

NOVATECH

Engineers, Planners & Landscape Architects

Engineering

Land/Site
Development
Municipal
Infrastructure
Environmental/
Water Resources
Traffic/
Transportation
Recreational

Planning

Land/Site
Development
Planning Application
Management
Municipal Planning
Urban Design
Expert Witness
(LPAT)
Wireless Industry

Landscape Architecture

Streetscapes &
Public Amenities
Open Space, Parks &
Recreation
Community &
Residential
Commercial &
Institutional
Environmental
Restoration

1104 Halton Terrace

Site Servicing and Stormwater Management Report



Engineering excellence.

Planning progress.

Liveable landscapes.

MAPLE LEAF HOMES
1104 HALTON TERRACE
SITE SERVICING AND STORMWATER
MANAGEMENT REPORT

Prepared for:

Maple Leaf Homes

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

Issued: October 19, 2021
Revised: November 3, 2023

Novatech File: 119024
Report Ref: R-2021-114

November 3, 2023

City of Ottawa
Planning, Infrastructure and Economic Development Department
Planning Services Branch
110 Laurier Ave. West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: Laurel McCreight, Planner

**Reference: 1104 Halton Terrace
Site Servicing and Stormwater Management Report
Novatech File No.: 119024**

Novatech has prepared this Site Servicing and Stormwater Management Report on behalf of Maple Leaf Homes for 1104 Halton Terrace.

The report provides an analysis of sewer capacity (sanitary, storm), water distribution, and stormwater management for the proposed development site.

Contact the undersigned with any questions or comments.

Sincerely,

NOVATECH



Lucas Wilson, P.Eng.
Project Engineer

TABLE OF CONTENTS

1.0	INTRODUCTION	3
1.1	Background	3
1.2	Additional Reports	5
2.0	EXISTING CONDITIONS	5
2.1	Topography & Drainage.....	5
2.2	Subsurface Conditions.....	5
3.0	WATERMAIN	6
3.1	Existing Conditions	6
3.2	Proposed Watermain System	6
3.3	Design Criteria.....	6
3.4	Hydraulic Analysis	7
4.0	SANITARY SERVICING	9
4.1	Existing Conditions	9
4.2	Proposed Sanitary Sewer Outlet.....	9
4.3	Design Criteria.....	9
4.4	Proposed Sanitary Sewer System	11
5.0	STORM SEWER SYSTEM AND STORMWATER MANAGEMENT	12
5.1	Stormwater Management Criteria	12
5.1.1	<i>Allowable Release Rate</i>	12
5.2	Existing and Proposed Storm Infrastructure.....	13
5.2.1	<i>Minor System (Storm Sewers)</i>	15
5.2.2	<i>Major System Design</i>	15
5.3	Hydrologic & Hydraulic Modelling	16
5.3.1	<i>PCSWMM Model Results</i>	18
6.0	ROADWAYS	21
6.1	Proposed Road Infrastructure	21
7.0	EROSION AND SEDIMENT CONTROL	21
8.0	CONCLUSIONS AND RECOMMENDATIONS	22
9.0	CLOSURE	24

LIST OF TABLES

Table 4.1:	Summary of Hydraulic Model Results - Maximum Day + Fire Flow
Table 4.2:	Summary of Hydraulic Model Results - Peak Hour Demand
Table 4.3:	Summary of Hydraulic Model Results – Maximum Pressure Check
Table 5.1:	Total Available Storage
Table 5.2:	Hydrologic Modelling Parameters (subcatchments)
Table 5.3:	Inlet Control Devices and Design Flows
Table 5.4:	Overland Flow Results
Table 5.5:	100-year HGL Elevations
Table 5.6:	Comparison of Peak Flows
Table 6.1:	Roadway Structure

LIST OF FIGURES

Figure 1	Site Location
Figure 2	Site Plan
Figure 3	Sanitary Collection
Figure 4	Watermain Distribution
Figure 5	Storm Drainage

LIST OF APPENDICIES

Appendix A	Correspondence
Appendix B	Sanitary Design Sheets
Appendix C	Watermain Boundary Conditions, FUS Calculations, and Modelling Results
Appendix D	STM Design Sheets, SWM Excerpts & PCSWMM Modelling Info

LIST OF DRAWINGS

119024-GR	Grading Plan
119024-GP	General Plan of Services
119024-STM1	Pre-Development Storm Drainage Area Plan
119024-STM2	Post-Development Storm Drainage Area Plan
119024-ESC	Erosion and Sediment Control Plan

ENCLOSED

- Report (pdf)
- Drawings (pdf)
- PCSWMM Packaged Model Files

1.0 INTRODUCTION

Novatech has been retained by Maple Leaf Homes to prepare a Site Servicing and Stormwater Management Report for 1104 Halton Terrace in North Kanata, Ottawa.

This report outlines the servicing and proposed storm drainage and stormwater management strategy for the site.

1.1 Background

The proposed development is located within the Kanata North Community west of the intersection of Halton Terrace and Old Carp Road. The development is approximately 0.72 ha and is bounded by Halton Terrace to the south and east, Old Carp Road to the north, and existing residential to the west. Refer to **Figure 1** – Site Location and **Figure 2** – Site Plan.



Figure 1 – Site Location

The proposed development will consist of one 4/5-storey apartment building with underground parking consisting of 103 units. The proposed site plan is shown in **Figure 2**.

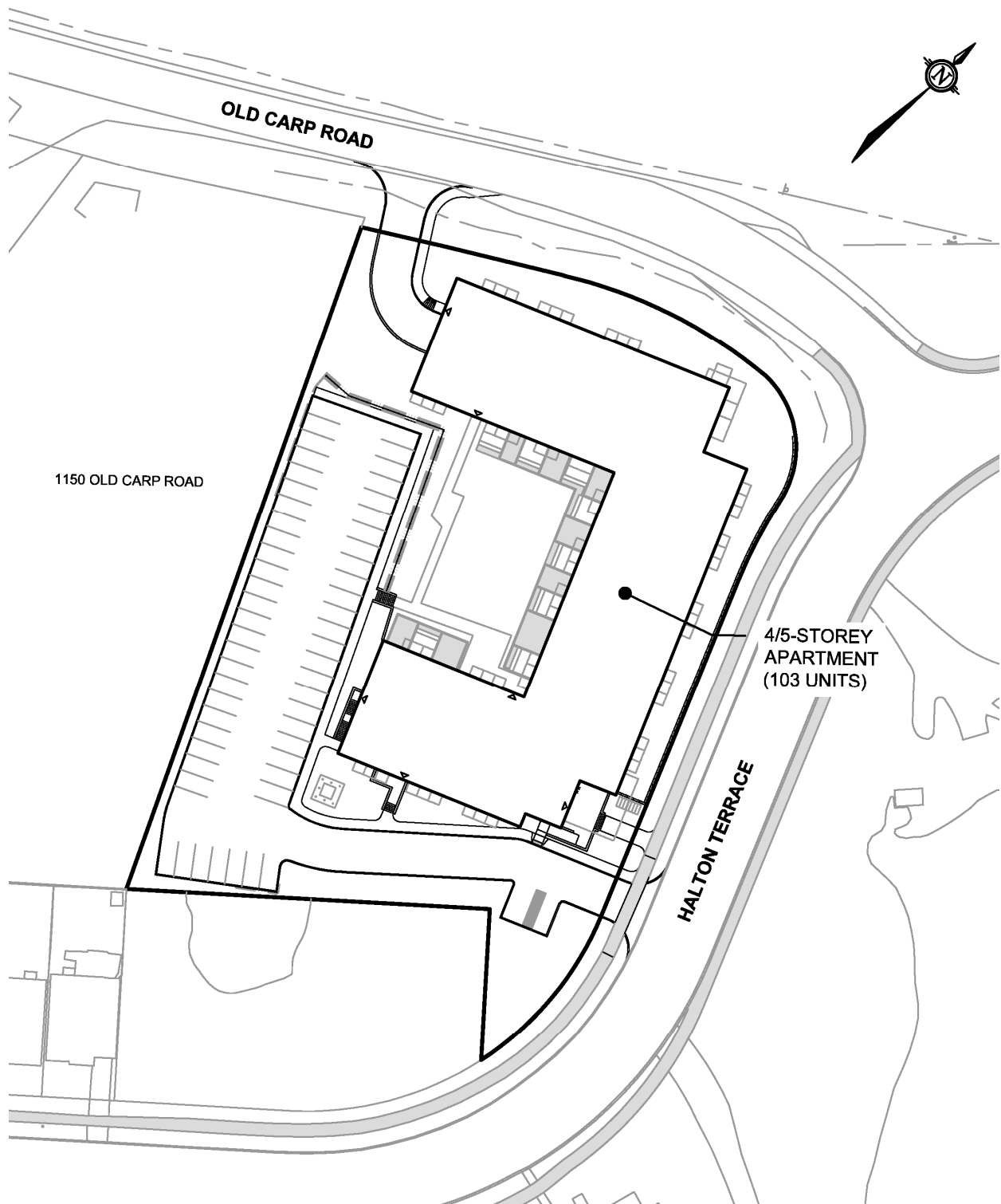


Figure 2 Site Plan

1.2 Additional Reports

This report provides information on the considerations and approach by which Novatech has designed and evaluated the proposed servicing for the Maple Leaf Homes Lands. This report should be read in conjunction with the following:

- *Geotechnical Investigation, Proposed Development, 1104 & 1150 Halton Terrace, completed by Paterson, Report: PG4872-1, dated May 3, 2019.*
- *Master Servicing Study Update for Morgan's Grant Subdivision, completed by J.L. Richards & Associates Limited, Ref. JLR 17730 dated September 2003.*
- *Morgan's Grant Stormwater Management Facility Design Brief, completed by Cumming Cockburn Limited, Ref. 3350-RS-03 dated August 2001*

2.0 EXISTING CONDITIONS

2.1 Topography & Drainage

The proposed site is currently undeveloped and consists of agricultural lands with scattered mature trees. Access to the site is currently provided off Old Carp Road via a private gravel entrance.

The site generally slopes northerly towards an existing ditch line within the Halton Terrace and Old Carp Road rights-of-way. The existing ditch is routed through a 500mm diameter culvert crossing Old Carp Road.

2.2 Subsurface Conditions

Paterson completed a geotechnical investigation in support of the development, consisting of 1104 Halton Terrace and 1150 Old Carp Road properties.

The principal findings of the geotechnical investigation are as follows:

- The existing soil profile consists of having a layer of topsoil ranging from 0.05m to 0.35m thick. Silty sand to clayey silt was generally encountered underlying the topsoil ranging from 0.6 to 0.9m thick. Glacial till consisting of light brown clayey silt with some sand, gravel, cobbles, and boulders was encountered underlying the silty sand to clayey silt layer ranging from 0.15m to 0.65m thick.
- Practical refusal was encountered at all test hole locations ranging from 0.45m to 2.15m below grade.
- Based on field observations, groundwater level is expected to be within the bedrock. Besides spring melt being encountered at TP 1-19 and TP 5-19, there was no groundwater encountered at all remaining test pits upon completion of excavation.

The report provides engineering guidelines based on Paterson's interpretation of the borehole information and project requirements. Refer to the above-noted report for complete details.

3.0 WATERMAIN

3.1 Existing Conditions

The proposed development is located inside the 2W2C Pressure Zone. An existing 300mm watermain is located along Halton Terrace.

3.2 Proposed Watermain System

A 200mm watermain and service will be installed connecting to the existing 300mm watermain in Halton Terrace. **Figure 3** highlights the proposed works and connection point for the proposed watermain and hydrants. All existing watermain boundary conditions were provided by the City of Ottawa and are included in **Appendix C**.

3.3 Design Criteria

A fire flow demand of 417 L/s has been calculated, as per the Fire Underwriter's Survey (FUS) and calculations are included in **Appendix C**. Watermain analysis was completed based on the following criteria:

Demands:

- Apartment Density 1.8 persons/unit
- Average Daily Demand 280 L/capita/day
- Max. Daily Demand 2.5 x Average Daily Demand
- Peak Hour Demand 2.2 x Maximum Daily Demand
- Fire Flow Demand Fire Underwriters Survey

System Requirements:

- Max. Pressure (Unoccupied Areas) 690 kPa (100 psi)
- Max. Pressure (Occupied Areas) 552 kPa (80 psi)
- Min. Pressure 276 kPa (40 psi) excluding fire flows
- Min. Pressure (Fire) 138 kPa (20 psi) including fire flows
- Max. Age (Quality) 192 hours (onsite)

Friction Factors:

- Watermain Size C-Factor
- 200mm 100
- 300mm 120

Hydraulic modelling of the development was completed using EPANET 2.0. EPANET is public domain software capable of modelling municipal water distribution systems by performing simulations of the water movement within a pressurized system. EPANET uses the Hazen-Williams equation to analyze the performance of the proposed watermain and considered the following input parameters: water demand, pipe length, pipe diameter, pipe roughness, and pipe elevation.

3.4 Hydraulic Analysis

A summary of the model results are shown below in **Table 3.1**, **Table 3.2** and **Table 3.3**. Full model results are included in **Appendix C**. Refer to **Figure 3** below for details about the node and pipe network. The analysis also includes demand from the existing and proposed single family homes along Halton Terrace.

Table 3.1: Summary of Hydraulic Model Results - Maximum Day + Fire Flow

Operating Condition	Minimum Pressure
417 L/s	275.66 kPa (EXHYD1)

Table 3.2: Summary of Hydraulic Model Results - Peak Hour Demand

Operating Condition	Maximum Pressure	Minimum Pressure
3.305 L/s through system	460.00 kPa (EXHYD2)	387.99 kPa (EXHYD1)

The hydraulic modelling summarized above highlights the maximum and minimum system pressures during Peak Hour conditions, and the minimum system pressures during the Maximum Day + Fire condition. Since the Maximum Day + Fire Flow pressures are above the minimum 140 kPa, and the Peak Hour Pressures onsite fall within the normal operating pressure range (345 kPa to 552 kPa) the proposed development can be adequately serviced.

Table 3.3: Summary of Hydraulic Model Results – Maximum Pressure Check

Operating Condition	Maximum Pressure	Minimum Pressure	Maximum Age
0.601 L/s through system	466.66 kPa (HYD3)	424.28 kPa (EXHYD1)	11.18 Hours (HYD3)

The average day pressures throughout the system are below 552 kPa, therefore pressure reducing valves are not required.

Water retention was analyzed at each node during average day demand. The maximum age throughout the system is within City standards.

A copy of the boundary conditions provided by the City of Ottawa, fire flow calculations, and detailed hydraulic analysis results are included in **Appendix C**.

There are no deviations from the City of Ottawa Design Guidelines – Water Distribution (2010).

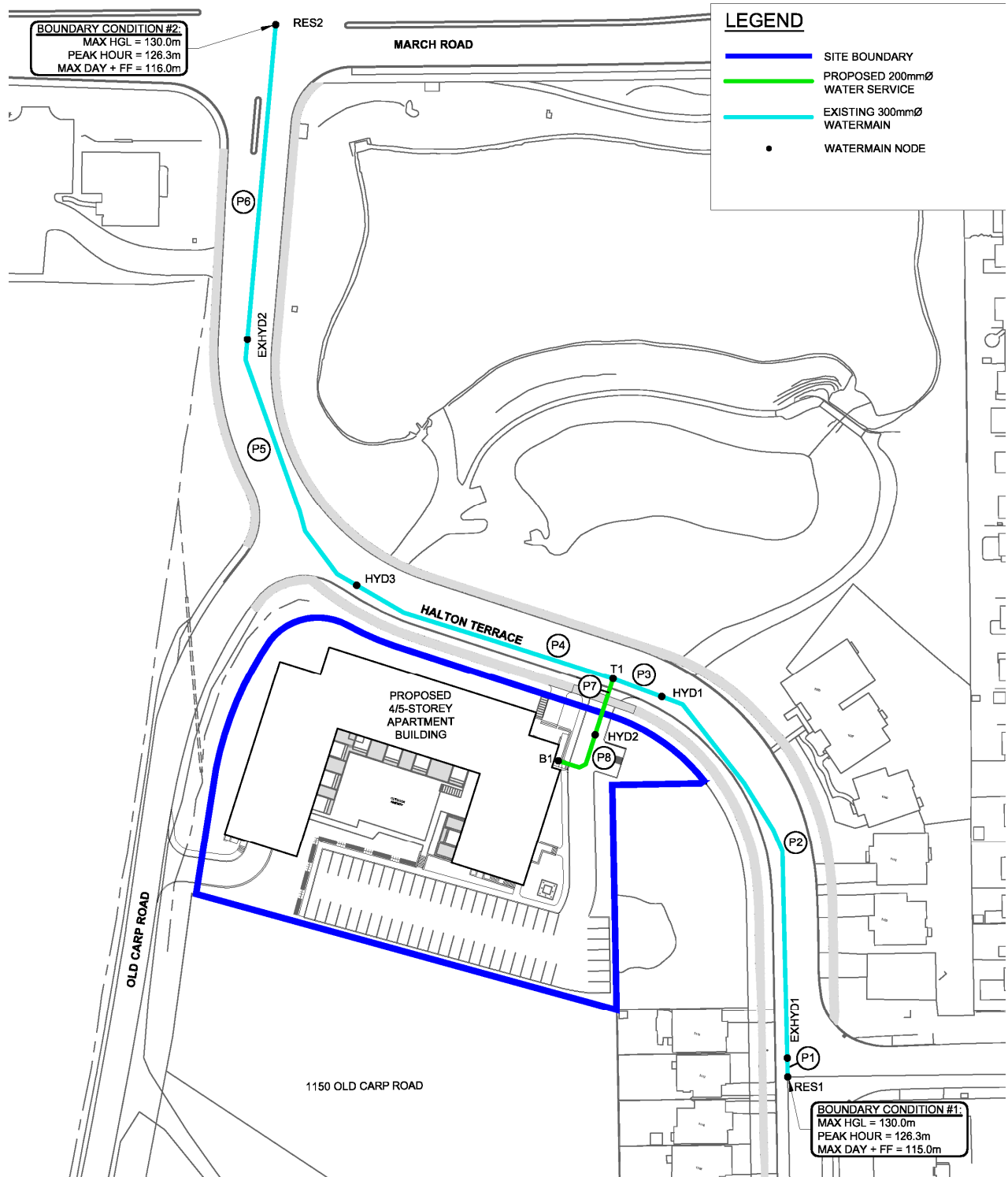


Figure 3 Watermain Distribution

4.0 SANITARY SERVICING

4.1 Existing Conditions

There is an existing 250mm sanitary sewer along Halton Terrace with an existing manhole adjacent to the proposed site. Flows from the site will be routed through the Morgan's Grant Subdivision sanitary sewers, which eventually outlets into the East March Trunk sewer.

4.2 Proposed Sanitary Sewer Outlet

A 200mm sanitary sewer and service will be installed connecting into the existing 250mm sanitary sewer network in Halton Terrace. The proposed outlet is consistent with the approved Morgan's Grant Master Servicing Study Update (J.L. Richards). The proposed sanitary layout can be seen on **Figure 4** below.

4.3 Design Criteria

Sanitary sewers, for the proposed development, are designed based on criteria established by the City of Ottawa in the following documents:

- Section 4.0 of the City of Ottawa Sewer Design Guidelines (October 2012).
- Technical Bulletin ISTB-2018-01 from the City of Ottawa regarding new sanitary design parameters. Design parameters from this technical bulletin will supersede values within the Sewer Design Guidelines (2012).

The resulting design parameters are summarized as follows:

Population Flow = 280 L/capita/day
Infiltration = 0.33 L/s/ha
Apartment = 1.8 persons per unit
Maximum Residential Peak Factor = 4.0
Harmon Correction Factor = 0.8
Minimum velocity = 0.6m/s
Manning's n = 0.013

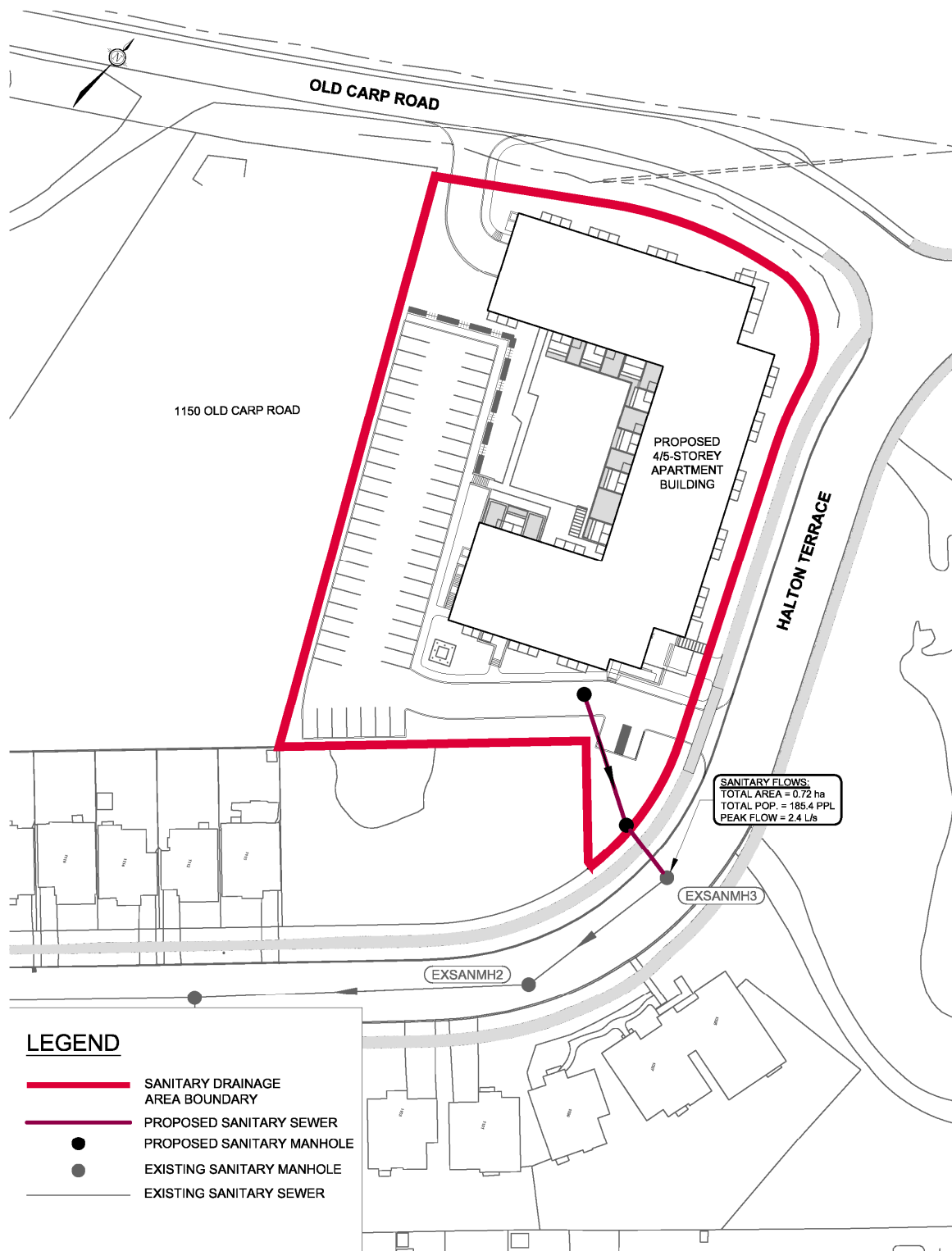


Figure 4 Sanitary Collection

4.4 Proposed Sanitary Sewer System

The calculated peak sanitary design flow for the development is 2.4 L/s. The total flow being directing to the 250mm sanitary sewer in Halton Terrace, consisting of the proposed site, future single-family homes and existing single-family homes is 3.1 L/s. The Morgan's Grant Master Servicing Study Update accounted for a total flow of 5.6 L/s through the existing 250mm sanitary sewers, exceeding the current calculated peak design flow of 3.1 L/s. For detailed calculations refer to the Sanitary Sewer Design Sheet located in **Appendix B**.

All residential units will have a gravity connection to the sanitary sewers.

The building USF is at an elevation of 80.97m and is too low to provide a gravity connection for the underground parking floor drains. A pump will be required to connect the underground parking floor drains to the 200mm diameter sanitary service.

The downstream sanitary sewers within Halton Terrace have adequate capacity to accommodate the proposed development as shown in the sanitary design sheet provided in **Appendix B**.

5.0 STORM SEWER SYSTEM AND STORMWATER MANAGEMENT

5.1 Stormwater Management Criteria

The following stormwater management criteria for the proposed development was prepared in accordance with the City of Ottawa Sewer Design Guidelines (October 2012) and the Master Servicing Study Update for Morgan's Grant Subdivision (J.L. Richards, September 2003).

- Provide a dual drainage system (i.e. minor and major system flows);
- Maximize the use of surface storage available on site;
- Control runoff to the allowable release rates for flows directed to Morgan's Grant SWMF and to the Old Carp Road ditch and specified in **Section 5.1.1** using on-site storage;
- Ensure that no surface ponding will occur on the paved surfaces (i.e. private drive aisles or parking areas) during the 2-year storm event; and,
- Ensure that ponding is confined within the parking areas at a maximum depth of 0.35m for both static ponding and dynamic flow.

5.1.1 Allowable Release Rate

Flows to Morgan's Grant SWMF

The allowable release rate was established based on the Morgan's Grant SWM Facility design report, which specifies a minor system release rate of 339 L/s for the 6.4 ha area directed to the SWM facility (represented as Area 11 in the Master Storm Drainage Plan for Morgan's Grant). This corresponds to an allowable release rate of 53 L/s/ha. The development has a total area of 0.72 ha and corresponds to an allowable release rate of 38.2 L/s for all storms up-to and including the 100-year storm event.

Flows to Old Carp Road 500mm Culvert

The allowable (pre-development) release rate has been calculated using the Rational Method with the following parameters:

- Drainage Area
 - 0.194 ha (Site boundary)
- Runoff Coefficient
 - 0.21 (Runoff coefficient increased by 25%, up to a maximum value of 1.00, for the 100-yr event.
- Rainfall Intensity
 - Based on City of Ottawa IDF data (Ottawa Sewer Design Guidelines) with a time-of-concentration of 10 minutes (derived using Uplands Method).

The allowable (pre-development) release rates are as follows. Refer to Appendix D for supporting calculations:

2-year	8.7 L/s
5-year	11.8 L/s
100-year	25.9 L/s

5.2 Existing and Proposed Storm Infrastructure

Existing Conditions

Under existing conditions, storm runoff from the site generally flows north to an existing ditch within the Halton Terrace and Old Carp Road rights-of-way. A portion of the site (0.522 ha) is directed to the storm sewer in Halton Terrace while the remainder of the site (0.194 ha) is routed through a 500mm diameter culvert crossing Old Carp Road, ultimately outletting to Shirley's Brook.

There are existing 375mm and 1500mm diameter storm sewers on Halton Terrace, outletting to the adjacent Morgan's Grant SWMF.

Proposed Conditions

The majority of runoff from the site (0.44 ha) will be routed to the 1500mm diameter storm sewer located at the main entrance on Halton Terrace. The remaining 0.28 ha, consisting of rooftop, underground parking ramp, and landscaped areas, will be routed to the 500mm diameter culvert crossing Old Carp Road. The storm sewers within Halton Terrace, comprising of runoff from the parking areas, are directed to Morgan's Grant SWMF which provides water quality control. As such, on-site stormwater quality controls are not required. Refer to **Figure 5** for the storm servicing layout.

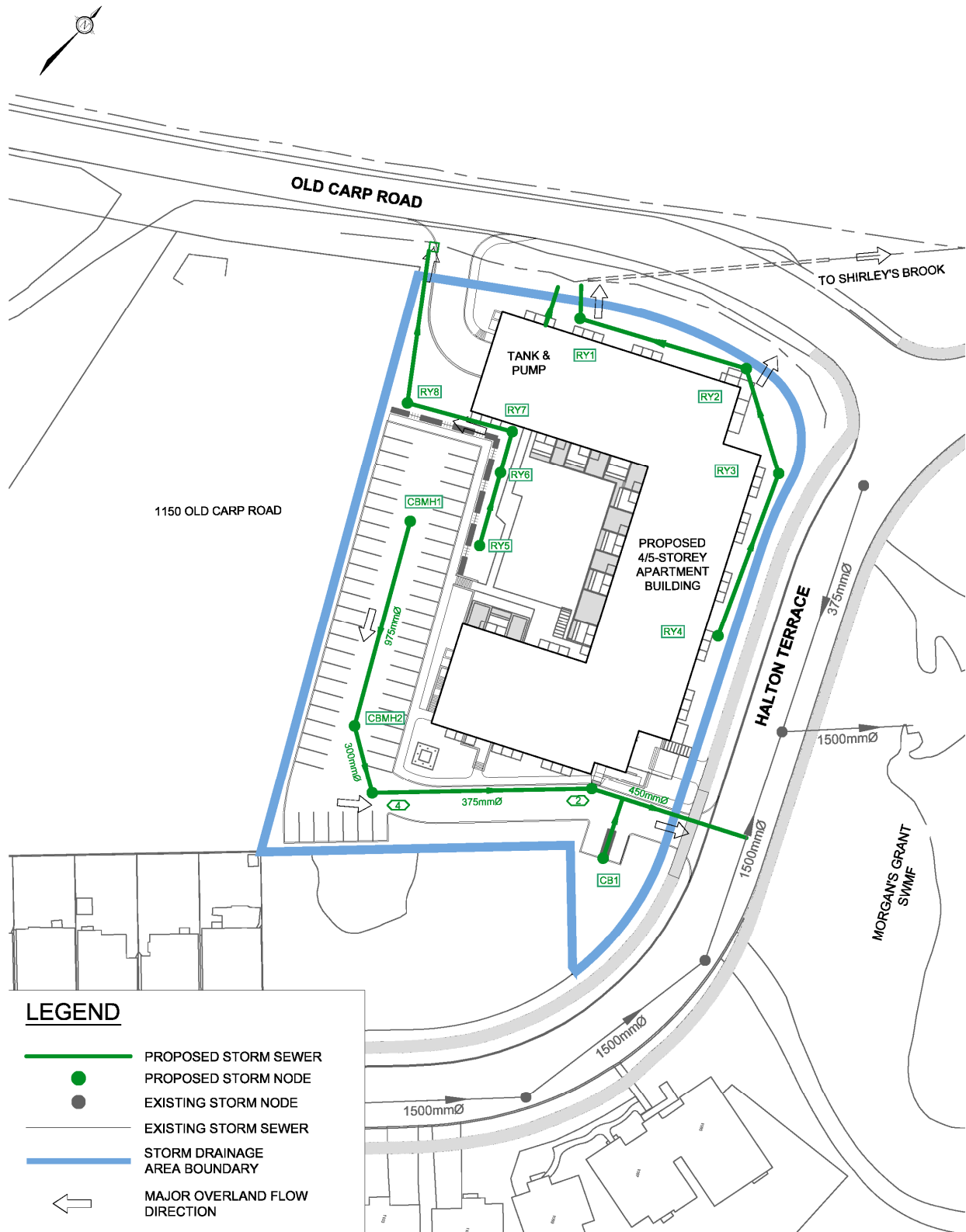


Figure 3 Storm Drainage

5.2.1 **Minor System (Storm Sewers)**

Storm servicing has been provided using a dual-drainage system. Runoff from frequent events will be conveyed by the proposed storm sewers (minor system), while flows from large storm events that exceed the capacity of the minor system will be stored underground using a series of Stormtech SC-740 storage chambers and 600mm diameter HDPE storage pipes, on the surface in road sags, and/or conveyed overland along defined overland flow routes (major system).

Storm Sewer Design Criteria

The following is the storm sewer design criteria [Ottawa Sewer Design Guidelines (Oct. 2012)]:

- Rational Method (Q) = $2.78CIA$, where
 - Q = peak flow (L/s)
 - C = runoff coefficient
 - $C = (0.70 * \%Imp.) + 0.20$
 - I = rainfall intensity for a 2-year return period (mm/hr)
 - $I_{2yr} = 732.951 / [(Tc(min) + 6.199)]^{0.810}$
 - A = site area (ha)
- Minimum Pipe Size = 250 mm; Minimum / Maximum Full Flow Velocity = 0.8 m/s / 3.0 m/s

The on-site storm sewers are sized to convey peak flows corresponding to a 2-year return period storm event based on the Rational Method. Refer to the storm sewer design sheets provided in **Appendix D**.

Underground Storage

Underground storage will be required to attenuate runoff from the site. Underground storage will be provided using Stormtech SC-740 storage chambers and a 975 mm diameter HDPE storage pipe, providing 62.6 m³ of storage. Refer to **Appendix D** for further details. The proposed layout of underground storage pipes are shown on the General Plan of Services (drawing 119024-GP).

Inlet Control Devices

Inlet control devices (ICDs) are to be installed within the selected catchbasins and rear-yard catchbasins. The ICDs have been sized to control minor system peak flows to the Halton Terrace storm sewer and Old Carp Road ditch to the allowable release rates and to ensure that no ponding occurs during the 2-year storm event.

Hydraulic Grade Line

The building USF is at an elevation of 80.97m and is too low to provide a gravity connection for the building foundation drain. A storage tank and pump are proposed to direct flows from the foundation drain and underground parking access ramp to the Old Carp Road ditch.

5.2.2 **Major System Design**

The site has been designed to convey private roadway and parking area runoff from storms that exceed the minor system capacity to Halton Terrace through the private entrance. The landscaped areas adjacent Halton Terrace and Old Carp Road have been designed to convey runoff that exceed the minor system capacity to the existing ditch along Old Carp Road. A third major overland flow route is provided for the shared amenity area, which is directed adjacent the underground parking ramp and outlets to the existing ditch along Old Carp Road. The site has been graded to ensure the 100-year peak overland flows are confined within the parking and landscaped areas.

Areas flowing uncontrolled to Halton Terrace and the existing Old Carp Road ditch are included as part of the minor system release rate.

Surface/Underground Storage

The stage-storage curves for each inlet were calculated based on the proposed Grading Plan (drawing 119024-GR) and the proposed underground storage locations. The total storage shown in the stage-storage curves at each inlet is provided in **Appendix D**. Approximately 62.6 m³ of underground storage and 126.2 m³ of surface storage is available on-site.

The total storage provided underground and on the surface is as follows:

Table 5.1: Total Available Storage

Structure ID	Underground Storage (m ³)	Surface Storage (m ³)	Total Storage (m ³)
	Provided	Provided	Provided
CB01*	-	5.0	5.0
TOTAL	-	5.0	5.0
CBMH01	-	55.0	55.0
CBMH02*	28.1	28.6	56.7
TOTAL	28.1	83.6	111.7
RY05	-	18.8	18.8
RY06	-	18.8	18.8
TOTAL	-	37.6	37.6
RY01*	34.5	-	34.5
TOTAL	34.5	-	34.5
TOTAL OVERALL	62.6	126.2	188.8

*Structure with ICD.

5.3 Hydrologic & Hydraulic Modelling

The City of Ottawa Sewer Design Guidelines (October 2012) require hydrologic modelling for all dual drainage systems. The performance of the proposed storm drainage system for 1104 Halton Terrace was evaluated using the PCSWMM hydrologic/hydraulic modelling software.

Design Storms

The PCSWMM model includes the following design storms based on the City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (October 2012):

- 3-hour Chicago Storm Distribution (10-minute time step)
- 12-hour SCS Storm Distribution (30-minute time step)

The 3-hour Chicago storm distribution includes the 2-year, 5-year, 100-year, and 100-year (+20%) return periods while the 12-hour SCS storm distribution includes only the 100-year return period.

The 3-hour Chicago storm distribution was determined to be the critical design storm for the proposed development.

PCSWMM Model Schematics, Output Data and Modelling Files

PCSWMM model schematics and output data for the 100-year 3-hour Chicago storm distribution are provided in **Appendix D**.

Table 5.2 provides a summary of the hydrologic modelling parameters (subcatchments).

Table 5.2: Hydrologic Modelling Parameters (subcatchments)

Area ID	Catchment Area (ha)	Runoff Coefficient (%)	Percent Imperviousness (%)	Zero Imperviousness (%)	Equivalent Width (m)	Average Slope (%)
Controlled Areas						
A-01	0.086	0.78	82.4	0	29	1
A-02	0.093	0.52	45.7	0	37	1
A-03	0.088	0.76	80.5	0	44	1
A-04	0.106	0.53	47.3	0	27	4
A-05	0.014	0.20	0	0	7	1
A-06	0.031	0.20	0	0	21	1
A-07	0.146	0.90	100	95	17	1
A-08	0.028	0.20	0	0	11	1
A-09	0.017	0.78	79.4	0	9	5
A-10	0.077	0.90	100	95	15	1
Uncontrolled Areas						
B-01	0.005	0.32	16.7	0	5	3
B-02	0.024	0.20	0	0	7	2
Subdivision	0.72	0.66	65.7	-	-	-

Subcatchment Areas / Runoff Coefficients

- The proposed site has been divided into subcatchments based on the tributary drainage areas to each inlet of the proposed storm sewer system, as shown on the Storm Drainage Area Plan (Drawing 119024-STM).
- Weighted runoff coefficients were assigned based on the percent impervious values used in the PCSWMM model. As per the City of Ottawa Sewer Design Guidelines (October 2012), the runoff coefficient is based on the following equation:

$$C = (\% \text{ Imp.} * 0.7) - 0.2$$

Infiltration

Infiltration losses for all catchment areas were modeled using Horton's infiltration equation, which defines the infiltration capacity of the soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values for the Sewer Design Guidelines were used for all catchments.

Horton's Equation:
 $f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: $f_o = 76.2$ mm/hr
 Final infiltration rate: $f_c = 13.2$ mm/hr
 Decay Coefficient: $k = 4.14$ /hr

Depression Storage

- The default values for depression storage (1.57 mm impervious / 4.67 mm pervious) have been applied to all catchments.

Subarea Routing

- Subarea routing for all subcatchments has been set to 'direct to outlet'.

Equivalent Width

- The equivalent width parameter for all subcatchments is based on the measured flow length.

Minor System Conduits (Bend / Exit Losses)

- The minor system network was created in Civil3D and imported into PCSWMM.
- The following exit losses have been inputted into the model. They represent the loss coefficient based on the bend angle, as per the Appendix 6-B in the City of Ottawa Sewer Design Guidelines (October 2012).

<u>Bend Angle</u>	<u>Loss Coefficient</u>
0	0.00
15	0.09
30	0.21
45	0.39
60	0.64
75	0.96
90	1.32

Downstream Boundary Condition (Minor System)

- The storm sewer outlets for the proposed development are the existing 500mm culvert crossing Old Carp Road and the 1500mm diameter storm sewer in Halton Terrace.
- The Master Servicing Study Update for Morgan's Grant Subdivision estimated a 100-year HGL elevation of 82.65m at the proposed connection (See **Appendix D** for MSS excerpts).
- A 100-yr boundary condition of 81.23m at the 500mm culvert was used, representing the obvert of the culvert (culvert analysis included in **Appendix D**).

5.3.1 PCSWMM Model ResultsInlet Control Devices (ICDs)

ICDs are provided for catchbasins within the roadway and catchbasins in the landscaped areas. The ICD sizes and design flows are provided in **Table 5.3**. The ICDs have been sized to maximize surface storage, limit the outlet peak flows to the allowable release rates and ensure no surface ponding during a 2-year storm event.

Table 5.3: Inlet Control Devices and Design Flows

Structure ID	ICD Size & Inlet Rate						
	ICD Type	T/G (m)	Orifice Invert (m)	100-year Head on Orifice (m)	2-year Orifice Peak Flow* (L/s)	5-year Orifice Peak Flow* (L/s)	100-year Orifice Peak Flow* (L/s)
CB01	Tempest MHF (120mm)	83.32	82.32	1.11	10.8	17.5	26.8
CBMH02	Tempest LMF	85.55	82.89	2.96	8.4	9.2	9.5
RY01	Tempest LMF	82.75	81.23	1.61	2.4	2.9	4.3
RY08	Tempest LMF	85.40	82.44	1.52	2.6	4.2	4.1

*From PCSWMM model, 3-hour Chicago storm distribution.

Both IPEX Tempest LMF and MHF ICDs are proposed for the site.

Overland Flow (Major System)

The major system network was evaluated using the PCSWMM model to ensure that the ponding depths conform to the City of Ottawa Sewer Design Guidelines (Oct. 2012). A summary of ponding depths at each inlet for the 2-year, 5-year, 100-year and 100-year (+20%) events are provided in **Appendix D**. The maximum static and dynamic ponding depths are less than 0.35m during all events up to and including the 100-year + 20%, thereby meeting the major system criteria. In addition, there is no cascading flow over the highpoints during the 100-year storm event.

Table 5.4: Overland Flow Results

Structure	T/G (m)	Max. Static Ponding		100-yr Event			
		Elev. (m)	Spill Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)
CB01	83.32	83.45	0.13	83.43	0.11	N	0.00
CBMH01	85.55	85.90	0.35	85.85	0.30	N	0.00
CBMH02	85.55	85.85	0.30	85.85	0.30	N	0.00
RY01	82.75	82.84	0.09	82.84	0.09	N	0.00
RY02	83.45	83.45	0.00	82.84	0.00	N	0.00
RY03	82.90	83.25	0.35	82.84	0.00	N	0.00
RY04	83.16	83.26	0.10	82.84	0.00	N	0.00
RY05	83.75	83.98	0.23	83.97	0.22	N	0.00
RY06	83.75	83.98	0.23	83.97	0.22	N	0.00
RY07	83.98	83.98	0.00	83.97	0.00	N	0.00
RY08	85.40	85.40	0.00	83.96	0.00	N	0.00

*From PCSWMM model, 3-hour Chicago storm distribution.

An expanded table of the ponding depths at low points in the roadway and landscaped areas (including the stress-test event) is provided in **Appendix D**. Based on these results, the proposed storm drainage system will not experience any adverse flooding even with a 20% increase to the 100-year event.

Hydraulic Grade Line

Table 5.5 provides a summary of the 100-year HGL elevations at each storm manhole.

Table 5.5: 100-year HGL Elevations

Manhole ID	MH Obvert Elevation (m)	T/G Elevation (m)	HGL Elevation (100yr) (m)	Design USF (m)
MH02	81.63	83.79	82.66	80.97
MH04	82.55	85.82	82.66	-
Connection to Ex.	81.49	83.22	82.65	-

**From PCSWMM model, 3-hour Chicago storm distribution.*

As shown above in **Table 5.5**, the USF is at an elevation of 80.97m and is too low to provide a gravity connection for the foundation drain to the proposed storm sewer system or to the existing ditch along Old Carp Road. A storage tank and pump (by others) will be required within the underground parking area to discharge flows from the foundation drain and the ramp trench drain to surface within the existing ditch along Old Carp Road.

Comparison of Peak Flows

Table 5.6 provides a comparison of the minor/major system flows from the proposed development to Klondike Road and the 500mm culvert crossing Old Carp Road.

Table 5.6: Comparison of Peak Flows

Outlet	Design Event	Allowable Release Rate (L/s)	Controlled Minor System Release Rate (L/s)	Uncontrolled Minor System Release Rate (L/s)	Total Minor System Release Rate (L/s)	Major System Release Rate (L/s)
1500m STM Sewer	2-yr	38.2	17.2	0.2	17.4	0
	5-yr		24.9	0.5	25.4	0
	100-yr		36.2	1.7	37.9	0
Old Carp Road Ditch	2-yr	8.7	7.5	0.0	7.5	0
	5-yr	11.8	11.0	0.7	11.7	0
	100-yr	25.9	15.3	4.3	19.6	0

(1) PCSWMM model results for the 3-hour Chicago storm distribution.

The 100-year minor system peak flow to Halton Terrace is controlled to just under the allowable release rate of 38.2 L/s for the proposed site. The peak flows to the Old Carp Road ditch are

controlled to the allowable release rates for all storm events. The total 100-year major system peak flow is contained on-site through a combination of underground and surface storage.

6.0 ROADWAYS

6.1 Proposed Road Infrastructure

Paterson has prepared a Geotechnical Investigation report for the Development (May 2019) that provides recommendations for roadway structure, servicing and foundations. The site consists of a private roadway and at-grade parking; the recommended roadway structure is as follows:

Table 6.1: Roadway Structure

Roadway Material Description	Pavement Structure Layer Thickness (mm)
	Private Road
Asphalt Wear Course: Superpave 12.5 (Class B)	40
Asphalt Binder Course: Superpave 19.0 (Class B)	50
Base: Granular A	150
Sub-Base: Granular B – Type II	<u>400</u>
Total	640

7.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the “Guidelines on Erosion and Sediment Control for Urban Construction Sites” (Government of Ontario, May 1987). An Erosion and Sediment Control Plan will be prepared as part of the detailed design.

Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site (OPSD 219.110), catch basin inserts under catch basin/maintenance hole lids, heavy duty silt fence barrier (OPSD 219.130), straw bale check dams (OPSD 219.180), rock check dams (219.210 or OPSD 219.211), riprap (OPSS 511), mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent Lands, water bodies or water treatment/conveyance facilities.

It will be the responsibility of the Contractor to submit a detailed construction schedule and appropriate staging, dewatering and erosion and sediment control plans to the Contract Administrator for review and approval prior to the commencement of work.

General Erosion and Sediment Control Measures

- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site

alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.

- A qualified inspector, provided by the owner, should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.
 - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control Plan.
 - Rock check dams and/or straw bales are to be installed in drainage ditches.
 - Catch basin inserts are to be placed under the grates of all existing and proposed catchbasins and structures.
 - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.
- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.

The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Sanitary Servicing

- Wastewater will discharge to a 250mm sanitary sewer in Halton Terrace consistent with the approved Morgan's Grant Master Servicing Study.
- The peak design flow from the development is 2.4 L/s, which is less than the flows identified in the Master Servicing Study (5.6 L/s).
- All residential units can be serviced by gravity sewer.
- A pump is required to discharge the underground parking floor drains to the 200mm sanitary sewer.

Watermain

- A 200mm watermain is proposed to service the development with a connection to the 300mm watermain in Halton Terrace.
- The proposed water distribution network provides fire protection and domestic supply under all operating conditions.

Stormwater Management

- Drainage is conveyed to the Halton Terrace storm sewer and the Old Carp Road ditch in accordance with flow control limits.
 - Storm sewers (minor system) have been designed to convey the uncontrolled 2-year peak flow using the Rational Method.

- Inflows to the minor system will be controlled using inlet control devices to the allowable release rates identified in Section 5.1.1.
- The proposed building requires a storage tank and sump pump for collection of drainage from the foundation weeper and ramp trench drain, all of which shall discharge to the existing roadside ditch along Old Carp Road.
- Roof drains shall discharge to surface within parking areas or landscaped areas as shown on the General Plan of Services (119024-GP).
- Rainfall in excess of the allowable minor system release rate is stored underground and/or on the surface (parking lot, swale depressions).
 - Major overland flow is routed to Halton Terrace and Old Carp Road for emergency purposes when rainfall exceeds the 100-year design storm.
 - Maximum ponding depth does not exceed 0.35m during the 100-year design storm.
 - No surface ponding occurs during the 2-year design storm.
 - Underground storage is provided within underground storage chambers, pipes and structures upstream of the flow control devices.

Erosion and Sediment control

- Erosion and sediment control measures (i.e. filter fabric, silt fences, etc.) will be implemented prior to construction and remain in place until vegetation is established.
- The Erosion and Sediment Control Plan outlines recommended measures to mitigate negative impact to adjacent lands, water bodies and water treatment/conveyance facilities.

9.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:



Lucas Wilson, P.Eng.
Project Engineer



Mark Bissett, P.Eng.
Senior Project Manager

FOR REVIEW

Appendix A
Correspondence

Lucas Wilson

From: Christine McCuaig <christine@q9planning.com>
Sent: Friday, November 20, 2020 8:30 AM
To: Brian Saumure; Mark Bissett; Jennifer Luong
Subject: Fwd: Pre-Consultation Follow-Up: 1104 Halton Terrace
Attachments: AODA Checklist.docx; 1104 Halton Terrace_design_brief_submission requirements.pdf; Plans & Study List (2020).pdf

From: "McCreight, Laurel" <Laurel.McCreight@ottawa.ca>
Date: November 20, 2020 at 7:55:06 AM EST
To: Christine McCuaig <christine@q9planning.com>
Subject: Pre-Consultation Follow-Up: 1104 Halton Terrace

Hi Christine,

Please refer to the below regarding the Pre-Application for 1104 Halton Terrace for a Site Plan Control Application and Zoning By-law Amendment for a residential development. I have also attached the required Plans & Study List for application submission.

An email was sent providing instructions on how to pay the fee for the pre-application consultation.

Below are staff's preliminary comments based on the information available at the time of the pre-consultation meeting:

Planning / Urban Design

- Grading of the site at the intersection of Old Carp Road and Halton Terrace will be an important consideration. Please ensure that the basement level is not exposed at this corner, and the principal entrance to the building is not significantly higher than the existing sidewalk/right of way.
- Will the Old Carp Road frontage be urbanized? If not please consider how this can be designed to work with the proposal.
- Please ensure the setback to the proposed low-rise residential is adequate and considers light and privacy.
- Please ensure that the TIA scoping includes all units, not just the apartment units, but also the detached dwellings.

- Please ensure adequate room for tree planting on-site.
- A design brief is required. Please see the attached terms of reference.
- Cash-in-lieu of Parkland will be required.
- You are encouraged to contact the Ward Councillor, Councillor [Jenna Sudds](#), regarding the proposal.

Engineering

- The Servicing Study Guidelines for Development Applications are available [here](#).
- Servicing and site works shall be in accordance with the following documents:
 - Ottawa Sewer Design Guidelines (October 2012)
 - Ottawa Design Guidelines – Water Distribution (2010)
 - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
 - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
 - City of Ottawa Environmental Noise Control Guidelines (January, 2016)
 - City of Ottawa Park and Pathway Development Manual (2012)
 - City of Ottawa Accessibility Design Standards (2012)
 - Ottawa Standard Tender Documents (latest version)
 - Ontario Provincial Standards for Roads & Public Works (2013)
- Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).
- The Stormwater Management Criteria for the subject site is to be based on the following:
 - The allowable storm release rate for the subject site is limited to 70 L/s/ha as per the Master Servicing Study Update for Morgan's Grant Subdivision.
 - Onsite storm runoff, in excess of the allowable release rate, must be detained on site.
 - The hydraulic grade line in the storm sewer must remain at least 0.3 m below the underside of adjacent building footings during the 100-year storm event.
 - Quantity control to be provided by the adjacent stormwater management facility and/or as determined by the Mississippi Valley Conservation Authority (MVCA). Please include correspondence from the MVCA in the stormwater management report.
- Additional studies pertaining to discharge to Shirley's Creek sub-watershed will not be required if out letting to existing stormwater management pond to the east. Stormwater charges will not be imposed to connect to the existing stormwater management pond to the east.
- No sanitary sewer capacity constraints were identified on Halton Terrace during the initial review of the concept plan.

- As per Section 4.3.1 of the Water Design Guidelines, two watermain connections will be required to provide a looped connection if the basic day demand is greater than 50 m³/day (approx. 50 homes).
- Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
 - Location of service
 - Type of development and the amount of fire flow required (as per FUS, 1999).
 - Average daily demand: ___ l/s.
 - Maximum daily demand: ___ l/s.
 - Maximum hourly daily demand: ___ l/s.
- An MECP Environmental Compliance Approval is not anticipated to be required for the subject site.
- Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04

Please contact Infrastructure Project Manager [Ahmed Elsayed](#) for follow-up questions.

Transportation

- Follow Traffic Impact Assessment Guidelines
 - Traffic Impact Assessment will be required.
 - Start this process asap.
 - Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
 - Reduced scope with regards to the study area will be considered.
- To allow for a reduction of the ROW from 26 m, the development proponent should demonstrate that the 24 m ROW can accommodate the road requirements, services, trees and pedestrian and cycling facilities. This can be done by showing the recommended cross section based on the Designing Neighbourhood Collector Guidelines (2019).
- Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following locations on the final plan will be required:
 - Collector Road to Collector Road: 5 metre x 5 metres
- Noise Impact Studies required for the following:
 - Road
 - Stationary (if there will be any exposed mechanical equipment due to the proximity to neighbouring noise sensitive land uses)
- It is recommended that the access is located only on Halton Terrace to minimize accesses on Old Carp. The realignment of Old Carp is going to add more traffic to this road and the road currently does not have many accesses. The location of the accesses will be further reviewed in the TIA. Sight line analysis for the accesses on Halton Terrace and Carp (if proposed) will be required.
- On site plan:
 - Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.

- Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions). Show on separate drawings.
- Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
- Show lane/aisle widths.
- Sidewalks are to be continuous across access as per City Specification 7.1.
- It is recommended that the accessibility requirements are implemented (checklist is attached.)

Please contact Transportation Project Manager, [Neeti Paudel](#) for follow-up questions.

Forestry

- A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan approval.
- Any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR.
- Any removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR.
- The TCR must list all trees on site by species, diameter and health condition.
- The TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site.
- If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained.
- The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
- Please ensure newly planted trees have an adequate soil volume for their size at maturity. Here are the recommended soil volumes:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

- For more information on the process or help with tree retention options, contact [Mark Richardson](#)

Other

Please refer to the links to [“Guide to preparing studies and plans”](#) and [fees](#) for general information. Additional information is available related to [building permits](#), [development charges](#), and the [Accessibility Design Standards](#). Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-consultation comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the

submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please do not hesitate to contact me if you have any questions.

Regards,
Laurel

Laurel McCreight MCIP, RPP
Planner
Development Review West
Urbaniste
Examen des demandes d'aménagement ouest

City of Ottawa | Ville d'Ottawa

613.580.2424 ext./poste 16587
ottawa.ca/planning / ottawa.ca/urbanisme

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

Appendix B
Sanitary Design Sheets

SANITARY SEWER DESIGN SHEET

Novatech Project #: 119024
 Project Name: 1104 Halton Terrace
 Date: 10/12/2023
 Input By: Lucas Wilson
 Reviewed By: Mark Bissett
 Drawing Reference: 119024-GP

Legend: Design Input by User
 As-Built Input by User
 Cumulative Cell
 Calculated Design Cell Output
 Calculated Annual Cell Output
 Calculated Rare Cell Output
Reference: City of Ottawa - Sewer Design Guidelines (2012 and TBs)
 MOE - Design Guidelines for Sewage Works (2008)

Location				Demand											Design Capacity								
Street	Area ID	From MH	To MH	Residential Flow								Extraneous Flow Area Method		Total Design Flow	Proposed Sewer Pipe Sizing / Design								
				Singles	Apts	Population (in 1000's)	Cumulative Population (in 1000's)	Average Pop. Flow Q(q) (L/s)	Design Peaking Factor M	Peak Design Pop. Flow Q(p) (L/s)	Res. Drainage Area (ha.)	Cumulative Res. Drainage Area (ha.)	Cumulative Extraneous Drainage Area (ha.)	Design Extraneous Flow Q(e) (L/s)	Total Peak Design Flow Q(D) (L/s)	Pipe Length (m)	Pipe Size (mm) and Material	Pipe ID Actual (m)	Roughness n	Design Grade So (%)	Capacity Qfull (L/s)	Full Flow Velocity Vfull (m/s)	Q(D) / Qfull
Site	-	MH3	EXMH3		103	0.185	0.185	0.60	3.53	2.12	0.720	0.720	0.720	0.24	2.4	36.7	200 PVC	0.203	0.013	0.50	24.2	0.75	9.7%
Halton Terrace	-	EXMH3	EXMH2	3		0.010	0.196	0.63	3.52	2.23	0.220	0.940	0.940	0.31	2.5	31.2	250 PVC	0.254	0.013	0.38	38.2	0.75	6.6%
Halton Terrace	-	EXMH2	EXMH1	10		0.034	0.230	0.74	3.50	2.60	0.420	1.360	1.360	0.45	3.1	59.9	250 PVC	0.254	0.013	0.27	32.2	0.64	9.5%

Demand Equation / Parameters

1. $Q(D), Q(A), Q(R) = Q(p) + Q(fd) + Q(ici) + Q(e)$
2. $Q(p) = (P \times q \times M \times K / 86,400)$
3. $q =$ 280 L/person/day (design)
200 L/person/day (annual and rare)
4. **M = Harmon Formula (maximum of 4.0)**
5. $K =$ 0.8 (design)
0.6 (annual and rare)
6. **Park flow is considered equivalent to a single unit / ha**
Park Demand = 4 single unit equivalent / park ha (~ 3,600 L/ha/day)
7. $Q(fd) =$ 0.45 L/unit
8. $Q(ici) =$ ICI Area x ICI Flow x ICI Peak
9. $Q(e) =$ 0.33 L/s/ha (design)
0.30 L/s/ha (annual)
0.55 L/s/ha (rare)

Definitions

- Q(D)** = Peak Design Flow (L/s)
Q(A) = Peak Annual Flow (L/s)
Q(R) = Peak Rare Flow (L/s)
Q(p) = Peak Design Population Flow (L/s)
Q(q) = Average Population Flow (L/s)
P = Residential Population =
q = Average Capita Flow
M = Harmon Formula
K = Harmon Correction Factor
Typ. Service Diameter (mm) = 135
Typ. Service Length (m) = 15
I/I Pipe Rate (L/mm dia/m/hr) = 0.007
Q(fd) = Foundation Flow (L/s)
Q(ici) = Industrial / Commercial / Institutional Flow (L/s)
Q(e) = Extraneous Flow (L/s)

	<u>Institutional / Commercial / Industrial</u>	<u>Industrial</u>	<u>Commercial / Institutional</u>
Design =	35000	28000	L/gross ha/day
Annual / Rare =	10000	17000	L/gross ha/day
ICI Peak *			
Design =	1.0	1.5	* ICI Peak = 1.0 Default, 1.5 if ICI in contributing area is >20% (design only)
Annual / Rare =		1.0	

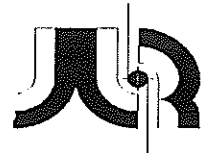
Capacity Equation

$Q_{full} = (1/n) A_p R^{2/3} S_o^{1/2}$

Definitions

- Q full** = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A_p = Pipe flow area (m²)
R = Wetted perimeter (m)
S_o = Pipe slope/gradient





J.L. Richards & Associates Limited
Consulting Engineers, Architects & Planners

CITY OF OTTAWA
MINTO DEVELOPMENT INC.
MORGAN'S GRANT SUBDIVISION - PHASE 10A & 10B
JLR NO. 17730

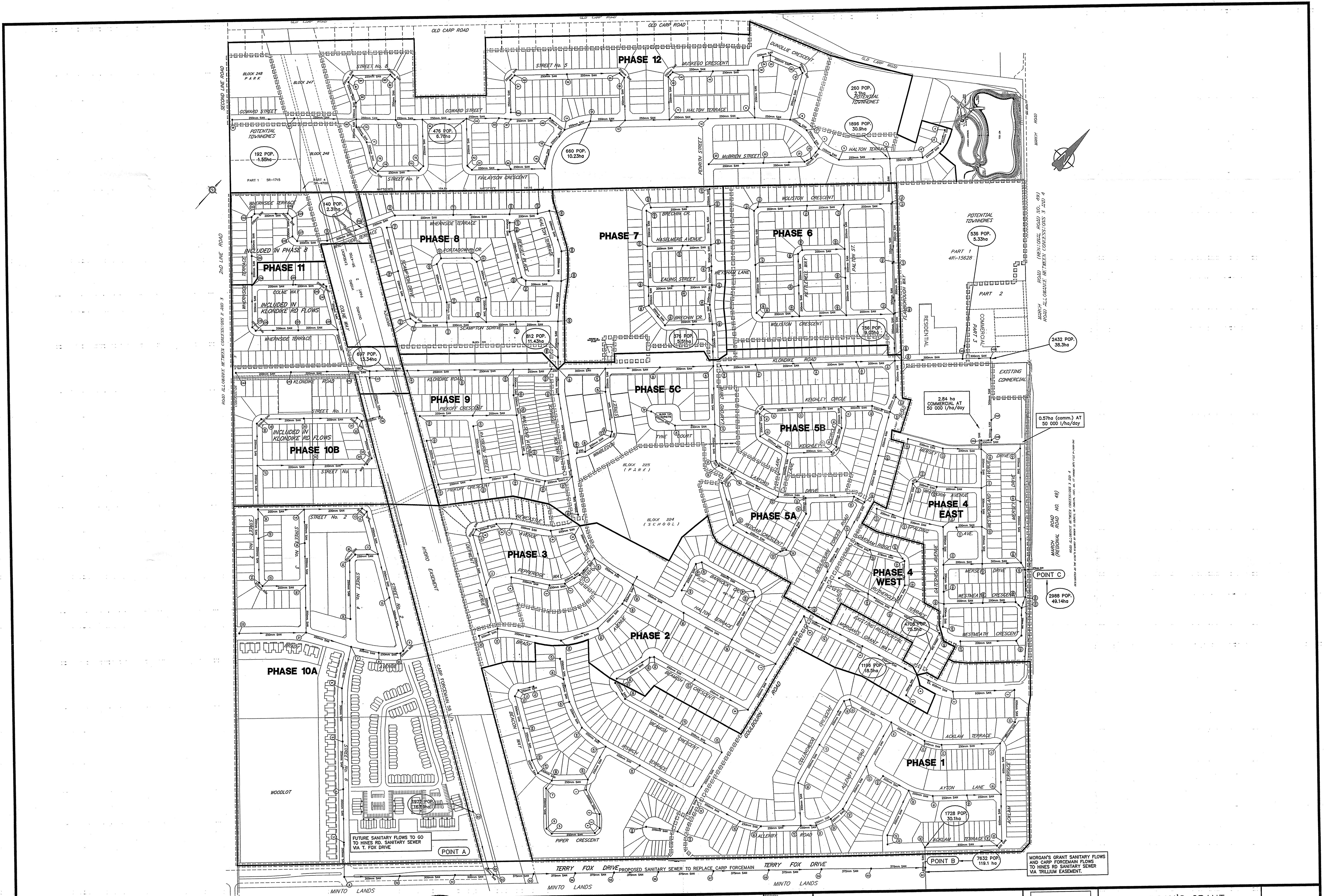
SANITARY SEWER DESIGN SHEET
Revised September 16, 2003

Designed by: J.B.
Checked by: L.J.

DESIGN PARAMETERS

I = 0.280	l/s/ha	q (res) = 350	l/cap/day
Singles = 4.0	pers / unit	q (com) = 50,000	l/ha/day
Townhouses = 4.0	pers / unit	q (inst) = 50,000	l/ha/day

STREET	M.H. #		NO. of UNITS	RESIDENTIAL				Peaking Factor	POPUL. FLOW l/s	NON-RESIDENTIAL				INFIL. FLOW l/s	PEAK FLOW l/s	SEWER DATA					UPSTREAM		DOWNSTREAM		COMMENTS		
	FROM	TO		POPUL. people	AREA ha	POPUL. people	AREA ha			AREA ha	CUMM. AREA ha	Peaking Factor	NON-RES. FLOW (l/s)			DIA. mm	Slope %	CAPAC. l/s	VEL. m/s	LENGTH m	RESIDUAL CAP. (l/s)	Obvert Drop	Obvert	Invert		Obvert	Invert
Street No. 1	5	5	4	16	0.15	1500	26.93	3.68	22.36	0.00	2.93	1.50	2.54	7.54	32.44	250	0.40	39.23	0.77	41.20	6.79	0.078	82.850	82.596	82.685	82.431	Phase 12
	5	Ex. 1	25	100	0.81	1600	27.74	3.66	23.72	0.00	2.93	1.50	2.54	7.77	34.03	250	0.40	39.23	0.77	90.60	5.21	0.063	82.622	82.368	82.260	82.006	Phase 12
STREET No. 1 Phase 12	4	3	2	8	0.21	8	0.21	4.00	0.13	0.00	0.00	1.50	0.00	0.06	0.19	250	0.40	39.23	0.77	24.00	39.04		82.140	81.890	82.044	81.794	PHASE 12
	3	2	3	12	0.33	20	0.54	4.00	0.32	0.00	0.00	1.50	0.00	0.15	0.48	250	0.40	39.23	0.77	24.70	38.76		82.024	81.774	81.925	81.675	PHASE 12
BIDGOOD LANDS	-	2	65	260	2.10	260	2.10	4.00	4.21	0.00	0.00	1.50	0.00	0.59	4.80	250	0.40	39.23	0.77	95.00	34.43						Assumed Future Townhomes
FLAMBOROUGH WAY	2	Ex. 1	4	16	0.34	296	2.98	4.00	4.80	0.00	0.00	1.50	0.00	0.83	5.63	250	0.40	39.23	0.77	37.50	33.60		81.905	81.655	81.755	81.505	PHASE 12
	Ex. 1	Ex. 172A		0	0.17	1896	30.89	3.60	27.68	0.00	2.93	1.50	2.54	8.65	38.87	300	0.18	42.21	0.58	81.10	3.34		81.726	81.426	81.584	81.284	PHASE 6 (as-built info. added)
	Ex. 172A	Ex. 171A		0	0.77	1896	31.66	3.60	27.68	0.00	2.93	1.50	2.54	8.86	39.09	300	0.19	44.07	0.60	104.80	4.98		81.584	81.284	81.384	81.084	PHASE 6 (as-built info. added)
	Ex. 171A	Ex. 170A		0	0.68	1896	32.34	3.60	27.68	0.00	2.93	1.50	2.54	9.06	39.28	300	0.20	44.98	0.62	88.50	5.71		81.344	81.044	81.168	80.868	PHASE 6 (as-built info. added)
	Ex. 170A	Ex. 142B		0	0.41	1896	32.75	3.60	27.68	0.00	2.93	1.50	2.54	9.17	39.39	300	0.18	42.24	0.58	77.00	2.85		81.165	80.865	81.035	80.730	PHASE 6 (as-built info. added)
	Ex. 142B	Ex. 142C		0	0.00	1896	32.75	3.60	27.68	0.00	2.93	1.50	2.54	9.17	39.39	300	0.21	46.28	0.63	17.10	6.89		80.954	80.649	80.918	80.613	PHASE 6 (as-built info. added)
	Ex. 142C	142D		0	0.22	1896	32.97	3.60	27.68	0.00	2.93	1.50	2.54	9.23	39.45	300	0.30	183.25	2.51	110.00	143.79	0.04	80.878	80.573	77.248	76.943	
KLONDIKE ROAD COMMERCIAL SITE	142D	142E	134	536	5.33	2432	38.30	3.52	34.66	0.37	3.30	1.50	2.86	10.72	48.25	300	0.30	55.25	0.76	50.50	7.00	1.07	76.178	75.873	76.026	75.722	Flow from Future Townhouse Complex
	142E	142F		0	2.84	2432	41.14	3.52	34.66	2.84	6.14	1.50	5.33	11.52	51.51	300	0.30	55.25	0.76	110.00	3.74		76.026	75.722	75.696	75.392	
	142F	120B		0	0.00	2432	41.14	3.52	34.66	0.00	6.14	1.50	5.33	11.52	51.51	300	0.30	55.25	0.76	36.15	3.74		75.696	75.392	75.588	75.283	Commercial Property
	120B	120A		0	0.00	2432	41.14	3.52	34.66	0.00	6.14	1.50	5.33	11.52	51.51	300	0.30	55.25	0.76	18.69	3.74		75.588	75.283	75.532	75.227	Commercial Property
	120A	Ex. 120		0	0.00	2432	41.14	3.52	34.66	0.00	6.14	1.50	5.33	11.52	51.51	300	0.38	62.18	0.85	15.84	10.67		75.532	75.227	75.177	75.167	
Mersey Drive	122	121		24	0.38	24	0.38	4.00	0.39	0.00	0.00	1.50	0.00	0.11	0.50	200	3.78	66.52	2.05	63.5	66.02		80.400	80.200	78.000	77.800	
	121	120		24	0.28	48	0.66	4.00	0.78	0.00	0.00	1.50	0.00	0.18	0.96	200	2.53	54.43	1.68	68.0	53.47		77.900	77.700	76.179	75.979	
Westmoreland Avenue	120			20	0.33	2500	42.13	3.51	35.53	0.00	6.14	1.50	5.33	11.80	52.66	300	0.42	65.32	0.90	70.6	12.66		75.467	75.167	75.171	74.871	Phase IV (as-built info. Added)
Whithorn Avenue	116	119		8	0.14	8	0.14	4.00	0.13	0.00	0.00	1.50	0.00	0.04	0.17	200	2.00	48.38	1.49	8.1	48.22		79.262	79.062	79.100	78.900	
	119	118		24	0.22	32	0.36	4.00	0.52	0.00	0.00	1.50	0.00	0.10	0.62	200	2.69	56.10	1.73	37.2	55.48		79.000	78.800	78.000	77.800	
	118			44	0.50	76	0.86	4.00	1.23	0.00	0.00	1.50	0.00	0.24	1.47	200	2.21	50.86	1.57	81.1	49.39		77.700	77.500	75.908	75.708	
Westmoreland Avenue		117		24	0.31	2600	43.30	3.49	36.81	0.00	6.14	1.50	5.33	12.12	54.26	300	0.42	65.49	0.90	68.8	11.23		75.160	74.860	74.870	74.570	Phase IV (as-built info. Added)
	111	110		12	0.33	12	0.33	4.00	0.19	0.00	0.00	1.50	0.00	0.09	0.29	200	1.91	47.28	1.46	46.0	47.00		76.500	76.300	75.620	75.420	
Westmoreland Avenue	110	109		16	0.30	2628	43.93	3.49	37.16	0.00	6.14	1.50	5.33	12.30	54.79	300	0.36	60.31	0.83	66.3	5.52		74.840	74.540	74.603	74.303	Phase IV (as-built info. Added)
	115	114		20	0.32	20	0.32	4.00	0.32	0.00	0.00	1.50	0.00	0.09	0.41	200	4.49	72.51	2.24	51.2	72.10		81.500	81.300	79.200	79.000	
	116	114		20	0.30	20	0.30	4.00	0.32	0.00	0.00	1.50	0.00	0.08	0.41	200	0.58	26.06	0.80	64.5	25.65		79.374	79.174	79.000	78.800	
	114	113		32	0.40	72	1.02	4.00	1.17	0.00	0.00	1.50	0.00	0.29	1.45	200	0.62	26.94	0.83	72.8	25.49		78.750	78.550	78.300	78.100	
	113	112		16	0.32	88	1.34	4.00	1.43	0.00	0.00	1.50	0.00	0.38	1.80	200	0.50	24.24	0.75	67.7	22.44		78.200	78.000	77.860	77.660	
	112A	112		16	0.35	16	0.35	4.00	0.26	0.00	0.00	1.50	0.00	0.10	0.36	200	1.00	34.21	1.06	48.0	33.86		77.680	77.480	77.200	77.000	
	112	109		16	0.32	120	2.01	4.00	1.94	0.00	0.00	1.50	0.00	0.56	2.51	200	1.71	44.74	1.38	70.0	42.23		77.097	76.897	75.900	75.700	
Mersey Drive	109	108		24	0.33	2772	46.27	3.47	38.98	0.00	6.14	1.50	5.33	12.96	57.27	300	0.46	68.74	0.94	68.7	11.47		74.580	74.280	74.261	73.961	Phase IV (as-built info. Added)
Mersey Drive	124	123		28	0.44	28	0.44	4.00	0.45	0.00	0.00	1.50	0.00	0.12	0.58	200	0.55	25.38	0.78	96.3	24.80		75.600	75.400	75.070	74.870	Phase IV (as-built info. Added)
	123	103		32	0.42	60	0.86	4.00	0.97	0.00	0.00	1.50	0.00	0.24	1.21	200	0.59	26.27	0.81	109.2	25.06		75.065	74.865	74.421	74.221	Phase IV (as-built info. Added)
Easement	103	104		0	0.00	2832	47.13	3.46	39.73	0.00	6.14	1.50	5.33	13.20	58.26	375	0.32	103.88	0.91	12.4	45.62		74.245	73.870	74.205	73.830	Phase IV (as-built info. Added)
	127	126		56	0.78	56	0.78	4.00	0.91	0.00	0.00	1.50	0.00	0.22	1.13	200	1.00	34.21	1.06	100.7	33.09		78.155	77.955	77.148	76.948	
	126	126A		16	0.19	72	0.97	4.00	1.17	0.00	0.00	1.50	0.00	0.27	1.44	200	0.58	26.06	0.80	13.1	24.62		77.118	76.918	77.042	76.842	
	126A	103		0	0.00	72	0.97	4.00	1.17	0.00	0.00	1.50	0.00	0.27	1.44	200	2.83	57.56	1.77	49.8	56.12		77.012	76.812	75.600	75.400	
	107	106		12	0.19	12	0.19	4.00	0.19	0.00	0.00	1.50	0.00	0.05	0.25	200	1.00	34.21	1.06	41.0	33.97		77.470	77.270	77.060	76.860	
	106	105		36	0.36	48	0.55	4.00	0																		



1	17/09/03	REVISED PHASE 10 AND 12	L.J.
---	----------	-------------------------	------

SCALE
 25m 50m 75m 100m
 HORIZONTAL 1:3000

J.L. Richards & Associates Limited
 Consulting Engineers, Architect & Planners
 OTTAWA, KINGSTON, SUDBURY, CANADA.

DESIGN
 CHECKED L.J.
 DRAWN M.Z.
 CHECKED
 APPROVED

MORGAN'S GRANT SUBDIVISION
 MASTER DRAINAGE PLAN (SANITARY)

DATED	SEPT. 2003
DWG. No.	17730-SA

Appendix C

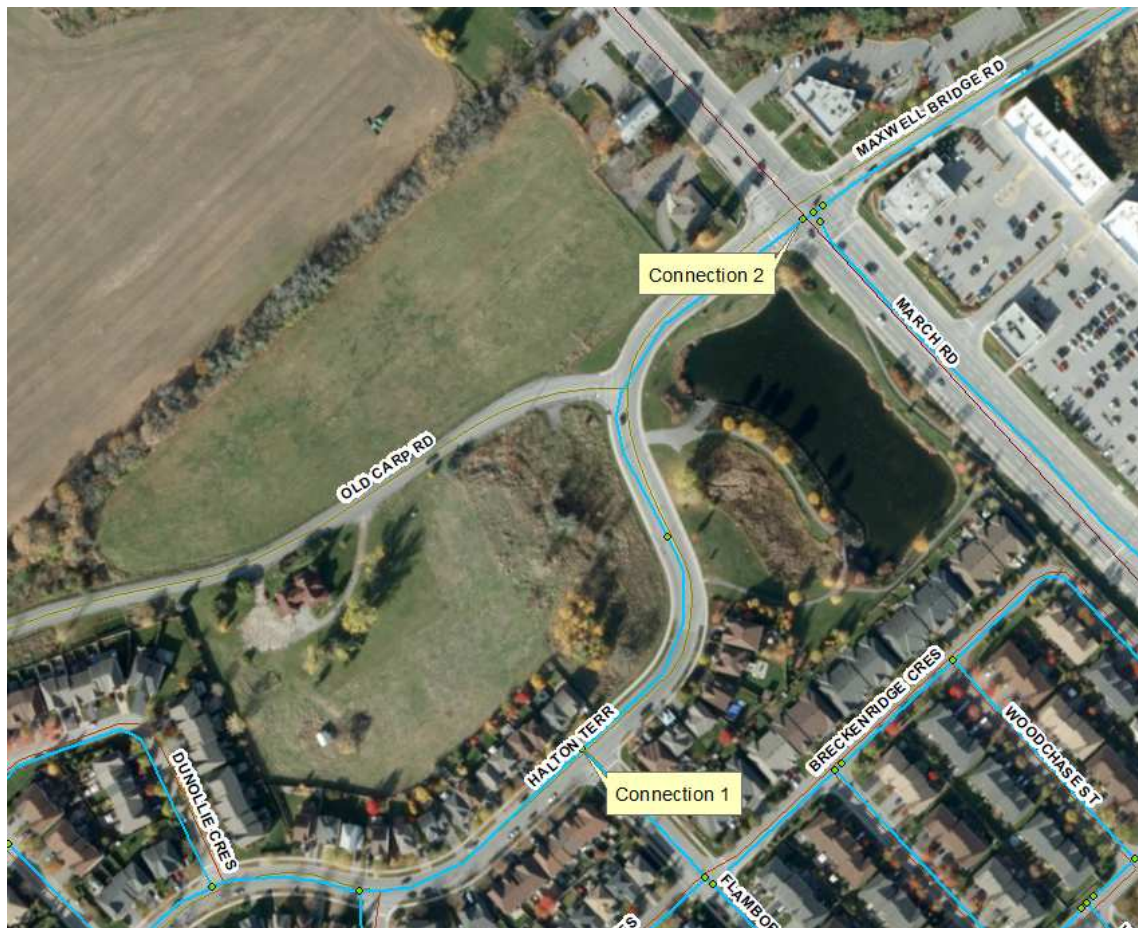
Watermain Boundary Conditions,
FUS Calculations, &
Modelling Results

Boundary Conditions 1104 Halton Terrace

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	30	0.50
Maximum Daily Demand	75	1.25
Peak Hour	166	2.76
Fire Flow Demand #1	20,000	333.33

Location



Results

Connection 1 – Halton Terr.

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	130.0	61.5
Peak Hour	126.3	56.3
Max Day plus Fire 1	115.0	40.2

Ground Elevation = 86.7 m

Connection 2 – Maxwell Bridge Rd.

Demand Scenario	Head (m)	Pressure¹ (psi)
Maximum HGL	130.0	72.5
Peak Hour	126.3	67.3
Max Day plus Fire 1	116.0	52.7

Ground Elevation = 79.0 m

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines



Engineers, Planners & Landscape Architects

Novatech Project #: 119024
 Project Name: 1104 Halton Terrace
 Date: 9/29/2023
 Input By: Designer
 Reviewed By: Project Manager

Legend

Building Description: Building 1 - 4/5-Storey Apartment
 Type V - Wood frame

Step	Input	Value Used	Total Fire Flow (L/min)			
Base Fire Flow						
1	Construction Material		Multiplier			
	Coefficient related to type of construction C	Type V - Wood frame	Yes	1.5		
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
Type I - Fire resistive construction (2 hrs)			0.6			
1.5						
2	Floor Area					
	A	Building Footprint (m ²)	2129			
		Number of Floors/Storeys	5			
		Area of structure considered (m ²)		10,645		
	F	Base fire flow without reductions				
$F = 220 C (A)^{0.5}$		34,000				
Reductions or Surcharges						
3	Occupancy hazard reduction or surcharge		FUS Table 3			
	(1)	Non-combustible		-25%		
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
Rapid burning			25%			
-15%						
4	Sprinkler Reduction		FUS Table 4			
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%		
		Standard Water Supply	Yes	-10%		
		Fully Supervised System		-10%		
		Cumulative Sub-Total		-40%		
Area of Sprinklered Coverage (m²)		10645	100%			
Cumulative Total		-40%				
5	Exposure Surcharge		FUS Table 5			
	(3)	North Side	>30m	0%		
		East Side	>30m	0%		
		South Side	20.1 - 30 m	10%		
		West Side	10.1 - 20 m	15%		
Cumulative Total		25%				
Results						
6	(1) + (2) + (3)	Total Required Fire Flow, rounded to nearest 1000L/min		L/min	25,000	
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	417
				or	USGPM	6,605

**1104 Halton Terrace
Water Demand**

	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Apartment Unit	N/A	103	185	0.601	1.502	3.305
Total	0.00	103	185	0.601	1.502	3.305

Water Demand Parameters

Apartment Unit	1.8	ppl/unit
Residential Demand	280	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Residential Fire Flow	417	L/s

1104 Halton Terrace: Watermain Demand

Node	Existing Singles	Apartment Unit	Total Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
B1		103	185	0.601	1.502	3.305	N/A
CAP1			0	0.000	0.000	0.000	N/A
EXHYD1	6		20	0.066	0.165	0.364	63
EXHYD2			0	0.000	0.000	0.000	63
HYD1			0	0.000	0.000	0.000	95
HYD2			0	0.000	0.000	0.000	95
HYD3			0	0.000	0.000	0.000	95
T1			0	0.000	0.000	0.000	N/A
Total	6.00	103	206	0.667	1.667	3.668	

Water Demand Parameters

Apartment Unit	1.8	ppl/unit	Residential Max Day	2.5	x Avg Day
Existing Singles	3.4	ppl/unit	Residential Peak Hour	2.2	x Max Day
Residential Demand	280	L/c/day	Apartment Fire Flow	417	L/s

1104 Halton Terrace: Watermain Analysis

Network Table - Nodes - (Peak Hour)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc B1	83.6	3.31	126.3	42.7	418.89	60.75
Junc EXHYD1	86.75	0.36	126.3	39.55	387.99	56.27
Junc EXHYD2	80.05	0	126.3	46.25	460.00	66.72
Junc HYD1	83.73	0	126.3	42.57	450.00	65.27
Junc HYD2	83.44	0	126.3	42.86	420.46	60.98
Junc HYD3	82.43	0	126.3	43.87	430.36	62.42
Junc T1	83.25	0	126.3	43.05	422.32	61.25
Resvr RES1	126.3	-2.27	126.3	0	0.00	0.00
Resvr RES2	126.3	-1.4	126.3	0	0.00	0.00

Network Table - Links - (Peak Hour)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	5	300	120	2.27	0.03	0.01	0.047
Pipe P2	100	300	120	1.91	0.03	0.00	0.039
Pipe P3	13	300	120	1.91	0.03	0.00	0.035
Pipe P4	67	300	120	-1.40	0.02	0.00	0.040
Pipe P5	68	300	120	-1.40	0.02	0.00	0.041
Pipe P6	77	300	120	-1.40	0.02	0.00	0.042
Pipe P7	15	204	100	3.31	0.10	0.12	0.048
Pipe P8	15	204	100	3.31	0.10	0.12	0.049

1104 Halton Terrace: Watermain Analysis

Network Table - Nodes - (Max Pressure Check)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi	Age Hours
Junc B1	83.6	0.6	130	46.4	455.18	66.02	11.14
Junc EXHYD1	86.75	0.07	130	43.25	424.28	61.54	0.21
Junc EXHYD2	80.05	0	130	49.95	460.00	66.72	5.92
Junc HYD1	83.73	0	130	46.27	450.00	65.27	5.84
Junc HYD2	83.44	0	130	46.56	456.75	66.25	10.91
Junc HYD3	82.43	0	130	47.57	466.66	67.68	11.18
Junc T1	83.25	0	130	46.75	458.62	66.52	10.7
Resvr RES1	130	-0.41	130	0	0.00	0.00	0
Resvr RES2	130	-0.25	130	0	0.00	0.00	0

Network Table - Links - (Max Pressure Check)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	5	300	120	0.41	0.01	0.00	0.000
Pipe P2	100	300	120	0.35	0.00	0.00	0.046
Pipe P3	13	300	120	0.35	0.00	0.00	0.179
Pipe P4	67	300	120	-0.25	0.00	0.00	0.063
Pipe P5	68	300	120	-0.25	0.00	0.00	0.063
Pipe P6	77	300	120	-0.25	0.00	0.00	0.055
Pipe P7	15	204	100	0.60	0.02	0.01	0.061
Pipe P8	15	204	100	0.60	0.02	0.01	0.060

1104 Halton Terrace: Watermain Analysis

Network Table - Nodes - (Max Day + FF)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc B1	83.6	1.5	112.19	28.59	280.47	40.68
Junc EXHYD1	86.75	66.17	114.85	28.1	275.66	39.98
Junc EXHYD2	80.05	66	114.01	33.96	460.00	66.72
Junc HYD1	83.73	95	113.15	29.42	450.00	65.27
Junc HYD2	83.44	95	112.19	28.75	282.04	40.91
Junc HYD3	82.43	95	113.19	30.76	301.76	43.77
Junc T1	83.25	0	113.12	29.87	293.02	42.50
Resvr RES1	115	-222.55	115	0	0.00	0.00
Resvr RES2	116	-196.12	116	0	0.00	0.00

Network Table - Links - (Max Day + FF)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	5	300	120	222.55	3.15	32.79	0.019
Pipe P2	100	300	120	156.38	2.21	17.06	0.021
Pipe P3	13	300	120	61.38	0.87	3.02	0.024
Pipe P4	67	300	120	-35.12	0.50	1.07	0.026
Pipe P5	68	300	120	-130.12	1.84	12.14	0.021
Pipe P6	77	300	120	-196.12	2.77	25.95	0.020
Pipe P7	15	204	100	96.50	2.95	64.00	0.029
Pipe P8	15	204	100	1.50	0.05	0.03	0.054

Appendix D

STM Design Sheets, SWM Excerpts &
PCSWMM Modelling Info

1104 Halton Terrace (119024)
PCSWMM Model Results (Ponding)

CB / CBMH ID	Invert Elev. (m)	Rim Elev. (m)	Spill Elev. (m)	Ponding Depth (m)	HGL Elev. (m) ¹				Ponding Depth (m)				Spill Depth (m)			
					2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)
CB01	82.32	83.32	83.45	0.13	82.51	82.71	83.43	83.48	0.00	0.00	0.11	0.16	0.00	0.00	0.00	0.03
CBMH01	83.68	85.55	85.90	0.35	85.21	85.68	85.85	85.86	0.00	0.13	0.30	0.31	0.00	0.00	0.00	0.00
CBMH02	82.89	85.55	85.85	0.30	85.21	85.68	85.85	85.86	0.00	0.13	0.30	0.31	0.00	0.00	0.00	0.01
RY01	81.23	82.75	82.84	0.09	81.75	81.96	82.84	82.92	0.00	0.00	0.09	0.17	0.00	0.00	0.00	0.08
RY02	81.73	83.45	83.45	0.00	81.75	81.96	82.84	82.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RY03	81.83	82.90	83.25	0.35	81.84	81.96	82.84	82.92	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
RY04	81.98	83.16	83.26	0.10	81.98	82.00	82.84	82.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RY05	82.65	83.75	83.98	0.23	82.94	83.72	83.97	84.00	0.00	0.00	0.22	0.25	0.00	0.00	0.00	0.02
RY06	82.58	83.75	83.98	0.23	82.94	83.72	83.97	84.00	0.00	0.00	0.22	0.25	0.00	0.00	0.00	0.02
RY07	82.54	83.98	83.98	0.00	82.94	83.72	83.97	84.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
RY08	82.44	85.40	85.40	0.00	82.94	83.72	83.96	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

¹ 3-hour Chicago Storm.

1104 Halton Terrace (119024)
 PCSWMM Storage Curves (underground/surface storage)

CB01-Storage		
Depth (m)	Area (m ²)	Volume (m ³)
0.00	0.36	0.00
1.00	0.36	0.36
1.13	76.60	5.36
1.14	0.00	5.75
2.00	0.00	5.75

CBMH01-Storage		
Depth (m)	Area (m ²)	Volume (m ³)
0.00	2.63	0.00
1.87	2.63	4.92
2.22	311.70	59.93
2.22	0.00	60.08
2.87	0.00	60.08

CBMH02-Storage		
Depth (m)	Area (m ²)	Volume (m ³)
0.00	2.63	0.00
2.66	2.63	7.00
2.96	188.00	35.59
2.96	0.00	35.68
3.66	0.00	35.68

RY05-Storage		
Depth (m)	Area (m ²)	Volume (m ³)
0.00	0.36	0.00
1.17	0.36	0.42
1.40	163	19.17
1.40	0.00	19.25
2.17	0.00	19.25

RY06-Storage		
Depth (m)	Area (m ²)	Volume (m ³)
0.00	0.36	0.00
1.24	0.36	0.45
1.47	163	19.20
1.47	0.00	19.28
2.24	0.00	19.28

1104 Halton Terrace (119024)
Summary of Hydraulic Grade Line (HGL) Elevations

MH ID	Obvert Elevation (m)	T/G Elevation (m)	HGL Elevation ¹ (m)	Surcharge (m)	Clearance from T/G (m)	HGL in Stress Test ¹ (m)
MH02	81.63	83.79	82.66	1.03	1.13	82.66
MH04	82.55	85.82	82.66	0.11	3.16	82.66
Connection to Ex.	81.49	83.22	82.65	1.16	0.57	82.65

¹ 3-hour Chicago Storm; Fixed outfall (100yr HGL @ connections to existing = 82.65).

HGL Elevation at CBMH01 is taken downstream of the ICD

STORM SEWER DESIGN SHEET
(Maple Leaf Homes)
 FLOW RATES BASED ON RATIONAL METHOD



LOCATION				AREA (ha)			FLOW							TOTAL FLOW	SEWER DATA								
Street	Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
	A-01, A-03, A-07	CBMH2	MH04	0.280	0.68	0.19	0.529	0.529	10.00	76.81			40.7	40.7	0.305	300	PVC	1.00	12.4	100.8	1.38	0.15	40%
						0.00	0.000	0.000	10.00														
		MH04	MH02	0.000	0.00	0.00	0.000	0.529	10.15	76.24			40.4	40.4	0.381	375	PVC	1.00	39.0	182.8	1.60	0.41	22%
						0.00	0.000	0.000	10.15														
	A-04	MH02	EX 1500mm	0.106	0.53	0.06	0.156	0.685	10.56	74.74			51.2	51.2	0.457	450	Conc	0.50	28.8	210.2	1.28	0.37	24%
						0.00	0.000	0.000	10.56														

Q = 2.78 AIC, where Q = Peak Flow in Litres per Second (L/s) A = Area in hectares (ha) I = Rainfall Intensity (mm/hr), 5 year storm C = Runoff Coefficient	Consultant:	Novatech
	Date:	October 12, 2023
	Design By:	Lucas Wilson
	Client:	
	Maple Leaf Homes	
	Dwg. Reference:	Checked By:
	119024-STM	MAB

Legend:
 * Indicates 100 Year intensity for storm sewers
 10.00 Storm sewers designed to the 2 year event (without ponding) for local roads
 10.00 Storm sewers designed to the 5 year event (without ponding) for collector roads
 10.00 Storm sewers designed to the 10 year event (without ponding) for arterial roads



1104 Halton Terrace (119024)
 Pre-Development Peak Flow Calculations (EXT-02)
 On-Site Area Draining to Old Carp Road

EXISTING CONDITIONS

Time-of-Concentration (Uplands Method)

Flow Classification (Land Use)	Length (m)	Elevation		Slope (%)	Velocity ¹ (m/s)	Time-of- Concentration (min)
		U/S (m)	D/S (m)			
EXT-02 Overland Flow (Pasture)	100	86.5	80.7	5.8%	0.45	3.7
TOTAL	100	86.5	80.7	5.8%	0.45	10.0

¹ Refer to Uplands Velocity Chart.

*Min 10-minutes.

Existing Catchment Parameters

Catchment ID	Areas (ha)			Runoff Coefficient		%Imperv.
	Total	Hard Surfaces (C=0.70)	Soft Surfaces (C=0.20)	C _{avg}	C _{100yr} ¹	
TOTAL	0.194	0.005	0.189	0.21	0.27	1.4%

¹ Runoff coefficient increases by 25%, up to a maximum value of 1.00, for the 100-year event.

Pre-Development Peak Flows

Catchment ID	Rainfall Intensity (mm/hr) ¹			Peak Flows (L/s)		
	2-year	5-year	100-year	2-year	5-year	100-year
EXT-02 (existing conditions)	76.81	104.19	178.56	8.7	11.8	25.9

¹ Tc is based on Uplands Method.

Notes:

Rainfall Intensity from City of Ottawa Sewer Design Guidelines (Oct. 2012)

- 100 year Intensity = $1735.688 / (T_c + 6.014)^{0.820}$
- 5 year Intensity = $998.071 / (T_c + 6.053)^{0.814}$
- 2 year Intensity = $732.951 / (T_c + 6.199)^{0.810}$

$$Q(\text{peak flow}) = 2.78 \times C \times I \times A$$

- C is the runoff coefficient
- I is the rainfall intensity
- A is the total drainage area

EXISTING CONDITIONS

Time-of-Concentration (Uplands Method)

Flow Classification (Land Use)	Length (m)	Elevation		Slope (%)	Velocity ¹ (m/s)	Time-of- Concentration (min)
		U/S (m)	D/S (m)			
EXT-01/EXT-04 Overland Flow (Pasture)	210	87.0	80.7	3.0%	0.37	9.5
TOTAL	210	87.0	80.7	3.0%	0.37	10.0

¹ Refer to Uplands Velocity Chart.

*Min 10-minutes.

Existing Catchment Parameters

Catchment ID	Areas (ha)			Runoff Coefficient		%Imperv.
	Total	Hard Surfaces (C=0.90)	Soft Surfaces (C=0.20)	C _{avg}	C _{100yr} ¹	
TOTAL	1.550	0.120	1.430	0.25	0.31	7.7%

¹ Runoff coefficient increases by 25%, up to a maximum value of 1.00, for the 100-year event.

Pre-Development Peak Flows

Catchment ID	Rainfall Intensity (mm/hr) ¹			Peak Flows (L/s)		
	2-year	5-year	100-year	2-year	5-year	100-year
Site Boundary (existing conditions)	76.81	104.19	178.56	84.1	114.1	237.0

¹ Tc is based on Uplands Method.

Notes:

Rainfall Intensity from City of Ottawa Sewer Design Guidelines (Oct. 2012)

- 100 year Intensity = $1735.688 / (Tc + 6.014)^{0.820}$
- 5 year Intensity = $998.071 / (Tc + 6.053)^{0.814}$
- 2 year Intensity = $732.951 / (Tc + 6.199)^{0.810}$

$$Q(\text{peak flow}) = 2.78 \times C \times I \times A$$

- C is the runoff coefficient
- I is the rainfall intensity
- A is the total drainage area

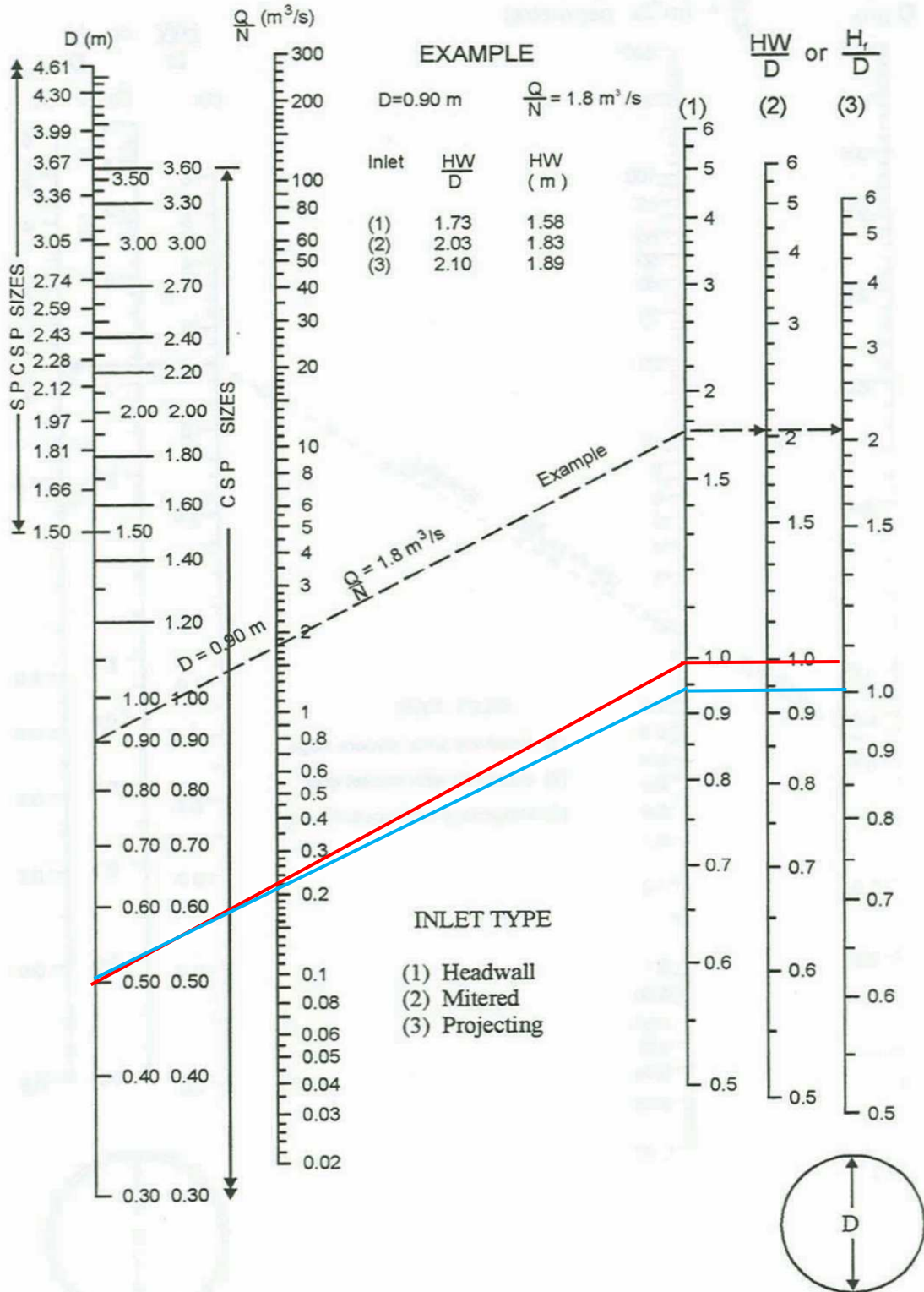
MTO Drainage Management Manual
Design Chart 2.32: Inlet Control: Circular Culverts
Source: Herr (1977)

PROJECT NAME: 1104 Halton Terrace
PROJECT #: 119024

500mm CSP Culvert
 Crosses Old Carp Road

Drainage Area to Culvert = 1.55 ha (approx.)
 Runoff Coefficient = 0.25 (approx.)

100-year Peak Flow = 0.237 m³/s
 Capacity (HW/D=1) = 0.21 m³/s



1104 Halton Terrace (119024)
PCSWMM Model Output
100yr 3-hour Chicago Storm



EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

 Element Count

Number of rain gages 1
 Number of subcatchments ... 12
 Number of nodes 29
 Number of links 31
 Number of pollutants 0
 Number of land uses 0

 Raingage Summary

Name	Data Source	Data Type	Recording Interval
RG-1	C3h-100yr	INTENSITY	10 min.

 Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
A-01	0.09	28.67	82.40	1.0000	RG-1	CBMH02
A-02	0.09	37.20	45.70	1.0000	RG-1	RY05
A-03	0.09	44.00	80.50	1.0000	RG-1	CBMH01
A-04	0.11	26.50	47.30	4.0000	RG-1	CB01
A-05	0.01	7.00	0.00	1.0000	RG-1	RY04
A-06	0.03	20.67	0.00	1.0000	RG-1	RY03
A-07	0.15	17.18	100.00	1.0000	RG-1	CBMH01
A-08	0.03	11.20	0.00	1.0000	RG-1	RY01
a-09	0.02	8.50	79.40	5.0000	RG-1	Ex_Ditch1
A-10	0.08	15.40	100.00	1.0000	RG-1	RY01
B-01	0.01	5.00	16.70	3.0000	RG-1	OF1
B-02	0.02	6.86	0.00	2.0000	RG-1	Ex_Ditch3

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HP01	JUNCTION	83.66	1.00	0.0	
HP02	JUNCTION	83.38	1.00	0.0	
HP-CBMH02	JUNCTION	85.85	1.00	0.0	
HP-CBMH03	JUNCTION	85.90	1.00	0.0	
HP-RY05	JUNCTION	83.85	1.00	0.0	
HP-RY06	JUNCTION	83.98	1.00	0.0	
HP-RY08	JUNCTION	83.26	1.00	0.0	
RY06-Dummy	JUNCTION	81.39	2.36	0.0	
Ex_1500	OUTFALL	80.11	1.38	0.0	
Ex_Ditch1	OUTFALL	81.20	0.00	0.0	
Ex_Ditch2	OUTFALL	80.95	0.00	0.0	
Ex_Ditch3	OUTFALL	83.22	1.00	0.0	
HP-CB01	OUTFALL	83.45	1.00	0.0	
HP-RY01	OUTFALL	82.84	1.00	0.0	
HP-RY02	OUTFALL	83.25	1.00	0.0	
OF1	OUTFALL	83.30	0.00	0.0	
CB01	STORAGE	82.32	2.00	0.0	
CBMH01	STORAGE	83.68	2.87	0.0	
CBMH02	STORAGE	82.89	3.66	0.0	
MH02	STORAGE	81.18	2.61	0.0	
MH04	STORAGE	82.17	3.65	0.0	
RY01	STORAGE	81.23	2.52	0.0	
RY02	STORAGE	81.73	2.72	0.0	
RY03	STORAGE	81.83	2.07	0.0	
RY04	STORAGE	81.98	2.18	0.0	
RY05	STORAGE	82.65	2.10	0.0	
RY06	STORAGE	82.58	2.17	0.0	
RY07	STORAGE	82.54	2.44	0.0	
RY08	STORAGE	82.44	2.96	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
CBMH01-CBMH02	CBMH01	CBMH02	CONDUIT	37.6	0.5053	0.0130
MH02-Ex_1500	MH02	Ex_1500	CONDUIT	28.8	0.4861	0.0130
MH04-MH02	MH04	MH02	CONDUIT	39.0	1.0001	0.0130
MS-CB01	CB01	HP-CB01	CONDUIT	3.0	-4.3374	0.0150
MS-CBMH01(1)	CBMH01	HP-CBMH03	CONDUIT	3.0	-11.7469	0.0150
MS-CBMH01(2)	HP-CBMH03	CBMH02	CONDUIT	3.0	11.7469	0.0150
MS-CBMH02(1)	CBMH02	HP-CBMH02	CONDUIT	3.0	-10.0504	0.0150
MS-CBMH02(2)	HP-CBMH02	CB01	CONDUIT	3.0	156.9311	0.0150
MS-HP01	HP01	RY04	CONDUIT	22.0	2.2733	0.0350
MS-HP02	HP02	RY01	CONDUIT	16.6	1.5062	0.0350
MS-RY01	RY01	HP-RY01	CONDUIT	3.0	-3.0014	0.0350
MS-RY02(1)	RY02	RY01	CONDUIT	27.6	2.5370	0.0350
MS-RY02(2)	RY02	RY03	CONDUIT	21.5	2.5590	0.0350
MS-RY03	RY03	HP-RY02	CONDUIT	3.0	-11.7469	0.0350
MS-RY04(1)	RY04	HP-RY08	CONDUIT	6.6	-1.5153	0.0350
MS-RY04(2)	HP-RY08	RY03	CONDUIT	20.0	1.8003	0.0350
MS-RY05(1)	RY05	HP-RY05	CONDUIT	3.0	-3.3352	0.0350
MS-RY05(2)	HP-RY05	RY06	CONDUIT	3.0	3.3352	0.0350
MS-RY06(1)	RY06	HP-RY06	CONDUIT	3.0	-7.6893	0.0350
MS-RY06(2)	HP-RY06	Ex_Ditch3	CONDUIT	30.3	2.5077	0.0350
RY01-RY06	RY02	RY06-Dummy	CONDUIT	3.0	1.0001	0.0130
RY03-RY02	RY03	RY02	CONDUIT	19.6	0.5102	0.0130
RY05-RY06	RY05	RY06	CONDUIT	13.5	0.5185	0.0130
RY06-RY07	RY06	RY07	CONDUIT	7.6	0.5263	0.0130
RY07-RY08	RY07	RY08	CONDUIT	19.3	0.5181	0.0130
RY08-RY03	RY04	RY03	CONDUIT	30.7	0.4886	0.0130
SC740	RY06-Dummy	RY01	CONDUIT	35.3	0.0283	0.0130
O-CB01	CB01	MH02	ORIFICE			
O-CBMH02	CBMH02	MH04	ORIFICE			
O-RY01	RY01	Ex_Ditch1	ORIFICE			
O-RY08	RY08	Ex_Ditch2	ORIFICE			

 Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
CBMH01-CBMH02	CIRCULAR	0.97	0.75	0.24	0.97	1	1593.18
MH02-Ex_1500	CIRCULAR	0.45	0.16	0.11	0.45	1	198.79
MH04-MH02	CIRCULAR	0.38	0.11	0.09	0.38	1	175.35
MS-CB01	RECT_OPEN	1.00	3.00	0.60	3.00	1	29632.76
MS-CBMH01(1)	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
MS-CBMH01(2)	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
MS-CBMH02(1)	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
MS-CBMH02(2)	RECT_OPEN	1.00	3.00	0.60	3.00	1	178242.59
MS-HP01	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8394.58
MS-HP02	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6832.97
MS-RY01	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	9645.56
MS-RY02(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8868.16
MS-RY02(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8906.40
MS-RY03	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	19082.29
MS-RY04(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6853.65
MS-RY04(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7470.34
MS-RY05(1)	RECT_OPEN	1.00	3.00	0.60	3.00	1	11136.28
MS-RY05(2)	RECT_OPEN	1.00	3.00	0.60	3.00	1	11136.28
MS-RY06(1)	RECT_OPEN	1.00	3.00	0.60	3.00	1	16909.22
MS-RY06(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8816.74
RY01-RY06	CIRCULAR	0.30	0.07	0.07	0.30	1	96.71
RY03-RY02	CIRCULAR	0.25	0.05	0.06	0.25	1	42.48
RY05-RY06	CIRCULAR	0.25	0.05	0.06	0.25	1	42.82
RY06-RY07	CIRCULAR	0.25	0.05	0.06	0.25	1	43.15
RY07-RY08	CIRCULAR	0.25	0.05	0.06	0.25	1	42.81
RY08-RY03	CIRCULAR	0.25	0.05	0.06	0.25	1	41.57
SC740	RECT_CLOSED	1.06	0.98	0.25	0.92	1	497.31

 NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

 Analysis Options

1104 Halton Terrace (119024)
PCSWMM Model Output
100yr 3-hour Chicago Storm

Flow Units LPS
 Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
 Infiltration Method HORTON
 Flow Routing Method DYNWAVE
 Surcharge Method EXTRAN
 Starting Date 07/21/2021 00:00:00
 Ending Date 07/22/2021 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00
 Routing Time Step 5.00 sec
 Variable Time Step YES
 Maximum Trials 8
 Number of Threads 4
 Head Tolerance 0.001524 m

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		
Total Precipitation	0.051	71.667
Evaporation Loss	0.000	0.000
Infiltration Loss	0.011	16.032
Surface Runoff	0.040	55.764
Final Storage	0.000	0.572
Continuity Error (%)	-0.978	

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.040	0.399
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.002
External Outflow	0.040	0.403
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.001	0.013
Final Stored Volume	0.001	0.013
Continuity Error (%)	-0.664	

Highest Continuity Errors
 Node RY06-Dummy (-14.37%)
 Node RY02 (7.84%)

Time-Step Critical Elements
 Link RY01-RY06 (6.08%)
 Link MS-CBMH02 (2) (4.93%)
 Link MS-RY05 (1) (2.55%)

Highest Flow Instability Indexes
 Link O-CB01 (122)
 Link MH02-Ex_1500 (13)
 Link RY01-RY06 (13)
 Link SC740 (9)
 Link RY03-RY02 (7)

Routing Time Step Summary
 Minimum Time Step : 0.50 sec

Average Time Step : 4.59 sec
 Maximum Time Step : 5.00 sec
 Percent in Steady State : -0.00
 Average Iterations per Step : 2.10
 Percent Not Converging : 0.00
 Time Step Frequencies :
 5.000 - 3.155 sec : 86.87 %
 3.155 - 1.991 sec : 5.93 %
 1.991 - 1.256 sec : 6.43 %
 1.256 - 0.792 sec : 0.61 %
 0.792 - 0.500 sec : 0.16 %

Subcatchment Runoff Summary

Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm
A-01	40.77	0.882	71.67	0.00	0.00	7.82	58.11	5.13	63.24
A-02	31.90	0.601	71.67	0.00	0.00	28.72	32.12	43.09	43.09
A-03	41.90	0.871	71.67	0.00	0.00	8.63	56.66	5.80	62.46
A-04	41.24	0.667	71.67	0.00	0.00	23.79	33.23	14.60	47.83
A-05	2.87	0.364	71.67	0.00	0.00	46.28	0.00	26.10	26.10
A-06	7.58	0.375	71.67	0.00	0.00	45.70	0.00	26.87	26.87
A-07	70.92	1.008	71.67	0.00	0.00	0.00	72.21	0.00	72.21
A-08	4.93	0.355	71.67	0.00	0.00	46.83	0.00	25.43	25.43
a-09	8.16	0.868	71.67	0.00	0.00	9.05	55.75	6.43	62.18
A-10	38.03	1.007	71.67	0.00	0.00	0.00	72.18	0.00	72.18
B-01	1.71	0.504	71.67	0.00	0.00	36.97	36.15	24.42	36.15
B-02	4.26	0.355	71.67	0.00	0.00	46.80	0.00	25.46	25.46

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
HP01	JUNCTION	0.00	0.00	83.66	0 00:00	0.00
HP02	JUNCTION	0.00	0.00	83.38	0 00:00	0.00
HP-CBMH02	JUNCTION	0.00	0.00	85.85	0 01:28	0.00
HP-CBMH03	JUNCTION	0.00	0.00	85.90	0 00:00	0.00
HP-RY05	JUNCTION	0.01	0.13	83.98	0 02:11	0.12
HP-RY06	JUNCTION	0.00	0.00	83.98	0 00:00	0.00
HP-RY08	JUNCTION	0.00	0.00	83.26	0 00:00	0.00
RY06-Dummy	JUNCTION	0.27	1.45	82.84	0 01:51	1.45
Ex_1500	OUTFALL	2.54	2.54	82.65	0 00:00	2.54
Ex_Ditch1	OUTFALL	0.03	0.03	81.23	0 00:00	0.03
Ex_Ditch2	OUTFALL	1.80	1.80	82.75	0 00:00	1.80
Ex_Ditch3	OUTFALL	0.00	0.00	83.22	0 00:00	0.00
HP-CB01	OUTFALL	0.00	0.00	83.45	0 00:00	0.00
HP-RY01	OUTFALL	0.00	0.00	82.84	0 00:00	0.00
HP-RY02	OUTFALL	0.00	0.00	83.25	0 00:00	0.00
OF1	OUTFALL	0.00	0.00	83.30	0 00:00	0.00
CB01	STORAGE	0.36	1.11	83.43	0 01:13	1.11
CBMH01	STORAGE	0.54	2.17	85.85	0 01:27	2.17
CBMH02	STORAGE	0.81	2.96	85.85	0 01:28	2.96
MH02	STORAGE	1.47	1.48	82.66	0 01:27	1.48

1104 Halton Terrace (119024)
 PCSWMM Model Output
 100yr 3-hour Chicago Storm



MH04	STORAGE	0.48	0.49	82.66	0	01:27	0.49
RY01	STORAGE	0.33	1.61	82.84	0	01:51	1.61
RY02	STORAGE	0.17	1.11	82.84	0	01:51	1.11
RY03	STORAGE	0.14	1.01	82.84	0	01:50	1.01
RY04	STORAGE	0.11	0.86	82.84	0	01:52	0.86
RY05	STORAGE	0.28	1.32	83.97	0	01:41	1.32
RY06	STORAGE	0.35	1.39	83.97	0	01:41	1.39
RY07	STORAGE	0.39	1.43	83.97	0	01:41	1.43
RY08	STORAGE	0.49	1.52	83.96	0	01:42	1.52

 Node Inflow Summary

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 ⁶ ltr	Total Inflow Volume 10 ⁶ ltr	Flow Balance Error Percent
HP01	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 ltr
HP02	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 ltr
HP-CBMH02	JUNCTION	0.00	17.80	0 01:28	0	0.0135	-0.002
HP-CBMH03	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 ltr
HP-RY05	JUNCTION	0.00	81.63	0 02:13	0	0.0205	0.448
HP-RY06	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 ltr
HP-RY08	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 ltr
RY06-Dummy	JUNCTION	0.00	27.76	0 01:08	0	0.0279	-12.565
Ex_1500	OUTFALL	0.00	36.16	0 01:12	0	0.269	0.000
Ex_Ditch1	OUTFALL	8.16	11.19	0 01:10	0.0106	0.0879	0.000
Ex_Ditch2	OUTFALL	0.00	4.13	0 01:42	0	0.0409	0.000
Ex_Ditch3	OUTFALL	4.26	4.26	0 01:10	0.00611	0.00611	0.000
HP-CB01	OUTFALL	0.00	0.00	0 00:00	0	0	0.000 ltr
HP-RY01	OUTFALL	0.00	0.00	0 00:00	0	0	0.000 ltr
HP-RY02	OUTFALL	0.00	0.00	0 00:00	0	0	0.000 ltr
OF1	OUTFALL	1.71	1.71	0 01:15	0.00181	0.00181	0.000
CB01	STORAGE	41.24	41.24	0 01:10	0.0507	0.0653	0.126
CBMH01	STORAGE	112.82	112.82	0 01:10	0.16	0.16	0.033
CBMH02	STORAGE	40.77	89.86	0 01:06	0.0543	0.215	0.020
MH02	STORAGE	0.00	36.16	0 01:13	0	0.271	-0.044
MH04	STORAGE	0.00	9.46	0 01:28	0	0.203	0.009
RY01	STORAGE	42.96	42.96	0 01:10	0.0627	0.0935	0.318
RY02	STORAGE	0.00	14.38	0 01:08	0	0.0134	8.511
RY03	STORAGE	7.58	14.25	0 01:08	0.00833	0.013	-0.234
RY04	STORAGE	2.87	9.89	0 01:10	0.00365	0.00425	-0.593
RY05	STORAGE	31.90	41.02	0 02:12	0.0401	0.0419	0.254
RY06	STORAGE	0.00	43.36	0 02:12	0	0.0418	-0.795
RY07	STORAGE	0.00	16.81	0 01:09	0	0.0411	0.022
RY08	STORAGE	0.00	9.53	0 01:09	0	0.0411	-0.000

 Node Surcharge Summary

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
RY06-Dummy	JUNCTION	2.04	0.386	0.912

 Node Flooding Summary

No nodes were flooded.

 Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt	Exfil Pcnt	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB01	0.000	3	0	0	0.004	66	0 01:13	26.81

CBMH01	0.007	12	0	0	0.047	78	0	01:27	52.09
CBMH02	0.006	17	0	0	0.036	100	0	01:25	27.27
MH02	0.002	56	0	0	0.002	57	0	01:27	36.16
MH04	0.001	13	0	0	0.001	13	0	01:27	10.87
RY01	0.000	13	0	0	0.001	64	0	01:51	27.80
RY02	0.000	6	0	0	0.000	41	0	01:51	9.11
RY03	0.000	7	0	0	0.000	49	0	01:50	8.61
RY04	0.000	5	0	0	0.000	39	0	01:52	3.66
RY05	0.001	4	0	0	0.008	42	0	01:41	43.88
RY06	0.001	4	0	0	0.008	42	0	01:41	44.12
RY07	0.000	16	0	0	0.001	58	0	01:41	9.53
RY08	0.000	17	0	0	0.001	51	0	01:42	4.13

 Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10 ⁶ ltr
Ex_1500	94.87	4.79	36.16	0.269
Ex_Ditch1	39.17	3.42	11.19	0.088
Ex_Ditch2	22.23	2.93	4.13	0.041
Ex_Ditch3	10.96	1.52	4.26	0.006
HP-CB01	0.00	0.00	0.00	0.000
HP-RY01	0.00	0.00	0.00	0.000
HP-RY02	0.00	0.00	0.00	0.000
OF1	10.76	0.42	1.71	0.002
System	22.25	13.08	56.01	0.406

 Link Flow Summary

Link	Type	Maximum Flow LPS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
CBMH01-CBMH02	CONDUIT	52.09	0 01:05	0.49	0.03	1.00
MH02-Ex_1500	CONDUIT	36.16	0 01:12	0.23	0.18	1.00
MH04-MH02	CONDUIT	10.87	0 01:26	0.10	0.06	1.00
MS-CB01	CONDUIT	0.00	0 00:00	0.00	0.00	0.05
MS-CBMH01 (1)	CONDUIT	0.00	0 00:00	0.00	0.00	0.15
MS-CBMH01 (2)	CONDUIT	0.00	0 00:00	0.00	0.00	0.15
MS-CBMH02 (1)	CONDUIT	17.80	0 01:28	0.04	0.00	0.15
MS-CBMH02 (2)	CONDUIT	17.80	0 01:28	1.63	0.00	0.05
MS-HP01	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
MS-HP02	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
MS-RY01	CONDUIT	0.00	0 00:00	0.00	0.00	0.04
MS-RY02 (1)	CONDUIT	0.00	0 00:00	0.00	0.00	0.04
MS-RY02 (2)	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
MS-RY03	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
MS-RY04 (1)	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
MS-RY04 (2)	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
MS-RY05 (1)	CONDUIT	41.62	0 02:13	0.09	0.00	0.17
MS-RY05 (2)	CONDUIT	40.74	0 02:12	0.09	0.00	0.17
MS-RY06 (1)	CONDUIT	0.00	0 00:00	0.00	0.00	0.11
MS-RY06 (2)	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
RY01-RY06	CONDUIT	14.38	0 01:08	0.58	0.15	1.00
RY03-RY02	CONDUIT	8.61	0 01:12	0.59	0.20	1.00
RY05-RY06	CONDUIT	23.13	0 01:09	0.47	0.54	1.00
RY06-RY07	CONDUIT	16.81	0 01:09	0.34	0.39	1.00
RY07-RY08	CONDUIT	9.53	0 01:09	0.19	0.22	1.00
RY08-RY03	CONDUIT	7.16	0 01:10	0.25	0.17	1.00
SC740	CONDUIT	24.90	0 01:09	0.06	0.05	1.00
O-CB01	ORIFICE	26.81	0 01:13			1.00
O-CBMH02	ORIFICE	9.46	0 01:28			1.00
O-RY01	ORIFICE	4.28	0 01:51			1.00
O-RY08	ORIFICE	4.13	0 01:42			1.00

 Flow Classification Summary

**1104 Halton Terrace (119024)
 PCSWMM Model Output
 100yr 3-hour Chicago Storm**

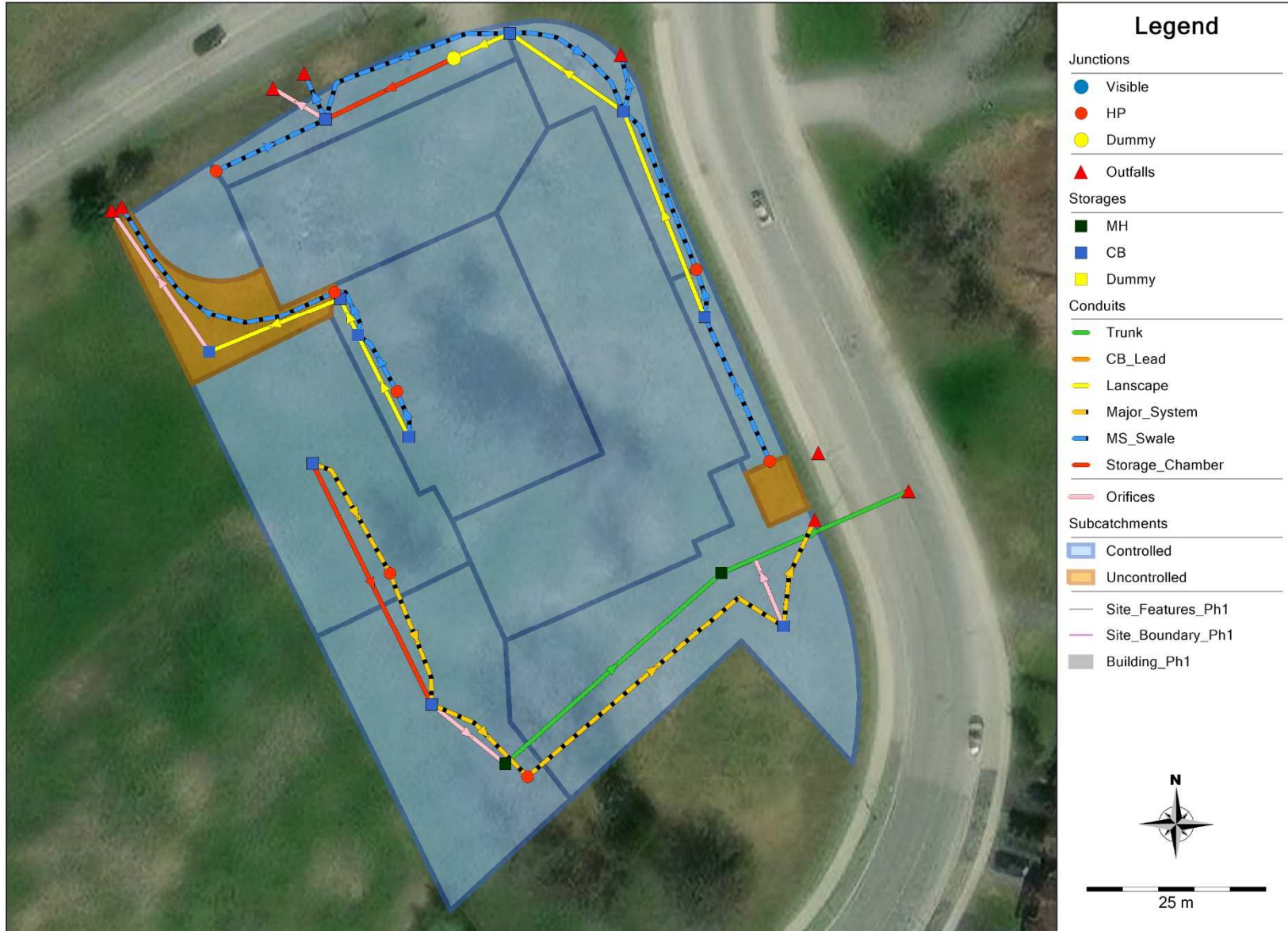
Conduit	Adjusted /Actual Length	Up		Down		Sub		Sup		Time in Flow Class		Inlet Ctrl
		Dry	Dry	Dry	Crit	Crit	Up	Down	Norm	Ltd		
CBMH01-CBMH02	1.00	0.01	0.00	0.00	0.34	0.00	0.00	0.00	0.65	0.01	0.00	
MH02-Ex_1500	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	
MH04-MH02	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-CB01	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-CBMH01 (1)	1.00	0.79	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-CBMH01 (2)	1.00	0.79	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-CBMH02 (1)	1.00	0.79	0.15	0.00	0.06	0.00	0.00	0.00	0.00	0.91	0.00	
MS-CBMH02 (2)	1.00	0.92	0.02	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	
MS-HP01	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-HP02	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-RY01	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-RY02 (1)	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-RY02 (2)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-RY03	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-RY04 (1)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-RY04 (2)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-RY05 (1)	1.00	0.86	0.01	0.00	0.13	0.00	0.00	0.00	0.00	0.86	0.00	
MS-RY05 (2)	1.00	0.86	0.01	0.00	0.13	0.00	0.00	0.00	0.00	0.86	0.00	
MS-RY06 (1)	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MS-RY06 (2)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
RY01-RY06	1.00	0.04	0.00	0.00	0.27	0.00	0.00	0.00	0.69	0.01	0.00	
RY03-RY02	1.00	0.04	0.00	0.00	0.96	0.01	0.00	0.00	0.00	0.77	0.00	
RY05-RY06	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	
RY06-RY07	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	
RY07-RY08	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	
RY08-RY03	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.80	0.00	
SC740	1.00	0.02	0.00	0.00	0.36	0.00	0.00	0.00	0.62	0.00	0.00	

 Conduit Surcharge Summary

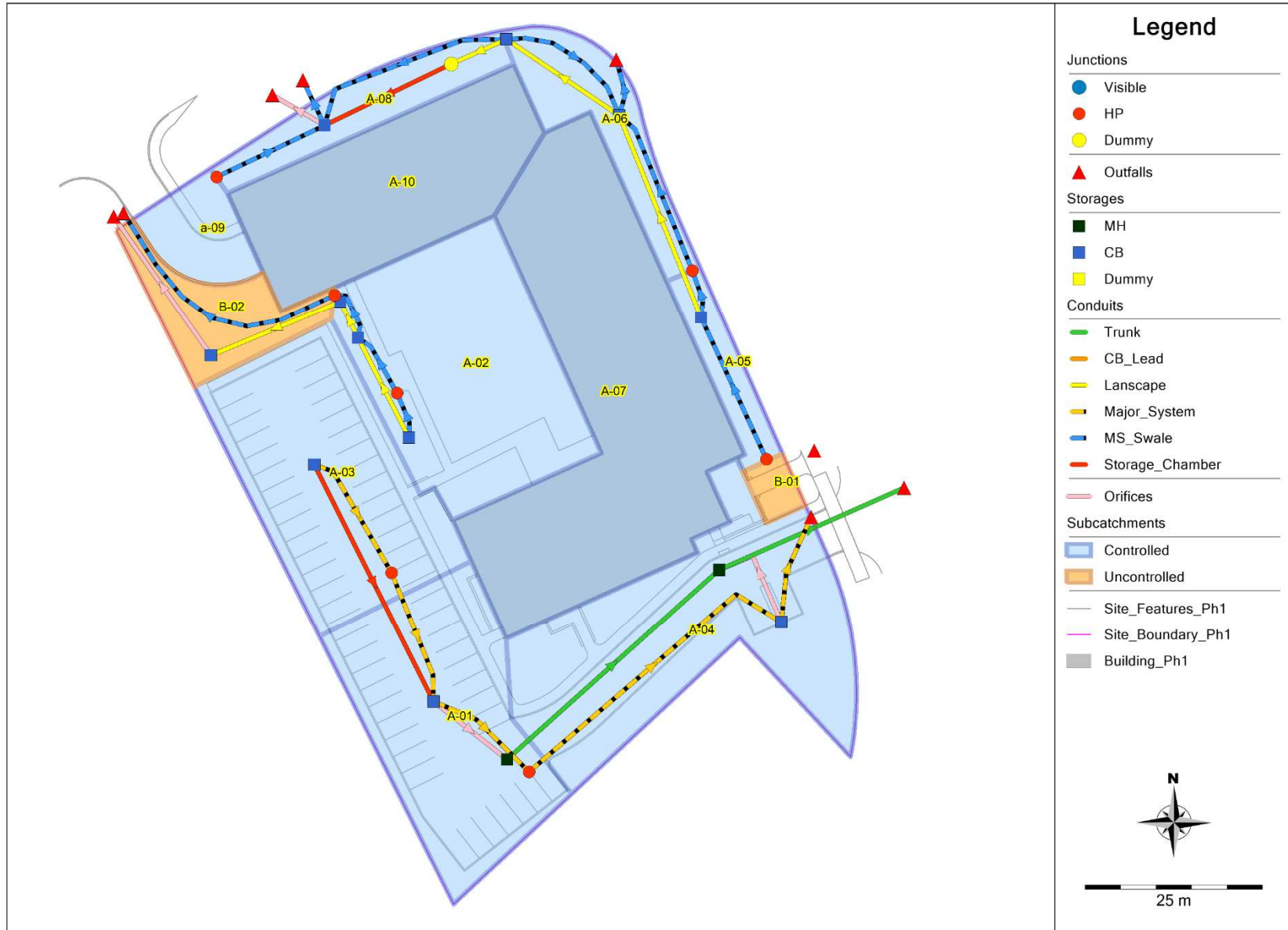
Conduit	Hours Full			Hours Above Full Capacity	
	Both Ends	Upstream	Dnstream	Normal Flow	Limited
CBMH01-CBMH02	4.65	4.65	4.83	0.01	0.01
MH02-Ex_1500	24.00	24.00	24.00	0.01	0.01
MH04-MH02	24.00	24.00	24.00	0.01	0.01
RY01-RY06	3.64	3.64	3.77	0.01	0.01
RY03-RY02	3.43	3.43	3.86	0.01	0.01
RY05-RY06	2.89	2.89	3.00	0.01	0.01
RY06-RY07	3.00	3.00	3.10	0.01	0.01
RY07-RY08	3.10	3.10	24.00	0.01	0.01
RY08-RY03	2.86	2.86	3.43	0.01	0.01
SC740	2.04	2.04	2.07	0.01	0.01

Analysis begun on: Thu Oct 12 11:39:27 2023
 Analysis ended on: Thu Oct 12 11:39:27 2023
 Total elapsed time: < 1 sec

Overall Model Schematic

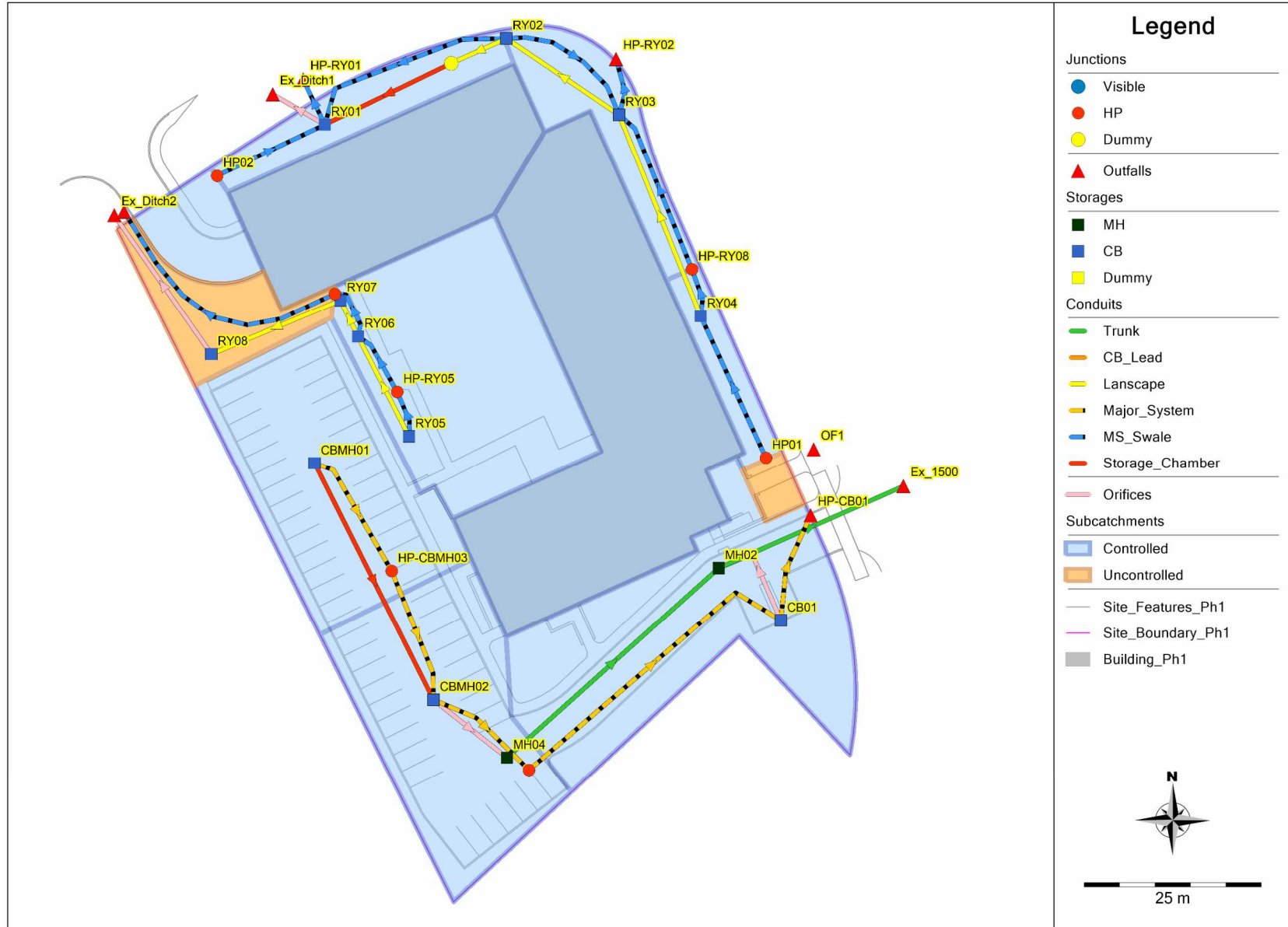


Subcatchments (ID's)



1104 Halton Terrace – Maple Leaf Homes (119024)
PCSWMM Model Schematic

Nodes ID's



User Inputs

Chamber Model:	SC-740
Outlet Control Structure:	No
Project Name:	Halton Terrace
Engineer:	Lucas Wilson
Project Location:	
Measurement Type:	Metric
Required Storage Volume:	34.00 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	153 mm.
Stone Above Chambers:	300 mm.
Average Cover Over Chambers:	458 mm.
Design Constraint Dimensions:	(3.00 m. x 40.00 m.)

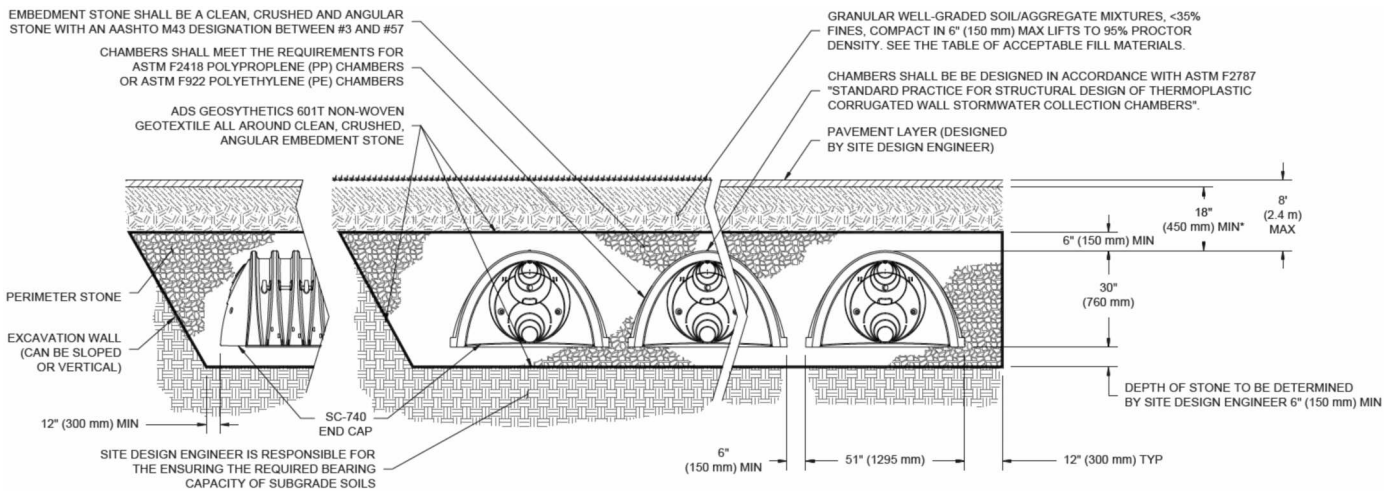
Results

System Volume and Bed Size

Installed Storage Volume:	34.47 cubic meters.
Storage Volume Per Chamber:	1.30 cubic meters.
Number Of Chambers Required:	12
Number Of End Caps Required:	2
Chamber Rows:	1
Maximum Length:	27.13 m.
Maximum Width:	1.91 m.
Approx. Bed Size Required:	51.68 square meters.

System Components

Amount Of Stone Required:	48 cubic meters
Volume Of Excavation (Not Including Fill):	63 cubic meters
Total Non-woven Geotextile Required:	209 square meters
Woven Geotextile Required (excluding Isolator Row):	0 square meters
Woven Geotextile Required (Isolator Row):	49 square meters
Total Woven Geotextile Required:	49 square meters
Impervious Liner Required:	0 square meters



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

Project: _____



Chamber Model -	SC-740
Units -	Metric
	100
Number of chambers -	12
Voids in the stone (porosity) -	40
Base of Stone Elevation -	81.23
Amount of Stone Above Chambers -	300
Amount of Stone Below Chambers -	152
	51.7

sq.meters Min. Area - 37.68 sq.meters

StormTech SC-740 Cumulative Storage Volumes

Height of System (mm)	Incremental Single Chamber (cubic meters)	Incremental Total Chamber (cubic meters)	Incremental Stone (cubic meters)	Incremental Ch & St (cubic meters)	Cumulative Chamber (cubic meters)	Elevation (meters)
1219	0.00	0.00	0.52	0.52	34.559	82.45
1194	0.00	0.00	0.52	0.52	34.034	82.42
1168	0.00	0.00	0.52	0.52	33.510	82.40
1143	0.00	0.00	0.52	0.52	32.985	82.37
1118	0.00	0.00	0.52	0.52	32.460	82.35
1092	0.00	0.00	0.52	0.52	31.935	82.32
1067	0.00	0.00	0.52	0.52	31.410	82.30
1041	0.00	0.00	0.52	0.52	30.886	82.27
1016	0.00	0.00	0.52	0.52	30.361	82.25
991	0.00	0.00	0.52	0.52	29.836	82.22
965	0.00	0.00	0.52	0.52	29.311	82.20
940	0.00	0.00	0.52	0.52	28.786	82.17
914	0.00	0.02	0.52	0.54	28.262	82.14
889	0.00	0.06	0.50	0.56	27.726	82.12
864	0.01	0.10	0.49	0.58	27.167	82.09
838	0.02	0.21	0.44	0.65	26.585	82.07
813	0.02	0.27	0.42	0.69	25.937	82.04
787	0.03	0.32	0.40	0.72	25.249	82.02
762	0.03	0.37	0.38	0.74	24.530	81.99
737	0.03	0.40	0.36	0.77	23.786	81.97
711	0.04	0.43	0.35	0.78	23.021	81.94
686	0.04	0.46	0.34	0.80	22.238	81.92
660	0.04	0.49	0.33	0.82	21.437	81.89
635	0.04	0.52	0.32	0.84	20.616	81.87
610	0.04	0.54	0.31	0.85	19.780	81.84
584	0.05	0.56	0.30	0.86	18.933	81.81
559	0.05	0.58	0.29	0.87	18.073	81.79
533	0.05	0.60	0.29	0.88	17.202	81.76
508	0.05	0.61	0.28	0.89	16.320	81.74
483	0.05	0.63	0.27	0.90	15.427	81.71
457	0.05	0.64	0.27	0.91	14.524	81.69
432	0.05	0.66	0.26	0.92	13.613	81.66
406	0.06	0.67	0.26	0.93	12.694	81.64
381	0.06	0.68	0.25	0.93	11.767	81.61
356	0.06	0.69	0.25	0.94	10.832	81.59
330	0.06	0.71	0.24	0.95	9.891	81.56
305	0.06	0.72	0.24	0.95	8.943	81.53
279	0.06	0.72	0.24	0.96	7.989	81.51
254	0.06	0.73	0.23	0.96	7.029	81.48
229	0.06	0.74	0.23	0.97	6.065	81.46
203	0.06	0.75	0.23	0.97	5.097	81.43
178	0.06	0.75	0.22	0.97	4.124	81.41
152	0.00	0.00	0.52	0.52	3.149	81.38
127	0.00	0.00	0.52	0.52	2.624	81.36
102	0.00	0.00	0.52	0.52	2.099	81.33
76	0.00	0.00	0.52	0.52	1.574	81.31
51	0.00	0.00	0.52	0.52	1.050	81.28
25	0.00	0.00	0.52	0.52	0.525	81.26

**MASTER SERVICING STUDY UPDATE
FOR MORGAN'S GRANT SUBDIVISION**

CITY OF OTTAWA

September 2003

Prepared for:

MINTO DEVELOPMENTS INC.
427 Laurier Avenue West, Suite 300
Ottawa, Ontario
K1R 7Y2

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED
Consulting Engineers, Architects & Planners
864 Lady Ellen Place
Ottawa, Ontario
K1Z 5M2

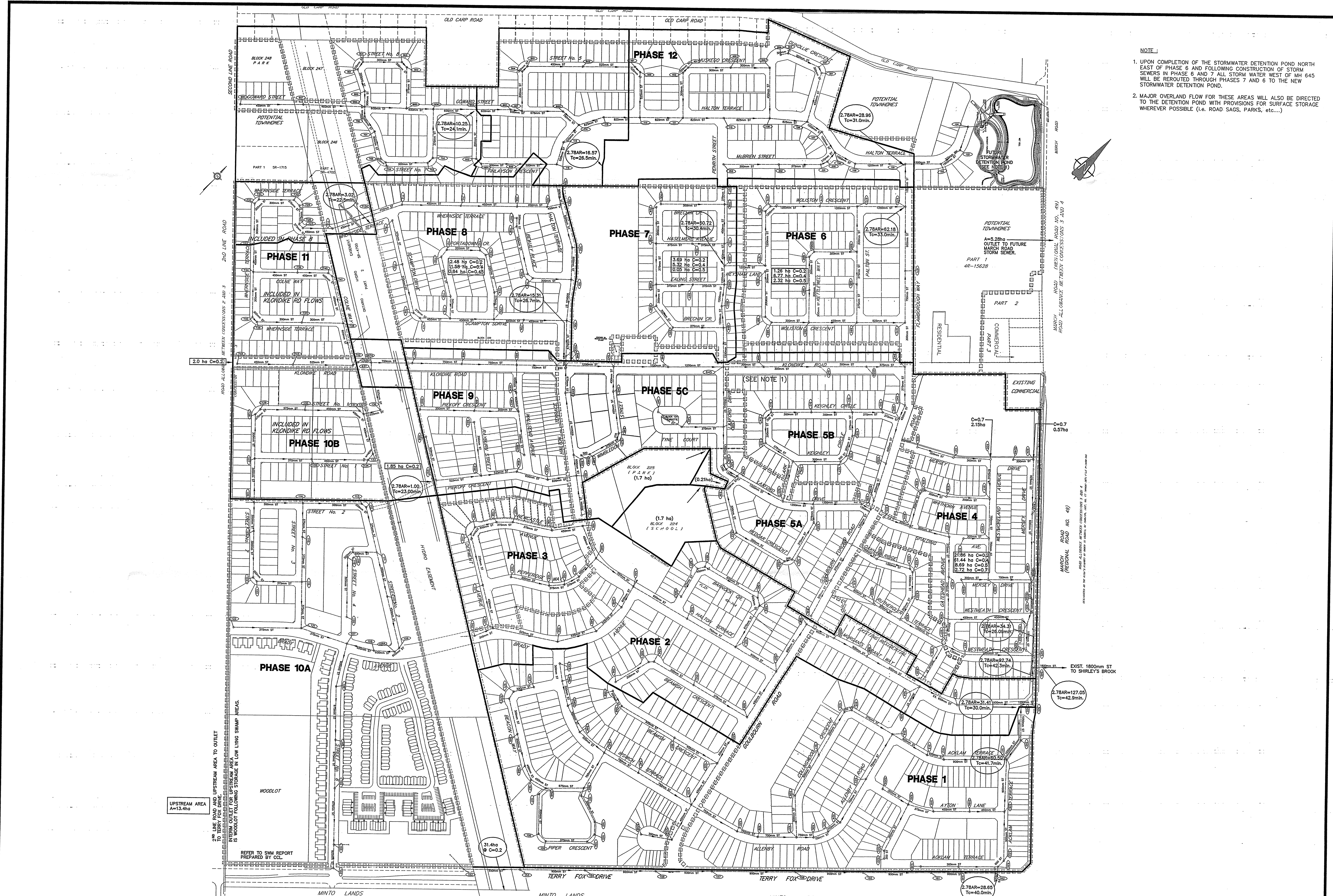
JLR 17730

Table 5 - Results of HGL Analysis (2003)

Manhole Junction Number	1:100 Year HGL Elevation (m)	HGL-Centreline Road Elev. (M)
101	83.927	3.073
102	83.392	1.908
103	83.017	1.733
104	82.322	1.068
Chamber	82.000	1.200

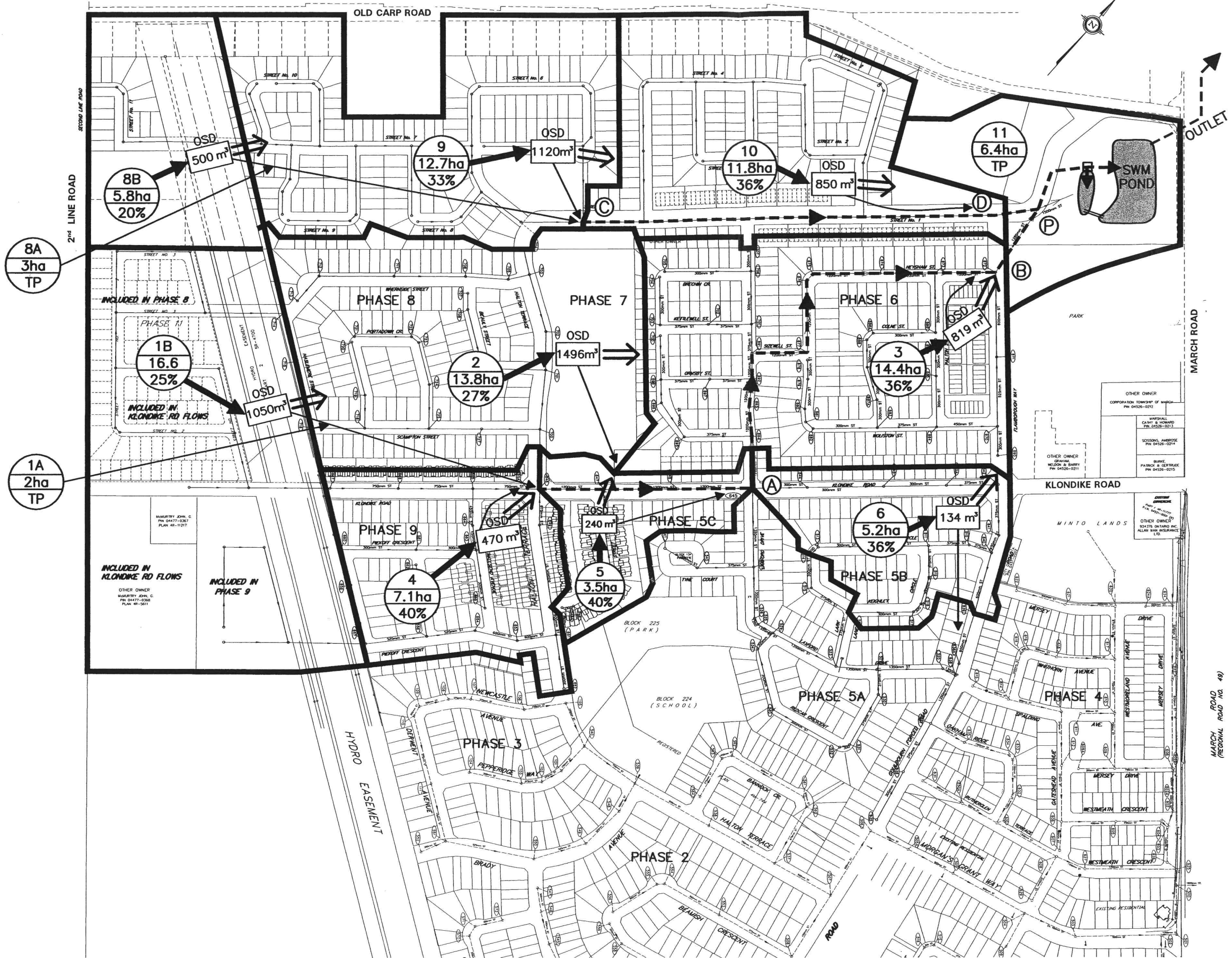
2.5 On-Site Storage Requirements

To minimize land requirements for stormwater management facilities, ICDs, combined with on-site storage, have been utilized in all recent Phases of the Subdivision. As such, local storm sewers are to be designed to limit the capture rate to 70 L/s/ha, approximately equivalent to a 1:5 year storm event. Storm runoff in excess of the 1:5 year recurrence is to be detained, tentatively, on site by means of road-sag storage, park storage, hydro easement storage or, ultimately, by the stormwater management facility. To maintain the integrity of the design of the stormwater management facilities (existing and future), specific on-site storage requirements have been calculated and are presented in Table 6.



- NOTE:**
- UPON COMPLETION OF THE STORMWATER DETENTION POND NORTH EAST OF PHASE 8 AND FOLLOWING CONSTRUCTION OF STORM SEWERS IN PHASE 6 AND 7 ALL STORM WATER WEST OF MH 645 WILL BE REROUTED THROUGH PHASES 7 AND 6 TO THE NEW STORMWATER DETENTION POND.
 - MAJOR OVERLAND FLOW FOR THESE AREAS WILL ALSO BE DIRECTED TO THE DETENTION POND WITH PROVISIONS FOR SURFACE STORAGE WHEREVER POSSIBLE (i.e. ROAD SAGS, PARKS, etc....)

<p>17/09/03 REVISED PHASE 10 AND 12</p>	<p>L.J.</p>	<p>SCALE</p> <p>0 25m 50m 75m 100m</p> <p>HORIZONTAL 1:3000</p>	<p>J.L. Richards & Associates Limited</p> <p>Consulting Engineers, Architect & Planners</p> <p>OTTAWA, KINGSTON, SUBURRY, CANADA.</p>	<p>Ottawa</p>	<p>MORGAN'S GRANT SUBDIVISION</p> <p>MASTER DRAINAGE PLAN (STORM)</p>	<p>DATED SEPT. 2003</p> <p>DWG. No. 17730-ST</p>
---	-------------	--	--	----------------------	---	--



NOTES:

OTTHYMO MODEL CONNECTIVITY

- MAIN SEWER
- MAJOR OVERFLOW
- TOTAL FLOW
- MINOR FLOW
- ID No.
- AREA
- COMPOSITE IMP OR TP

Ottawa

CCL Cumming Cockburn Limited
Consulting Engineers and Planners
Ottawa, Kingston, Toronto, Waterloo, London

**MORGAN'S GRANT
SUBDIVISION**

MASTER STORM DRAINAGE PLAN

DATE JULY 2001	SCALE 1:5000	DWG. NO. FIGURE 2
-------------------	-----------------	----------------------

```

01621> PEAK FLOW REDUCTION [Qout/Qin] (%) = 99.602
01622> TIME SHIFT OF PEAK FLOW (min) = 3.00
01623> MAXIMUM STORAGE USED (ha.m.) = .4825E-02
01624>
01625> -----
01626> 001:0063-----
01627> *
01628>
01629> ROUTE RESERVOIR Requested routing time step = 3.0 min.
01630> IN>07: (000100)
01631> OUT<08: (000100)
01632>
01633> ===== OUTFLOW STORAGE TABLE =====
01634> OUTFLOW STORAGE OUTFLOW STORAGE
01635> (cms) (ha.m.) (cms) (ha.m.)
01636> .000 .0000E+00 .042 .4300E-01
01637> *** WARNING: Inflow hydrograph is dry.
01638>
01639> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01640> (ha) (cms) (hrs) (mm) (cms)
01641> INFLOW >07: (000100) .00 .000 .000 .000
01642> OUTFLOW<08: (000100) .00 .000 .000 .000
01643>
01644> *** WARNING: Inflow and outflow hydrographs are dry.
01645>
01646> 001:0064-----
01647> *
01648> # FLOW POINT "D" ||
01649> #
01650> *
01651>
01652> ADD HYD (000132) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01653> (ha) (cms) (hrs) (mm) (cms)
01654> ID1 03:000100 11.80 .481 12.30 28.69 .000
01655> +ID2 02:000100 21.50 .893 12.40 26.35 .000
01656>
01657> SUM 01:000132 33.30 1.356 12.40 27.18 .000
01658>
01659> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01660>
01661> 001:0065-----
01662> *
01663> #
01664> # SWM FACILITY Minor Flow ||
01665> #
01666> *
01667>
01668> ADD HYD (000214) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01669> (ha) (cms) (hrs) (mm) (cms)
01670> IN>01: (000132) 33.30 1.356 12.40 27.18 .000
01671> +ID2 04:000100 57.40 2.194 12.50 27.41 .000
01672>
01673> SUM 02:000214 90.70 3.487 12.45 27.33 .000
01674>
01675> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01676>
01677> 001:0066-----
01678> *
01679> #
01680> # ROUTE RESERVOIR Requested routing time step = 3.0 min.
01681> IN>02: (000214)
01682> OUT<04: (000100)
01683>
01684> ===== OUTFLOW STORAGE TABLE =====
01685> OUTFLOW STORAGE OUTFLOW STORAGE
01686> (cms) (ha.m.) (cms) (ha.m.)
01687> .000 .0000E+00 3.500 .1890E+00
01688> 1.100 .1165E+00 7.000 .2500E+00
01689>
01690> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01691> (ha) (cms) (hrs) (mm) (cms)
01692> INFLOW >02: (000214) 90.70 3.487 12.450 27.326
01693> OUTFLOW<04: (000100) 90.70 3.386 12.550 27.326
01694> OVERFLOW<01: (000100) .00 .000 .000 .000
01695>
01696> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01697> CUMULATIVE TIME OF OVERFLOWS (hours) = .00
01698> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01699>
01700>
01701> PEAK FLOW REDUCTION [Qout/Qin] (%) = 97.085
01702> TIME SHIFT OF PEAK FLOW (min) = 6.00
01703> MAXIMUM STORAGE USED (ha.m.) = .1856E+00
01704>
01705> -----
01706> 001:0067-----
01707> *
01708>
01709> ADD HYD (000389) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01710> (ha) (cms) (hrs) (mm) (cms)
01711> ID1 01:000100 .00 .000 .000 .000 **DRY**
01712> +ID2 04:000100 90.70 3.386 12.55 27.33 .000
01713>
01714> SUM 05:000389 90.70 3.386 12.55 27.33 .000
01715>
01716> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01717>
01718> 001:0068-----
01719> *
01720> #
01721> # AREA 11 (Park Adjacent to SWM Facility) ||
01722> #
01723> #
01724> *
01725>
01726> CALIB NASHYD Area (ha) = 6.40 Curve Number (CN) = 85.00
01727> 01:000100 DT = 3.00 Ia (mm) = 1.500 # of Linear Res. (N) = 3.00
01728> U.H. Tp (hrs) = .200
01729>
01730> Unit Hyd Qpeak (cms) = 1.222
01731>
01732> PEAK FLOW (cms) = .339 (i)
01733> TIME TO PEAK (hrs) = 12.100
01734> RUNOFF VOLUME (mm) = 21.796
01735> TOTAL RAINFALL (mm) = 45.500
01736> RUNOFF COEFFICIENT = .479
01737>
01738> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01739>
01740>
01741> 001:0069-----
01742> *
01743> #
01744> # SWM FACILITY Major Flow ||
01745> #
01746> *
01747>
01748> ADD HYD (000389) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01749> (ha) (cms) (hrs) (mm) (cms)
01750> ID1 08:000100 .00 .000 .000 .000 **DRY**
01751> +ID2 09:000100 .00 .000 .000 .000 **DRY**
01752>
01753> SUM 03:000389 .00 .000 .000 .000 **DRY**
01754>
01755> 001:0070-----

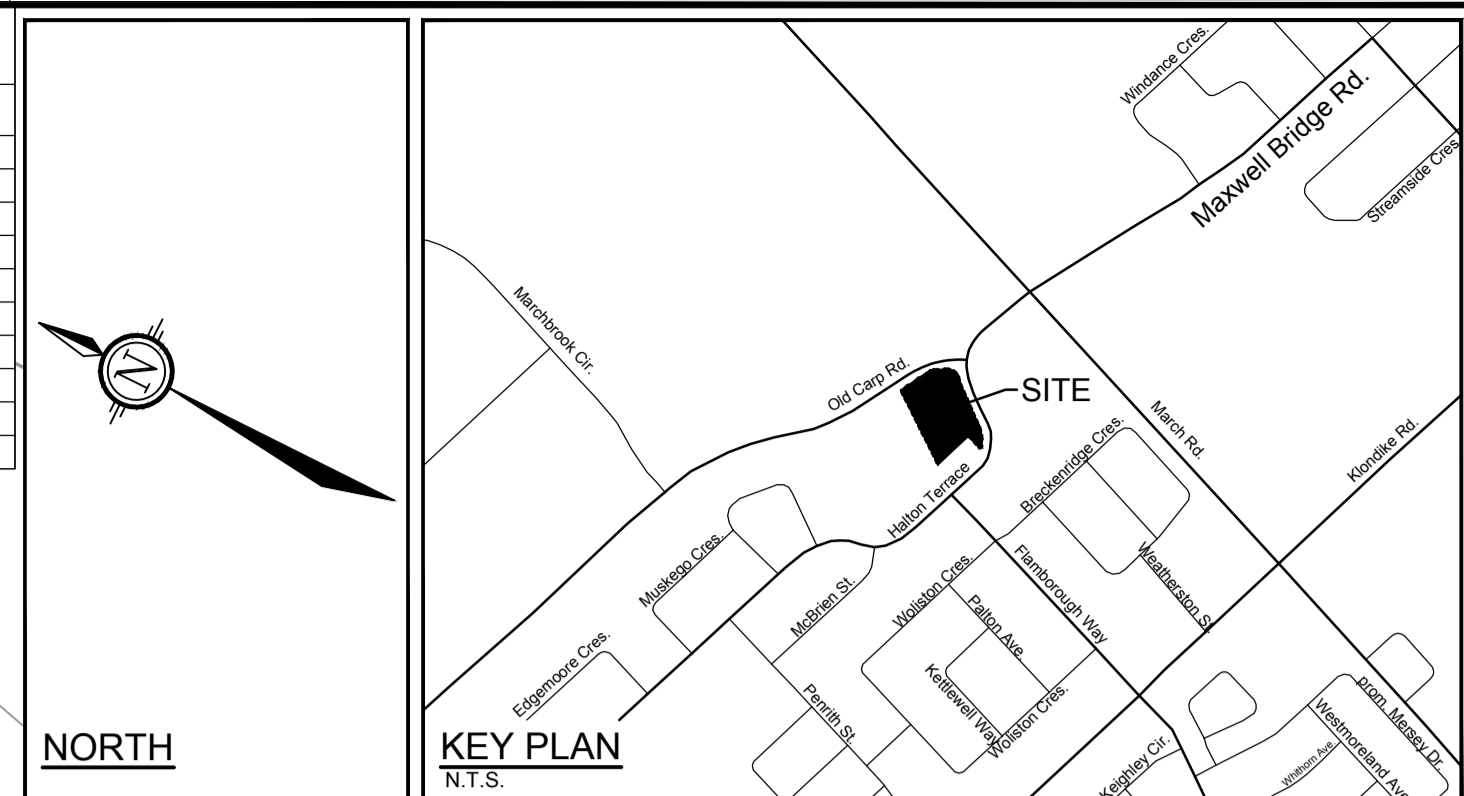
```

```

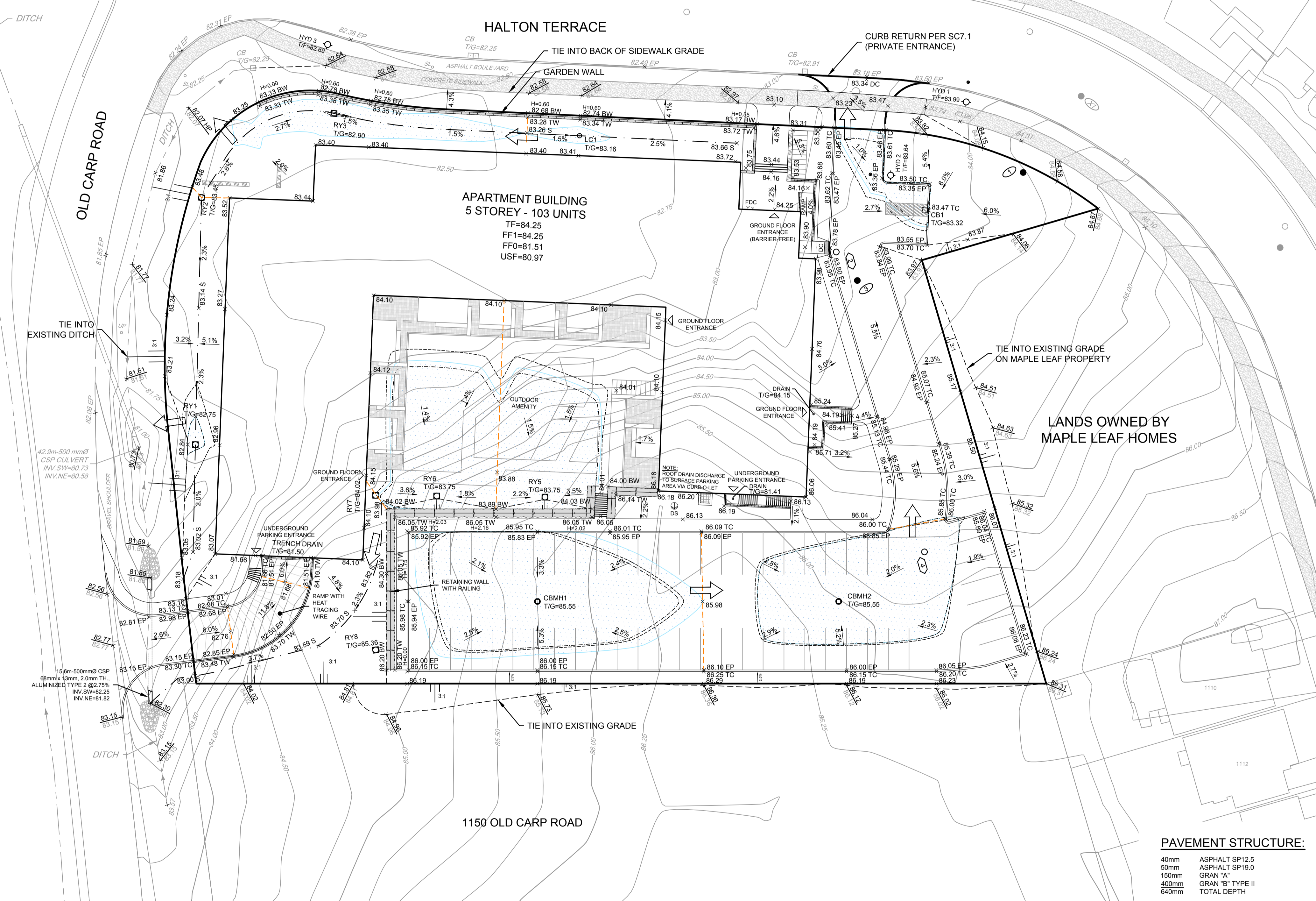
01756> *
01757>
01758> ADD HYD (000461) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01759> (ha) (cms) (hrs) (mm) (cms)
01760> ID1 06:000798 .00 .000 .000 .000 **DRY**
01761> +ID2 01:000100 6.40 .339 12.10 21.80 .000
01762>
01763> SUM 04:000461 6.40 .339 12.10 21.80 .000
01764>
01765> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01766>
01767> 001:0071-----
01768> *
01769> #
01770> #
01771> #
01772> #
01773> #
01774> #
01775> #
01776> #
01777> #
01778> #
01779> #
01780> #
01781> #
01782> #
01783> #
01784> #
01785> #
01786> #
01787> #
01788> #
01789> #
01790> #
01791> #
01792> #
01793> #
01794> #
01795> #
01796> #
01797> #
01798> #
01799> #
01800> #
01801> #
01802> #
01803> #
01804> #
01805> #
01806> #
01807> #
01808> #
01809> #
01810> #
01811> #
01812> #
01813> #
01814> #
01815> #
01816> #
01817> #
01818> #
01819> #
01820> #
01821> #
01822> #
01823> #
01824> #
01825> #
01826> #
01827> #
01828> #
01829> #
01830> #
01831> #
01832> #
01833> #
01834> #
01835> #
01836> #
01837> #
01838> #
01839> #
01840> #
01841> #
01842> #
01843> #
01844> #
01845> #
01846> #
01847> #
01848> #
01849> #
01850> #
01851> #
01852> #
01853> #
01854> #
01855> #
01856> #
01857> #
01858> #
01859> #
01860> #
01861> #
01862> #
01863> #
01864> #
01865> #
01866> #
01867> #
01868> #
01869> #
01870> #
01871> #
01872> #
01873> #
01874> #
01875> #
01876> #
01877> #
01878> #
01879> #
01880> #
01881> #
01882> #
01883> #
01884> #
01885> #
01886> #
01887> #
01888> #
01889> #
01890> #
01891> #
01892> #
01893> #
01894> #
01895> #
01896> #
01897> #
01898> #
01899> #
01900> #
01901> #
01902> #
01903> #
01904> #
01905> #
01906> #
01907> #
01908> #
01909> #
01910> #
01911> #
01912> #
01913> #
01914> #
01915> #
01916> #
01917> #
01918> #
01919> #
01920> #
01921> #
01922> #
01923> #
01924> #
01925> #
01926> #
01927> #
01928> #
01929> #
01930> #
01931> #
01932> #
01933> #
01934> #
01935> #
01936> #
01937> #
01938> #
01939> #
01940> #
01941> #
01942> #
01943> #
01944> #
01945> #
01946> #
01947> #
01948> #
01949> #
01950> #
01951> #
01952> #
01953> #
01954> #
01955> #
01956> #
01957> #
01958> #
01959> #
01960> #
01961> #
01962> #
01963> #
01964> #
01965> #
01966> #
01967> #
01968> #
01969> #
01970> #
01971> #
01972> #
01973> #
01974> #
01975> #
01976> #
01977> #
01978> #
01979> #
01980> #
01981> #
01982> #
01983> #
01984> #
01985> #
01986> #
01987> #
01988> #
01989> #
01990> #
01991> #
01992> #
01993> #
01994> #
01995> #
01996> #
01997> #
01998> #
01999> #
02000> #

```


STRUCTURE	100 YEAR PONDING ELEVATION	100 YEAR PONDING DEPTH (m)	100 YEAR +20% PONDING ELEVATION	100 YEAR +20% PONDING DEPTH (m)	MAX STATIC PONDING ELEVATION	MAX STATIC PONDING DEPTH (m)
CB01	83.43	0.11	83.48	0.16	83.45	0.13
CBMH01	85.85	0.30	85.86	0.31	85.90	0.35
CBMH02	85.85	0.30	85.86	0.31	85.85	0.30
RY01	82.84	0.09	82.92	0.17	82.84	0.09
RY02	82.84	0.00	82.92	0.00	83.45	0.00
RY03	82.84	0.00	82.92	0.02	83.25	0.35
RY04	82.84	0.00	82.92	0.00	83.26	0.10
RY05	83.97	0.22	84.00	0.25	83.98	0.23
RY06	83.97	0.22	84.00	0.25	83.98	0.23
RY07	83.97	0.00	84.00	0.02	83.98	0.00
RY08	83.96	0.00	84.00	0.00	85.40	0.00



MORGAN'S GRANT SWMF



LEGEND

	PROPOSED GRADE AND DIRECTION OF FLOW		HYDRANT WITH TOP OF FLANGE ELEVATION
	PROPOSED ELEVATION		SANITARY MANHOLE
	EXISTING ELEVATION		STORM MANHOLE
	EXISTING SPOT ELEVATION		CATCHBASIN WITH TOP OF GRATE ELEVATION CB WITH ICD
	EXISTING ELEVATION AT BACK OF SIDEWALK		LANDSCAPE TYPE CATCHBASIN WITH TOP OF GRATE ELEVATION
	EXISTING CONTOUR ELEVATION		VALVE & VALVE BOX LOCATION
	MAJOR OVERLAND FLOW DIRECTION		FF= FINISHED FLOOR
	TERRACE GRADE (3:1 MAX)		TF= TOP OF FOUNDATION
	SWALE AND TERRACE		USF= UNDERSIDE OF FOOTING
	MAX STATIC PONDING LIMITS		EP EDGE OF PAVEMENT
	100-YR PONDING LIMITS		TC TOP OF CURB
	100-YR +20% PONDING LIMITS		FDC FIRE DEPARTMENT CONNECTION
	FEATURE WALL		DS ROOFTOP DOWNSPOUT LOCATION

- GENERAL NOTES:**
- DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
 - THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
 - CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
 - BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.
 - CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
 - DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
 - OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
 - RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF CITY OF OTTAWA AUTHORITIES.
 - ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA DETAIL R-10.
 - THICKNESS OF GRANULAR MATERIAL AND ASPHALT LAYERS TO MATCH EXISTING.
 - BOULEVARDS SHALL BE REINSTATED WITH 100mm OF TOPSOIL, SEED AND MULCH.
 - REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
 - ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
 - REFER TO GEOTECHNICAL INVESTIGATION PG4872-1 (DATED MAY 3, 2019), PREPARED BY PATERSON GROUP FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
 - PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE ROADSIDE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS.

- GRADING AND PAVEMENT NOTES:**
- ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED HARD SURFACE (i.e. PAVEMENT, CURB, SIDEWALK, ETC.) AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
 - EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE HEAVILY PROOF ROLLED WITH A LARGE (10 TON) VIBRATORY STEEL DRUM ROLLER UNDER DRY CONDITIONS AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
 - ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
 - THE GRANULAR BASE SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
 - ROADWAY SUBGRADE TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION TO REVIEW IF A WOVEN GEOTEXTILE IS REQUIRED BELOW THE GRANULAR MATERIALS, AND TO CONFIRM THE DEPTH AND COMPACTION OF GRANULAR 'B'.
 - PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE PER CITY OF OTTAWA STANDARDS.
 - MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
 - MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
 - ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
 - ALL CURBS SHALL BE BARRIER CURB UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC-1).
 - REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

PAVEMENT STRUCTURE:

40mm	ASPHALT SP12.5
50mm	ASPHALT SP19.0
150mm	GRAN "A"
400mm	GRAN "B" TYPE II
640mm	TOTAL DEPTH

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
2.	CITY SUBMISSION	NOV 3/23	MAB
1.	CITY SUBMISSION	OCT 19/21	MAB

SCALE			
1:300			

DESIGN	
DTD	CHECKED
LWR	DRAWN
DTD	CHECKED
MAB	APPROVED
JGR	APPROVED

FOR REVIEW ONLY

L.R. WILSON
100160065
PROVINCE OF ONTARIO

M.A. BISSETT
2023.11.03
PROV. OF ONT.

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone: (613) 254-9643
Facsimile: (613) 254-5867
Website: www.novatech-eng.com

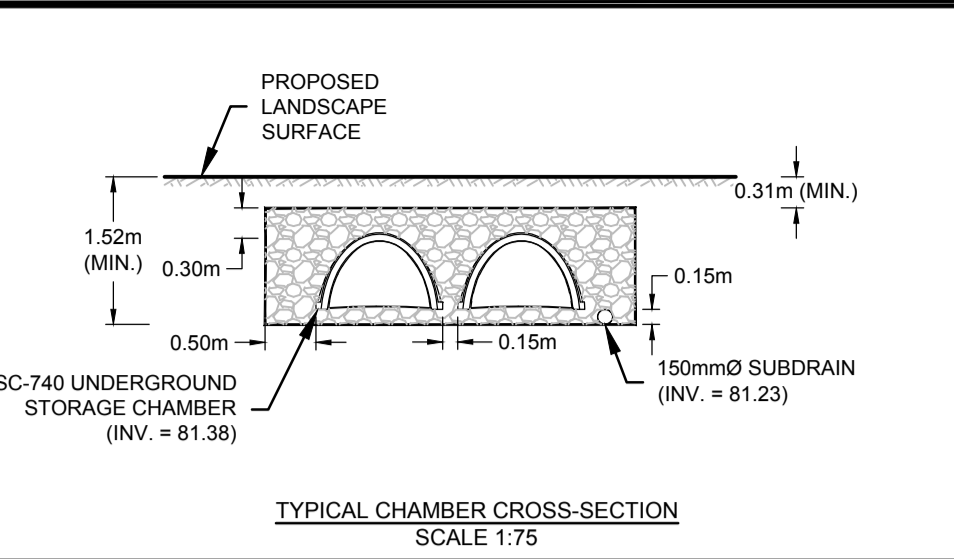
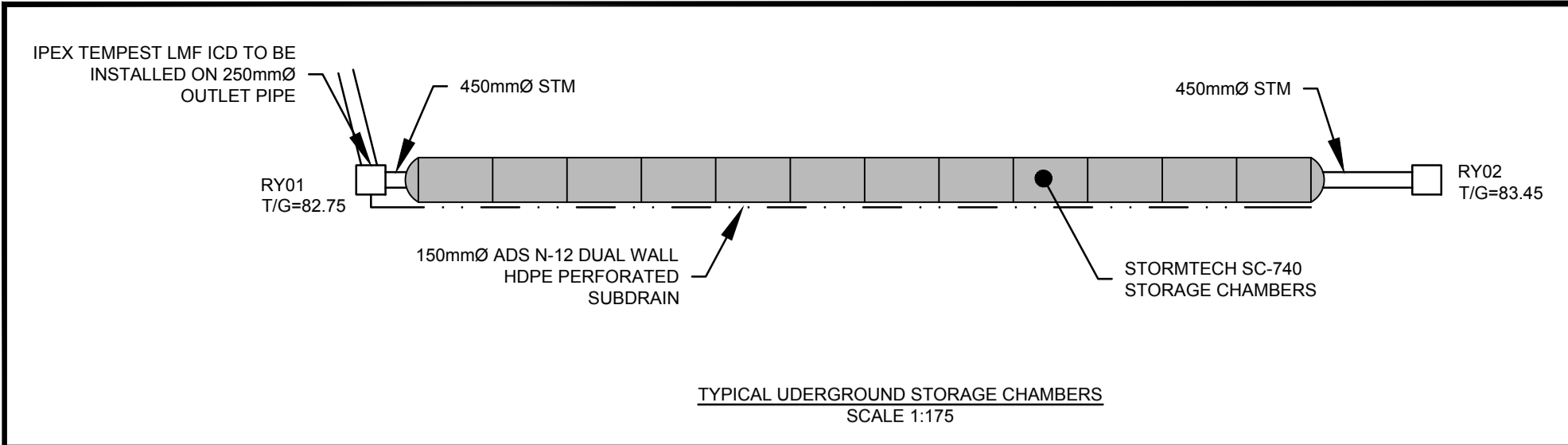
CITY OF OTTAWA
1104 HALTON TERRACE

GRADING PLAN

PROJECT No.	119024
REV #	REV #2
DRAWING No.	119024-GR

M:\2019\119024\CAD\Drawings\119024-GR.dwg, PLANS-A1, Nov. 02, 2023 - 4:00pm, d.mullin

PLAN #18654 D07-12-21-0186



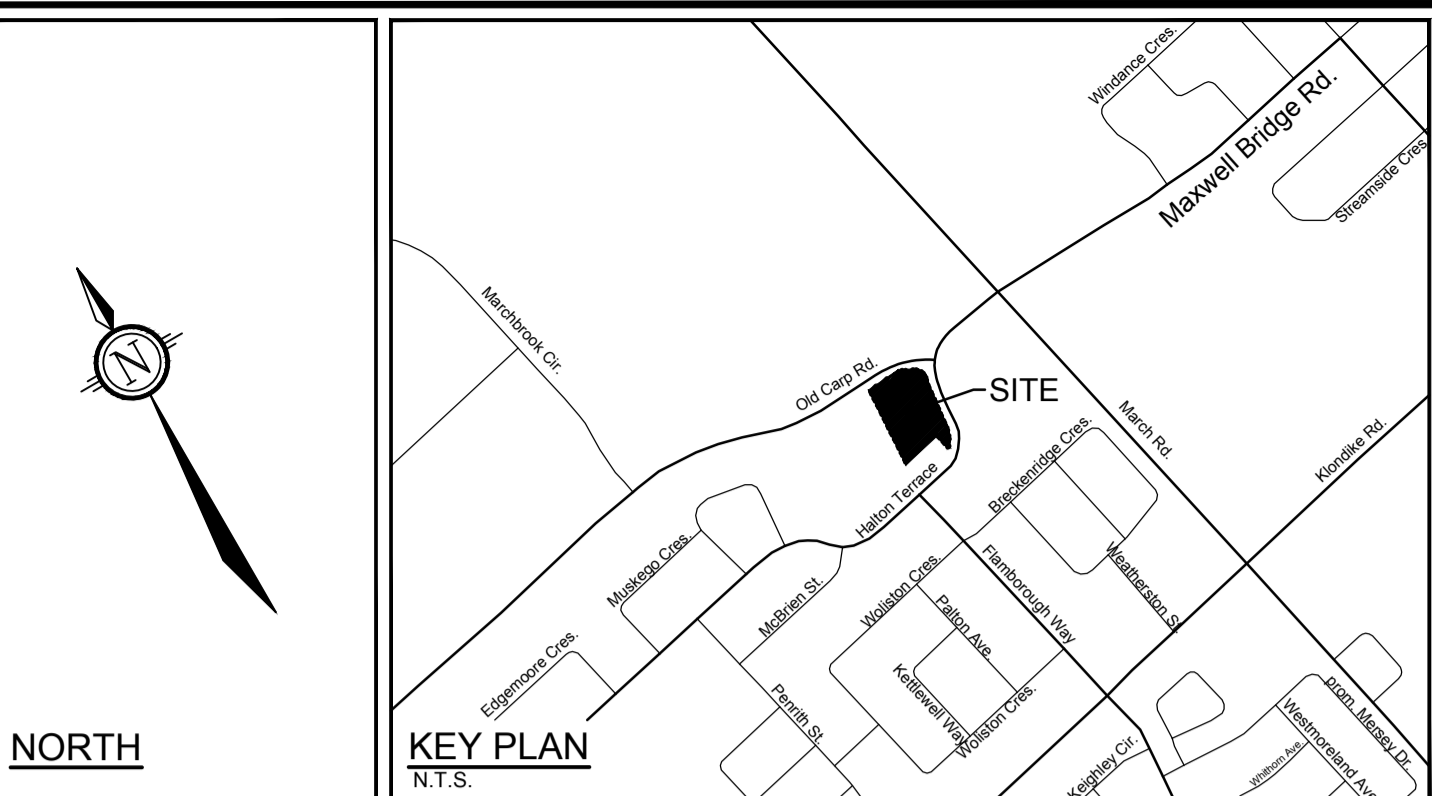
ICD TABLE				
STRUCTURE ID	ICD TYPE	INVERT (m)	100-YR HEAD (m)	100-YR PEAK FLOW (L/s)
CB1	TEMPEST MHF (120mm)	NW=82.32	1.11	26.8
CBMH2	TEMPEST LMF	SE=82.89 NW=83.49	2.96	9.5
RY1	TEMPEST LMF	NE=81.38	1.61	4.3
RY8	TEMPEST LMF	NE=82.44 NW=82.44	1.52	4.2

CATCHBASIN TABLE			
CB No.	T/G ELEVATION	INVERT	ICD DIA.
CB1	83.32	82.02	TEMPEST MHF (120mm)
LC1	83.16	81.98	-
RY1	82.75	81.38	TEMPEST LMF
RY2	83.45	81.89	-
RY3	82.90	81.69	-
RY5	83.75	82.35	-
RY6	83.75	82.28	-
RY7	84.02	82.24	-
RY8	85.36	82.14	TEMPEST LMF

STM MANHOLE TABLE				
MANHOLE ID	SIZE (mm)	T/G ELEV	INVERT	PIPE DIA. (mm)
2	1200Ø	83.79	NE=81.18 SW=81.78	NE=450 SW=375
4	1200Ø	85.82	NE=82.17 NW=82.77	NE=375 NW=300
103	1200Ø	84.06	NW=80.23 S=80.52	NW=1500 S=1500
104	1200Ø	82.73	SE=80.00 NE=79.40 NW=79.99	NE=1500 NW=1500 NW=375
CBMH1	1800Ø	85.55	SE=83.68	SE=975
CBMH2	1800Ø	85.55	SE=82.89 NW=83.49	SE=300 NW=975

SAN MANHOLE TABLE				
MANHOLE ID	SIZE (mm)	T/G ELEV	INVERT	PIPE DIA. (mm)
X1	1200Ø	84.21	S=81.78 W=82.11	S=250 W=200
1	1200Ø	84.36	NW=82.18 E=82.17	E=200 NW=200
3	1200Ø	84.02	SE=82.30 NW=82.33	SE=200 NW=200

WATERMAIN TABLE			
Station	FIG ELEVATION	TOP OF WATERMAIN	DESCRIPTION
1+000.00	83.34	80.94	200x300 TEE
1+008.86	83.46	81.07	VB1
1+014.46	83.40	81.03	HYD 2 TEE
1+022.15	83.71	81.31	45° H.BEND
1+023.89	83.79	81.39	45° H.BEND
1+024.77	83.78	81.38	VB2
1+029.31	83.90	81.50	CAP



- LEGEND**
- Sanitary Manhole, Sewer & Direction of Flow
 - Storm Manhole, Sewer & Direction of Flow
 - Watermain and Diameter
 - Valve & Valve Box
 - Bend and Thrust Block
 - Hydrant CW Valve & Lead
 - Cap
 - Feature Wall
 - Road Catchbasin
 - Road Catchbasin with ICD
 - Landscape Type Catchbasin
 - Rear Yard Catchbasin
 - Underground Storage Chambers with Subdrain
 - Roof Top Downspout Location
 - Pump Outlet Location
 - Fire Department Connection
 - Water Meter
 - Remote Meter

- GENERAL NOTES:**
- DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
 - THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
 - CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
 - BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING, INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED.
 - CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
 - DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
 - OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
 - RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF MUNICIPAL AUTHORITIES.
 - REMOVE FROM SITE ALL DEBRIS AND EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER.
 - ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
 - REFER TO GEOTECHNICAL INVESTIGATION PG4872-1 (DATED MAY 3, 2019), PREPARED BY PATERSON GROUP INC. FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
 - PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE ROADSIDE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS.

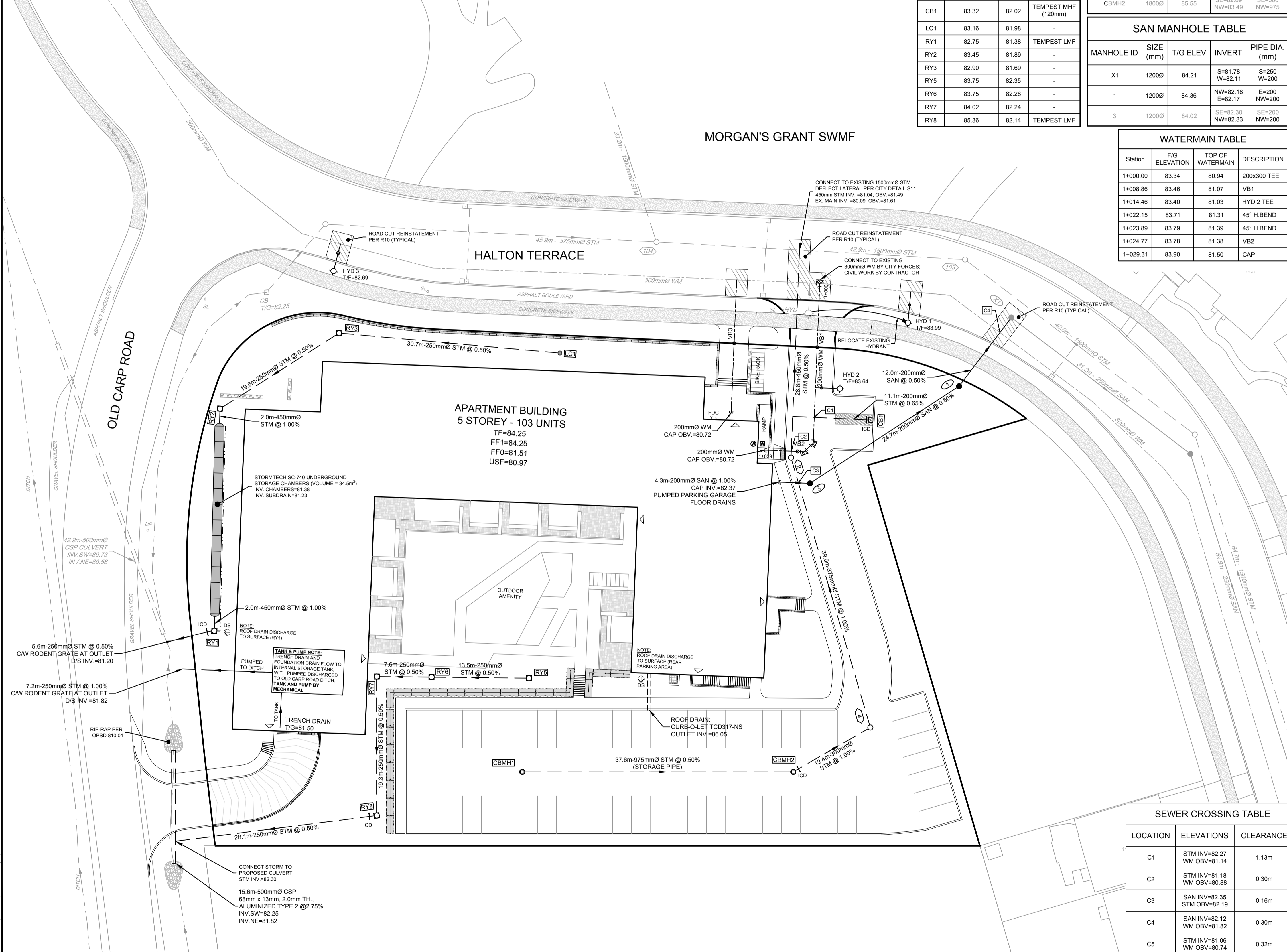
- SEWER NOTES:**
- SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200Ø)	701.010	OPSD
ROADSIDE CB, FRAME & COVER	S2 & S19	CITY OF OTTAWA
STORM / SANITARY MH FRAME & COVER	S24.1 / S24 & S25	CITY OF OTTAWA
STORM SEWER	PVC DR 35 OR CONC.	(CLASS SPECIFIED ON PROFILE DRAWINGS)
SANITARY SEWER	PVC DR 35	
CATCHBASIN LEAD	PVC DR 35	
 - INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmx1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
 - SERVICES ARE TO BE CONSTRUCTED TO PROPERTY LINE AT MINIMUM SLOPE OF 1.0% (2.0% IS PREFERRED).
 - PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
 - SEWER SERVICE CONNECTIONS PER CITY OF OTTAWA DETAILS S11 AND S11.1.
 - THE SITE SERVICING CONTRACTOR SHALL PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPS 410.07.16 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF THE ENGINEER.
 - STORM MANHOLES AND CBMHS SHALL HAVE 300mm SUMP UNLESS OTHERWISE INDICATED.
 - CONTRACTOR TO TELEVISION (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.

- WATERMAIN NOTES:**
- GENERAL:

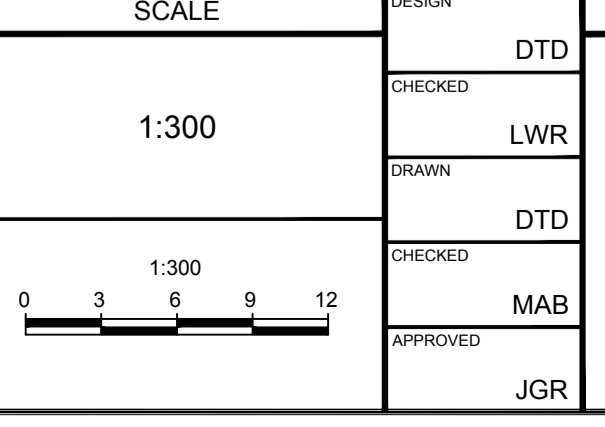
ITEM	DETAIL No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER / OVER SEWER	W25 / W25.2	CITY OF OTTAWA
HYDRANT LOCATION	W18	CITY OF OTTAWA
 - THE WATERMAIN SHALL BE PVC DR 18 IN ACCORDANCE WITH MATERIAL SPECIFICATION MW-18.1, UNLESS OTHERWISE INDICATED.
 - SUPPLY AND CONSTRUCT ALL WATERMANS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMANS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
 - WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
 - PROVIDE MINIMUM 0.50m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.

SEWER CROSSING TABLE		
LOCATION	ELEVATIONS	CLEARANCE
C1	STM INV=82.27 WM OBV=81.14	1.13m
C2	STM INV=81.18 WM OBV=80.88	0.30m
C3	SAN INV=82.35 STM OBV=82.19	0.16m
C4	SAN INV=82.12 WM OBV=81.82	0.30m
C5	STM INV=81.06 WM OBV=80.74	0.32m



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
2.	CITY SUBMISSION	NOV 3/23	MAB
1.	CITY SUBMISSION	OCT 19/21	MAB



FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
(613) 254-9643
(613) 254-5867
www.novatech-eng.com

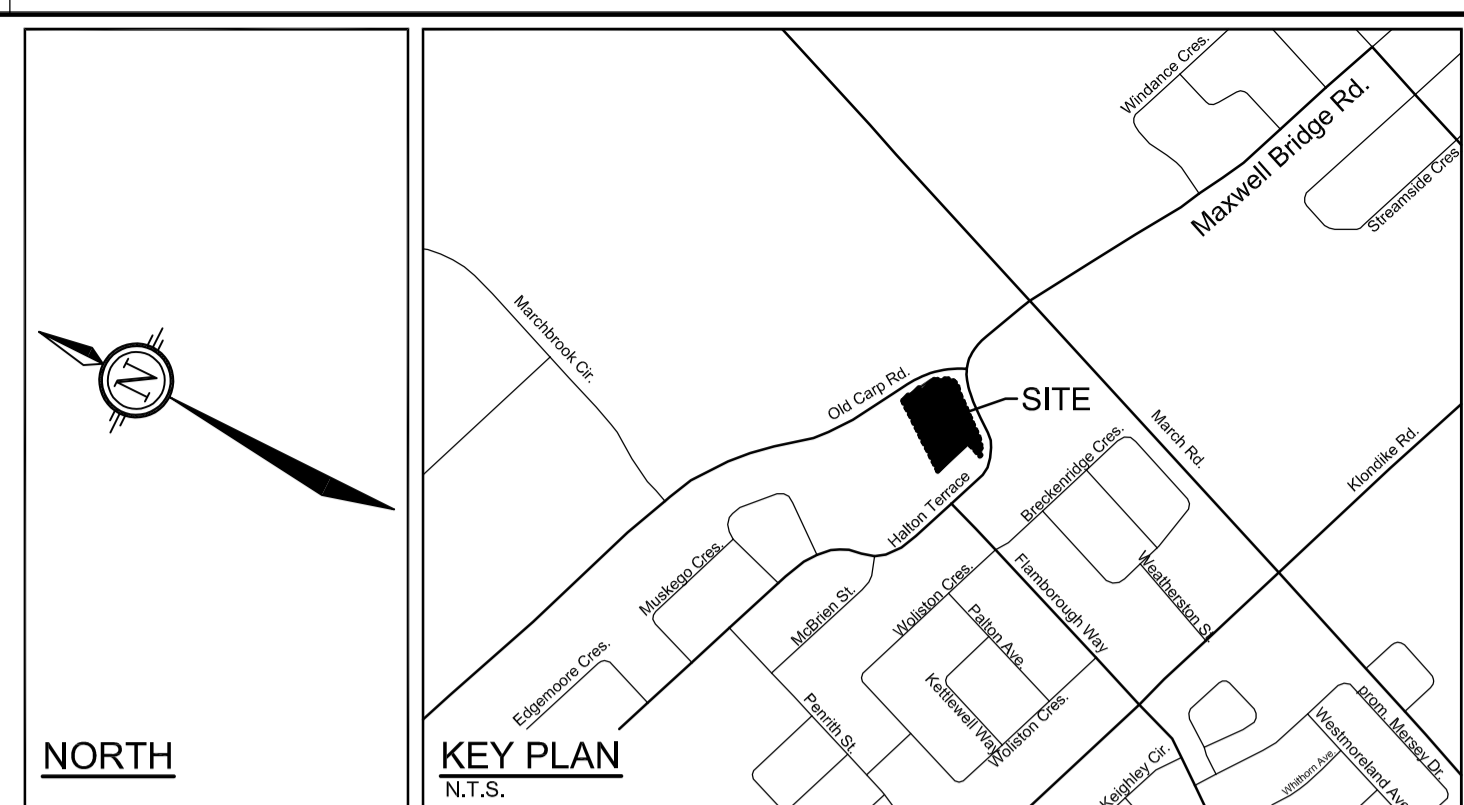
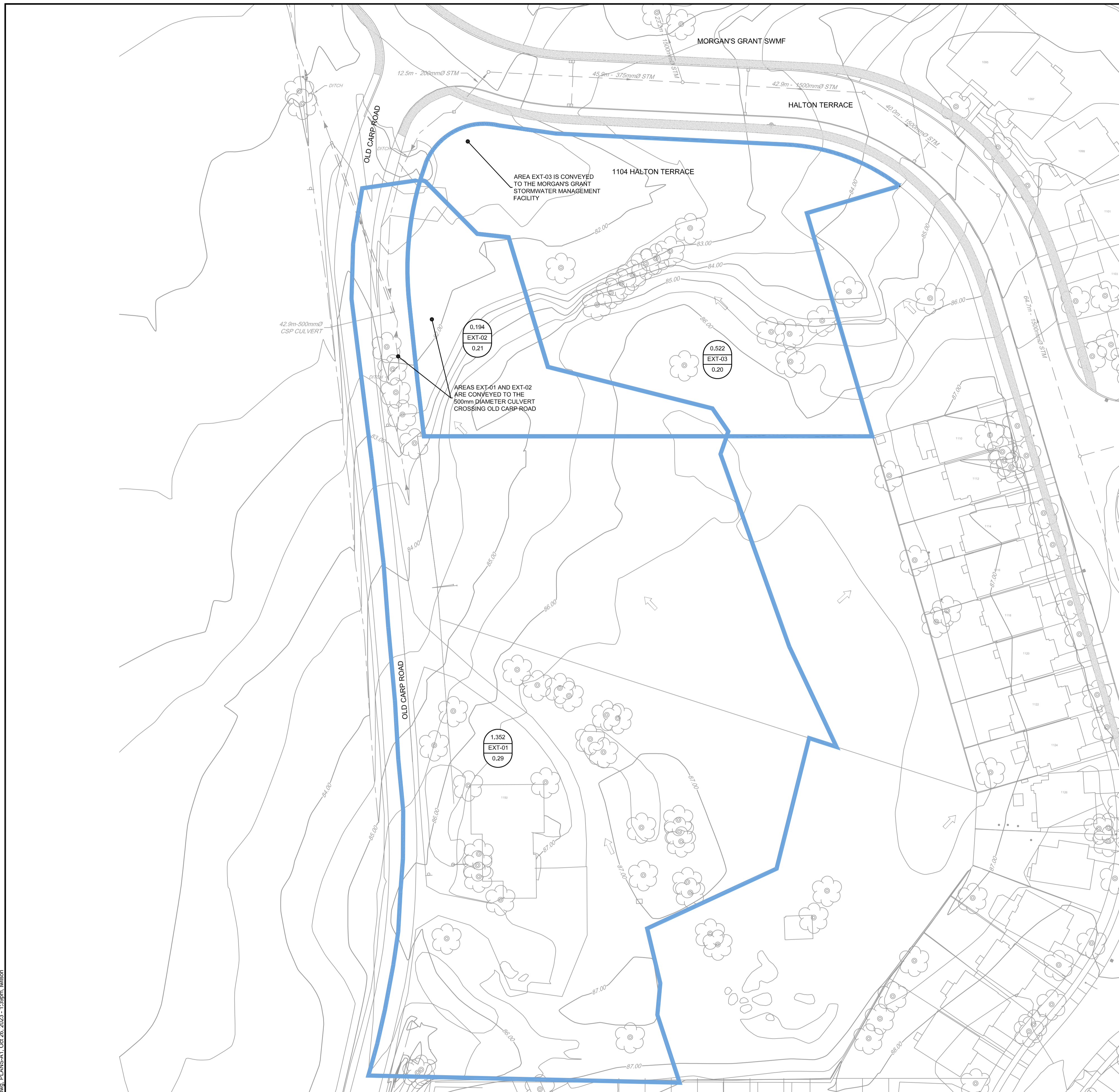
CITY OF OTTAWA
1104 HALTON TERRACE

GENERAL PLAN OF SERVICES

PROJECT No. 119024-GP
REV # 2
DRAWING No. 119024-GP

M:\2021\119024-GP\Drawings\PLANS-AT_119024-GP.dwg, PLANS-AT_119024-GP.dwg, 3:18pm, d.dellon

PLAN #18654 D07-12-21-0186

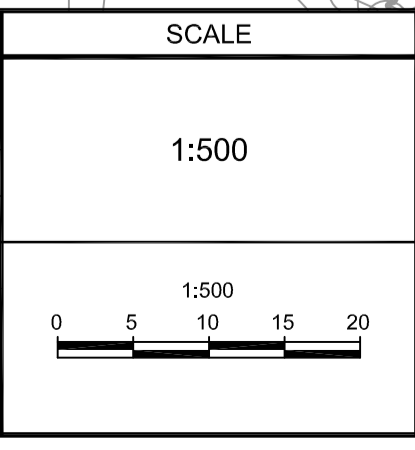


- LEGEND**
- 0.24 ha EXISTING AREA (hectares)
 - A-01 AREA ID
 - 0.65 RUN-OFF COEFFICIENT
 - EXISTING STORM DRAINAGE AREA BOUNDARY
 - EXISTING STORM MANHOLE / SEWER AND FLOW DIRECTION
 - EXISTING ROAD CATCHBASIN
 - EXISTING FLOW DIRECTION

NOTE:
 THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	CITY SUBMISSION	NOV 3/23	MAB

DESIGN	DTD
CHECKED	LWR
DRAWN	DTD
CHECKED	MAB
APPROVED	JGR



FOR REVIEW ONLY

NOVATECH
 Engineers, Planners & Landscape Architects
 Suite 200, 240 Michael Cowpland Drive
 Ottawa, Ontario, Canada K2M 1P6
 Telephone (613) 254-9643
 Facsimile (613) 254-5867
 Website www.novatech-eng.com

CITY OF OTTAWA
 1104 HALTON TERRACE

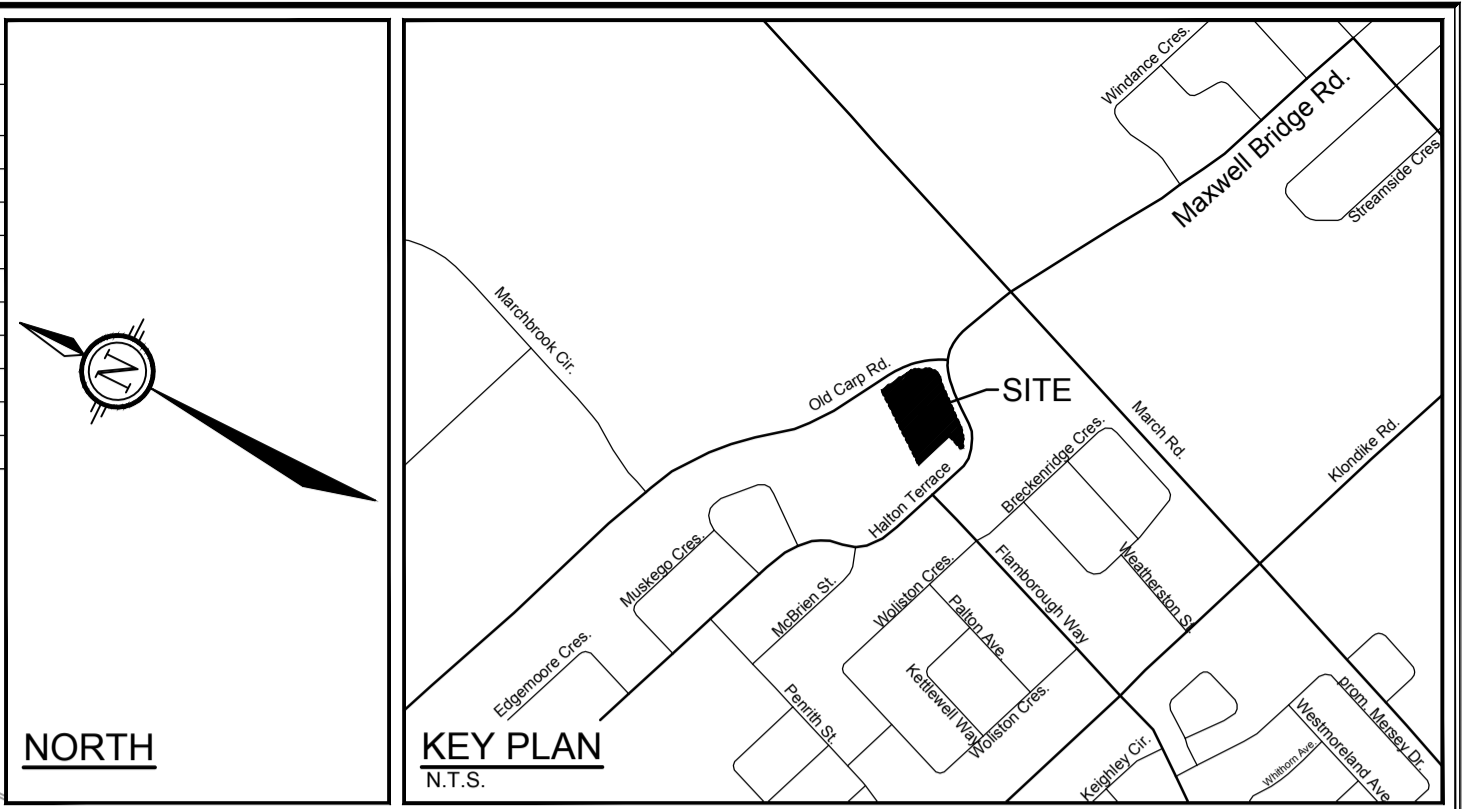
PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

PROJECT No.	119024
REV	REV # 1
DRAWING No.	119024-STM1

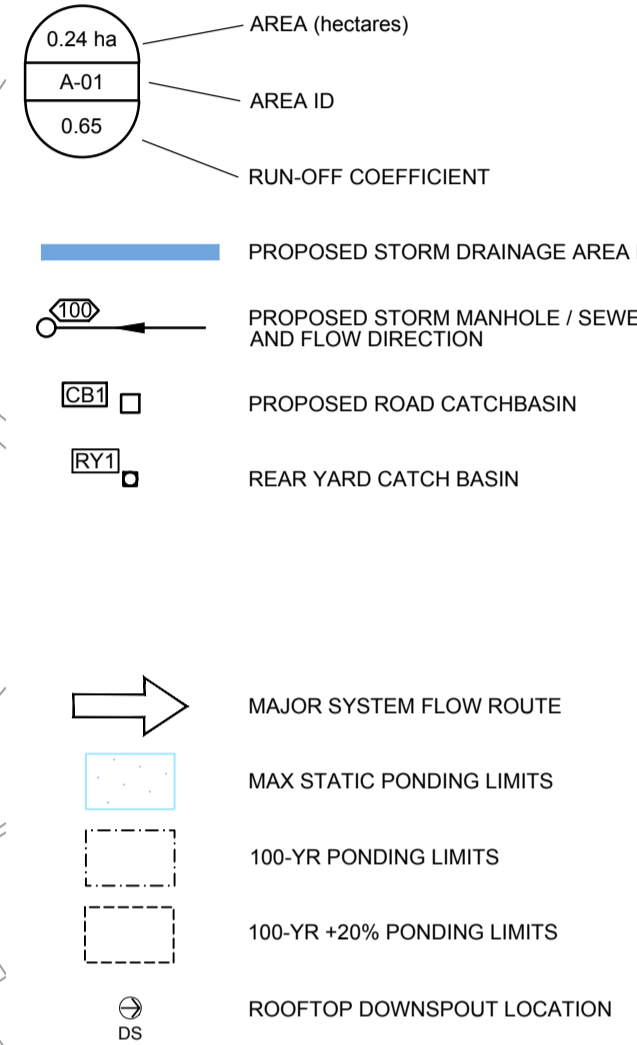
M:\2019\119024\CADD\Design\119024-STM1.dwg, PLANIS-A1, Oct 26, 2023, 1:38pm, Wilson

PLAN #18654 D07-12-21-0186

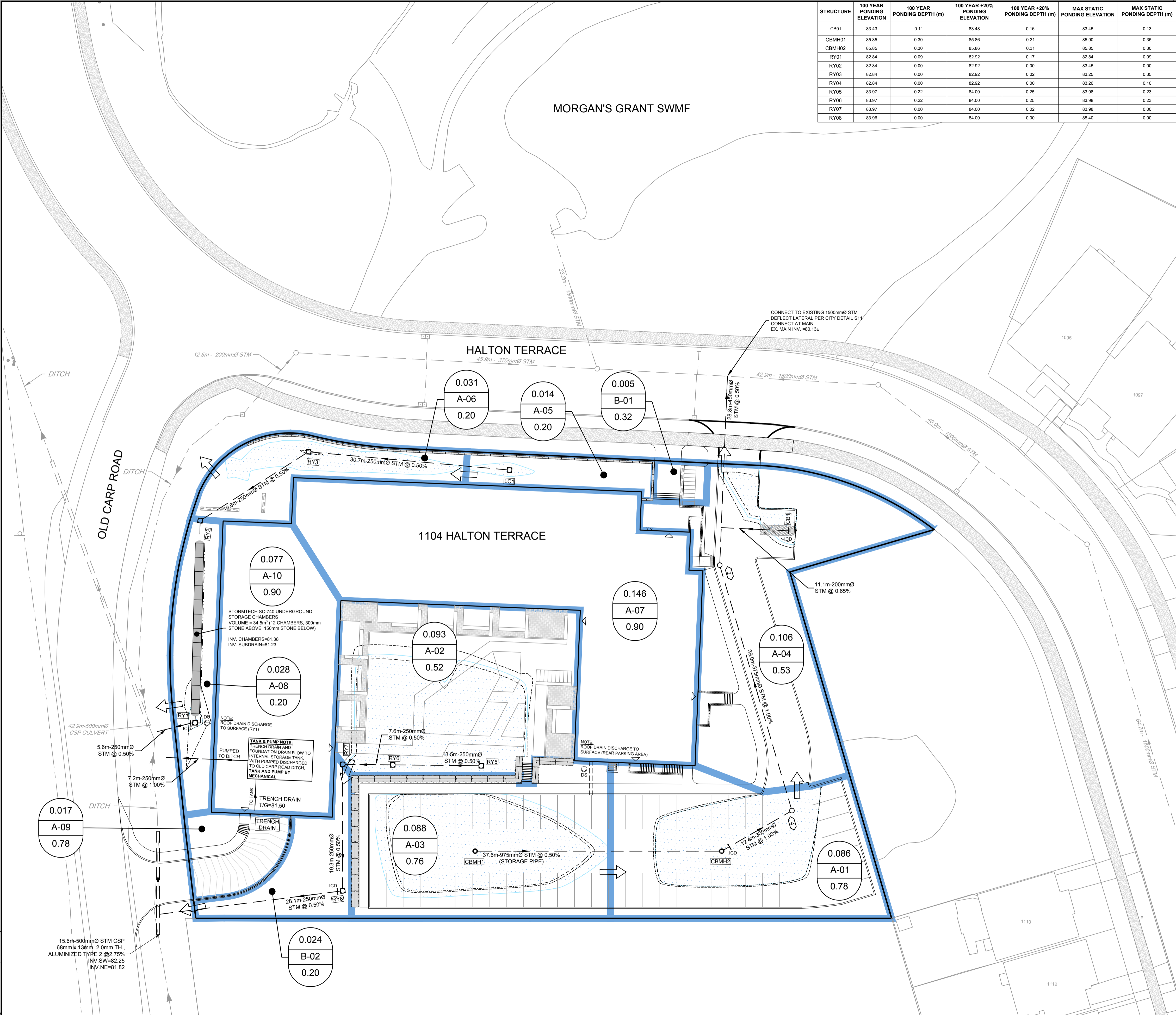
STRUCTURE	100 YEAR PONDING ELEVATION	100 YEAR PONDING DEPTH (m)	100 YEAR +20% PONDING ELEVATION	100 YEAR +20% PONDING DEPTH (m)	MAX STATIC PONDING ELEVATION	MAX STATIC PONDING DEPTH (m)
CB01	83.43	0.11	83.48	0.16	83.45	0.13
CBMH01	85.85	0.30	85.86	0.31	85.90	0.35
CBMH02	85.85	0.30	85.86	0.31	85.85	0.30
RY01	82.84	0.09	82.92	0.17	82.84	0.09
RY02	82.84	0.00	82.92	0.00	83.45	0.00
RY03	82.84	0.00	82.92	0.02	83.25	0.35
RY04	82.84	0.00	82.92	0.00	83.26	0.10
RY05	83.97	0.22	84.00	0.25	83.98	0.23
RY06	83.97	0.22	84.00	0.25	83.98	0.23
RY07	83.97	0.00	84.00	0.02	83.98	0.00
RY08	83.96	0.00	84.00	0.00	85.40	0.00



NORTH



ICD TABLE				
STRUCTURE ID	ICD TYPE	INVERT (m)	100-YR HEAD (m)	100-YR PEAK FLOW (L/s)
CB1	TEMPEST MHF (120mm)	NW=82.32	1.11	28.8
CBMH2	TEMPEST LMF	SE=82.89 NW=83.49	2.96	9.5
RY1	TEMPEST LMF	NE=81.38	1.61	4.3
RY8	TEMPEST LMF	NE=82.44 NW=82.44	1.52	4.2



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
2.	CITY SUBMISSION	NOV 3/23	MAB
1.	CITY SUBMISSION	OCT 19/21	MAB

SCALE	
1:300	
0 3 6 9 12	

DESIGN	
DTD	CHECKED
LWR	DRAWN
DTD	CHECKED
MAB	APPROVED
JGR	

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone: (613) 254-9643
Facsimile: (613) 254-5867
Website: www.novatech-eng.com

CITY OF OTTAWA
1104 HALTON TERRACE

STORM DRAINAGE AREA PLAN

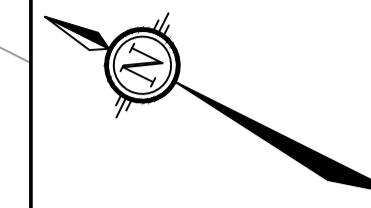
PROJECT No. 119024
REV # 2
DRAWING No. 119024-STM2

M:\2019\119024\CAD\Design\119024-STM.dwg, PLANS-A1, Oct 31, 2023, 4:29pm, addison

PLAN #18654 D07-12-21-0186

MORGAN'S GRANT SWMF

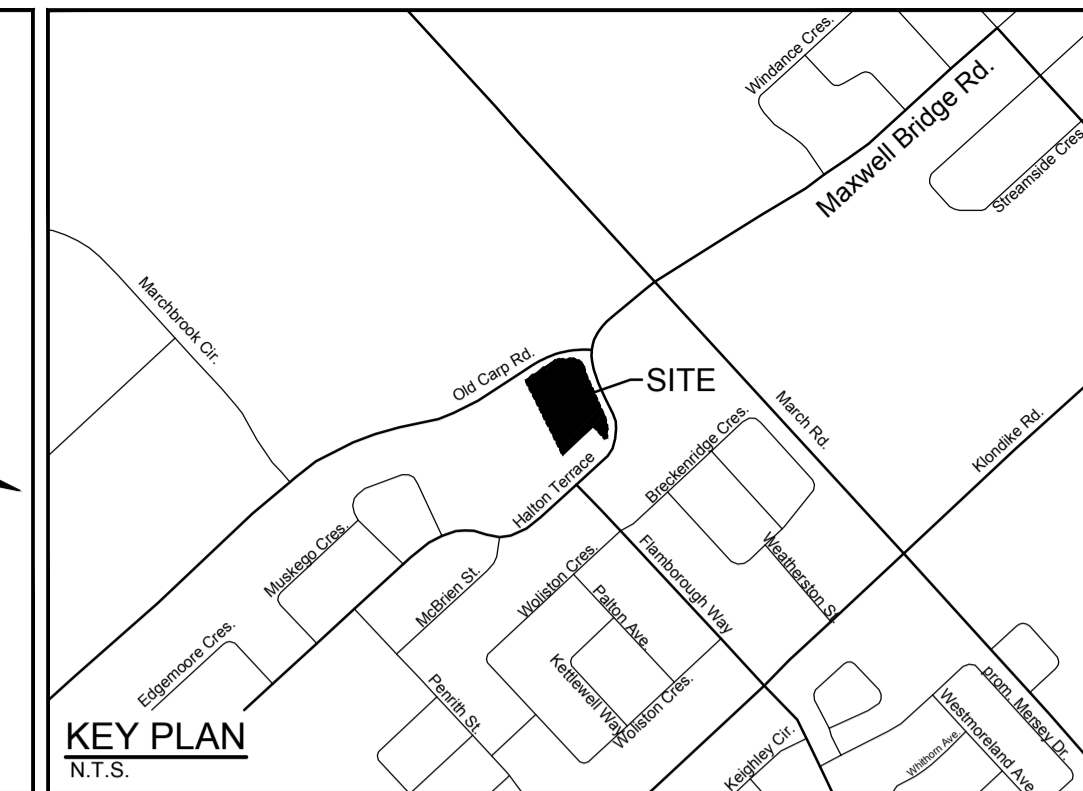
MORGAN'S GRANT SWMF



NORTH

KEY PLAN

N.T.S.



LEGEND

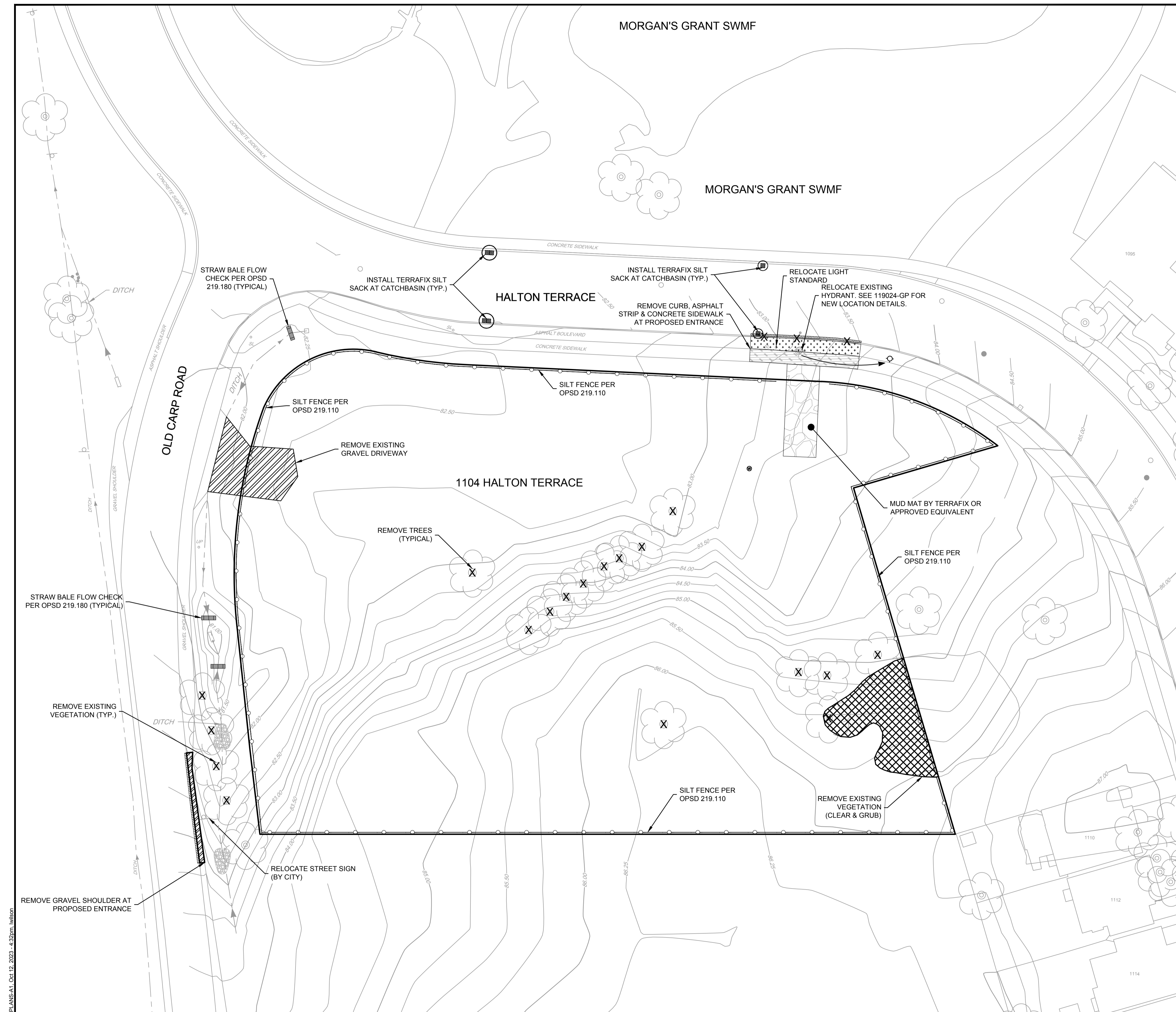
- CLEARING AND GRUBBING
- GRAVEL SHOULDER & DRIVEWAY REMOVAL
- REMOVE ASPHALT
- REMOVALS
- SILT FENCE PER OPSD 219.110
- STRAW BALE FLOW CHECK PER OPSD 219.180
- DRY GRIND EXISTING ASPHALT. AVERAGE DEPTH 50mm AND 0.3m FROM BACK OF FULL DEPTH ASPHALT
- REMOVE CONCRETE SIDEWALK
- EXISTING CONTOUR AND ELEVATION
- MUD MATS
- SILT SACK INSTALLED AT EXISTING CATCHBASIN

EROSION AND SEDIMENT CONTROL NOTES :

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, THE MUNICIPALITY AND THE CONSERVATION AUTHORITY. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE DITCH OR STORM SYSTEM DURING CONSTRUCTION, SILT SACKS WILL BE PLACED UNDER GRATES OF ALL PROPOSED AND EXISTING CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED IN SELECTED LOCATIONS SHOWN ON THIS PLAN, AND STRAW BALE BARRIERS WILL BE INSTALLED WITHIN THE OUTLET DITCHES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
4. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
5. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
6. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.

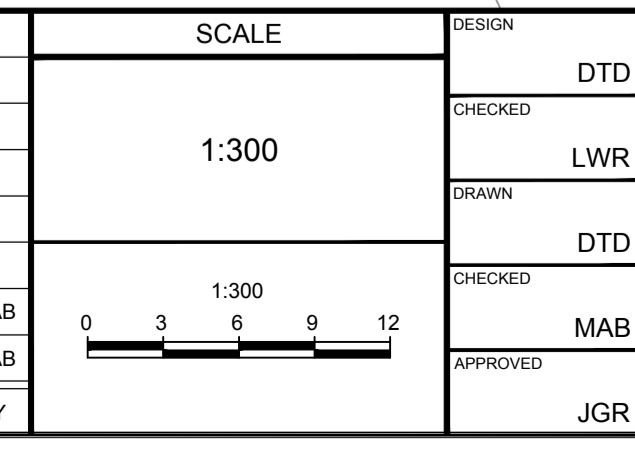
REMOVALS NOTES :

1. ALL HYDRANTS, VALVES AND OTHER APPURTENANCES TO BE REMOVED SHALL BE SALVAGED AND DELIVERED TO CITY OF OTTAWA MAINTENANCE YARD AT CLYDE AVENUE.
2. THE CONTRACTOR SHALL PROTECT ALL SURVEY MONUMENTS.
3. REMOVAL OF ALL ABOVE GROUND TRAFFIC PLANT AND STREETLIGHTING TO BE DONE BY OTHERS. CONTRACTOR SHALL PROTECT AND MAINTAIN EXISTING STREETLIGHTING, HYDRO POLES AND OVERHEAD LINES DURING CONSTRUCTION.
4. ALL BELL AND HYDRO OTTAWA MAINTENANCE HOLE ADJUSTMENTS SHALL BE PERFORMED BY AN APPROVED CONTRACTOR ONLY.
5. ALL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIAL SHALL BE REMOVED FROM IMPROVED AREAS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. FORESTRY TO BE CONTACTED PRIOR TO ANY SELECTIVE PRUNING OR REMOVALS WITHIN THE AREAS OF TRESS SURROUNDING THE TRANS CANADA TRAIL AND TREES THAT ARE TO REMAIN ARE TO HAVE PROPER TREE PROTECTION FENCING.



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
2.	CITY SUBMISSION	NOV 3/23	MAB
1.	CITY SUBMISSION	OCT 19/21	MAB



DESIGN

DTD

CHECKED LWR

DRAWN DTD

CHECKED MAB

APPROVED JGR

FOR REVIEW ONLY

NOVATECH

Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
1104 HALTON TERRACE

PROJECT No. 119024

REV # 2

DRAWING No. 119024-ESC

SITE REMOVALS, EROSION AND SEDIMENT CONTROL PLAN

M:\2019\119024\CAD\Design\119024-ESC.dwg, PLANS-A1, Oct 12, 2023, 4:32pm, Wilson

PLAN #18654 D07-12-21-0186