180.82	77.12
WJ3001087	0.84	126.51	182.44	79.51
WJ3001088	0.07	126.78	182.44	79.14
WJ3001089	0.41	126.08	182.44	80.12
WJ48236	0	127.16	180.82	76.28
WJ48237	0	127.48	180.82	75.82
WJ48238	0.07	127.48	180.82	75.82
WJ48239	0.04	127.16	180.83	76.29
WJ56492	20.61	125.32	179.68	77.28
WJ56518	14.46	126.18	179.43	75.69
WJ56519	1.5	125.85	179.42	76.16

EX_MHD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.13	125.02	178.42	75.91
J2	0.62	127.12	178.9	73.61
J3	0	127.62	179.51	73.76
J4	1.47	127.56	179.51	73.85
J5	0.34	127.44	179.79	74.43
J6	0.44	128	179.54	73.27
J7	0.22	128.02	179.54	73.25
J8	0	127.88	179.54	73.45
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.14	127.79	179.54	73.57
WJ3000463	3.6	126.32	179.52	75.63
WJ3000544	0.2	126.61	178.9	74.33
WJ3000621	1.52	125.46	179.53	76.87
WJ3000632	0	124.91	178.4	76.04
WJ3000758	0	127.23	178.9	73.45
WJ3000759	0	127.73	179.5	73.61
WJ3000760	0.13	127.67	179.54	73.74
WJ3000761	0.11	126.43	180.9	77.43
WJ3000762	0	126.59	180.95	77.27
WJ3000763	0.62	126.59	180.96	77.29
WJ3000764	0	126.39	182.44	79.69
WJ3000765	0.09	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	7.09	126.37	182.5	79.79
WJ3000982	0	128.2	179.54	72.99
WJ3000985	0	126.57	180.85	77.17
WJ3001087	0.71	126.51	182.44	79.51
WJ3001088	0.06	126.78	182.44	79.14
WJ3001089	0.34	126.08	182.44	80.12
WJ48236	0	127.16	180.85	76.32
WJ48237	0	127.48	180.85	75.87
WJ48238	0.06	127.48	180.85	75.87
WJ48239	0.03	127.16	180.86	76.34
WJ56492	17.31	125.32	179.82	77.48
WJ56518	12.15	126.18	179.54	75.85
WJ56519	1.26	125.85	179.54	76.32

EX_MDD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.19	125.02	178.42	75.91
J2	0.94	127.12	178.79	73.45
J3	0	127.62	179.27	73.43
J4	2.22	127.56	179.27	73.52
J5	0.52	127.44	179.59	74.14
J6	0.67	128	179.32	72.95
J7	0.33	128.02	179.32	72.93
J8	0	127.88	179.32	73.13
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.22	127.79	179.32	73.25
WJ3000463	5.44	126.32	179.2	75.18
WJ3000544	0.3	126.61	178.79	74.18
WJ3000621	2.3	125.46	179.24	76.45
WJ3000632	0	124.91	178.4	76.04
WJ3000758	0	127.23	178.79	73.3
WJ3000759	0	127.73	179.27	73.28
WJ3000760	0.19	127.67	179.32	73.42
WJ3000761	0.17	126.43	180.8	77.3
WJ3000762	0	126.59	180.85	77.14
WJ3000763	0.94	126.59	180.86	77.15
WJ3000764	0	126.39	182.44	79.69
WJ3000765	0.14	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	10.72	126.37	182.49	79.78
WJ3000982	0	128.2	179.32	72.67
WJ3000985	0	126.57	180.77	77.05
WJ3001087	1.07	126.51	182.44	79.5
WJ3001088	0.09	126.78	182.44	79.13
WJ3001089	0.52	126.08	182.44	80.12
WJ48236	0	127.16	180.77	76.21
WJ48237	0	127.48	180.77	75.75
WJ48238	0.09	127.48	180.77	75.75
WJ48239	0.05	127.16	180.77	76.22
WJ56492	26.17	125.32	179.46	76.97
WJ56518	18.36	126.18	179.25	75.44
WJ56519	1.9	125.85	179.25	75.91

EX_PHD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.44	125.02	178.4	75.89
J2	2.15	127.12	178.5	73.04
J3	0	127.62	178.53	72.38
J4	5.09	127.56	178.51	72.43
J5	1.19	127.44	179.02	73.34
J6	1.55	128	178.68	72.05
J7	0.76	128.02	178.68	72.03
J8	0	127.88	178.68	72.23
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.49	127.79	178.68	72.35
WJ3000463	12.45	126.32	177.17	72.3
WJ3000544	0.7	126.61	178.5	73.76
WJ3000621	5.26	125.46	177.33	73.74
WJ3000632	0	124.91	178.4	76.04
WJ3000758	0	127.23	178.5	72.89
WJ3000759	0	127.73	178.64	72.38
WJ3000760	0.44	127.67	178.69	72.52
WJ3000761	0.38	126.43	180.52	76.9
WJ3000762	0	126.59	180.56	76.73
WJ3000763	2.15	126.59	180.57	76.74
WJ3000764	0	126.39	182.43	79.67
WJ3000765	0.32	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	24.55	126.37	182.45	79.73
WJ3000985	0	126.57	180.52	76.7
WJ3001087	2.44	126.51	182.42	79.48
WJ3001088	0.2	126.78	182.42	79.11
WJ3001089	1.19	126.08	182.42	80.09
WJ48236	0	127.16	180.52	75.85
WJ48237	0	127.48	180.52	75.4
WJ48238	0.2	127.48	180.52	75.4
WJ48239	0.12	127.16	180.52	75.85
WJ56492	59.94	125.32	177.47	74.14
WJ56518	42.05	126.18	177.38	72.78
WJ56519	4.36	125.85	177.39	73.27

PROP_ADD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.15	125.02	178.43	75.92
J10	1.26	127.38	179.03	73.42
J11	0.3	127.54	179.08	73.27
J12	0	127.85	179.17	72.95
J14	0.03	127.91	179.22	72.94
J15	0	127.52	179.28	73.58
J16	0	127.74	179.27	73.25
J17	0	127.84	179.26	73.11
J2	0.74	127.12	178.84	73.53
J3	0	127.62	179.19	73.32
J4	1.75	127.56	179.19	73.41
J5	0.41	127.44	179.28	73.71
J6	0.53	128	179.15	72.71
J7	0.26	128.02	179.08	72.59
J8	0	127.88	178.91	72.55
J9	0.18	127.18	178.92	73.55
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.17	127.79	178.91	72.67
WJ3000463	4.28	126.32	179.17	75.14
WJ3000544	0.24	126.61	178.84	74.25
WJ3000621	1.81	125.46	179.2	76.39
WJ3000632	0	124.91	178.4	76.04
WJ3000760	0.15	127.67	179.22	73.28
WJ3000761	0.13	126.43	180.73	77.2
WJ3000762	0	126.59	180.79	77.05
WJ3000763	0.74	126.59	180.8	77.06
WJ3000764	0	126.39	182.44	79.69
WJ3000765	0.11	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	8.44	126.37	182.49	79.79
WJ3000985	0	126.57	180.71	76.97
WJ3001087	0.84	126.51	182.44	79.5
WJ3001088	0.07	126.78	182.44	79.13
WJ3001089	0.41	126.08	182.44	80.11
WJ48236	0	127.16	180.71	76.12
WJ48237	0	127.48	180.71	75.67
WJ48238	0.07	127.48	180.71	75.67
WJ48239	0.04	127.16	180.71	76.13
WJ56492	20.61	125.32	179.49	77.01
WJ56518	14.46	126.18	179.21	75.38
WJ56519	1.5	125.85	179.2	75.85

PROP_MHD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.13	125.02	178.43	75.92
J10	1.06	127.38	179.08	73.5
J11	0.25	127.54	179.14	73.35
J12	0	127.85	179.23	73.04
J14	0.03	127.91	179.29	73.04
J15	0	127.52	179.34	73.67
J16	0	127.74	179.33	73.34
J17	0	127.84	179.33	73.2
J2	0.62	127.12	178.88	73.59
J3	0	127.62	179.26	73.42
J4	1.47	127.56	179.26	73.5
J5	0.34	127.44	179.35	73.8
J6	0.44	128	179.21	72.8
J7	0.22	128.02	179.14	72.67
J8	0	127.88	178.95	72.61
J9	0.15	127.18	178.97	73.62
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.14	127.79	178.95	72.73
WJ3000463	3.6	126.32	179.29	75.3
WJ3000544	0.2	126.61	178.88	74.31
WJ3000621	1.52	125.46	179.3	76.54
WJ3000632	0	124.91	178.4	76.04
WJ3000760	0.13	127.67	179.28	73.37
WJ3000761	0.11	126.43	180.76	77.24
WJ3000762	0	126.59	180.82	77.09
WJ3000763	0.62	126.59	180.83	77.11
WJ3000764	0	126.39	182.44	79.69
WJ3000765	0.09	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	7.09	126.37	182.5	79.79
WJ3000985	0	126.57	180.74	77
WJ3001087	0.71	126.51	182.44	79.5
WJ3001088	0.06	126.78	182.44	79.13
WJ3001089	0.34	126.08	182.44	80.12
WJ48236	0	127.16	180.74	76.16
WJ48237	0	127.48	180.74	75.71
WJ48238	0.06	127.48	180.74	75.71
WJ48239	0.03	127.16	180.74	76.17
WJ56492	17.31	125.32	179.62	77.2
WJ56518	12.15	126.18	179.31	75.53
WJ56519	1.26	125.85	179.31	76

PROP_MDD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.19	125.02	178.42	75.91
J10	1.6	127.38	178.94	73.29
J11	0.38	127.54	178.98	73.12
J12	0	127.85	179.05	72.79
J14	0.04	127.91	179.11	72.78
J15	0	127.52	179.17	73.42
J16	0	127.74	179.16	73.09
J17	0	127.84	179.15	72.95
J2	0.94	127.12	178.78	73.44
J3	0	127.62	179.08	73.15
J4	2.22	127.56	179.08	73.24
J5	0.52	127.44	179.17	73.55
J6	0.67	128	179.04	72.56
J7	0.33	128.02	178.98	72.45
J8	0	127.88	178.83	72.44
J9	0.23	127.18	178.84	73.44
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.22	127.79	178.83	72.56
WJ3000463	5.44	126.32	179.02	74.92
WJ3000544	0.3	126.61	178.78	74.16
WJ3000621	2.3	125.46	179.05	76.18
WJ3000632	0	124.91	178.4	76.04
WJ3000760	0.19	127.67	179.1	73.12
WJ3000761	0.17	126.43	180.69	77.14
WJ3000762	0	126.59	180.75	76.98
WJ3000763	0.94	126.59	180.75	77
WJ3000764	0	126.39	182.44	79.68
WJ3000765	0.14	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	10.72	126.37	182.49	79.78
WJ3000985	0	126.57	180.67	76.91
WJ3001087	1.07	126.51	182.44	79.5
WJ3001088	0.09	126.78	182.44	79.13
WJ3001089	0.52	126.08	182.44	80.11
WJ48236	0	127.16	180.67	76.07
WJ48237	0	127.48	180.67	75.61
WJ48238	0.09	127.48	180.67	75.61
WJ48239	0.05	127.16	180.67	76.07
WJ56492	26.17	125.32	179.29	76.73
WJ56518	18.36	126.18	179.06	75.17
WJ56519	1.9	125.85	179.06	75.65

PROP_PHD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.44	125.02	178.41	75.89
J10	3.66	127.38	178.54	72.72
J11	0.87	127.54	178.55	72.51
J12	0	127.85	178.57	72.11
J14	0.09	127.91	178.62	72.09
J15	0	127.52	178.69	72.74
J16	0	127.74	178.68	72.41
J17	0	127.84	178.67	72.27
J2	2.15	127.12	178.49	73.03
J3	0	127.62	178.58	72.45
J4	5.09	127.56	178.58	72.53
J5	1.19	127.44	178.7	72.87
J6	1.55	128	178.59	71.91
J7	0.76	128.02	178.57	71.86
J8	0	127.88	178.51	71.99
J9	0.52	127.18	178.51	72.97
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.49	127.79	178.51	72.11
WJ3000463	12.45	126.32	177.22	72.36
WJ3000544	0.7	126.61	178.49	73.75
WJ3000621	5.26	125.46	177.37	73.8
WJ3000632	0	124.91	178.4	76.04
WJ3000760	0.44	127.67	178.62	72.43
WJ3000761	0.38	126.43	180.5	76.86
WJ3000762	0	126.59	180.54	76.7
WJ3000763	2.15	126.59	180.55	76.71
WJ3000764	0	126.39	182.43	79.67
WJ3000765	0.32	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	24.55	126.37	182.45	79.73
WJ3000985	0	126.57	180.5	76.67
WJ3001087	2.44	126.51	182.42	79.48
WJ3001088	0.2	126.78	182.42	79.11
WJ3001089	1.19	126.08	182.42	80.09
WJ48236	0	127.16	180.5	75.83
WJ48237	0	127.48	180.5	75.37
WJ48238	0.2	127.48	180.5	75.37
WJ48239	0.12	127.16	180.5	75.83
WJ56492	59.94	125.32	177.5	74.19
WJ56518	42.05	126.18	177.42	72.84
WJ56519	4.36	125.85	177.43	73.33

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Hydraulic Modelling Results - Junctions

NOLOOP_ADD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.15	125.02	178.43	75.92
J10	1.26	127.38	179.07	73.48
J11	0.3	127.54	179.14	73.36
J12	0	127.85	179.26	73.09
J14	0.03	127.91	179.34	73.11
J15	0	127.52	179.4	73.74
J16	0	127.74	179.39	73.41
J17	0	127.84	179.38	73.27
J2	0.74	127.12	178.81	73.48
J3	0	127.62	179.3	73.47
J4	1.75	127.56	179.3	73.56
J5	0.41	127.44	179.4	73.87
J6	0.53	128	179.34	72.98
J7	0.26	128.02	179.34	72.96
J8	0	127.88	179.34	73.16
J9	0.18	127.18	178.92	73.55
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.17	127.79	179.34	73.28
WJ3000463	4.28	126.32	179.28	75.29
WJ3000544	0.24	126.61	178.81	74.2
WJ3000621	1.81	125.46	179.3	76.54
WJ3000632	0	124.91	178.4	76.04
WJ3000760	0.15	127.67	179.34	73.45
WJ3000761	0.13	126.43	180.77	77.25
WJ3000762	0	126.59	180.83	77.1
WJ3000763	0.74	126.59	180.83	77.11
WJ3000764	0	126.39	182.44	79.69
WJ3000765	0.11	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	8.44	126.37	182.49	79.79
WJ3000985	0	126.57	180.74	77.01
WJ3001087	0.84	126.51	182.44	79.5
WJ3001088	0.07	126.78	182.44	79.13
WJ3001089	0.41	126.08	182.44	80.12
WJ48236	0	127.16	180.74	76.17
WJ48237	0	127.48	180.74	75.71
WJ48238	0.07	127.48	180.74	75.71
WJ48239	0.04	127.16	180.75	76.18
WJ56492	20.61	125.32	179.57	77.13
WJ56518	14.46	126.18	179.31	75.53
WJ56519	1.5	125.85	179.31	76

NOLOOP_MHD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.13	125.02	178.43	75.92
J10	1.06	127.38	179.13	73.57
J11	0.25	127.54	179.21	73.45
J12	0	127.85	179.34	73.19
J14	0.03	127.91	179.42	73.22
J15	0	127.52	179.47	73.85
J16	0	127.74	179.46	73.52
J17	0	127.84	179.45	73.38
J2	0.62	127.12	178.85	73.53
J3	0	127.62	179.38	73.58
J4	1.47	127.56	179.38	73.67
J5	0.34	127.44	179.47	73.98
J6	0.44	128	179.42	73.09
J7	0.22	128.02	179.42	73.07
J8	0	127.88	179.42	73.27
J9	0.15	127.18	178.96	73.61
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.14	127.79	179.42	73.39
WJ3000463	3.6	126.32	179.39	75.46
WJ3000544	0.2	126.61	178.85	74.26
WJ3000621	1.52	125.46	179.41	76.69
WJ3000632	0	124.91	178.4	76.04
WJ3000760	0.13	127.67	179.42	73.56
WJ3000761	0.11	126.43	180.8	77.3
WJ3000762	0	126.59	180.86	77.15
WJ3000763	0.62	126.59	180.87	77.16
WJ3000764	0	126.39	182.44	79.69
WJ3000765	0.09	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	7.09	126.37	182.5	79.79
WJ3000985	0	126.57	180.77	77.05
WJ3001087	0.71	126.51	182.44	79.51
WJ3001088	0.06	126.78	182.44	79.13
WJ3001089	0.34	126.08	182.44	80.12
WJ48236	0	127.16	180.77	76.21
WJ48237	0	127.48	180.77	75.76
WJ48238	0.06	127.48	180.77	75.76
WJ48239	0.03	127.16	180.78	76.22
WJ56492	17.31	125.32	179.71	77.32
WJ56518	12.15	126.18	179.42	75.68
WJ56519	1.26	125.85	179.42	76.15

NOLOOP_MDD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.19	125.02	178.42	75.91
J10	1.6	127.38	178.97	73.34
J11	0.38	127.54	179.03	73.2
J12	0	127.85	179.14	72.91
J14	0.04	127.91	179.21	72.93
J15	0	127.52	179.27	73.57
J16	0	127.74	179.26	73.24
J17	0	127.84	179.25	73.1
J2	0.94	127.12	178.75	73.4
J3	0	127.62	179.18	73.29
J4	2.22	127.56	179.17	73.38
J5	0.52	127.44	179.28	73.7
J6	0.67	128	179.21	72.8
J7	0.33	128.02	179.21	72.78
J8	0	127.88	179.21	72.98
J9	0.23	127.18	178.84	73.44
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.22	127.79	179.21	73.1
WJ3000463	5.44	126.32	179.11	75.05
WJ3000544	0.3	126.61	178.75	74.12
WJ3000621	2.3	125.46	179.14	76.31
WJ3000632	0	124.91	178.4	76.04
WJ3000760	0.19	127.67	179.21	73.27
WJ3000761	0.17	126.43	180.72	77.18
WJ3000762	0	126.59	180.77	77.02
WJ3000763	0.94	126.59	180.78	77.04
WJ3000764	0	126.39	182.44	79.68
WJ3000765	0.14	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	10.72	126.37	182.49	79.78
WJ3000985	0	126.57	180.69	76.95
WJ3001087	1.07	126.51	182.44	79.5
WJ3001088	0.09	126.78	182.44	79.13
WJ3001089	0.52	126.08	182.44	80.11
WJ48236	0	127.16	180.69	76.1
WJ48237	0	127.48	180.69	75.65
WJ48238	0.09	127.48	180.7	75.65
WJ48239	0.05	127.16	180.7	76.11
WJ56492	26.17	125.32	179.37	76.84
WJ56518	18.36	126.18	179.16	75.3
WJ56519	1.9	125.85	179.16	75.78

NOLOOP_PHD				
ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.44	125.02	178.41	75.89
J10	3.66	127.38	178.55	72.74
J11	0.87	127.54	178.57	72.54
J12	0	127.85	178.6	72.15
J14	0.09	127.91	178.66	72.15
J15	0	127.52	178.73	72.8
J16	0	127.74	178.72	72.46
J17	0	127.84	178.71	72.32
J2	2.15	127.12	178.49	73.02
J3	0	127.62	178.62	72.5
J4	5.09	127.56	178.61	72.58
J5	1.19	127.44	178.74	72.93
J6	1.55	128	178.66	72.01
J7	0.76	128.02	178.66	71.99
J8	0	127.88	178.66	72.19
J9	0.52	127.18	178.51	72.97
WJ24325	0	126.43	178.4	73.87
WJ3000016	0.49	127.79	178.66	72.32
WJ3000463	12.45	126.32	177.24	72.39
WJ3000544	0.7	126.61	178.49	73.74
WJ3000621	5.26	125.46	177.4	73.83
WJ3000632	0	124.91	178.4	76.04
WJ3000760	0.44	127.67	178.66	72.49
WJ3000761	0.38	126.43	180.5	76.87
WJ3000762	0	126.59	180.55	76.7
WJ3000763	2.15	126.59	180.55	76.71
WJ3000764	0	126.39	182.43	79.67
WJ3000765	0.32	126.26	182.5	79.95
WJ3000766	0	91.22	182.5	129.77
WJ3000767	24.55	126.37	182.45	79.73
WJ3000985	0	126.57	180.5	76.67
WJ3001087	2.44	126.51	182.42	79.48
WJ3001088	0.2	126.78	182.42	79.11
WJ3001089	1.19	126.08	182.42	80.09
WJ48236	0	127.16	180.5	75.83
WJ48237	0	127.48	180.5	75.37
WJ48238	0.2	127.48	180.5	75.37
WJ48239	0.12	127.16	180.5	75.83
WJ56492	59.94	125.32	177.53	74.22
WJ56518	42.05	126.18	177.44	72.87
WJ56519	4.36	125.85	177.45	73.36

EX_MDD+FF							
ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (psi)	Hydrant Available Flow (L/s)	Hydrant Pressure at Available Flow (psi)
J1	0.19	75.91	178.42	378	75.56	5,219.80	20
J2	0.94	73.45	178.79	378	31.03	429.13	20
J3	0	73.43	179.27	378	62.64	916.07	20
J4	2.22	73.52	179.27	378	61.87	882.6	20
J5	0.52	74.14	179.59	378	66.14	1077.08	20
J6	0.67	72.95	179.32	378	43.73	522.56	20
J7	0.33	72.93	179.32	378	-41.63	248.99	20
J8	0	73.13	179.32	378	-98.11	200.33	20
WJ24325	0	73.87	178.4	378	50.65	595.34	20
WJ3000016	0.22	73.25	179.32	378	-132.61	181.69	20
WJ3000463	5.44	75.18	179.2	378	-136.9	183.1	20
WJ3000544	0.3	74.18	178.79	378	-153.63	174.14	20
WJ3000621	2.3	76.45	179.24	378	-181.36	165.12	20
WJ3000758	0	73.3	178.79	378	68.45	1354.6	20
WJ3000759	0	73.28	179.27	378	66.29	1147.88	20
WJ3000760	0.19	73.42	179.32	378	66.24	1133.17	20
WJ3000761	0.17	77.3	180.8	378	73.03	1,720.22	20
WJ3000762	0	77.14	180.85	378	72.92	1,750.39	20
WJ3000763	0.94	77.15	180.86	378	72.94	1,755.37	20
WJ3000766	0	129.77	182.5	378	114.58	1,099.84	20
WJ3000767	10.72	79.78	182.49	378	69.13	985.97	20
WJ3000982	0	72.67	179.32	378	30.65	427.28	20
WJ3000985	0	77.05	180.77	378	-159.14	174.61	20
WJ3001087	1.07	79.5	182.44	378	27.4	407.38	20
WJ3001088	0.09	79.13	182.44	378	-14.14	295.29	20
WJ3001089	0.52	80.12	182.44	378	-70.67	230.09	20
WJ48236	0	76.21	180.77	378	68.65	1,182.12	20
WJ48237	0	75.75	180.77	378	69.47	1,318.04	20
WJ48238	0.09	75.75	180.77	378	67.95	1,154.16	20
WJ48239	0.05	76.22	180.77	378	70.19	1,358.01	20
WJ56492	26.17	76.97	179.46	378	38.38	500.01	20
WJ56518	18.36	75.44	179.25	378	38.01	493.15	20
WJ56519	1.9	75.91	179.25	378	38.8	481.32	20

PROP_MDD+FF							
ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (psi)	Hydrant Available Flow (L/s)	Hydrant Pressure at Available Flow (psi)
J1	0.19	75.91	178.42	378	75.58	5,285.01	20.02
J14	0.04	72.78	179.11	378	67.68	1,337.20	20
J2	0.94	73.44	178.78	378	69.77	1,569.65	20
J3	0	73.15	179.08	378	68.09	1,349.80	20
J4	2.22	73.24	179.08	378	67.99	1,328.04	20
J5	0.52	73.55	179.17	378	68.18	1311.19	20
J6	0.67	72.56	179.04	378	57.05	731.91	20
J7	0.33	72.45	178.98	378	52.54	638.03	20
J8	0	72.44	178.83	378	57.83	749.93	20
WJ24325	0	73.87	178.4	378	50.65	595.34	20
WJ3000016	0.22	72.56	178.83	378	23.32	391.74	20
WJ3000463	5.44	74.92	179.02	378	-134.52	184.11	20
WJ3000544	0.3	74.16	178.78	378	-114.89	192.62	20
WJ3000621	2.3	76.18	179.05	378	-178.99	165.86	20
WJ3000760	0.19	73.12	179.1	378	67.33	1253.77	20
WJ3000761	0.17	77.14	180.69	378	73.17	1,802.63	20
WJ3000762	0	76.98	180.75	378	73.04	1,830.32	20
WJ3000763	0.94	77	180.75	378	73.06	1,834.96	20
WJ3000766	0	129.77	182.5	378	114.58	1,099.84	20
WJ3000767	10.72	79.78	182.49	378	69.13	985.97	20
WJ3000985	0	76.91	180.67	378	-159.09	174.41	20
WJ3001087	1.07	79.5	182.44	378	27.39	407.34	20
WJ3001088	0.09	79.13	182.44	378	-14.15	295.26	20
WJ3001089	0.52	80.11	182.44	378	-70.68	230.07	20
WJ48236	0	76.07	180.67	378	68.69	1,200.13	20
WJ48237	0	75.61	180.67	378	69.51	1,343.07	20
WJ48238	0.09	75.61	180.67	378	68	1,171.32	20
WJ48239	0.05	76.07	180.67	378	70.25	1,387.51	20
WJ56492	26.17	76.73	179.29	378	39.63	509.45	20
WJ56518	18.36	75.17	179.06	378	40.34	511.57	20
WJ56519	1.9	75.65	179.06	378	41.17	500.46	20

NOLOOP_MDD+FF							
ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (psi)	Hydrant Available Flow (L/s)	Hydrant Pressure at Available Flow (psi)
J1	0.19	75.91	178.42	378	75.57	5,262.85	20.01
J14	0.04	72.93	179.21	378	67.1	1,254.57	20
J2	0.94	73.4	178.75	378	69.61	1,539.32	20
J3	0	73.29	179.18	378	67.62	1,278.29	20
J4	2.22	73.38	179.17	378	67.51	1,260.40	20
J5	0.52	73.7	179.28	378	67.63	1238.62	20
J6	0.67	72.8	179.21	378	43.93	524.8	20
J7	0.33	72.78	179.21	378	21.33	383.61	20
J8	0	72.98	179.21	378	-35.14	256.87	20
WJ24325	0	73.87	178.4	378	50.65	595.34	20
WJ3000016	0.22	73.1	179.21	378	-69.64	221.44	20
WJ3000463	5.44	75.05	179.11	378	-134.73	184.12	20
WJ3000544	0.3	74.12	178.75	378	-115.05	192.51	20
WJ3000621	2.3	76.31	179.14	378	-179.2	165.88	20
WJ3000760	0.19	73.27	179.21	378	66.44	1154.24	20
WJ3000761	0.17	77.18	180.72	378	73.11	1,773.54	20
WJ3000762	0	77.02	180.77	378	72.99	1,801.88	20
WJ3000763	0.94	77.04	180.78	378	73.01	1,806.62	20
WJ3000766	0	129.77	182.5	378	114.58	1,099.84	20
WJ3000767	10.72	79.78	182.49	378	69.13	985.97	20
WJ3000985	0	76.95	180.69	378	-159.11	174.46	20
WJ3001087	1.07	79.5	182.44	378	27.39	407.35	20
WJ3001088	0.09	79.13	182.44	378	-14.15	295.27	20
WJ3001089	0.52	80.11	182.44	378	-70.68	230.07	20
WJ48236	0	76.1	180.69	378	68.67	1,193.85	20
WJ48237	0	75.65	180.69	378	69.49	1,334.35	20
WJ48238	0.09	75.65	180.7	378	67.98	1,165.33	20
WJ48239	0.05	76.11	180.7	378	70.22	1,377.23	20
WJ56492	26.17	76.84	179.37	378	39.49	508.21	20
WJ56518	18.36	75.3	179.16	378	40.13	509.62	20
WJ56519	1.9	75.78	179.16	378	40.97	498.44	20

160560009 - OLTA Overlea
Hydraulic Modelling Results - Pipes (Peak Hour Demand Conditions)

Overlea WM - Existing and Proposed Replacement Sections

EX_PHD											
ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
LN3000902	WJ3000759	WJ3000760	17.05	406.4	85	-94.54	0.73	0.05	2.9	Open	0
LN3001099	WJ3000762	WJ3000761	13.11	406.4	85	102.9	0.79	0.04	3.39	Open	0
LN3001128	WJ3000763	WJ3000762	1.73	406.4	85	106.92	0.82	0.01	3.65	Open	0
LN3001133	WJ3000765	WJ3000764	6.88	406.4	85	187.15	1.44	0.07	10.27	Open	0
LN3001681	WJ3000632	WJ24325	432.72	406.4	85	0	0	0	0	Open	0
LN3007869	WJ48236	WJ3000985	431.56	254	85	0	0	0	0	Open	0
LN3007885	WJ3000761	J5	474.15	406.4	85	98.97	0.76	1.5	3.16	Open	0
LN3007885_1	J5	WJ3000760	109.23	406.4	85	97.78	0.75	0.34	3.09	Open	0
LN3007892	WJ3000761	WJ48239	175.06	363	145	3.54	0.03	0	0	Open	0
LN3007903	WJ3000762	WJ48238	177.53	201.7	85	4.02	0.13	0.05	0.25	Open	0
LN3007905	WJ3000763	WJ3000764	188.01	406.4	85	-183.32	1.41	1.86	9.89	Open	0
LN3007906	WJ3000765	WJ3000767	45.51	303.5	85	24.55	0.34	0.05	0.99	Open	0
LN3007908	WJ3001087	WJ3000764	96.4	254	85	-3.84	0.08	0.01	0.08	Open	0
LN3007911	WJ3001087	WJ3001088	77.68	254	85	0.2	0	0	0	Open	0
LN3007913	WJ3001089	WJ3001087	60.44	201.7	85	-1.19	0.04	0	0.03	Open	0
LN3007921	WJ3000766	WJ3000765	282.89	406.4	85	0	0	0	0	Open	0
LN3007944	WJ56519	WJ3000621	134.01	201.7	85	5.26	0.16	0.06	0.42	Open	0
LN3007948	WJ56519	WJ3000463	104.67	201.7	85	12.45	0.39	0.22	2.06	Open	0
LN3007963	WJ56519	J4	304.15	303.5	85	-49.82	0.69	1.12	3.67	Open	0
LN3007963_1	J3	WJ3000759	23.92	303.5	85	-54.91	0.76	0.11	4.4	Open	0
LN3007963_2	J4	J3	5.86	303.5	85	-54.91	0.76	0.03	4.4	Open	0
LN3008818	WJ3000758	J1	188.16	406.4	85	36.78	0.28	0.09	0.5	Open	0
LN3008818_1	J1	WJ3000632	9.38	406.4	85	36.34	0.28	0	0.49	Open	0
LN3008822	WJ3000544	J2	113.66	201.7	85	-0.7	0.02	0	0.01	Open	0
LN3008822_1	J2	WJ3000758	22.93	201.7	85	-2.85	0.09	0	0.13	Open	0
LN3008830	WJ3000758	WJ3000759	236.51	406.4	85	-39.63	0.31	0.14	0.58	Open	0
LN3008846	WJ3000760	J6	98.46	303.5	85	2.8	0.04	0	0.02	Open	0
LN3008846_1	J6	WJ3000982	57.34	303.5	85	1.25	0.02	0	0	Open	0
LN3008864	WJ3000016	J8	65.29	254	85	-0.49	0.01	0	0	Open	0
LN3008864_1	J7	WJ3000982	136.57	254	85	-1.25	0.02	0	0.01	Open	0
LN3008864_2	J8	J7	106.86	254	85	-0.49	0.01	0	0	Open	0
LN48671	WJ48239	WJ48237	19.95	302	147	3.43	0.05	0	0.01	Open	0
LN48672	WJ48238	WJ48237	24.42	302	147	3.82	0.05	0	0.01	Open	0
LN48673	WJ48237	WJ48236	15.36	302	147	0	0	0	0	Open	0
LN48674	WJ48237	RES2	497.81	302	147	7.25	0.1	0.02	0.04	Open	0
LN56621	WJ56518	WJ56519	8.3	303.5	85	-27.75	0.38	0.01	1.24	Open	0
LN56623	WJ3000763	WJ56492	403.37	303.5	85	74.24	1.03	3.1	7.68	Open	0
LN56628	WJ56492	WJ56518	683.36	302	147	14.3	0.2	0.09	0.14	Open	0
P1	RES1	WJ3000632	1	2,000.00	150	-36.34	0.01	0	0	Open	0
P3	RES3	WJ3000765	1	2,000.00	150	212.02	0.07	0	0	Open	0

160560009 - OLTA Overlea
Hydraulic Modelling Results - Pipes (Peak Hour Demand Conditions)

Overlea WM - Existing and Proposed Replacement Sections

						PROP_PHD					
ID	**From Node**	**To Node**	**Length (m)**	**Diameter (mm)**	**Roughness**	**Flow (L/s)**	**Velocity (m/s)**	**Headloss (m)**	**HL/1000 (m/k-m)**	**Status**	**Flow Reversal Count**
LN3001099	WJ3000762	WJ3000761	13.11	406.4	85	104.73	0.81	0.05	3.51	Open	0
LN3001128	WJ3000763	WJ3000762	1.73	406.4	85	108.69	0.84	0.01	3.76	Open	0
LN3001133	WJ3000765	WJ3000764	6.88	406.4	85	188.23	1.45	0.07	10.38	Open	0
LN3001681	WJ3000632	WJ24325	432.72	406.4	85	0	0	0	0	Open	0
LN3007869	WJ48236	WJ3000985	431.56	254	85	0	0	0	0	Open	0
LN3007885	WJ3000761	J5	474.15	406.4	85	109.3	0.84	1.8	3.79	Open	0
LN3007892	WJ3000761	WJ48239	175.06	363	145	-4.95	0.05	0	0.01	Open	0
LN3007903	WJ3000762	WJ48238	177.53	201.7	85	3.96	0.12	0.04	0.25	Open	0
LN3007905	WJ3000763	WJ3000764	188.01	406.4	85	-184.39	1.42	1.88	9.99	Open	0
LN3007906	WJ3000765	WJ3000767	45.51	303.5	85	24.55	0.34	0.05	0.99	Open	0
LN3007908	WJ3001087	WJ3000764	96.4	254	85	-3.84	0.08	0.01	0.08	Open	0
LN3007911	WJ3001087	WJ3001088	77.68	254	85	0.2	0	0	0	Open	0
LN3007913	WJ3001089	WJ3001087	60.44	201.7	85	-1.19	0.04	0	0.03	Open	0
LN3007921	WJ3000766	WJ3000765	282.89	406.4	85	0	0	0	0	Open	0
LN3007944	WJ56519	WJ3000621	134.01	201.7	85	5.26	0.16	0.06	0.42	Open	0
LN3007948	WJ56519	WJ3000463	104.67	201.7	85	12.45	0.39	0.22	2.06	Open	0
LN3007963	WJ56519	J4	304.15	303.5	85	-50.52	0.7	1.15	3.77	Open	0
LN3008818_1	J1	WJ3000632	9.38	406.4	85	40.82	0.31	0.01	0.61	Open	0
LN3008822	WJ3000544	J2	113.66	201.7	85	-0.7	0.02	0	0.01	Open	0
LN3008846	WJ3000760	J6	98.46	303.5	85	12.83	0.18	0.03	0.3	Open	0
LN3008864	WJ3000016	J8	65.29	254	85	-0.49	0.01	0	0	Open	0
LN3008864_2	J8	J7	106.86	254	85	-10.52	0.21	0.05	0.49	Open	0
LN48671	WJ48239	WJ48237	19.95	302	147	-5.07	0.07	0	0.02	Open	0
LN48672	WJ48238	WJ48237	24.42	302	147	3.76	0.05	0	0.01	Open	0
LN48673	WJ48237	WJ48236	15.36	302	147	0	0	0	0	Open	0
LN48674	WJ48237	RES2	497.81	302	147	-1.31	0.02	0	0	Open	0
LN56621	WJ56518	WJ56519	8.3	303.5	85	-28.45	0.39	0.01	1.3	Open	0
LN56623	WJ3000763	WJ56492	403.37	303.5	85	73.54	1.02	3.05	7.55	Open	0
LN56628	WJ56492	WJ56518	683.36	302	147	13.6	0.19	0.08	0.12	Open	0
OVL_WM1	J1	J2	192.03	379.5	120	-41.26	0.36	0.09	0.46	Open	0
OVL_WM10	WJ3000760	J14	25.01	379.5	120	-13.27	0.12	0	0.06	Open	0
OVL_WM11	J3	J4	6.02	379.5	120	55.61	0.49	0	0.8	Open	0
OVL_WM12	J14	J17	18.55	379.5	120	-108.11	0.96	0.05	2.74	Open	0
OVL_WM13	J17	J16	22.47	572.6	120	-108.11	0.42	0.01	0.37	Open	0
OVL_WM14	J16	J15	55.73	572.6	120	-81.22	0.32	0.01	0.22	Open	0
OVL_WM15	J15	J5	20.87	572.6	120	-108.11	0.42	0.01	0.37	Open	0
OVL_WM16	J15	J16	58.2	379.5	120	26.89	0.24	0.01	0.21	Open	0
OVL_WM2	J2	J9	51.84	379.5	120	-34.08	0.3	0.02	0.32	Open	0
OVL_WM3	J9	J10	75.36	379.5	120	-34.6	0.31	0.03	0.33	Open	0
OVL_WM4	J10	J11	33.47	379.5	120	-38.27	0.34	0.01	0.4	Open	0
OVL_WM5	J11	J12	57.58	379.5	120	-39.14	0.35	0.02	0.42	Open	0
OVL_WM6	J12	J3	18.77	379.5	120	-39.14	0.35	0.01	0.42	Open	0
OVL_WM7	J3	J14	17.86	379.5	120	-94.75	0.84	0.04	2.15	Open	0
OVL_WM8	J6	J7	187.01	302	120	11.28	0.16	0.02	0.13	Open	0
OVL_WM9	J8	J2	182.22	302	120	10.03	0.14	0.02	0.1	Open	0
P1	RES1	WJ3000632	1	2000	150	-40.82	0.01	0	0	Open	0
P3	RES3	WJ3000765	1	2000	150	213.09	0.07	0	0	Open	0

160560009 - OLTA Overlea
Hydraulic Modelling Results - Pipes (Peak Hour Demand Conditions)

Overlea WM - Existing and Proposed Replacement Sections

NOLOOP_PHD											
ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
LN3001099	WJ3000762	WJ3000761	13.11	406.4	85	104.85	0.81	0.05	3.51	Open	0
LN3001128	WJ3000763	WJ3000762	1.73	406.4	85	108.86	0.84	0.01	3.76	Open	0
LN3001133	WJ3000765	WJ3000764	6.88	406.4	85	188.14	1.45	0.07	10.37	Open	0
LN3001681	WJ3000632	WJ24325	432.72	406.4	85	0	0	0	0	Open	0
LN3007869	WJ48236	WJ3000985	431.56	254	85	0	0	0	0	Open	0
LN3007885	WJ3000761	J5	474.15	406.4	85	108.04	0.83	1.76	3.71	Open	0
LN3007892	WJ3000761	WJ48239	175.06	363	145	-3.57	0.03	0	0	Open	0
LN3007903	WJ3000762	WJ48238	177.53	201.7	85	4.01	0.13	0.04	0.25	Open	0
LN3007905	WJ3000763	WJ3000764	188.01	406.4	85	-184.3	1.42	1.88	9.98	Open	0
LN3007906	WJ3000765	WJ3000767	45.51	303.5	85	24.55	0.34	0.05	0.99	Open	0
LN3007908	WJ3001087	WJ3000764	96.4	254	85	-3.84	0.08	0.01	0.08	Open	0
LN3007911	WJ3001087	WJ3001088	77.68	254	85	0.2	0	0	0	Open	0
LN3007913	WJ3001089	WJ3001087	60.44	201.7	85	-1.19	0.04	0	0.03	Open	0
LN3007921	WJ3000766	WJ3000765	282.89	406.4	85	0	0	0	0	Open	0
LN3007944	WJ56519	WJ3000621	134.01	201.7	85	5.26	0.16	0.06	0.42	Open	0
LN3007948	WJ56519	WJ3000463	104.67	201.7	85	12.45	0.39	0.22	2.06	Open	0
LN3007963	WJ56519	J4	304.15	303.5	85	-50.78	0.7	1.16	3.8	Open	0
LN3008818_1	J1	WJ3000632	9.38	406.4	85	39.31	0.3	0.01	0.57	Open	0
LN3008822	WJ3000544	J2	113.66	201.7	85	-0.7	0.02	0	0.01	Open	0
LN3008846	WJ3000760	J6	98.46	303.5	85	2.8	0.04	0	0.02	Open	0
LN3008864	WJ3000016	J8	65.29	254	85	-0.49	0.01	0	0	Open	0
LN3008864_2	J8	J7	106.86	254	85	-0.49	0.01	0	0	Open	0
LN48671	WJ48239	WJ48237	19.95	302	147	-3.68	0.05	0	0.01	Open	0
LN48672	WJ48238	WJ48237	24.42	302	147	3.8	0.05	0	0.01	Open	0
LN48673	WJ48237	WJ48236	15.36	302	147	0	0	0	0	Open	0
LN48674	WJ48237	RES2	497.81	302	147	0.12	0	0	0	Open	0
LN56621	WJ56518	WJ56519	8.3	303.5	85	-28.7	0.4	0.01	1.32	Open	0
LN56623	WJ3000763	WJ56492	403.37	303.5	85	73.29	1.01	3.03	7.5	Open	0
LN56628	WJ56492	WJ56518	683.36	302	147	13.35	0.19	0.08	0.12	Open	0
OVL_WM1	J1	J2	192.03	379.5	120	-39.74	0.35	0.08	0.43	Open	0
OVL_WM10	WJ3000760	J14	25.01	379.5	120	-3.24	0.03	0	0	Open	0
OVL_WM11	J3	J4	6.02	379.5	120	55.87	0.49	0	0.81	Open	0
OVL_WM12	J14	J17	18.55	379.5	120	-106.85	0.94	0.05	2.68	Open	0
OVL_WM13	J17	J16	22.47	572.6	120	-106.85	0.41	0.01	0.36	Open	0
OVL_WM14	J16	J15	55.73	572.6	120	-80.27	0.31	0.01	0.21	Open	0
OVL_WM15	J15	J5	20.87	572.6	120	-106.85	0.41	0.01	0.36	Open	0
OVL_WM16	J15	J16	58.2	379.5	120	26.58	0.23	0.01	0.2	Open	0
OVL_WM2	J2	J9	51.84	379.5	120	-42.59	0.38	0.03	0.49	Open	0
OVL_WM3	J9	J10	75.36	379.5	120	-43.11	0.38	0.04	0.5	Open	0
OVL_WM4	J10	J11	33.47	379.5	120	-46.78	0.41	0.02	0.58	Open	0
OVL_WM5	J11	J12	57.58	379.5	120	-47.65	0.42	0.03	0.6	Open	0
OVL_WM6	J12	J3	18.77	379.5	120	-47.65	0.42	0.01	0.6	Open	0
OVL_WM7	J3	J14	17.86	379.5	120	-103.52	0.92	0.05	2.53	Open	0
OVL_WM8	J6	J7	187.01	302	120	1.25	0.02	0	0	Open	0
P1	RES1	WJ3000632	1	2000	150	-39.31	0.01	0	0	Open	0
P3	RES3	WJ3000765	1	2000	150	213.01	0.07	0	0	Open	0

160560009 - OLTA Overlea
Hydraulic Modelling Results - Pipes (Maximum Day + Fire Flow Conditions)

Overlea WM - Existing and Proposed Replacement Sections

					EX_MDD+FF						
ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
LN3000902	WJ3000759	WJ3000760	17.05	406.4	85	-122.65	0.95	0.08	4.7	Open	0
LN3001099	WJ3000762	WJ3000761	13.11	406.4	85	115.6	0.89	0.06	4.21	Open	0
LN3001128	WJ3000763	WJ3000762	1.73	406.4	85	119.82	0.92	0.01	4.51	Open	0
LN3001133	WJ3000765	WJ3000764	6.88	406.4	85	186.26	1.44	0.07	10.18	Open	0
LN3001681	WJ3000632	WJ24325	432.72	406.4	85	0	0	0	0	Open	0
LN3007869	WJ48236	WJ3000985	431.56	254	85	0	0	0	0	Open	0
LN3007885	WJ3000761	J5	474.15	406.4	85	124.58	0.96	2.29	4.83	Open	0
LN3007885_1	J5	WJ3000760	109.23	406.4	85	124.06	0.96	0.52	4.8	Open	0
LN3007892	WJ3000761	WJ48239	175.06	363	145	-9.15	0.09	0	0.02	Open	0
LN3007903	WJ3000762	WJ48238	177.53	201.7	85	4.22	0.13	0.05	0.28	Open	0
LN3007905	WJ3000763	WJ3000764	188.01	406.4	85	-184.58	1.42	1.88	10.01	Open	0
LN3007906	WJ3000765	WJ3000767	45.51	303.5	85	10.72	0.15	0.01	0.21	Open	0
LN3007908	WJ3001087	WJ3000764	96.4	254	85	-1.68	0.03	0	0.02	Open	0
LN3007911	WJ3001087	WJ3001088	77.68	254	85	0.09	0	0	0	Open	0
LN3007913	WJ3001089	WJ3001087	60.44	201.7	85	-0.52	0.02	0	0.01	Open	0
LN3007921	WJ3000766	WJ3000765	282.89	406.4	85	0	0	0	0	Open	0
LN3007944	WJ56519	WJ3000621	134.01	201.7	85	2.3	0.07	0.01	0.09	Open	0
LN3007948	WJ56519	WJ3000463	104.67	201.7	85	5.44	0.17	0.05	0.44	Open	0
LN3007963	WJ56519	J4	304.15	303.5	85	9.65	0.13	0.05	0.18	Open	0
LN3007963_1	J3	WJ3000759	23.92	303.5	85	7.42	0.1	0	0.11	Open	0
LN3007963_2	J4	J3	5.86	303.5	85	7.42	0.1	0	0.11	Open	0
LN3008818	WJ3000758	J1	188.16	406.4	85	-188.17	1.45	1.95	10.38	Open	0
LN3008818_1	J1	WJ3000632	9.38	406.4	85	-188.36	1.45	0.1	10.39	Open	0
LN3008822	WJ3000544	J2	113.66	201.7	85	-0.3	0.01	0	0	Open	0
LN3008822_1	J2	WJ3000758	22.93	201.7	85	-1.24	0.04	0	0.03	Open	0
LN3008830	WJ3000758	WJ3000759	236.51	406.4	85	-130.07	1	1.24	5.24	Open	0
LN3008846	WJ3000760	J6	98.46	303.5	85	1.22	0.02	0	0	Open	0
LN3008846_1	J6	WJ3000982	57.34	303.5	85	0.55	0.01	0	0	Open	0
LN3008864	WJ3000016	J8	65.29	254	85	-0.22	0	0	0	Open	0
LN3008864_1	J7	WJ3000982	136.57	254	85	-0.55	0.01	0	0	Open	0
LN3008864_2	J8	J7	106.86	254	85	-0.22	0	0	0	Open	0
LN48671	WJ48239	WJ48237	19.95	302	147	-9.2	0.13	0	0.06	Open	0
LN48672	WJ48238	WJ48237	24.42	302	147	4.13	0.06	0	0.01	Open	0
LN48673	WJ48237	WJ48236	15.36	302	147	0	0	0	0	Open	0
LN48674	WJ48237	RES2	497.81	302	147	-5.06	0.07	0.01	0.02	Open	0
LN56621	WJ56518	WJ56519	8.3	303.5	85	19.28	0.27	0.01	0.63	Open	0
LN56623	WJ3000763	WJ56492	403.37	303.5	85	63.82	0.88	2.34	5.81	Open	0
LN56628	WJ56492	WJ56518	683.36	302	147	37.65	0.53	0.55	0.81	Open	0
P1	RES1	WJ3000632	1	2,000.00	150	188.36	0.06	0	0	Open	0
P3	RES3	WJ3000765	1	2,000.00	150	197.12	0.06	0	0	Open	0

160560009 - OLTA Overlea
Hydraulic Modelling Results - Pipes (Maximum Day + Fire Flow Conditions)

Overlea WM - Existing and Proposed Replacement Sections

						PROP_MDD+FF					
ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
LN3001099	WJ3000762	WJ3000761	13.11	406.4	85	119.94	0.92	0.06	4.51	Open	0
LN3001128	WJ3000763	WJ3000762	1.73	406.4	85	123.41	0.95	0.01	4.74	Open	0
LN3001133	WJ3000765	WJ3000764	6.88	406.4	85	191.27	1.47	0.07	10.69	Open	0
LN3001681	WJ3000632	WJ24325	432.72	406.4	85	0	0	0	0	Open	0
LN3007869	WJ48236	WJ3000985	431.56	254	85	0	0	0	0	Open	0
LN3007885	WJ3000761	J5	474.15	406.4	85	140.27	1.08	2.86	6.02	Open	0
LN3007892	WJ3000761	WJ48239	175.06	363	145	-20.5	0.2	0.02	0.11	Open	0
LN3007903	WJ3000762	WJ48238	177.53	201.7	85	3.47	0.11	0.03	0.19	Open	0
LN3007905	WJ3000763	WJ3000764	188.01	406.4	85	-189.59	1.46	1.98	10.52	Open	0
LN3007906	WJ3000765	WJ3000767	45.51	303.5	85	10.72	0.15	0.01	0.21	Open	0
LN3007908	WJ3001087	WJ3000764	96.4	254	85	-1.68	0.03	0	0.02	Open	0
LN3007911	WJ3001087	WJ3001088	77.68	254	85	0.09	0	0	0	Open	0
LN3007913	WJ3001089	WJ3001087	60.44	201.7	85	-0.52	0.02	0	0.01	Open	0
LN3007921	WJ3000766	WJ3000765	282.89	406.4	85	0	0	0	0	Open	0
LN3007944	WJ56519	WJ3000621	134.01	201.7	85	2.3	0.07	0.01	0.09	Open	0
LN3007948	WJ56519	WJ3000463	104.67	201.7	85	5.44	0.17	0.05	0.44	Open	0
LN3007963	WJ56519	J4	304.15	303.5	85	11.06	0.15	0.07	0.23	Open	0
LN3008818_1	J1	WJ3000632	9.38	406.4	85	-173.5	1.34	0.08	8.93	Open	0
LN3008822	WJ3000544	J2	113.66	201.7	85	-0.3	0.01	0	0	Open	0
LN3008846	WJ3000760	J6	98.46	303.5	85	19.81	0.27	0.07	0.66	Open	0
LN3008864	WJ3000016	J8	65.29	254	85	-0.22	0	0	0	Open	0
LN3008864_2	J8	J7	106.86	254	85	-18.8	0.37	0.15	1.44	Open	0
LN48671	WJ48239	WJ48237	19.95	302	147	-20.55	0.29	0.01	0.26	Open	0
LN48672	WJ48238	WJ48237	24.42	302	147	3.38	0.05	0	0.01	Open	0
LN48673	WJ48237	WJ48236	15.36	302	147	0	0	0	0	Open	0
LN48674	WJ48237	RES2	497.81	302	147	-17.17	0.24	0.09	0.19	Open	0
LN56621	WJ56518	WJ56519	8.3	303.5	85	20.7	0.29	0.01	0.72	Open	0
LN56623	WJ3000763	WJ56492	403.37	303.5	85	65.24	0.9	2.44	6.05	Open	0
LN56628	WJ56492	WJ56518	683.36	302	147	39.07	0.55	0.59	0.87	Open	0
OVL_WM1	J1	J2	192.03	379.5	120	173.31	1.53	1.26	6.57	Open	0
OVL_WM10	WJ3000760	J14	25.01	379.5	120	-20	0.18	0	0.12	Open	0
OVL_WM11	J3	J4	6.02	379.5	120	-8.84	0.08	0	0.02	Open	0
OVL_WM12	J14	J17	18.55	379.5	120	-139.75	1.24	0.08	4.41	Open	0
OVL_WM13	J17	J16	22.47	572.6	120	-139.75	0.54	0.01	0.59	Open	0
OVL_WM14	J16	J15	55.73	572.6	120	-104.99	0.41	0.02	0.35	Open	0
OVL_WM15	J15	J5	20.87	572.6	120	-139.75	0.54	0.01	0.59	Open	0
OVL_WM16	J15	J16	58.2	379.5	120	34.76	0.31	0.02	0.34	Open	0
OVL_WM2	J2	J9	51.84	379.5	120	190.65	1.69	0.41	7.84	Open	0
OVL_WM3	J9	J10	75.36	379.5	120	-126.58	1.12	0.28	3.67	Open	0
OVL_WM4	J10	J11	33.47	379.5	120	-128.18	1.13	0.13	3.76	Open	0
OVL_WM5	J11	J12	57.58	379.5	120	-128.56	1.14	0.22	3.78	Open	0
OVL_WM6	J12	J3	18.77	379.5	120	-128.56	1.14	0.07	3.78	Open	0
OVL_WM7	J3	J14	17.86	379.5	120	-119.72	1.06	0.06	3.31	Open	0
OVL_WM8	J6	J7	187.01	302	120	19.14	0.27	0.06	0.34	Open	0
OVL_WM9	J8	J2	182.22	302	120	18.59	0.26	0.06	0.32	Open	0
P1	RES1	WJ3000632	1	2000	150	173.5	0.06	0	0	Open	0
P3	RES3	WJ3000765	1	2,000.00	150	202.13	0.06	0	0	Open	0

160560009 - OLTA Overlea
Hydraulic Modelling Results - Pipes (Maximum Day + Fire Flow Conditions)

Overlea WM - Existing and Proposed Replacement Sections

NOLOOP_MDD+FF											
ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
LN3001099	WJ3000762	WJ3000761	13.11	406.4	85	119.21	0.92	0.06	4.45	Open	0
LN3001128	WJ3000763	WJ3000762	1.73	406.4	85	122.92	0.95	0.01	4.72	Open	0
LN3001133	WJ3000765	WJ3000764	6.88	406.4	85	189.74	1.46	0.07	10.54	Open	0
LN3001681	WJ3000632	WJ24325	432.72	406.4	85	0	0	0	0	Open	0
LN3007869	WJ48236	WJ3000985	431.56	254	85	0	0	0	0	Open	0
LN3007885	WJ3000761	J5	474.15	406.4	85	137.03	1.06	2.73	5.77	Open	0
LN3007892	WJ3000761	WJ48239	175.06	363	145	-17.99	0.17	0.02	0.09	Open	0
LN3007903	WJ3000762	WJ48238	177.53	201.7	85	3.71	0.12	0.04	0.22	Open	0
LN3007905	WJ3000763	WJ3000764	188.01	406.4	85	-188.06	1.45	1.95	10.36	Open	0
LN3007906	WJ3000765	WJ3000767	45.51	303.5	85	10.72	0.15	0.01	0.21	Open	0
LN3007908	WJ3001087	WJ3000764	96.4	254	85	-1.68	0.03	0	0.02	Open	0
LN3007911	WJ3001087	WJ3001088	77.68	254	85	0.09	0	0	0	Open	0
LN3007913	WJ3001089	WJ3001087	60.44	201.7	85	-0.52	0.02	0	0.01	Open	0
LN3007921	WJ3000766	WJ3000765	282.89	406.4	85	0	0	0	0	Open	0
LN3007944	WJ56519	WJ3000621	134.01	201.7	85	2.3	0.07	0.01	0.09	Open	0
LN3007948	WJ56519	WJ3000463	104.67	201.7	85	5.44	0.17	0.05	0.44	Open	0
LN3007963	WJ56519	J4	304.15	303.5	85	10.03	0.14	0.06	0.19	Open	0
LN3008818_1	J1	WJ3000632	9.38	406.4	85	-177.77	1.37	0.09	9.34	Open	0
LN3008822	WJ3000544	J2	113.66	201.7	85	-0.3	0.01	0	0	Open	0
LN3008846	WJ3000760	J6	98.46	303.5	85	1.22	0.02	0	0	Open	0
LN3008864	WJ3000016	J8	65.29	254	85	-0.22	0	0	0	Open	0
LN3008864_2	J8	J7	106.86	254	85	-0.22	0	0	0	Open	0
LN48671	WJ48239	WJ48237	19.95	302	147	-18.04	0.25	0	0.21	Open	0
LN48672	WJ48238	WJ48237	24.42	302	147	3.62	0.05	0	0.01	Open	0
LN48673	WJ48237	WJ48236	15.36	302	147	0	0	0	0	Open	0
LN48674	WJ48237	RES2	497.81	302	147	-14.42	0.2	0.07	0.14	Open	0
LN56621	WJ56518	WJ56519	8.3	303.5	85	19.67	0.27	0.01	0.65	Open	0
LN56623	WJ3000763	WJ56492	403.37	303.5	85	64.2	0.89	2.37	5.87	Open	0
LN56628	WJ56492	WJ56518	683.36	302	147	38.03	0.53	0.57	0.83	Open	0
OVL_WM1	J1	J2	192.03	379.5	120	177.58	1.57	1.32	6.87	Open	0
OVL_WM10	WJ3000760	J14	25.01	379.5	120	-1.41	0.01	0	0	Open	0
OVL_WM11	J3	J4	6.02	379.5	120	-7.8	0.07	0	0.02	Open	0
OVL_WM12	J14	J17	18.55	379.5	120	-136.51	1.21	0.08	4.22	Open	0
OVL_WM13	J17	J16	22.47	572.6	120	-136.51	0.53	0.01	0.57	Open	0
OVL_WM14	J16	J15	55.73	572.6	120	-102.55	0.4	0.02	0.34	Open	0
OVL_WM15	J15	J5	20.87	572.6	120	-136.51	0.53	0.01	0.57	Open	0
OVL_WM16	J15	J16	58.2	379.5	120	33.96	0.3	0.02	0.32	Open	0
OVL_WM2	J2	J9	51.84	379.5	120	176.34	1.56	0.35	6.78	Open	0
OVL_WM3	J9	J10	75.36	379.5	120	-140.89	1.25	0.34	4.47	Open	0
OVL_WM4	J10	J11	33.47	379.5	120	-142.49	1.26	0.15	4.57	Open	0
OVL_WM5	J11	J12	57.58	379.5	120	-142.87	1.26	0.26	4.59	Open	0
OVL_WM6	J12	J3	18.77	379.5	120	-142.87	1.26	0.09	4.59	Open	0
OVL_WM7	J3	J14	17.86	379.5	120	-135.07	1.19	0.07	4.14	Open	0
OVL_WM8	J6	J7	187.01	302	120	0.55	0.01	0	0	Open	0
P1	RES1	WJ3000632	1	2000	150	177.77	0.06	0	0	Open	0
P3	RES3	WJ3000765	1	2000	150	200.59	0.06	0	0	Open	0

Appendix H. Sanitary Flow Demand Calculation

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Sanitary Flow Demand

Location: Thorncliffe TOC
Block D

Items	Sanitary Demand Calculation		Remark
Site Parameters			
Average waste water flow	450	l/capita/day	Multi-unit high-rise = 450 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Non-Residential average flow	180000	l/floor hectare/day	Commercial = 180000 litres/ floor hectare / day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	13957	Sq.m	
Total GFA	Residential	Non-Residential	
	0	18147	Sq.m
Residential Units	0	n/a	
Residential/Non-Residential Population	0	200	

Peaking Factor	Residential	Non-Residential	
Residential peak factor (PF=)	4.5	n/a	*Commercial peak factor is included in average flow*
Extraneour Flow			
Infiltration allowance (< 10 ha)	0.26	l/s/ha	
Residential Flow	0.00	l/s	peak sanitary flow
Non-Residential Flow	3.78	l/s	peak sanitary flow
Inflow and Infiltration	0.36	l/s	groundwater discharge to sanitary sewer
Maximum Cumulative Flow with peaking factor	**4.14**	**l/s**	

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Sanitary Flow Demand

Location: Thorncliffe TOC
Block D1

Items	Sanitary Demand Calculation		Remark
Site Parameters			
Average waste water flow	450	l/capita/day	Multi-unit high-rise = 450 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Non-Residential average flow	180000	l/floor hectare/day	Commercial = 180000 litres/ floor hectare / day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	13961	Sq.m	
Total GFA	Residential	Non-Residential	
	30866	193	Sq.m
Residential Units	426	n/a	
Residential/Non-Residential Population	1151	3	
Peaking Factor	Residential	Non-Residential	
Residential peak factor (PF=)	3.8	n/a	*Commercial peak factor is included in average flow*
Extraneour Flow			
Infiltration allowance (< 10 ha)	0.26	l/s/ha	
Residential Flow	5.99	l/s	peak sanitary flow
Non-Residential Flow	0.04	l/s	peak sanitary flow
Inflow and Infiltration	0.36	l/s	groundwater discharge to sanitary sewer
Maximum Cumulative Flow with peaking factor	**23.18**	**l/s**	

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Sanitary Flow Demand

Location: Thorncliffe TOC
Block E1

Items	Sanitary Demand Calculation		Remark
Site Parameters			
Average waste water flow	450	l/capita/day	Multi-unit high-rise = 450 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Non-Residential average flow	180000	l/floor hectare/day	Commercial = 180000 litres/ floor hectare / day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	5389	Sq.m	
Total GFA	Residential	Non-Residential	
	47370	1718	Sq.m
Residential Units	663	n/a	
Residential/Non-Residential Population	1791	19	

Peaking Factor	Residential	Non-Residential	
Residential peak factor (PF=)	3.6	n/a	*Commercial peak factor is included in average flow*
Extraneour Flow			
Infiltration allowance (< 10 ha)	0.26	l/s/ha	
Residential Flow	9.33	l/s	peak sanitary flow
Non-Residential Flow	0.36	l/s	peak sanitary flow
Inflow and Infiltration	0.14	l/s	groundwater discharge to sanitary sewer
Maximum Cumulative Flow with peaking factor	**34.08**	**l/s**	

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Sanitary Flow Demand

Location: Thorncliffe TOC
Block E3

Items	Sanitary Demand Calculation		Remark
Site Parameters			
Average waste water flow	450	l/capita/day	Multi-unit high-rise = 450 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Non-Residential average flow	180000	l/floor hectare/day	Commercial = 180000 litres/ floor hectare / day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	6082	Sq.m	
Total GFA	Residential	Non-Residential	
	55926	2000	Sq.m
Residential Units	761	n/a	
Residential/Non-Residential Population	2055	22	
Peaking Factor	Residential	Non-Residential	
Residential peak factor (PF=)	3.6	n/a	*Commercial peak factor is included in average flow*
Extraneour Flow			
Infiltration allowance (< 10 ha)	0.26	l/s/ha	
Residential Flow	10.70	l/s	peak sanitary flow
Non-Residential Flow	0.42	l/s	peak sanitary flow
Inflow and Infiltration	0.16	l/s	groundwater discharge to sanitary sewer
Maximum Cumulative Flow with peaking factor	**39.11**	**l/s**	

Computed by: J. Pacheco-Phillips
Date: 8/30/2023

DESIGN CALCULATION
Sanitary Flow Demand

Location: Thorncliffe TOC
Block E4 & E5

Items	Sanitary Demand Calculation		Remark
Site Parameters			
Average waste water flow	450	l/capita/day	Multi-unit high-rise = 450 litres / capita /day *(City of Toronto Design Criteria for Sewers and Watermain)*
Non-Residential average flow	180000	l/floor hectare/day	Commercial = 180000 litres/ floor hectare / day *(City of Toronto Design Criteria for Sewers and Watermain)*
Total Site Area	11864	Sq.m	
Total GFA	Residential	Non-Residential	
	59349	843	Sq.m
Residential Units	805	n/a	
Residential/Non-Residential Population	2174	10	
Peaking Factor	Residential	Non-Residential	
Residential peak factor (PF=)	3.6	n/a	*Commercial peak factor is included in average flow*
Extraneour Flow			
Infiltration allowance (< 10 ha)	0.26	l/s/ha	
Residential Flow	11.32	l/s	peak sanitary flow
Non-Residential Flow	0.18	l/s	peak sanitary flow
Inflow and Infiltration	0.31	l/s	groundwater discharge to sanitary sewer
Maximum Cumulative Flow with peaking factor	**41.25**	**l/s**	

Appendix I. Overlea Boulevard Modifications Advanced Works Permanent Sanitary Sewer Upgrades Comparative Analysis Memo

Ontario Line – Overlea Boulevard AW

Permanent Sanitary Sewer Upgrades Comparative Analysis Memo

Ontario Line Technical Advisor

TORONTO, ONTARIO

June 20, 2023

Roderick Leung, EIT: Civil Engineer-In-Training
Michael Day, P.Eng.: Senior Engineering Project Manager
Matt Gable,EIT: Civil Engineering-In-Training

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
0	01/05/2023	Roderick Leung Raul Zalazar	Michael Day Steven Halpenny Brian Magee Douglas Nuttall	Tracy Johnson Walter Bayless	Initial document
1	06/16/2023	Roderick Leung Matt Gable	Douglas Nuttall	Tracy Johnson Walter Bayless	100% Submission

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Abbreviations

AW	Advanced Works
CoT	City of Toronto
EG&S	Elevated Guideway and Station
MECP	Ministry of the Environment, Conservation, and Parks
OMSF	Operations, Maintenance, and Storage Facility
OLTA	Ontario Line Technical Authority
RDII	Rainfall Derived Infiltration and Inflow
SCA	Sewer Capacity Analysis
TOC	Transit Oriented Community
WWF	Wet Weather Flow

ONETEAM
ONTARIO LINE TECHNICAL ADVISOR

To: Toronto Water – Environmental Monitoring & Protection Unit

Topic: Overlea Boulevard. AW – Permanent Sanitary Sewer Sanitary Upgrades – Comparative Analysis Memo.

Date: June 16, 2023

1. Introduction

This Memo is prepared to provide background information, overview of the scope of work, locations, and other pertinent information related to the Permanent Sewer Connections within the Overlea Boulevard Advanced Works area and serves to analyze the capacity of the sewer system before and after the proposed sanitary sewer improvements.

The project is in the City of Toronto, Ontario, and forms part of the 2041 Regional Transportation Plan. Overlea Boulevard Advanced Works is located within the Elevated Segment in the Thorncliffe Park Area as shown on **Figure 1**.

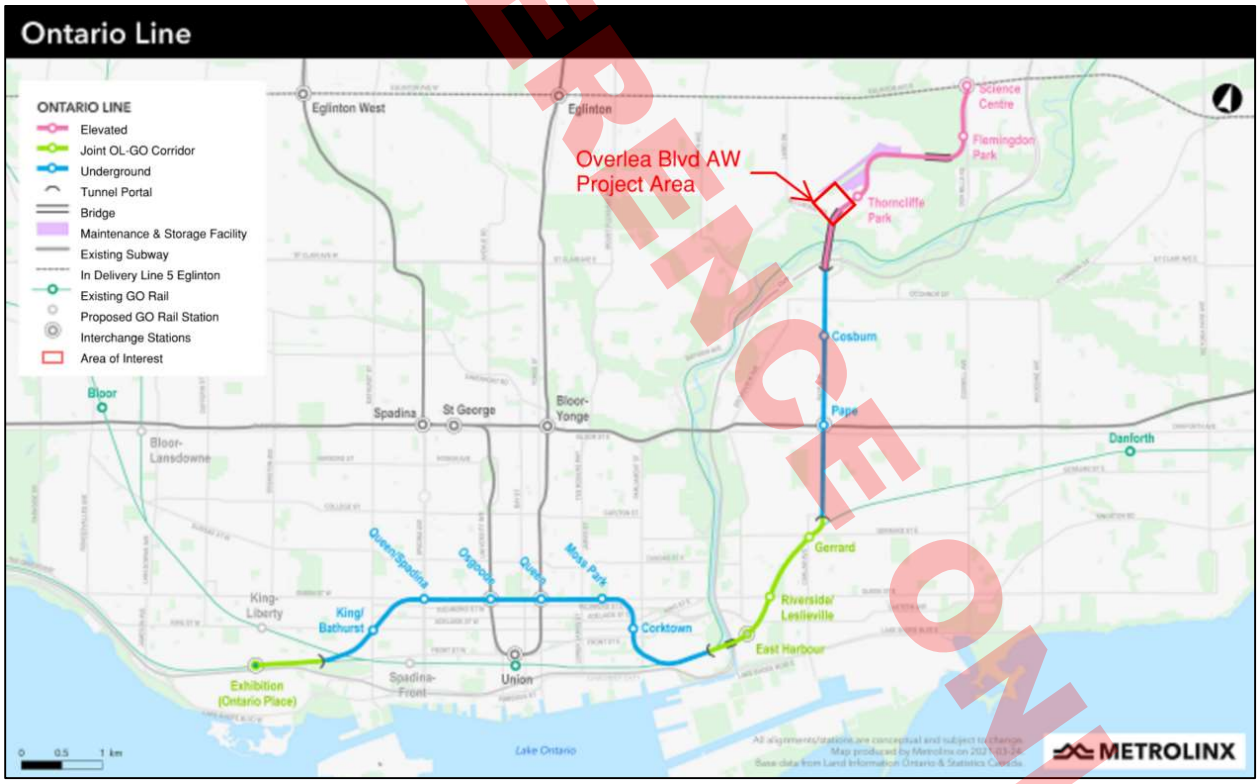


Figure 1. Ontario Line Segments

This Memorandum should be read in conjunction with the OLTA – Overlea Advanced Works Sewer Capacity Analysis Report for Temporary Construction Dewatering (Draft) (dated November 15, 2022), and the OLTA – Thorncliffe Park Watermain Replacement Hydraulic Analysis (Draft) (dated May 1, 2023), and

the detailed design submission drawings included as part of Overlea Boulevard Advanced Works 100% submission.

1.1. Background Review

The following documents were reviewed as part of the background investigation and will be referenced throughout this Memo:

- Operations, Maintenance & Storage Facility (OMSF) – Sewer Capacity Analysis Report (OLTA, July 20, 2022)
- OLTA – Permanent Sewer Capacity Memo – ((OMSF), October 01, 2021)
- Sewer Capacity Assessment Guidelines (City of Toronto, July 2021)
- Design Criteria for Sewers and Watermains (City of Toronto, January 2021)

1.2. Concept Overview

1.2.1. Sanitary Main along Overlea Boulevard

There is an existing 250mm sanitary sewer main along Overlea Boulevard that services the following buildings between Millwood Road and Thorncliffe Park Drive (**Figure 2**):

- 2 Overlea Boulevard, East York, ON M4H 1P4, Canada (to be retained)
- 6 - 8 Overlea Boulevard, East York, ON M4H 1P4, Canada (To be demolished)
- 10 Overlea Boulevard, East York, ON M4H 1P4, Canada (To be demolished)
- 14 - 16 Overlea Boulevard, East York, ON M4H 1P4, Canada (to be demolished)
- 20 Overlea Boulevard, East York, ON M4H 1P4, Canada (New Mosque – by others)
- 4 Banigan Dr, East York, ON M4H 1E9, Canada (to be retained)
- 6, 10, 12 Banigan Dr, East York, ON M4H 1E9, Canada (to be retained)
- 7, 9, 11 Banigan Dr, East York, ON M4H 1E9, Canada (to be retained)
- 14, 16, 18, 20 Banigan Dr, East York, ON M4H 1E9, Canada (to be retained)
- 1 Leaside Park Dr, East York, ON M4H 1R1, Canada (to be retained)

The above-mentioned existing sanitary sewer main will not be impacted by the future alignment of the guideway for the proposed rapid transit system along that stretch of roadway. Minor adjustments to existing maintenance holes will be required to accommodate the proposed/new roadway grades, thereby providing our team the opportunity to bring those structural elements up to current City Standards, and to install watertight lid/covers for maintenance holes in key locations (sags/low points of the roadway), with the associated benefits to the system.

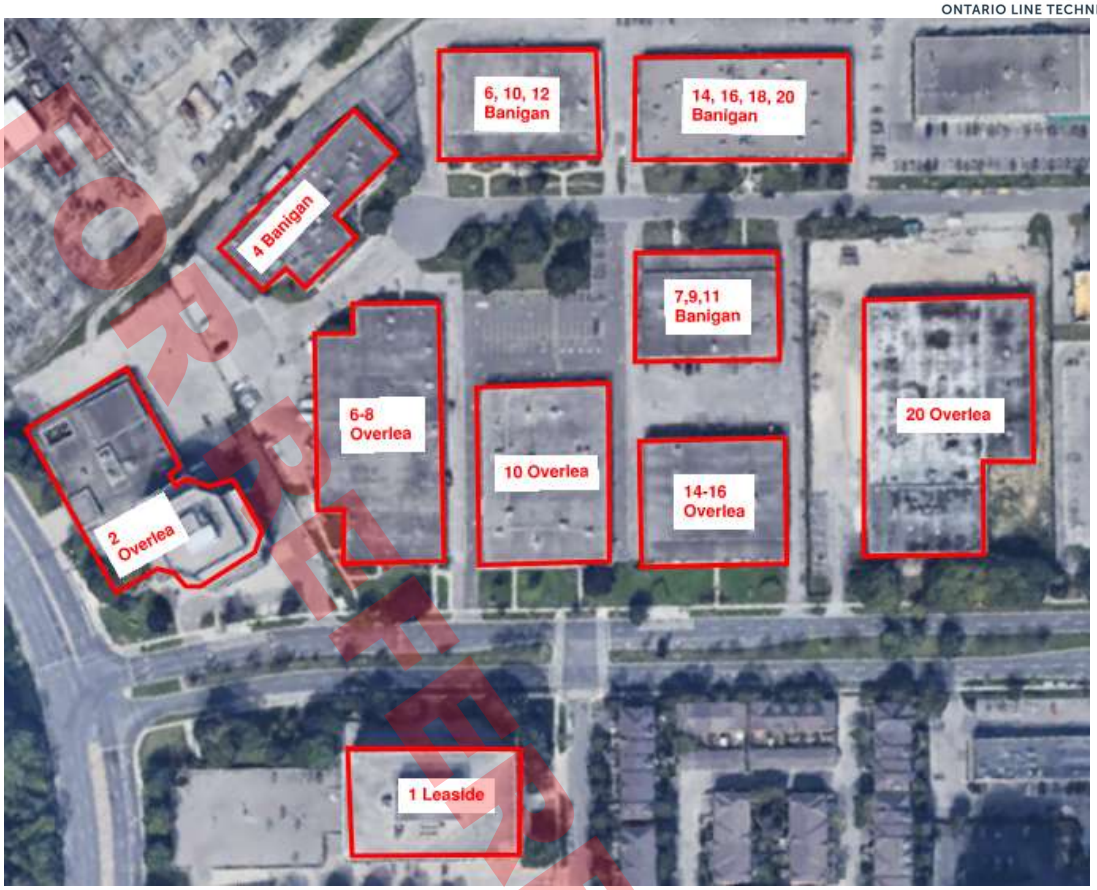


Figure 2. Buildings Serviced by Existing Sanitary Sewer along Overlea Boulevard

1.2.2. Services Along Overlea Boulevard

The services to the existing buildings along Overlea Boulevard will remain unchanged for the most part. For the buildings located at 6-8 Overlea, there is an opportunity to upgrade the sanitary sewer service as shown in our detailed design, to ensure adequate separation to other proposed infrastructure (dry utilities and pier supports).

It is our understanding that the sanitary sewer service for 20 Overlea has been upgraded by others (Islamic Society of Toronto) as part of a proposed redevelopment of that site and has received approval to proceed.

Since there are no changes to the existing sanitary drainage pattern or groundwater discharge, no downstream sanitary system analysis is required as part of these upgrades. For Temporary Construction Dewatering, please refer to OLTA – Overlea Advanced Works Sewer Capacity Analysis (SCA) Draft Report - November 15, 2022.

1.2.3. March of Dimes Site (10 Overlea Boulevard)

The acquisition of the March of Dimes (MoD) property at 10 Overlea (PIN 103690049) allows the demolition of the MoD building in support of the extension of Leaside Park Drive to connect Overlea Boulevard and Banigan Drive. The proposed sanitary system approach provided by the proposed Leaside

Park Drive Extension has been reviewed with the City on multiple occasions during both regular Subway Technical Working Table meetings and special meetings with Toronto Water (TW) and the City of Toronto Coordination Team.

This proposed approach is to consolidate the wet utility services for the buildings along Banigan Drive through the proposed Leaside Park Drive extension right of way (ROW) and the construction of a new sanitary main on City ROW to service the properties along Banigan Drive as shown on **Figure 3**. Overview of the entire area including the OMSF land acquisition can be found in **Appendix B**.

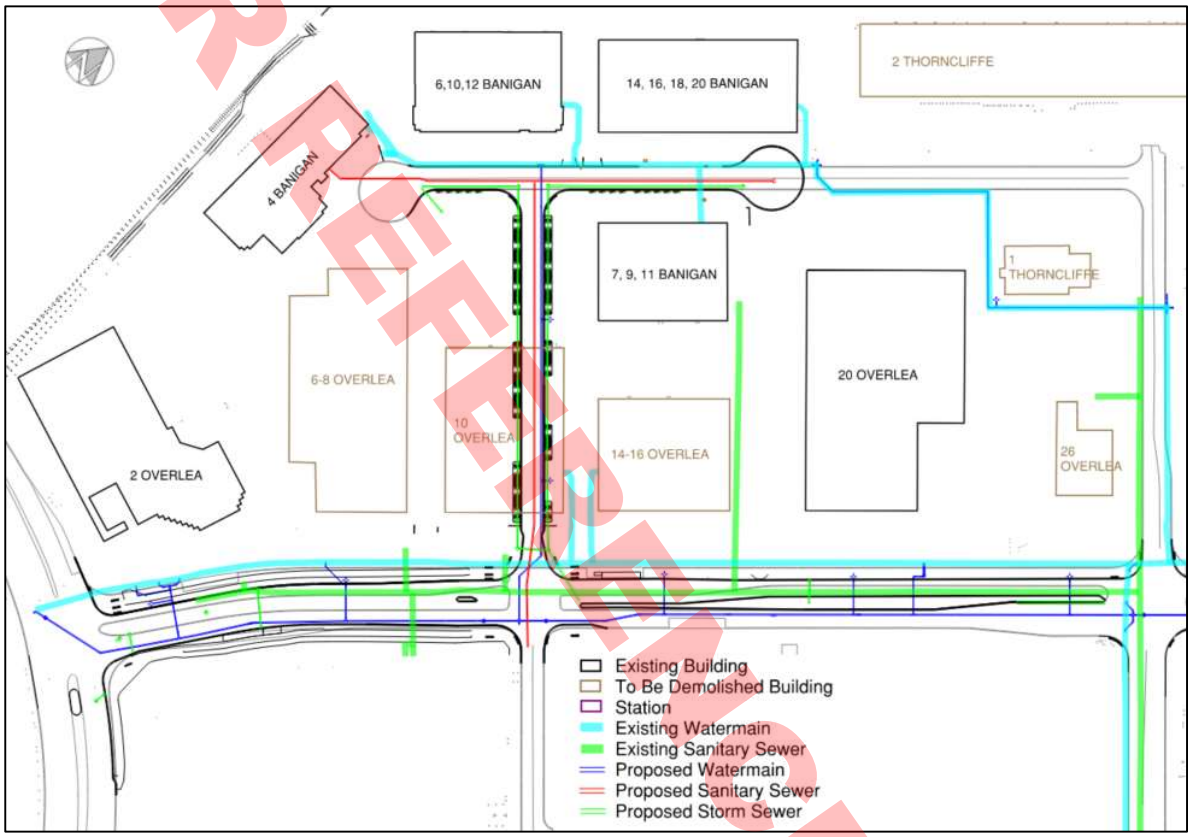


Figure 3. Overlea Boulevard Key Plan - Wet Utilities Overview

For the design of the Sanitary Main along Banigan Drive and Leaside Park Drive Extension, the following City design criteria were considered:

1. Pipe size and capacity to support current and future developments including high-rise condominium. Minimum pipe size 300 mm.
2. Slope to meet MECP guidelines. Minimum 0.22% for a 300mm and larger.
3. Flow Velocity to be minimum 0.6 metres/second.
4. Discharge unit rate 180,000 litres/floor area in ha/day.

Therefore, the design reflects the larger constraints and uses for a 300mm diameter PVC DR35 Sanitary Sewer Main, meeting adequate depth of cover and grades at both ends of the upgrades.

SUE investigations have been undertaken to identify existing service locations. Two properties on Banigan Drive will have to be located and separated on site and the sanitary service of the western-most property on Banigan Drive has a known location and will be connected to the proposed sanitary sewer.

Table 1. Buildings with Respective Floor Areas and Lot Areas

Current Building Tenant	Address	Development Type	Approx. Floor Area (ha)	Approx. lot area (ha)
Islamic Society of Toronto	20 Overlea	Institutional	0.51	1.21
Overlea LINC	14 - 16 Overlea	Institutional	0.23	0.53
Children's Fitness Centers	7, 9, 11 Banigan	Commercial	0.19	0.36
March of Dimes	10 Overlea	Office	0.30	0.73
Grounded Engineering	6 - 8 Overlea	Office	0.40	0.95
Salvation Army - Main (14 floors)	2 Overlea	Office	0.97	0.32
Outer (12 floors)	-	-	0.81	0.00
Vacant Building	4 Banigan	Office	0.18	0.45
Stage Right Home	6, 10, 12 Banigan	Retail	0.22	0.43
Ultimate Kitchens	14, 16, 18, 20 Banigan	Retail	0.28	0.48
Low-rise Apartments and Main Shops	1 Leaside	LD Residential and Retail	1.61	10

The site contains a mix of development types including institutional, industrial, office, commercial, and retail uses. The analysis will focus on nine buildings (**Table 1**) between Millwood Road and Thorncliffe Park Drive that were serviced by the existing sanitary sewer.

This Memo will focus on the peak demands of the proposed sanitary sewer system along Banigan Drive and Leaside Park Drive and its connection to the existing sanitary system along Overlea Boulevard.

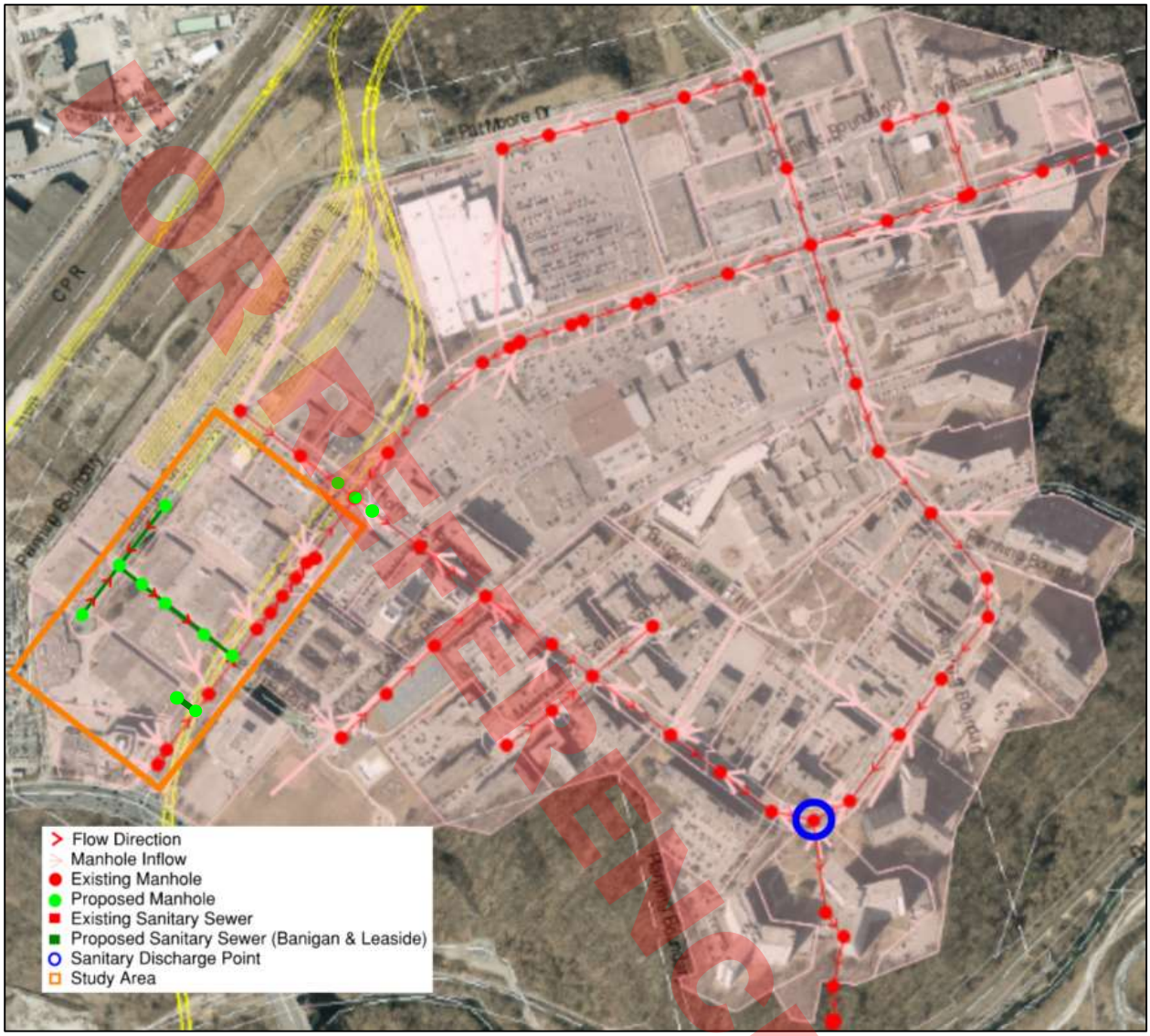


Figure 4. Overview of Thorncliffe Segment Sanitary System

2. Sewer Comparative Analysis

2.1. Existing Sewer System

The sanitary peak demands were computed from each individual building in the study area. Out of the ten buildings, three will be demolished prior to completion of Overlea AW (2025) for the future TOCs, removing their respective peak demands. Due to the lack of sanitary information and studies available in this area, the City of Toronto recommends evaluating the system using an estimated average peak flow of 180,000 litres / floor-area ha / day for non-residential properties.

As a result, for this analysis the average peak flow of each building is dependent only on the Gross Floor Area (GFA) of the building. The sanitary infiltration was estimated to be 0.26 litres / second / ha but is

already accounted for in the estimated 180,000 litres / floor / ha / day; therefore, no additional RDII value will be included. Calculations and the resultant Average Peak Flows are shown in **Appendix A**.

Nine existing maintenance holes along Overlea Boulevard (**Table 2** and **Figure 5**) are to be retained. The existing sanitary sewer is flowing from Millwood Road to Thorncliffe Park Drive with service connections to buildings along Overlea Boulevard.

Table 2. Data for Existing Overlea Boulevard Maintenance Hole

Maintenance Hole ID	Rim El. (m)	Downstream Pipe			Upstream Pipe		
		Invert El. (m)	Size (mm)	Material	Invert El. (m)	Size (mm)	Material
MH4005316662	124.38	Unknown, buried with asphalt			-	-	-
MH4007016673	126.52	124.30	250	PVC	124.35	250	PVC
MH4013216718	127.44	124.23	275	PVC	124.28	250	PVC
MH4020416772	127.06	123.80	275	PVC	123.83	275	PVC
MH4020416772A	127.33	123.72	300	VCP	123.75	275	VCP
MH4020416772B	127.42	123.57	300	VCP	123.60	300	VCP
MH4026116815	127.54	123.56	300	Concrete	123.60	300	Concrete
MH4027716827	127.69	123.50	300	Concrete	123.55	300	Concrete
MH4034916882	127.97	-	-	-	123.32	300	Concrete

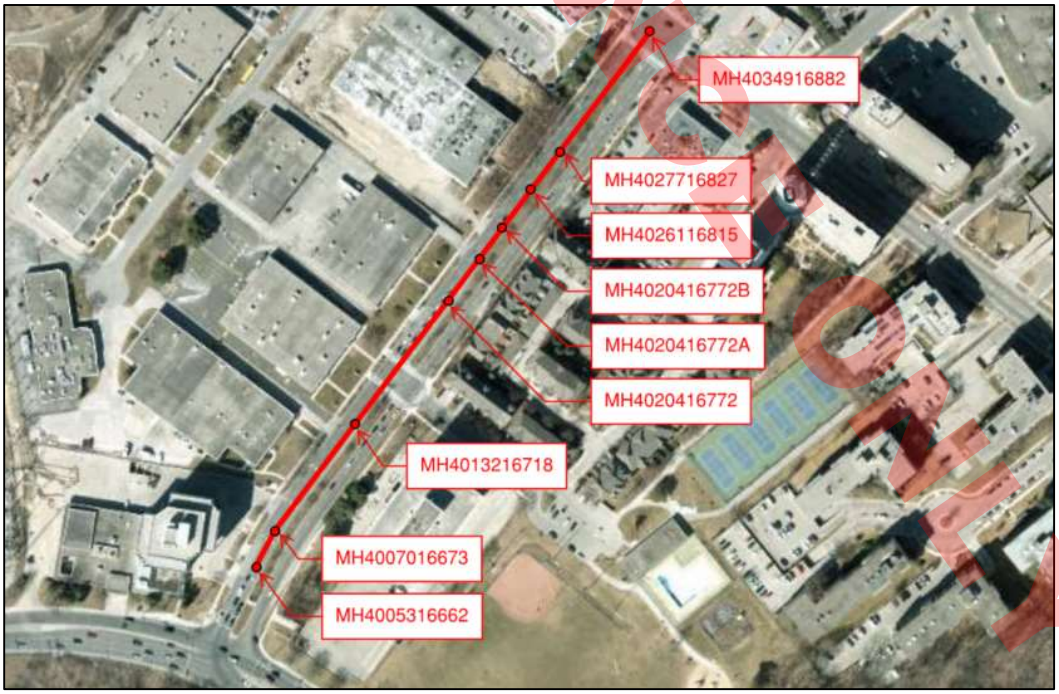


Figure 5. Existing Maintenance Holes along Overlea Boulevard

The existing 250mm sanitary sewer system along Overlea will not be impacted by the construction of the Metrolinx (MX) proposed guideway. However, many existing buildings in this area already have, are being, or will be acquired by MX, with some planned for demolition and others planned for reduced building footprints. Currently, 4, 6, 8 Overlea, 10 Overlea, and 14-16 Overlea are planned to be demolished to allow for construction of the Leaside Park Drive Extension and future TOC developments.

2.2. Future Demands

The building demands, as we currently understand them, are shown in **Table 3**. This table also shows one of the potential servicing patterns, with TOC's D, D1 and E1 discharging to Thorncliffe, and E3, E4 and E5 discharging to Leaside. The expected sanitary flow column is the greater of the flows calculated using the City of Toronto approach by unit count, City of Toronto approach by floor area, or the Building Code approach by fixture unit counts.

Table 3. Future Buildings

Future Site	Building	Catchment	Land Use	Floor Area (m2)	# Units	Effective Population	Expected Peak Sanitary Discharge (L/s)
F1	TOC E4 (East)	B4	Resid.	39,302	536	942	38.9
F1	TOC E5 (West)	B5	Resid.	19,231	268	466	24.1
F2	TOC E3 (North and South)	B4/B5	Resid.	69,019	831	1,445	71.5
F3	TOC E1	D	Resid.	44,495	661	1,726	46.9
F4	TOC D1	D	Office.	41,023	-	-	22.1
F5	Thorncliffe Stn	D	Inst.	4,581	-	151	39.4
F6	TOC D	D	Resid.	40,460	544	1,550	43.3
F7	Headhouse	E	Inst.	1,062		35	4.4
F8	OMSF	F	Indust.	1,415		19	5.0
Total					3,208	10,092	282

2.3. Proposed Sewer System

In addition to the Thorncliffe Park Station and Operation, Maintenance, and Storage Facility (OMSF), there are six Transit Orientated Communities (TOC) proposed around Overlea Boulevard. **Figure 6** below shows the existing area and proposed sanitary network upgrades as well as the proposed TOCs.

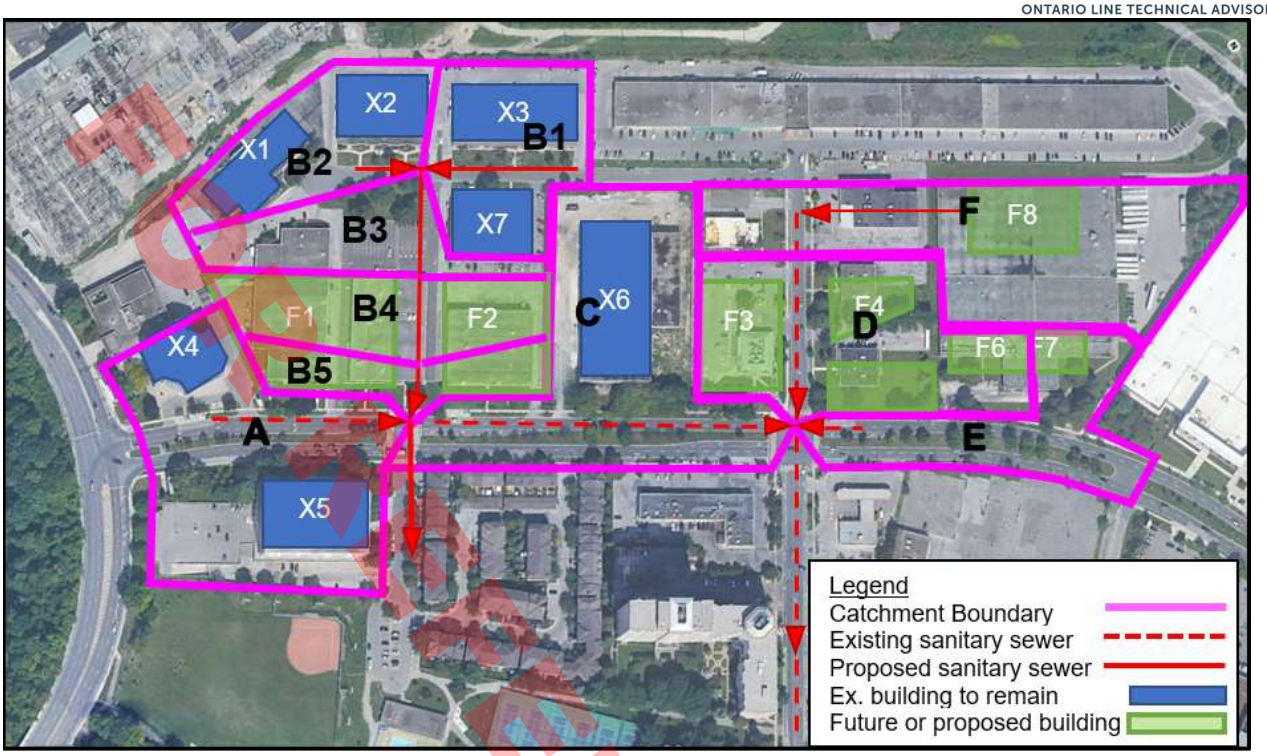


Figure 6. Site Plan with Sanitary Sewer Upgrades

Table 4 below displays the proposed sanitary sewer pipes in each catchment shown in **Figure 6**. It is noted that the sanitary sewer in Catchment D will be redesigned as a part of the Elevated Guideway and Station (EG&S) contract.

Table 4. Overlea Future Buildout Sanitary Flows

Catchment	Total Flow	IA	Total	Pipe size	Slope	Q max	Q/Q$_{max}$	V$_{max}$
	(l/s)	(l/s)	(l/s)	(mm)		(m^3/s)		(m/s)
A (Existing)	12.35	0.34	12.69	250	0.22%	0.028	45%	0.57
B1	0.97	0.22	1.19	300	1.00%	0.097	1%	0.71
B2	0.83	0.23	1.06	300	1.00%	0.097	1%	0.70
B3	1.81	0.45	2.25	300	0.55%	0.072	3%	0.60
B4	82.53	0.45	82.97	450	0.13%	0.103	81%	0.65
B5	136.33	0.58	136.92	450	0.36%	0.171	80%	1.08
Leaside	148.68	0.92	149.61	450	0.45%	0.191	78%	1.20
C (Existing)	2.52	0.31	2.84	300	0.25%	0.048	6%	0.44
F (Existing)	5.00	0.49	5.49	250	0.07%	0.016	35%	0.32
D (By Others)	117.25	0.82	118.07	375	1.4%	0.21	57%	1.9
E (Existing)	4.40	0.03	4.43	250	0.26%	0.030	15%	0.45
Thorncliffe	124.2	1.17	125.33	450	0.68%	0.235	53%	1.48

The OMSF land area acquisition and related changes will result in the elimination of current roadway access to Banigan Drive via Thorncliffe Park Drive. This acquisition will result in the transfer of properties from the City of Toronto to MX and eliminate access to existing water, sanitary, and storm utilities. The proposed Leaside Park Drive Extension is intended to provide new access to the water and sanitary utilities from Banigan Drive to Overlea Boulevard. The full effects of this acquisition are detailed in the OLTA - Operations, Maintenance & Storage Facility (OMSF) – Sewer Capacity Analysis Report.

The exact location of the sanitary services to the existing buildings along Banigan Drive is unknown and are assumed to be on private property. This assumption is due to the unavailability of as-built information for that area. Therefore, the new sanitary main will be proposed within the City's ROW to update the existing system in alignment with the City of Toronto's Design Criteria for Sewers and Watermains. 12 proposed maintenance holes (Type 1220A SRC) along Banigan Drive, Leaside Drive, Thorncliffe Park Drive and Overlea Boulevard (**Table 5** and **Figure 7**) are included in the utility design drawings. Definitive service connections from buildings along Banigan Drive were not found in Planview or CoT records but based on current SUE information, they are assumed to flow into Overlea Boulevard towards Thorncliffe Park Drive.

Table 5. Data for Proposed Banigan Drive, Leaside Park Drive and Thorncliffe Park Drive Maintenance Holes

Maintenance Hole ID	Street Name	Rim El. (m)	Downstream Pipe			Upstream Pipe		
			Invert El. (m)	Size (mm)	Material	Invert El. (m)	Size (mm)	Material
PROP. MH 01	Leaside Drive	127.63	123.80	450	PVC	123.80/124.00	450/250	PVC/VCP
PROP. MH 02	Leaside Drive	127.28	124.10	450	PVC	124.13	450	PVC
PROP. MH 03	Leaside Drive	127.56	124.20	450	PVC	124.35	300	PVC
PROP. MH 04	Banigan Drive	128.34	124.77	300	PVC	124.83/124.83	300/300	PVC/PVC
PROP. MH 05	Banigan Drive	128.13	125.32	300	PVC	-	-	-
PROP. MH 06	Banigan Drive	128.35	125.68	300	PVC	-	-	-
PROP. MH 07	Overlea Boulevard	127.45	124.30	250	PVC	124.30/124.30	250/250	VCP/PVC
PROP. MH 08	Overlea Boulevard	127.70	124.34	300	PVC	-	-	-
PROP. MH 09	Leaside Drive	127.30	-	-	-	123.68	450	PVC
PROP. MH 10	Thorncliffe Park Drive	127.86	123.57	375	PVC	123.82	300	Concrete
PROP. MH 11	Overlea Boulevard	127.83	123.10	450	PVC	123.32	375	PVC
PROP. MH 12	Thorncliffe Park Drive	127.72	122.99	250	Concrete	122.99	450	PVC

Figure 7. Proposed Maintenance Holes Plan

3. Conclusions

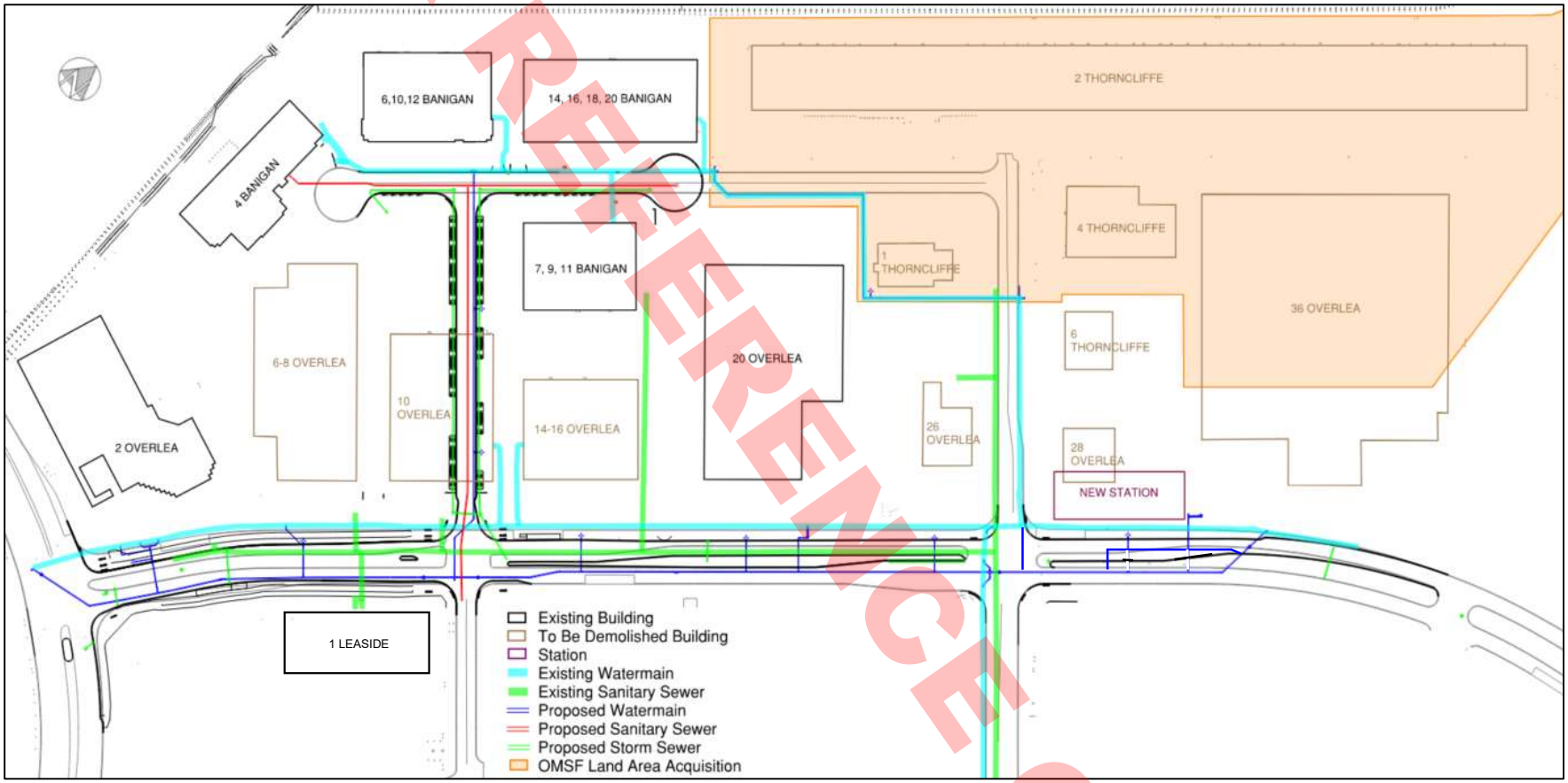
The following summarizes the main findings and recommendations from this memo.

1. There will be a net decrease on the sanitary loading within the sewer system for the Overlea Advanced Works. No additional loads will be introduced as part of Overlea AW, with three existing buildings being demolished to make room for Leaside Park Drive and future TOC developments. Comparing the current as-is scenario with the construction of the proposed sanitary sewer, an estimated 1.94 l/sec decrease will be observed entering the Thorncliffe Park Drive sanitary sewer system.
2. With the OMSF land area acquisition and the resultant elimination of utility servicing towards Thorncliffe Park Drive, all wet utilities along Banigan Drive will be re-routed towards Leaside Park Drive using the proposed 300mm PVC sanitary sewer. There is residual capacity available in this area for future developments, but further analysis will need to be completed to understand the limitations and opportunities of the system as development advances.
3. For the Sanitary Sewer Model, Capacity Criteria, and Level of Protection please refer to the Draft Ontario Line – Overlea Boulevard Advanced Works - Sewer Capacity Analysis Report for Temporary Construction Dewatering (OLTA, Nov. 2022).
4. Additional capacity in the sanitary sewers were also made to accommodate the future TOC developments. This includes the upsizing of sanitary sewer pipes along Thorncliffe Park Drive, Leaside Park Drive Extension and providing a stub for future connection down Leaside Park Drive.

Appendix A: Average Peak Flow of Existing Buildings

#	Current Building Tenant	Future Plans for Building	Street Address	Drains To	Development Type	Approx. Floor Area (m^2)	Number of Floors	Approx. Floor Area (ha)	Average Peak Flow (L/sec)
1	Islamic Society of Toronto	No Change	20 Overlea	MH4026116815	Institutional	5067	1	0.51	2.5
2	Overlea LINC	Demolish	14 - 16 Overlea	MH4020416772	Institutional	2295	1	0.23	0.48
3	Children's Fitness Centres	No Change	7, 9, 11 Banigan	MH4020416772	Commercial	1876	1	0.19	0.39
4	Grounded Engineering	Demolish	1, 3 Banigan	MH4007016673	Office	4042	1	0.40	0.84
5	March of Dimes	Demolish	10 Overlea	MH4013216718	Institutional	2956	1	0.30	0.62
6	Salvation Army - Main (14 floors)	No Change	2 Overlea	MH4013216718	Office	692	14	0.97	2.02
	- Outer (12 floors)					675	12	0.81	1.69
7	Vacant Building	No Change	4 Banigan	MH4007016673	Office	1804	1	0.18	0.38
8	Stage Right Home	No Change	6, 10, 12 Banigan	MH4013216718	Retail	2200	1	0.22	0.46
9	Ultimate Kitchens	No Change	14, 16, 18, 20 Banigan	N/A	Retail	2793	1	0.28	0.58
10	Low-Rise Apartments and Main Floor Shops	No Change	1 Leaside	N/A	LD-Residential and Retail	16,170		1.62	8.6
						TOTAL		**4.77**	**16.7**

Appendix B: Overlea Boulevard Key Plan and OMSF Land Area Acquisition



Appendix J. Drainage Plan

LEGEND

- EXISTING STORM CATCHMENT
- 101 — DRAINAGE AREA ID
- 0.98 | 0.9 — RUNOFF COEFFICIENT
- DRAINAGE AREA (ha)
- OVERLAND FLOW DIRECTION
- STM STM — EXISTING STORM SEWER

NOTES:

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

BANIGAN DR

EX. 450mm CONC. STM SEWER

EX. 250mm CONC. STM SEWER

EX. 375mm CONC. STM SEWER

THORNCLIFFE PARK DR

MATCHLINE PLAN2

E4-E5 0.84 | 0.83

E3 0.61 | 0.87

E1 0.42 | 0.86

EX. 600mm CONC. STM SEWER

OVERLEA BLVD

EX. 525mm STM SEWER

EX. 525mm STM SEWER

EX. 600mm STM SEWER

EX. 675mm STM SEWER

EX. 675mm STM SEWER

EX. 825mm STM SEWER

PLAN 1
EXISTING DRAINAGE PLAN

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PLOTTED BY: KHODADADI, MAHSA

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ONTARIO LINE TECHNICAL ADVISOR

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APPROVED

ONTARIO LINE SUBWAY

TITLE THORNCLIFFE PARK TOC
EXISTING DRAINAGE PLAN

Plot Date: 30 August 2023

METROLINX Infrastructure Ontario

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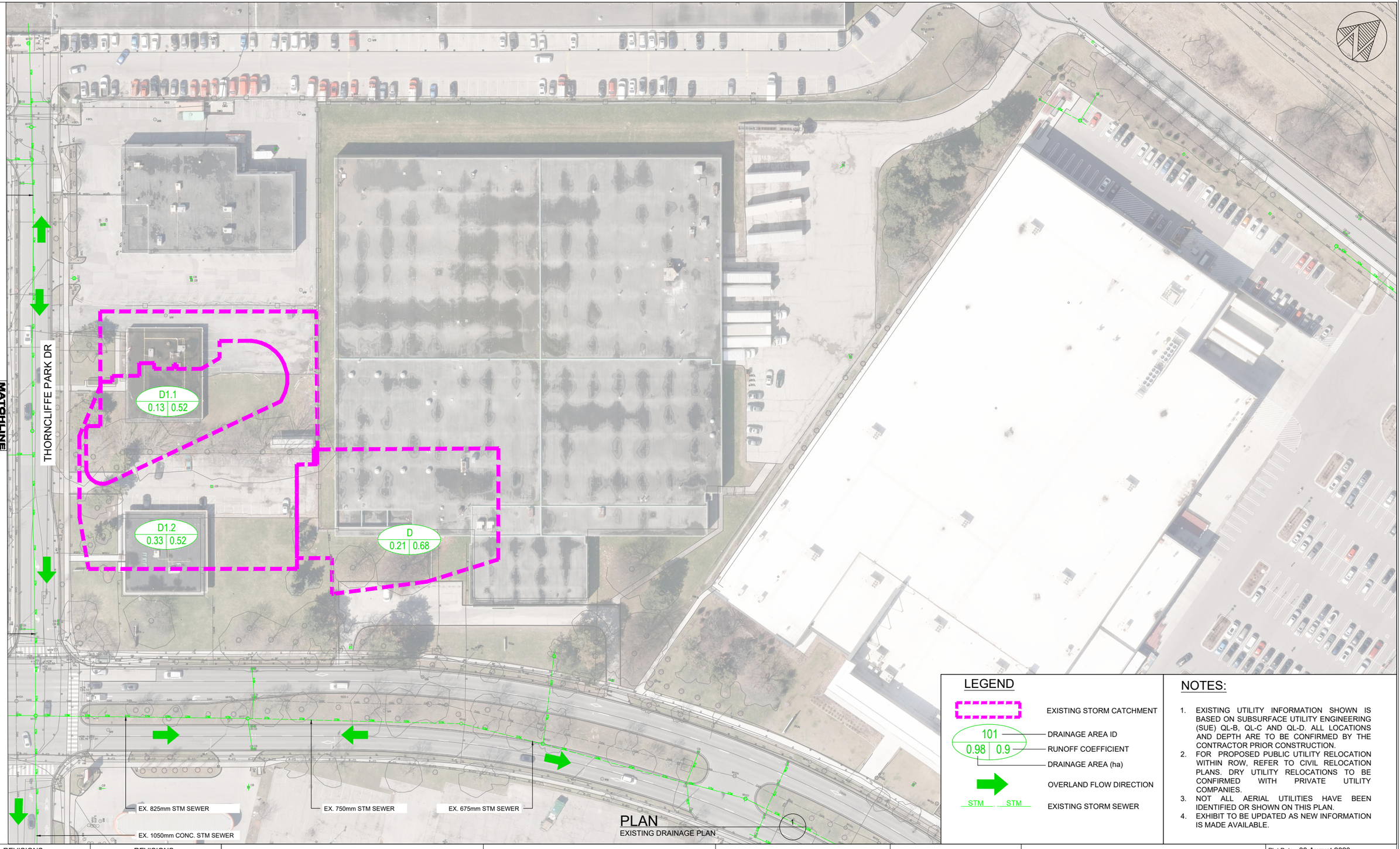

PLAN
EXISTING DRAINAGE PLAN 1

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MATCHLINE
PLAN1

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- STM STM — EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TANK — PROPOSED STORMWATER TANK
- PROPOSED STORMWATER SYSTEM FOR AW CONTRACT
- CONCEPTUAL STORMWATER SYSTEM FOR EGS CONTRACT

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MATCHLINE PLAN2

E4-E5
0.84 | 0.67

TANK

TANK

E3
0.61 | 0.83

E1
0.42 | 0.81

THORNCLIFFE GUIDEWAY WB TRACK

THORNCLIFFE GUIDEWAY EB TRACK

PROPOSED 375mm STORM SEWER CONNECTION

EX. 600mm CONC. STM SEWER

PROPOSED 375mm STORM SEWER CONNECTION
CONTROL MANHOLE

PROPOSED 375mm STORM SEWER CONNECTION
CONTROL MANHOLE

OVERLEA BLVD

EX. 525mm STM SEWER

EX. 525mm STM SEWER

EX. 600mm STM SEWER

EX. 675mm STM SEWER

EX. 675mm STM SEWER

EX. 825mm STM SEWER

PLAN
EXISTING DRAINAGE PLAN
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PROPOSED DRAINAGE PLAN

Plot Date: 30 August 2023

METROLINX
Infrastructure Ontario

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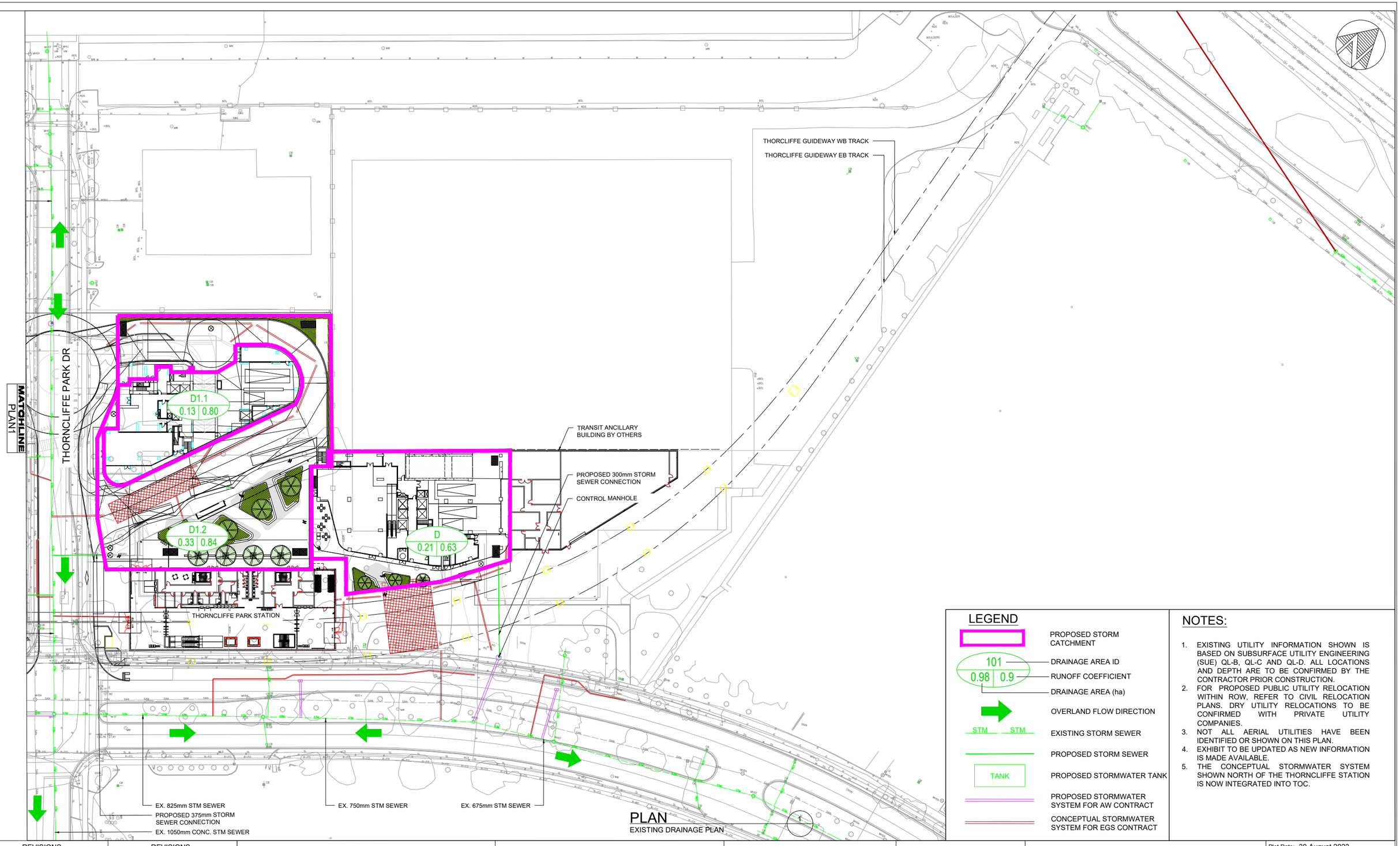

PLAN
EXISTING DRAINAGE PLAN

MATCHLINE
PLAN1

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3. NOT ALL AERIAL UTILITIES HAVE BEEN IDENTIFIED OR SHOWN ON THIS PLAN.
4. EXHIBIT TO BE UPDATED AS NEW INFORMATION IS MADE AVAILABLE.
5. THE CONCEPTUAL STORMWATER SYSTEM SHOWN NORTH OF THE THORNCLIFFE STATION IS NOW INTEGRATED INTO TOC.

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