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1104 Halton Terrace

Site Servicing and Stormwater Management Report

MAPLE LEAF HOMES

1104 HALTON TERRACE

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared for:

Maple Leaf Homes

Prepared By:

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

NOVATECH
Engineers, Planners & Landscape Architects

September 18, 2024

City of Ottawa
Planning, Infrastructure and Economic Development Department
Planning Services Branch
110 Laurier Ave. West, 4th Floor
Ottawa, Ontario
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Attention: **Abi Dieme, Project Manager - Infrastructure Approvals**

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

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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**.

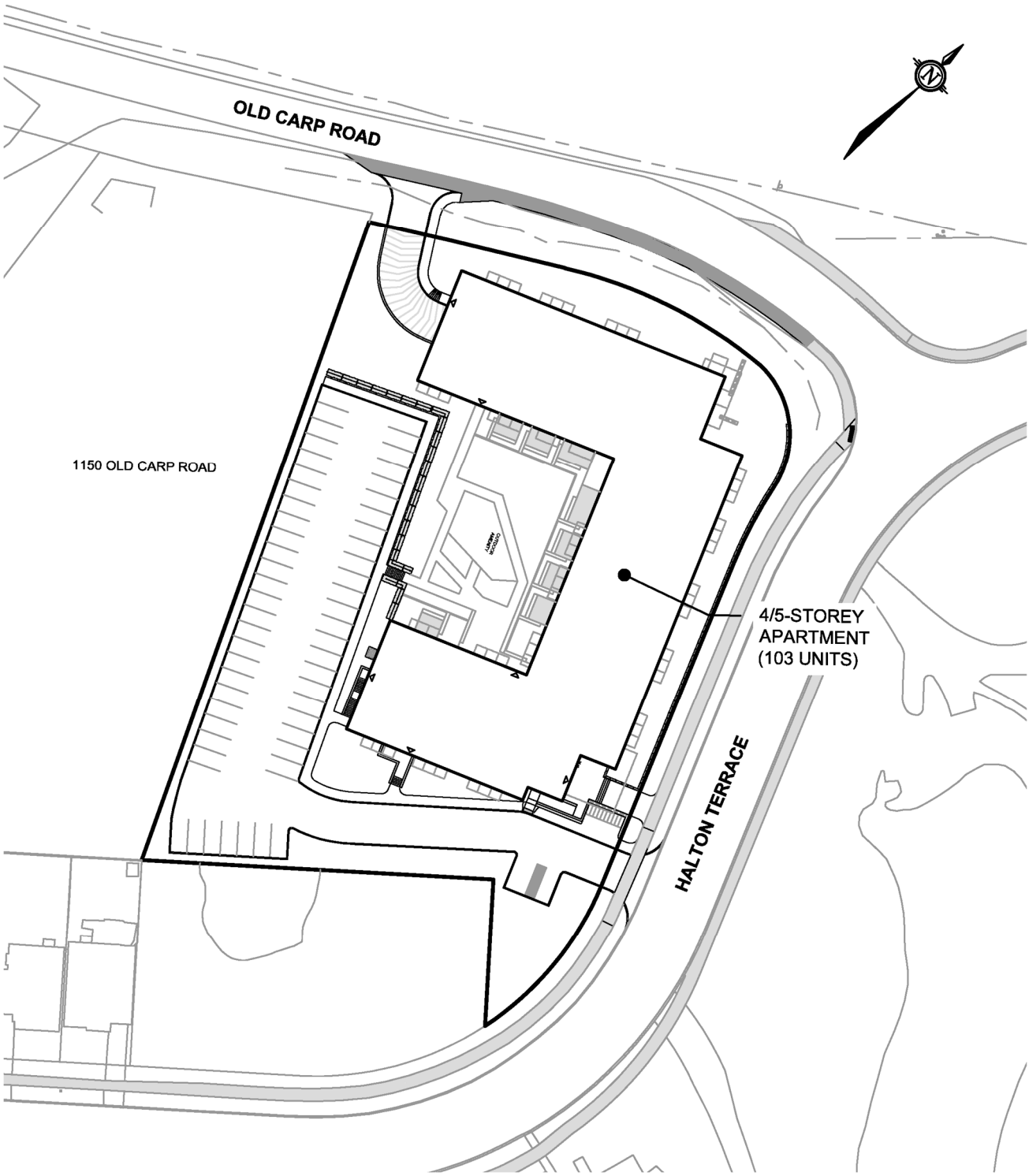

Figure 2 Site Plan

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

The site will be serviced by two 200mm water services, separated by an isolation valve, connecting to the existing 300mm watermain in Halton Terrace. **Figure 3** highlights the proposed works and connection point for the proposed watermains 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 150 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
150 L/s	367.19 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)	386.02 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	468.43 kPa (T1)	434.09 kPa (EXHYD1)	11.14 Hours (B1)

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).

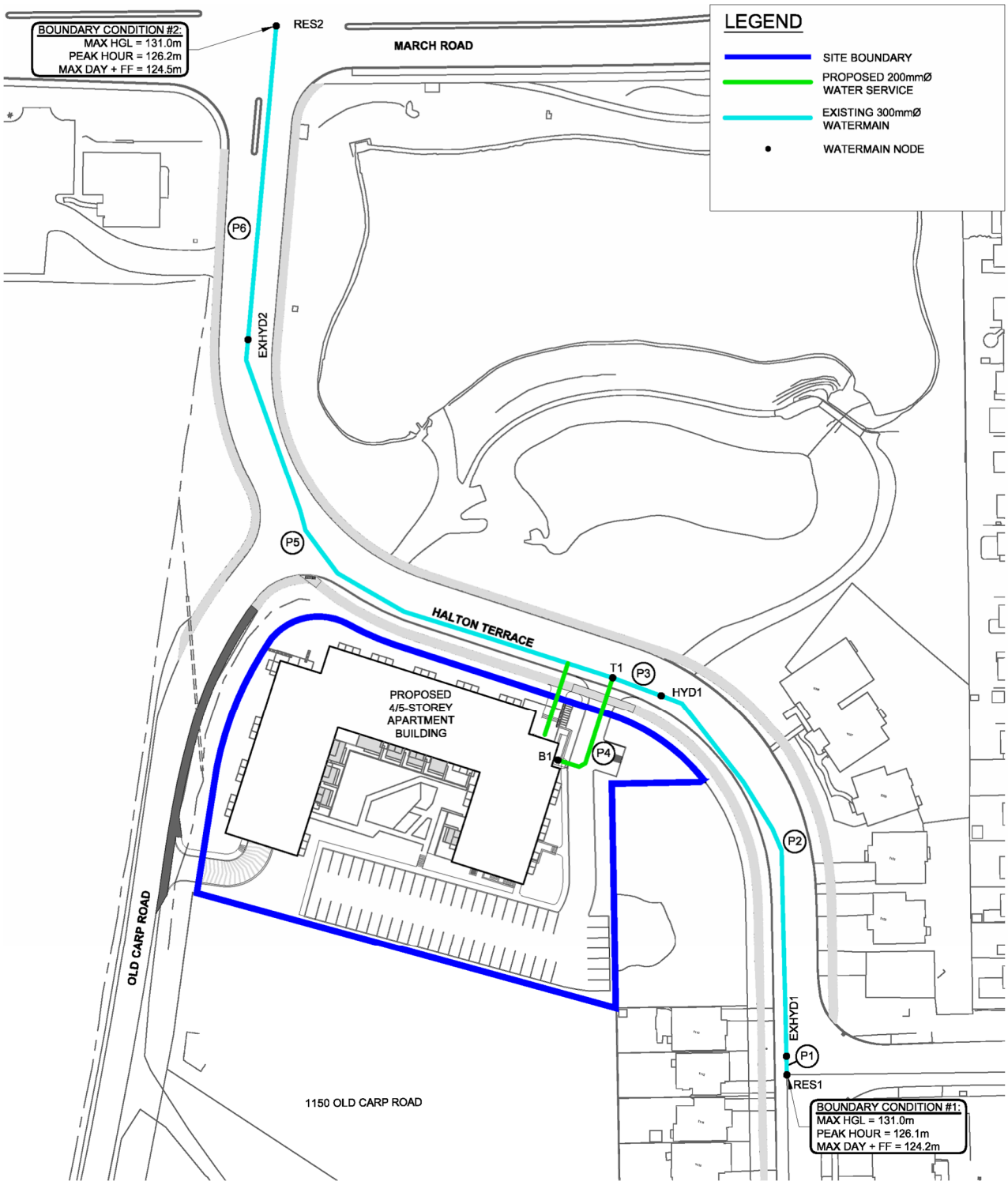

Figure 3 Watermain Distribution

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

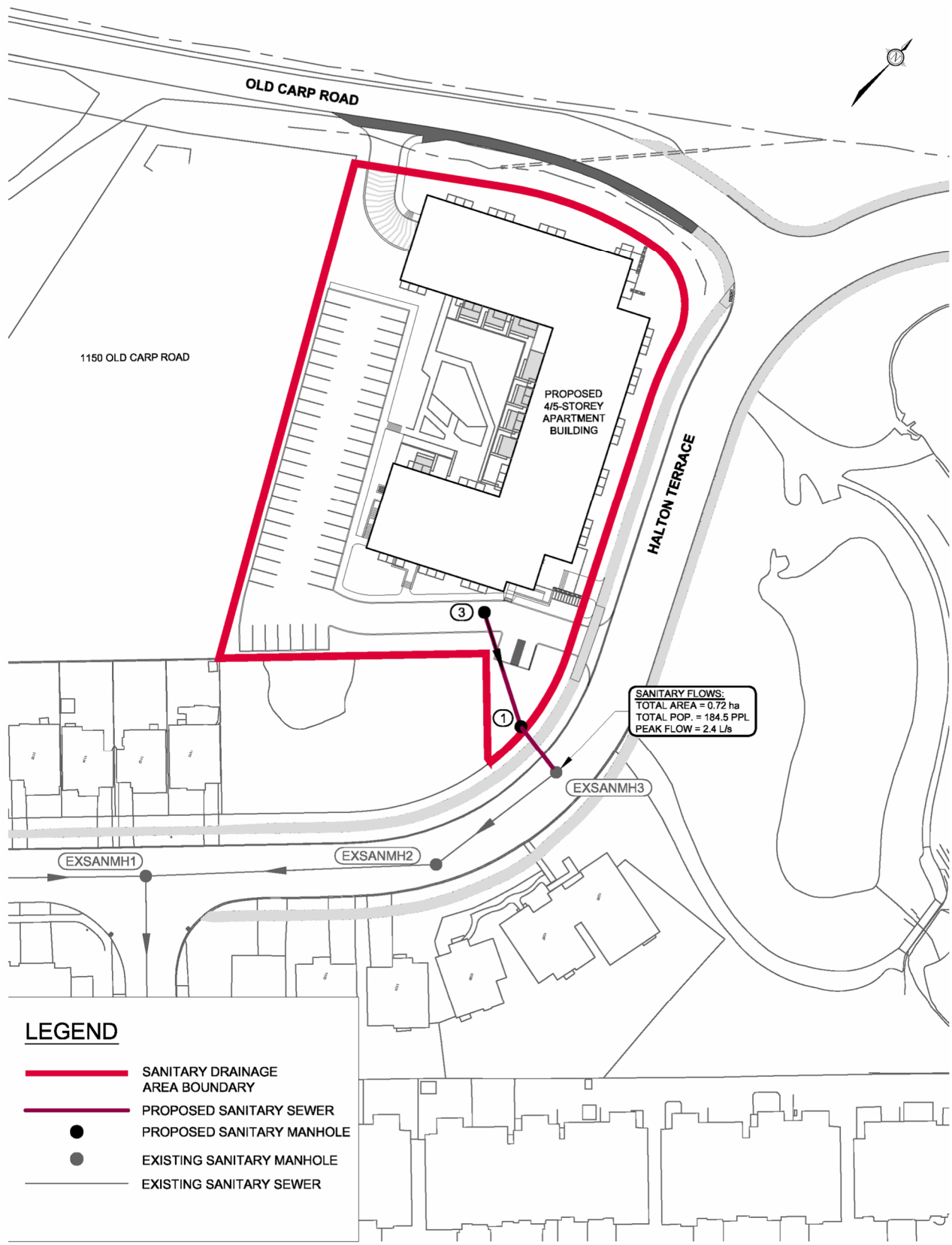

Figure 4 Sanitary Collection

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 (0.44 ha) is directed to the storm sewer in Halton Terrace while the remainder of the site (0.28 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

An area of 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, amenity area and rooftop 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.

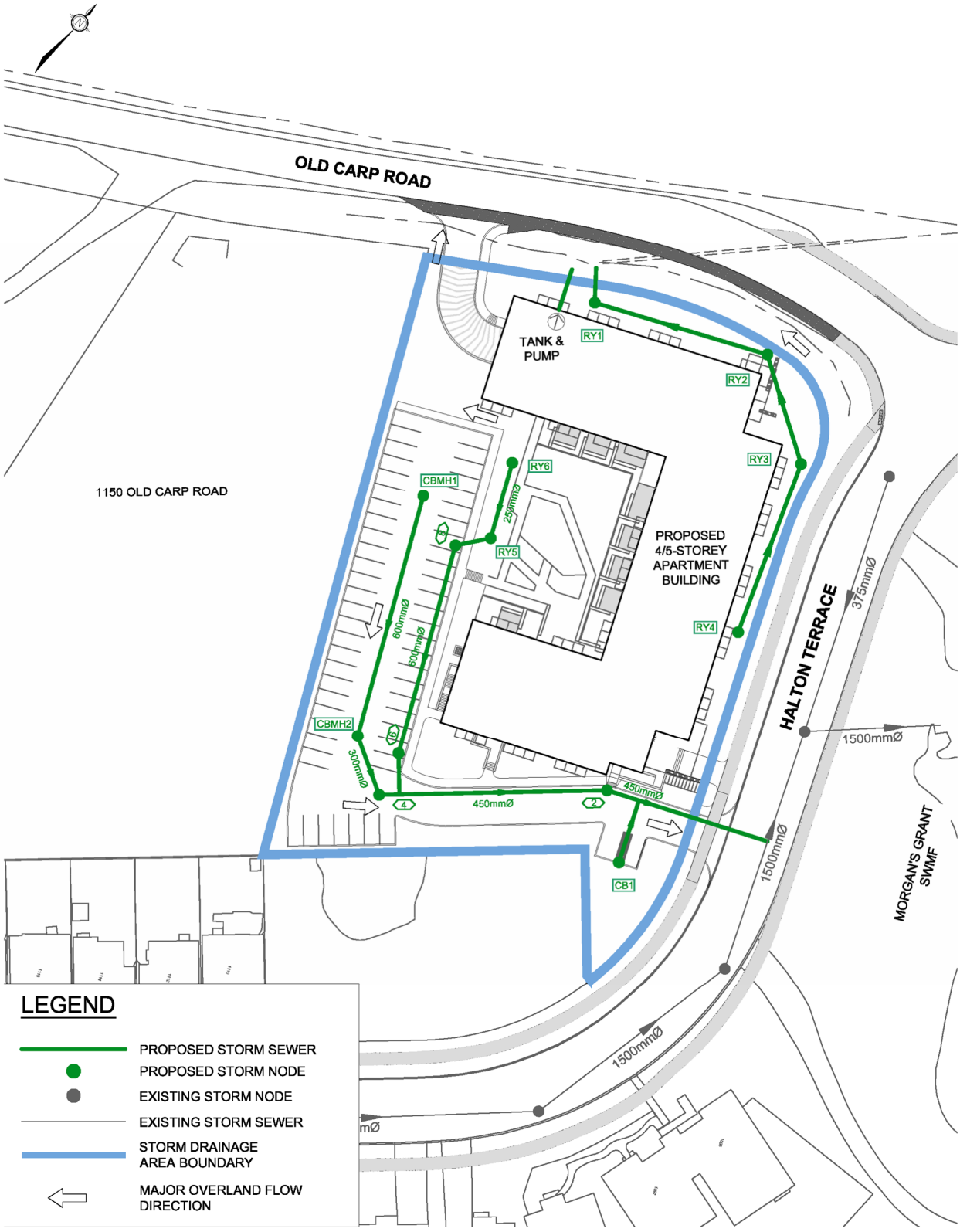

Figure 3 Storm Drainage

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 600 mm diameter HDPE storage pipes, providing 103.5 m^3 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 roadway structures 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 103.5 m^3 of underground storage and 85.4 m^3 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	-	45.3	45.3
CBMH02*	12.0	30.3	42.3
TOTAL	**12.0**	**75.6**	**87.6**
RY05	-	2.4	2.4
RY06	-	2.4	2.4
MH06*	10.5	-	10.5
TOTAL	**10.5**	**4.8**	**15.3**
RY01*	81.0	-	81.0
TOTAL	**81.0**	**-**	**81.0**
TOTAL OVERALL	**103.5**	**85.4**	**188.9**

*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	0.053	0.90	100	95	11	1
A-08	0.028	0.20	0	0	11	1
A-09	0.017	0.76	79.4	0	9	5
A-10	0.077	0.90	100	95	15	1
A-11	0.093	0.90	100	95	19	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	**0.715**	**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:

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

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).

Bend Angle	Loss Coefficient
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 Results

Inlet Control Devices (ICDs)

ICDs are provided for specified structures 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 (112mm)	83.32	82.32	1.13	10.8	17.4	23.7
CBMH02	Tempest LMF	85.55	82.88	2.97	6.3	6.6	6.7
RY01	Tempest LMF	82.75	81.23	1.55	6.6	7.5	9.4
MH06	Tempest LMF	85.86	82.70	1.14	2.7	3.9	7.0

**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	83.45	0.13	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	82.77	0.02	N	0.00
RY02	83.45	83.45	0.00	82.77	0.00	N	0.00
RY03	82.90	83.25	0.35	82.77	0.00	N	0.00
RY04	83.16	83.26	0.10	82.77	0.00	N	0.00
RY05	83.80	83.90	0.10	83.84	0.04	N	0.00
RY06	83.80	83.90	0.10	83.84	0.04	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	85.74	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	16.1	0.2	16.3	0
	5-yr		25.2	0.5	25.7	0
	100-yr		36.5	1.7	38.2	0
Old Carp Road Ditch	2-yr	8.7	8.7	0.0	8.7	0
	5-yr	11.8	10.9	0.7	11.6	0
	100-yr	25.9	16.0	4.3	20.3	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 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	400
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

- Two 200mm service connections are proposed to service the development with connections 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 in 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

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Appendix B

Watermain Boundary Conditions,
FUS Calculations, &
Modelling Results

Boundary Conditions
1104 Halton Terrace

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	36	0.60
Maximum Daily Demand	90	1.50
Peak Hour	198	3.31
Fire Flow Demand #1	9,000	150.00

Location

Results

Connection 1 – Flamborough Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.0	63.1
Peak Hour	126.1	56.2
Max Day plus Fire Flow #1	124.2	53.5

[1] Ground Elevation = 86.6 m

Connection 2 – March Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.0	74.1
Peak Hour	126.2	67.2
Max Day plus Fire Flow #1	124.5	64.8

[1] Ground Elevation = 78.9 m

Notes

1. *As per OWDG Technical Bulleting ISTB-2021-03 Section 4.3.1:*

   Industrial, commercial, institutional service areas with a basic day demand greater than 50 m^3/day (0.58 L/s) and residential areas serving 50 or more dwellings shall be connected with a minimum of two watermains, separated by an isolation valve, to avoid the creation of a vulnerable service area.

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

Engineers, Planners & Landscape Architects

Novatech Project #: 119024
Project Name: 1104 Halton Terrace
Date: 9/12/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett
Drawing Reference: 119024-GP

Legend: Input by User / No Input Required
Reference: Fire Underwriter's Survey Guideline (2020) Formula Method

Building Description: 4/5 Storey Residential Building
Type II - Non-combustible construction

Step			Choose		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		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	2238			
		Total Floors/Storeys (Podium)	4			
		Tower Footprint (m^2)	1705			
		Total Floors/Storeys (Tower)	1			
		Protected Openings (1 hr)	No			
		A, Total Effective Floor Area (m^2)			**7,567**	
	F	**Base fire flow without reductions**				**15,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**12,750**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-5,100**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Sub-Total	**-40%**	
		Area of Sprinklered Coverage (m^2)	10658	100%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge per**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	>30m		0%	**1,275**
		East Side	>30m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	>30m		0%	
				Cumulative Total	**10%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**9,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**150**
				or	USGPM	2,378

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	150	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
EXHYD1	6		20	0.066	0.165	0.364	N/A
EXHYD2			0	0.000	0.000	0.000	N/A
HYD1			0	0.000	0.000	0.000	150
T1			0	0.000	0.000	0.000	N/A
Total	**6**	**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	150	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	126.12	42.52	417.12	60.50
Junc EXHYD1	86.75	0.36	126.1	39.35	386.02	55.99
Junc EXHYD2	80.05	0	126.17	46.12	460.00	66.72
Junc HYD1	83.73	0	126.12	42.39	450.00	65.27
Junc T1	83.25	0	126.13	42.88	420.65	61.01
Resvr RES1	126.1	15.25	126.1	0	0.00	0.00
Resvr RES2	126.2	-18.92	126.2	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	-15.25	0.22	0.23	0.029
Pipe P2	100	300	120	-15.61	0.22	0.24	0.029
Pipe P3	13	300	120	-15.61	0.22	0.24	0.029
Pipe P4	31	200	100	3.31	0.11	0.14	0.048
Pipe P5	135	300	120	-18.92	0.27	0.34	0.028
Pipe P6	77	300	120	-18.92	0.27	0.34	0.028

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	131	47.4	464.99	67.44	11.14
Junc EXHYD1	86.75	0.07	131	44.25	434.09	62.96	0.21
Junc EXHYD2	80.05	0	131	50.95	460.00	66.72	5.92
Junc HYD1	83.73	0	131	47.27	450.00	65.27	5.84
Junc T1	83.25	0	131	47.75	468.43	67.94	10.7
Resvr RES1	131	-0.41	131	0	0.00	0.00	0
Resvr RES2	131	-0.25	131	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	0.356
Pipe P2	100	300	120	0.35	0.00	0.00	0.046
Pipe P3	13	300	120	0.35	0.00	0.00	0.000
Pipe P4	31	200	100	0.60	0.02	0.01	0.062
Pipe P5	135	300	120	-0.25	0.00	0.00	0.063
Pipe P6	77	300	120	-0.25	0.00	0.00	0.055

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	123.7	40.1	393.38	57.06
Junc EXHYD1	86.75	0.17	124.18	37.43	367.19	53.26
Junc EXHYD2	80.05	0	124.21	44.16	460.00	66.72
Junc HYD1	83.73	150	123.66	39.93	450.00	65.27
Junc T1	83.25	0	123.7	40.45	396.81	57.55
Resvr RES1	124.2	-82.53	124.2	0	0.00	0.00
Resvr RES2	124.5	-69.14	124.5	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	82.53	1.17	5.22	0.023
Pipe P2	100	300	120	82.37	1.17	5.20	0.023
Pipe P3	13	300	120	-67.63	0.96	3.61	0.023
Pipe P4	31	200	100	1.50	0.05	0.03	0.054
Pipe P5	135	300	120	-69.14	0.98	3.76	0.023
Pipe P6	77	300	120	-69.14	0.98	3.76	0.023

Appendix C

Sanitary Design Sheets

SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119024
Project Name: 1104 Halton Terrace
Date: 9/12/2024
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							
				Residential Flow									Extraneous Flow Area Method		Total Design Flow	Proposed Sewer Pipe Sizing / Design							
Street	Area ID	From MH	To MH	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 x q x M x K / 86,400)
3. **q =** 280 L/per person/day (design); 200 L/per 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/s/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)

	Singles	Semis / Towns	Apts
P = Residential Population =	3.4	2.7	1.8

q = Average Capita Flow
M = Harmon Formula
K = Harmon Correction Factor
Typ. Service Diameter (mm) = 135
Typ. Service Length (m) = 15 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)

Institutional / Commercial / Industrial	Industrial	Commercial / Institutional	
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) Ap R^(2/3) So^(1/2)

Definitions

Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
Ap = Pipe flow area (m^2)
R = Wetted perimeter (m)
So = 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

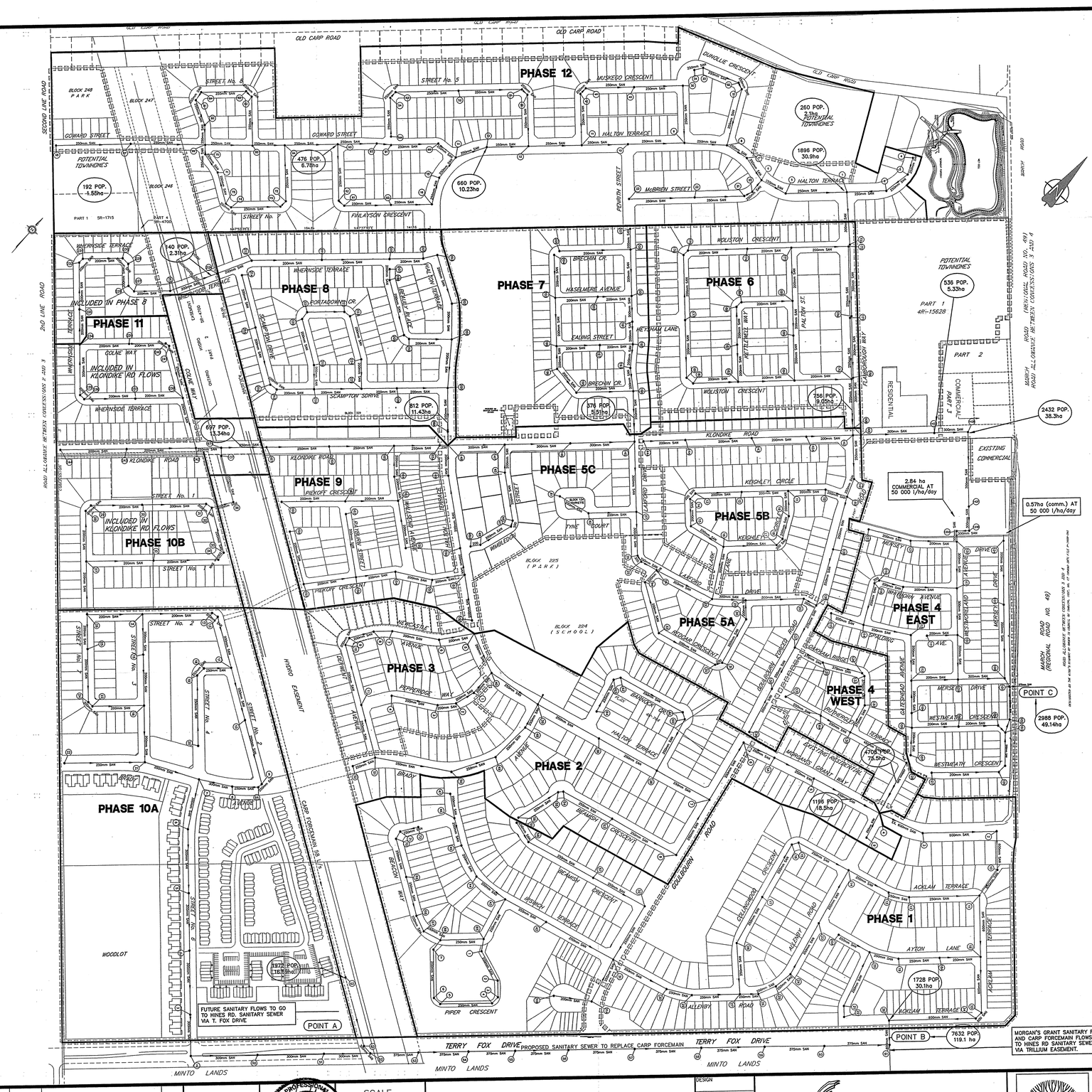
SANITARY SEWER DESIGN SHEET
Revised September 16, 2003

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. #		RESIDENTIAL						NON-RESIDENTIAL				INFIL.	PEAK	SEWER DATA						UPSTREAM		DOWNSTREAM		COMMENTS
			NO. of	INDIVIDUAL		CUMMULATIVE		Peaking	POPUL.	AREA	CUMM.	Peaking	NON-	FLOW	FLOW	DIA.	Slope	CAPAC.	VEL.	LENGTH	RESIDUAL	Obvert	Obvert	Invert	Obvert	Invert	
	FROM	TO	UNITS	POPUL. people	AREA ha	POPUL. people	AREA ha	Factor	FLOW l/s	ha	AREA ha	Factor	RES. FLOW (l/s)	l/s	l/s	mm	%	l/s	m/s	m	CAP. (l/s)	Drop					
Street No. 1		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
	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
FLAMBOROUGH WAY	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)
KLONDIKE ROAD	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	3.30	183.25	2.51	110.00	143.79	0.04	80.878	80.573	77.248	76.943	
KLONDIKE ROAD	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
COMMERCIAL SITE	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	[illegible]	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	[illegible]		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	[illegible]		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		[illegible]		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	[illegible]		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	[illegible]	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	[illegible]		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	[illegible]		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	[illegible]	[illegible]		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	0.78	0.00	0.00	1.50	0.00	0.15	0.93	200	0.58	26.06	0.80	69.9	25.12		77.000	76.800	76.595	76.395	
	105	104		32	0.39	80	0.94	4.00	1.30	0.00	0.00	1.50	0.00	0.26	1.56	200	0.58	26.06	0.80	59.2	24.50		75.860	75.660	75.516	75.316	
	104	103		4	0.01	84	0.95	4.00	1.36	0.00	0.00	1.50	0.00	0.27	1.63	200	1.00	34.21	1.06	14.9	32.59		75.049	74.849	74.900	74.700	



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

LICENSED PROFESSIONAL ENGINEER — L.J. JABLONSKI — 16/9/03 — PROVINCE OF ONTARIO

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	

Ottawa

minto

MORGAN'S GRANT SUBDIVISION
MASTER DRAINAGE PLAN (SANITARY)

DATED SEPT. 2003
DWG. No. 17730–SA

Appendix D

STM Design Sheets, SWM Excerpts &
PCSWMM Modelling Info

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

NOVATECH
Engineers, Planners & Landscape Architects

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	82.54	82.80	83.45	83.47	0.00	0.00	0.13	0.15	0.00	0.00	0.00	0.02
CBMH01	83.69	85.55	85.90	0.35	85.51	85.68	85.85	85.86	0.00	0.13	0.30	0.31	0.00	0.00	0.00	0.00
CBMH02	82.88	85.55	85.85	0.30	85.51	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	81.97	82.15	82.77	82.93	0.00	0.00	0.02	0.18	0.00	0.00	0.00	0.09
RY02	81.47	83.45	83.45	0.00	81.96	82.15	82.77	82.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RY03	81.72	82.90	83.25	0.35	81.97	82.15	82.77	82.92	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
RY04	81.96	83.16	83.26	0.10	81.96	82.15	82.77	82.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RY05	82.80	83.80	83.90	0.10	82.90	83.06	83.84	83.91	0.00	0.00	0.04	0.11	0.00	0.00	0.00	0.01
RY06	82.87	83.80	83.90	0.10	82.90	83.06	83.84	83.91	0.00	0.00	0.04	0.11	0.00	0.00	0.00	0.01

[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	1.17	0.00
1.86	1.17	2.18
2.21	257.70	47.48
2.21	0.00	47.61
2.86	0.00	47.61

CBMH02-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	1.17	0.00
2.67	1.17	3.12
2.97	200.80	33.42
2.97	0.00	33.52
3.67	0.00	33.52

RY05-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.00	0.36	0.36
1.10	48	2.76
1.10	0.00	2.78
2.00	0.00	2.78

RY06-Storage		
Depth (m)	Area (m2)	Volume (m3)
0.00	0.36	0.00
0.93	0.36	0.33
1.03	48	2.73
1.03	0.00	2.76
1.93	0.00	2.76

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	82.69	1.06	1.10	82.69
MH04	82.55	85.74	82.69	0.14	3.05	82.69
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).*

1104 Halton Terrace
Maple Leaf Homes
Project No.: 119024

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

NOVATECH
Engineers, Planners & Landscape Architects

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	0.227	0.80	0.18	0.505	0.505	10.00	76.81			38.8	38.8	0.305	300	PVC	1.00	10.8	100.8	1.38	0.13	38%
						0.00	0.000	0.000	10.00													
						0.00	0.000	0.000	10.00													
	A-02	MH04	MH02	0.093	0.52	0.05	0.134	0.639	10.13	76.31			48.8	48.8	0.457	450	Conc	1.00	39.0	297.2	1.81	0.36	16%
						0.00	0.000	0.000	10.13													
						0.00	0.000	0.000	10.13													
	A-04	MH02	EX 1500mm	0.106	0.53	0.06	0.156	0.795	10.49	74.98			59.6	59.6	0.457	450	Conc	0.50	28.8	210.2	1.28	0.37	28%
						0.00	0.000	0.000	10.49													
						0.00	0.000	0.000	10.49													

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:	September 12, 2024
Design By:	Lucas Wilson
Client:	**Dwg. Reference:** / **Checked By:**
Maple Leaf Homes	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

NOVATECH
Engineers, Planners & Landscape Architects

EXISTING CONDITIONS

Time-of-Concentration (Uplands Method)

Flow Classification (Land Use)	Length (m)	Elevation U/S (m)	Elevation D/S (m)	Slope (%)	Velocity[1] (m/s)	Time-of-Concentration (min)
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) Total	Hard Surfaces (C=0.70)	Soft Surfaces (C=0.20)	Runoff Coefficient C_{avg}	Runoff Coefficient C_{100yr}[1]	%Imperv.
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] 2-year	5-year	100-year	Peak Flows (L/s) 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 = $1735.688 / (Tc + 6.014)^{0.820}$
- 5 year Intensity = $998.071 / (Tc + 6.053)^{0.814}$
- 2 year Intensity = $732.951 / (Tc + 6.199)^{0.810}$

Q(peak flow) = 2.78 x C x I x A

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

1104 Halton Terrace (119204)
Pre-Development Peak Flow Calculations (EXT-01 EXT-02)
Upstream Area Draining to 500mm Culvert

NOVATECH
Engineers, Planners & Landscape Architects

EXISTING CONDITIONS

Time-of-Concentration (Uplands Method)

Flow Classification (Land Use)	Length (m)	Elevation U/S (m)	Elevation D/S (m)	Slope (%)	Velocity[1] (m/s)	Time-of-Concentration (min)
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(peak flow) = 2.78 x C x I x A
- C is the runoff coefficient
- I is the rainfall intensity
- A is the total drainage area

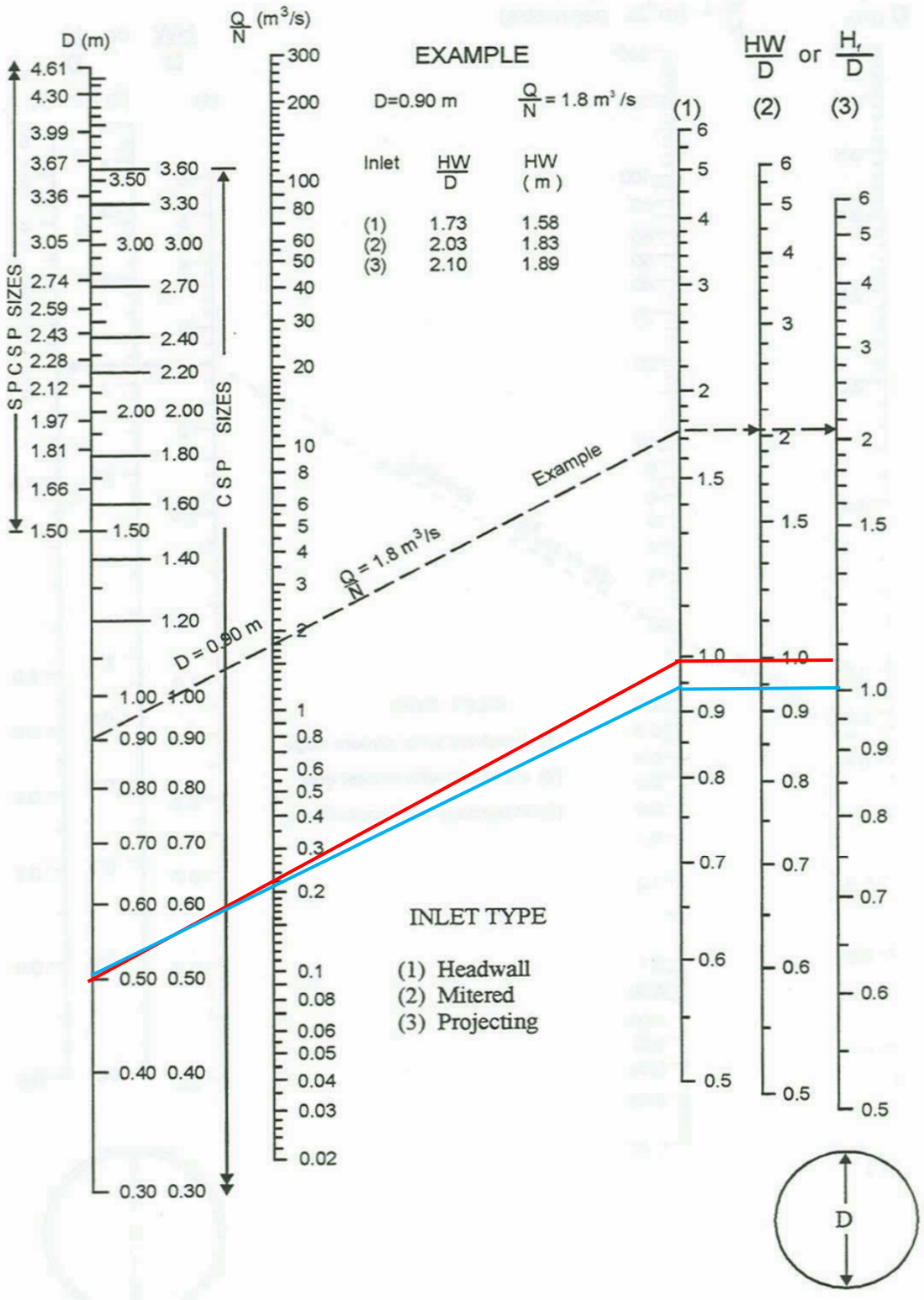
MTO Drainage Management Manual
Design Chart 2.32: Inlet Control: Circular Culverts
Source: Herr (1977)

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 m^3/s
Capacity (HW/D=1) = 0.21 m^3/s



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

NOVATECH
Engineers, Planners & Landscape Architects

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


  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 13
  Number of nodes ........... 27
  Number of links ........... 30
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
                                                  Data       Recording
  Name                 Data Source                Type       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                        0.05     10.60    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
  A-11                        0.09     18.60    100.00    1.0000 RG-1                 RY03
  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
  ************
                                      Invert      Max.    Ponded    External
  Name                 Type            Elev.     Depth      Area    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        83.90      1.00       0.0
  HP-RY06              JUNCTION        83.90      1.00       0.0
  HP-RY08              JUNCTION        83.26      1.00       0.0
  Ex_1500              OUTFALL         80.11      1.38       0.0
  Ex_Ditch1            OUTFALL         81.20      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         83.69      2.86       0.0
  CBMH02               STORAGE         82.88      3.67       0.0
  MH02                 STORAGE         81.18      2.61       0.0
  MH04                 STORAGE         82.17      3.57       0.0
  MH06                 STORAGE         82.70      3.16       0.0
  MH08                 STORAGE         82.76      3.22       0.0
  RY01                 STORAGE         81.23      2.52       0.0
  RY02                 STORAGE         81.47      2.98       0.0
  RY03                 STORAGE         81.72      2.18       0.0
  RY04                 STORAGE         81.96      2.20       0.0
  RY05                 STORAGE         82.80      2.00       0.0
  RY06                 STORAGE         82.87      1.93       0.0


  ************
  Link Summary
  ************
  Name                 From Node        To Node          Type            Length    %Slope Roughness
  ---------------------------------------------------------------------------------------------------
  CBMH01-CBMH02        CBMH01           CBMH02           CONDUIT           42.5    0.4941    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
  MH08-MH06            MH08             MH06             CONDUIT           37.0    0.1892    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   -3.3352    0.0350
  MS-RY06(2)           HP-RY06          Ex_Ditch3        CONDUIT           30.3    2.2448    0.0350
  RY03-RY02            RY03             RY02             CONDUIT           19.6    0.5102    0.0130
  RY05-MH08            RY05             MH08             CONDUIT            6.0    0.5000    0.0130
  RY05-RY06            RY06             RY05             CONDUIT           13.5    0.5185    0.0130
  RY08-RY03            RY04             RY03             CONDUIT           28.0    0.3214    0.0130
  SC740                RY02             RY01             CONDUIT           35.3    0.2550    0.0130
  O-CB01               CB01             MH02             ORIFICE
  O-CBMH02             CBMH02           MH04             ORIFICE
  O-MH06               MH06             MH04             ORIFICE
  O-RY01               RY01             Ex_Ditch1        ORIFICE


  ********************
  Cross Section Summary
  ********************
                                        Full      Full      Hyd.      Max.   No. of      Full
  Conduit              Shape            Depth      Area      Rad.     Width  Barrels      Flow
  ---------------------------------------------------------------------------------------------
  CBMH01-CBMH02        CIRCULAR         0.61      0.29      0.15      0.61       1    451.09
  MH02-Ex_1500         CIRCULAR         0.45      0.16      0.11      0.45       1    198.79
  MH04-MH02            CIRCULAR         0.45      0.16      0.11      0.45       1    285.13
  MH08-MH06            CIRCULAR         0.61      0.29      0.15      0.61       1    279.12
  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 11136.28
  MS-RY06(2)           RECT_OPEN        1.00      2.50      0.56      2.50       1  7232.76
  RY03-RY02            RECT_CLOSED      1.06      0.98      0.25      0.92       1  2110.52
  RY05-MH08            CIRCULAR         0.25      0.05      0.06      0.25       1    42.05
  RY05-RY06            CIRCULAR         0.25      0.05      0.06      0.25       1    42.82
  RY08-RY03            RECT_CLOSED      1.06      0.98      0.25      0.92       1  1675.17
  SC740                RECT_CLOSED      1.06      0.98      0.25      0.92       1  1491.93


  ***********************************************************
  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
  ****************
  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 ........ 6.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.051        71.667
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.011        16.032
Surface Runoff ...........         0.040        55.758
Final Storage ............         0.000         0.571
Continuity Error (%) .....        -0.969


**************************        Volume         Volume
Flow Routing Continuity        hectare-m       10^6 ltr
**************************     ---------      ---------
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         0.401
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 (%) .....         0.045


****************************
Time-Step Critical Elements
****************************
Link RY05-MH08 (3.24%)


********************************
Highest Flow Instability Indexes
********************************
Link O-CB01 (130)
Link MH02-Ex_1500 (30)
Link MH04-MH02 (18)
Link SC740 (4)
Link RY03-RY02 (4)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     5.92 sec
Maximum Time Step           :     6.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00
Percent Not Converging      :     0.01
Time Step Frequencies       :
    6.000 -  3.650 sec      :    98.30 %
    3.650 -  2.221 sec      :     1.46 %
    2.221 -  1.351 sec      :     0.18 %
    1.351 -  0.822 sec      :     0.03 %
    0.822 -  0.500 sec      :     0.03 %


***************************
Subcatchment Runoff Summary
***************************

-----------------------------------------------------------------------------------------------------------------------
                                  Total      Total      Total      Total      Imperv       Perv      Total      Total
Peak  Runoff
                                 Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff
Runoff    Coeff
  Subcatchment                       mm         mm         mm         mm         mm         mm         mm
10^6 ltr      LPS
-----------------------------------------------------------------------------------------------------------------------
  A-01                            71.67       0.00       0.00       7.82      58.11       5.13      63.24
0.05    40.77   0.882
  A-02                            71.67       0.00       0.00      28.72      32.12      43.09      43.09
0.04    31.90   0.601
  A-03                            71.67       0.00       0.00       8.63      56.66       5.80      62.46
0.05    41.90   0.871
  A-04                            71.67       0.00       0.00      23.79      33.23      14.60      47.83
0.05    41.24   0.667
  A-05                            71.67       0.00       0.00      46.28       0.00      26.10      26.10
0.00     2.87   0.364
  A-06                            71.67       0.00       0.00      45.70       0.00      26.87      26.87
0.01     7.58   0.375
  A-07                            71.67       0.00       0.00       0.00      72.18       0.00      72.18
0.04    26.17   1.007
  A-08                            71.67       0.00       0.00      46.83       0.00      25.43      25.43
0.01     4.93   0.355
  a-09                            71.67       0.00       0.00       9.05      55.75       6.43      62.18
0.01     8.16   0.868
  A-10                            71.67       0.00       0.00       0.00      72.18       0.00      72.18
0.06    38.03   1.007
  A-11                            71.67       0.00       0.00       0.00      72.18       0.00      72.18
0.07    45.93   1.007
  B-01                            71.67       0.00       0.00      36.97      36.15      24.42      36.15
0.00     1.71   0.504
  B-02                            71.67       0.00       0.00      46.80       0.00      25.46      25.46
0.01     4.26   0.355


******************
Node Depth Summary
******************

-----------------------------------------------------------------------------------------
                                  Average    Maximum    Maximum  Time of Max     Reported
                                    Depth      Depth        HGL   Occurrence   Max Depth
Node                 Type          Meters     Meters     Meters  days hr:min       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  00:00         0.00
HP-CBMH03            JUNCTION        0.00       0.00      85.90    0  00:00         0.00
HP-RY05              JUNCTION        0.00       0.00      83.90    0  00:00         0.00
HP-RY06              JUNCTION        0.00       0.00      83.90    0  00:00         0.00
HP-RY08              JUNCTION        0.00       0.00      83.26    0  00:00         0.00
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_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         0.35       1.13      83.45    0  01:13         1.13
CBMH01               STORAGE         0.47       2.16      85.85    0  01:55         2.16
CBMH02               STORAGE         0.71       2.97      85.85    0  01:53         2.97
MH02                 STORAGE         1.47       1.48      82.66    0  01:20         1.48
MH04                 STORAGE         0.48       0.49      82.66    0  01:20         0.49
MH06                 STORAGE         0.06       1.14      83.84    0  01:31         1.14
MH08                 STORAGE         0.06       1.08      83.84    0  01:31         1.08
RY01                 STORAGE         0.22       1.54      82.77    0  01:44         1.54
RY02                 STORAGE         0.17       1.30      82.77    0  01:44         1.30
RY03                 STORAGE         0.12       1.05      82.77    0  01:44         1.05
RY04                 STORAGE         0.07       0.81      82.77    0  01:43         0.81
RY05                 STORAGE         0.05       1.04      83.84    0  01:31         1.04
RY06                 STORAGE         0.04       0.97      83.84    0  01:32         0.97


******************
```

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	0.00	0 00:00	0	0	0.000	ltr
HP-CBMH03	JUNCTION	0.00	0.00	0 00:00	0	0	0.000	ltr
HP-RY05	JUNCTION	0.00	0.00	0 00:00	0	0	0.000	ltr
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
Ex_1500	OUTFALL	0.00	36.52	0 01:21	0	0.242	0.000	
Ex_Ditch1	OUTFALL	8.16	15.99	0 01:10	0.0106	0.152	0.000	
Ex_Ditch3	OUTFALL	4.26	4.26	0 01:10	0.00612	0.00612	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	0.0508	0.052	0.310	
CBMH01	STORAGE	68.08	68.08	0 01:10	0.0933	0.0934	0.051	
CBMH02	STORAGE	40.77	59.45	0 01:05	0.0544	0.148	0.038	
MH02	STORAGE	0.00	36.51	0 01:20	0	0.244	-0.048	
MH04	STORAGE	0.00	13.75	0 01:33	0	0.189	-0.009	
MH06	STORAGE	0.00	17.25	0 01:11	0	0.0403	0.312	
MH08	STORAGE	0.00	28.95	0 01:11	0	0.0401	-0.422	
RY01	STORAGE	42.96	47.01	0 01:10	0.0628	0.154	-0.131	
RY02	STORAGE	0.00	48.98	0 01:10	0	0.0938	-0.019	
RY03	STORAGE	53.50	62.89	0 01:09	0.0755	0.0966	0.202	
RY04	STORAGE	2.87	37.16	0 01:11	0.00366	0.0182	0.384	
RY05	STORAGE	31.90	31.90	0 01:10	0.0402	0.0423	0.118	
RY06	STORAGE	0.00	4.71	0 01:22	0	0.00212	0.223	

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB01	0.000	3	0	0	0.005	93	0 01:13	23.70
CBMH01	0.004	9	0	0	0.034	72	0 01:55	21.74
CBMH02	0.004	13	0	0	0.032	97	0 01:53	6.73
MH02	0.002	56	0	0	0.002	57	0 01:20	36.52
MH04	0.001	13	0	0	0.001	14	0 01:20	15.06
MH06	0.000	2	0	0	0.001	36	0 01:31	7.03
MH08	0.000	2	0	0	0.001	34	0 01:31	17.25
RY01	0.000	9	0	0	0.001	61	0 01:44	48.60
RY02	0.000	6	0	0	0.000	44	0 01:44	15.48
RY03	0.000	5	0	0	0.000	48	0 01:44	49.18
RY04	0.000	3	0	0	0.000	37	0 01:43	15.04
RY05	0.000	1	0	0	0.001	29	0 01:31	30.29
RY06	0.000	1	0	0	0.001	29	0 01:32	1.48

****
Outfall Loading Summary
****

	Flow	Avg	Max	Total

Outfall Node	Freq Pcnt	Flow LPS	Flow LPS	Volume 10^6 ltr
Ex_1500	91.95	3.31	36.52	0.242
Ex_Ditch1	25.29	7.50	15.99	0.152
Ex_Ditch3	6.40	1.38	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	6.33	0.40	1.71	0.002
System	18.57	12.58	54.92	0.402

****
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	21.74	0 01:05	0.46	0.05	1.00
MH02-Ex_1500	CONDUIT	36.52	0 01:21	0.23	0.18	1.00
MH04-MH02	CONDUIT	15.06	0 01:25	0.09	0.05	1.00
MH08-MH06	CONDUIT	17.25	0 01:11	0.50	0.06	1.00
MS-CB01	CONDUIT	0.00	0 00:00	0.00	0.00	0.07
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	0.00	0 00:00	0.00	0.00	0.15
MS-CBMH02(2)	CONDUIT	0.00	0 00:00	0.00	0.00	0.07
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	0.01
MS-RY02(1)	CONDUIT	0.00	0 00:00	0.00	0.00	0.01
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	0.00	0 00:00	0.00	0.00	0.02
MS-RY05(2)	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
MS-RY06(1)	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
MS-RY06(2)	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
RY03-RY02	CONDUIT	40.50	0 01:11	0.45	0.02	1.00
RY05-MH08	CONDUIT	28.95	0 01:11	0.79	0.69	1.00
RY05-RY06	CONDUIT	4.71	0 01:22	0.10	0.11	1.00
RY08-RY03	CONDUIT	34.44	0 01:11	0.27	0.02	0.81
SC740	CONDUIT	40.77	0 01:09	0.19	0.03	1.00
O-CB01	ORIFICE	23.70	0 01:13			1.00
O-CBMH02	ORIFICE	6.73	0 01:53			1.00
O-MH06	ORIFICE	7.03	0 01:31			1.00
O-RY01	ORIFICE	9.72	0 01:44			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
CBMH01-CBMH02	1.00	0.01	0.00	0.00	0.30	0.00	0.00	0.70	0.02	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
MH04-MH02	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH08-MH06	1.00	0.81	0.04	0.00	0.14	0.00	0.00	0.00	0.86	0.00
MS-CB01	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CBMH01(1)	1.00	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CBMH01(2)	1.00	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CBMH02(1)	1.00	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CBMH02(2)	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	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
MS-HP02	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-RY01	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-RY02(1)	1.00	0.98	0.02	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
MS-RY03	1.00	1.00	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
MS-RY04(2)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-RY05(1)	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MS-RY05(2)	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-RY06(1)	1.00	0.98	0.02	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
RY03-RY02	1.00	0.34	0.00	0.00	0.20	0.00	0.00	0.46	0.01	0.00
RY05-MH08	1.00	0.04	0.00	0.00	0.14	0.00	0.00	0.82	0.86	0.00
RY05-RY06	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.87	0.00
RY08-RY03	1.00	0.68	0.00	0.00	0.17	0.00	0.00	0.15	0.01	0.00
SC740	1.00	0.01	0.00	0.00	0.23	0.00	0.00	0.75	0.02	0.00

****
Conduit Surcharge Summary
****

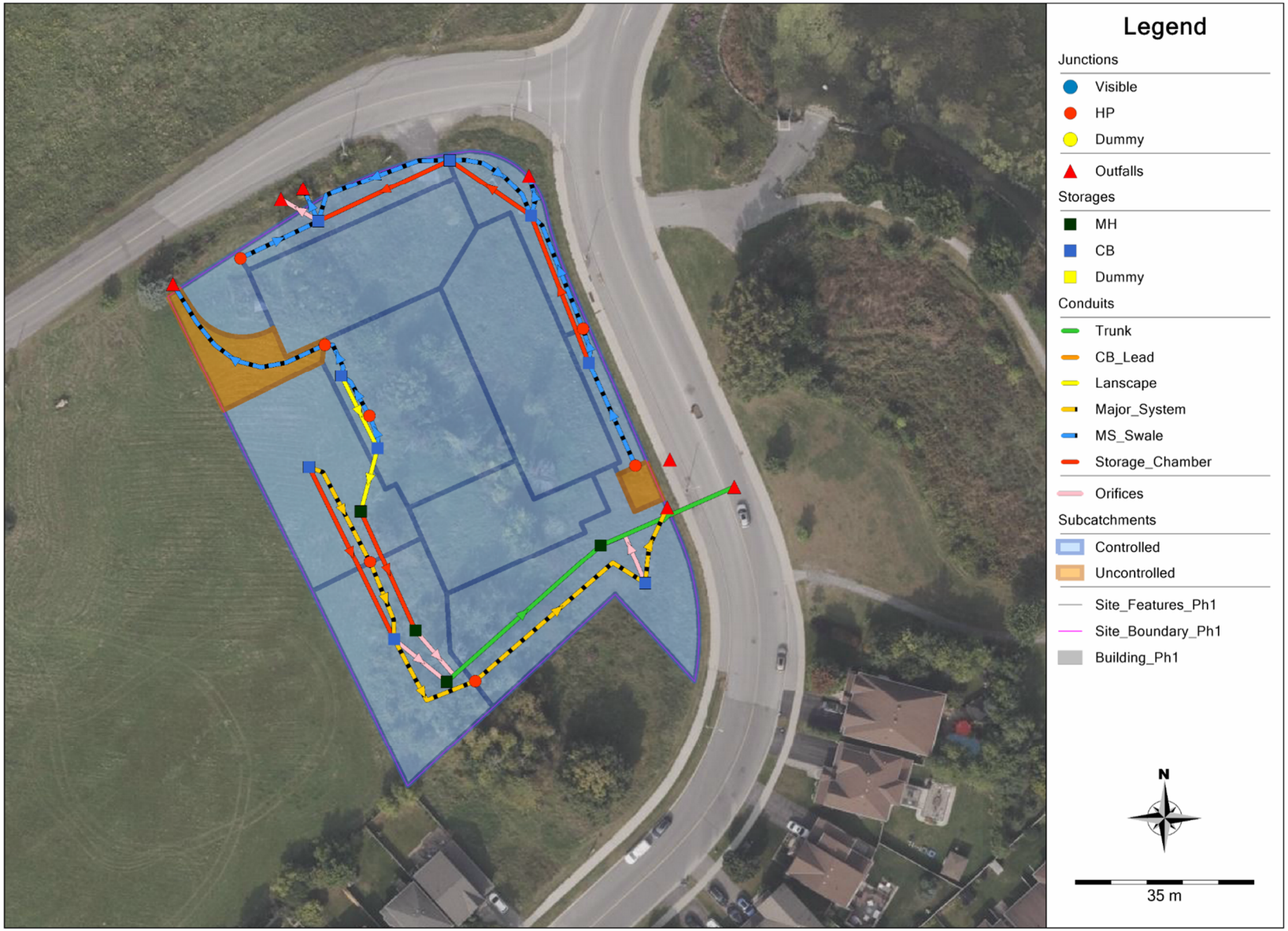
	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
CBMH01-CBMH02	5.35	5.35	5.60	0.01	0.01
MH02-Ex_1500	24.00	24.00	24.00	0.01	0.01
MH04-MH02	24.00	24.00	24.00	0.01	0.01
MH08-MH06	0.92	0.92	1.01	0.01	0.01
RY03-RY02	0.01	0.01	0.91	0.01	0.01
RY05-MH08	1.53	1.53	1.60	0.01	0.01
RY05-RY06	1.36	1.36	1.53	0.01	0.01
SC740	1.59	1.59	1.95	0.01	0.01

Analysis begun on: Tue Aug 27 11:36:38 2024
Analysis ended on: Tue Aug 27 11:36:39 2024
Total elapsed time: 00:00:01

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

NOVATECH
Engineers, Planners & Landscape Architects

Overall Model Schematic



Date: 2024-08-27
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1104 Halton Terrace – Maple Leaf Homes (119024)
PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Subcatchments (ID's)

Date: 2024-08-27
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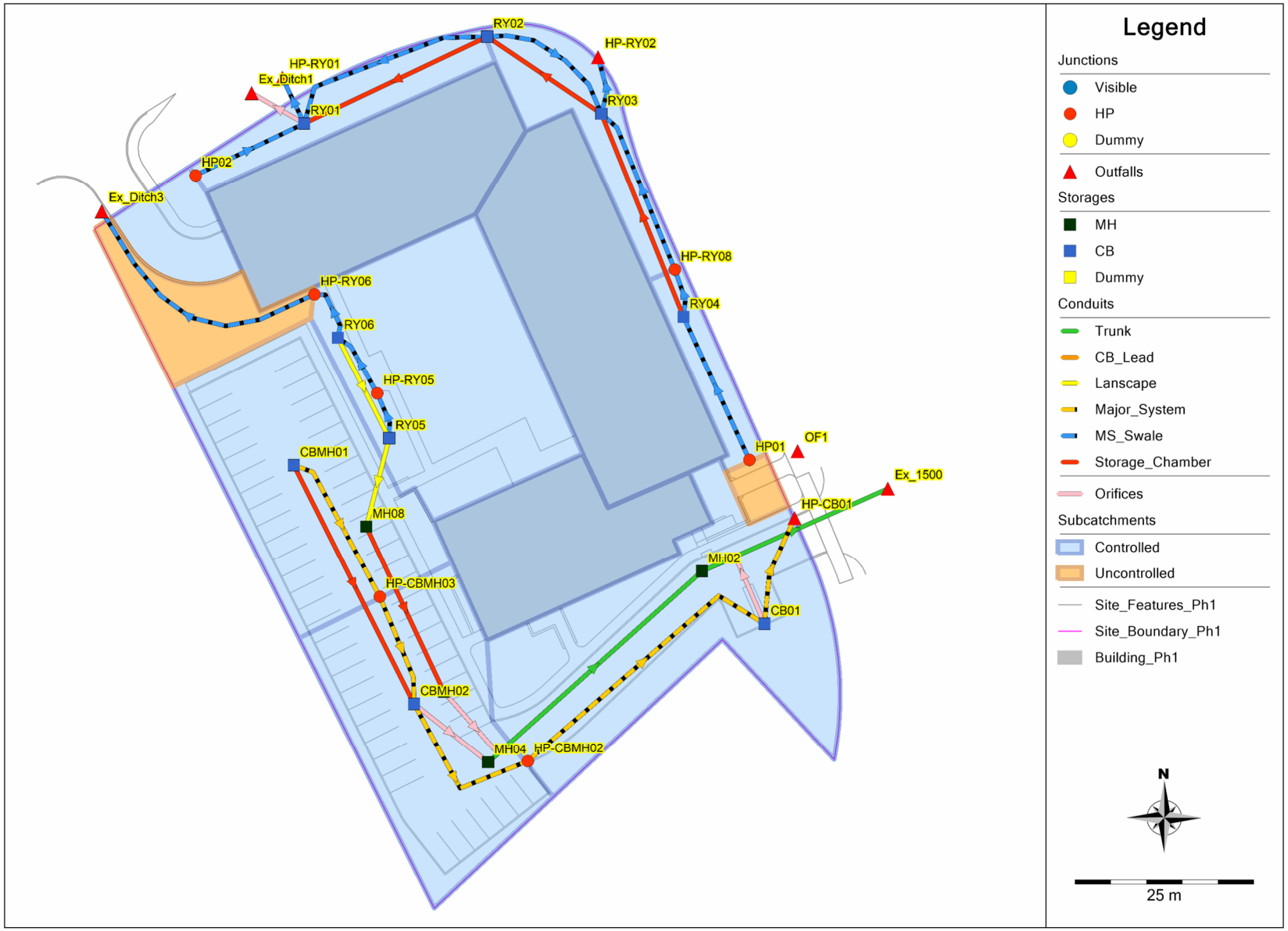
1104 Halton Terrace – Maple Leaf Homes (119024)
PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Nodes ID's



Date: 2024-08-27
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User Inputs

Chamber Model:	SC-740
Outlet Control Structure:	No
Project Name:	1104 Halton Terrace Phase 1
Engineer:	Lucas Wilson
Project Location:	Ontario
Measurement Type:	Metric
Required Storage Volume:	12.00 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	153 mm.
Stone Above Chambers:	153 mm.
Average Cover Over Chambers:	458 mm.
Design Constraint Dimensions:	(2.11 m. x 15.00 m.)

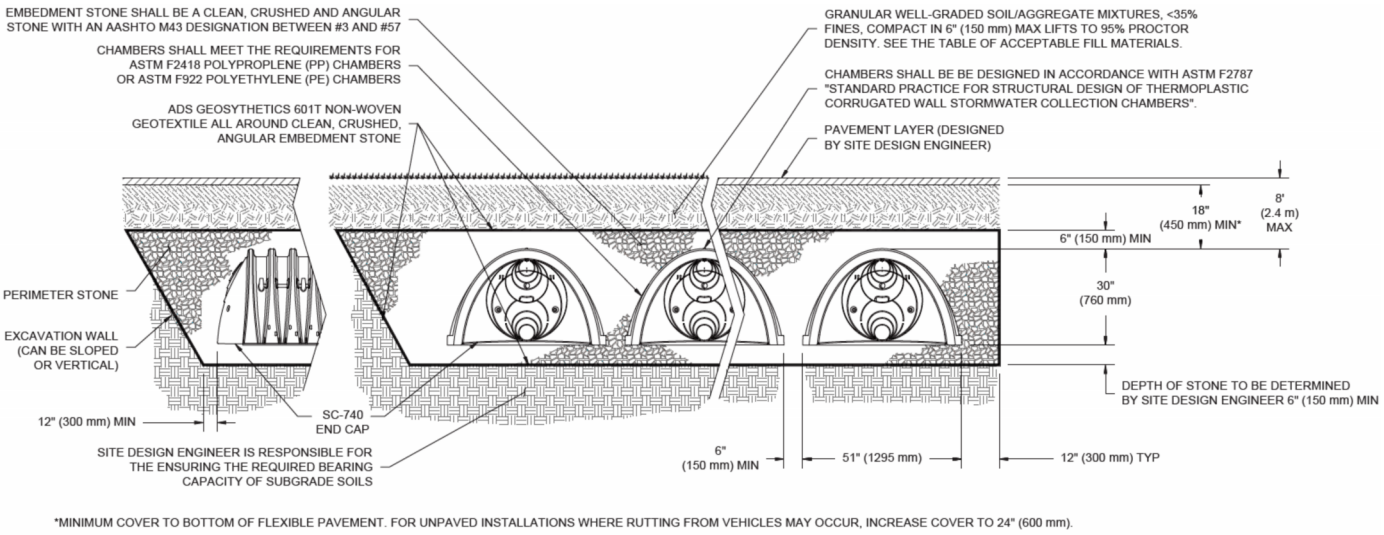
Results

System Volume and Bed Size

Installed Storage Volume:	13.61 cubic meters.
Storage Volume Per Chamber:	1.30 cubic meters.
Number Of Chambers Required:	5
Number Of End Caps Required:	2
Chamber Rows:	1
Maximum Length:	11.95 m.
Maximum Width:	1.91 m.
Approx. Bed Size Required:	22.76 square meters.

System Components

Amount Of Stone Required:	18 cubic meters
Volume Of Excavation (Not Including Fill):	25 cubic meters
Total Non-woven Geotextile Required:	91 square meters
Woven Geotextile Required (excluding Isolator Row):	0 square meters
Woven Geotextile Required (Isolator Row):	21 square meters
Total Woven Geotextile Required:	21 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).

User Inputs

Chamber Model:	SC-740
Outlet Control Structure:	Yes
Project Name:	119024
Engineer:	Lucas Wilson
Project Location:	
Measurement Type:	Metric
Required Storage Volume:	32.00 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	152 mm.
Stone Above Chambers:	152 mm.
Average Cover Over Chambers:	457 mm.
Design Constraint Dimensions:	(3.54 m. x 15.32 m.)

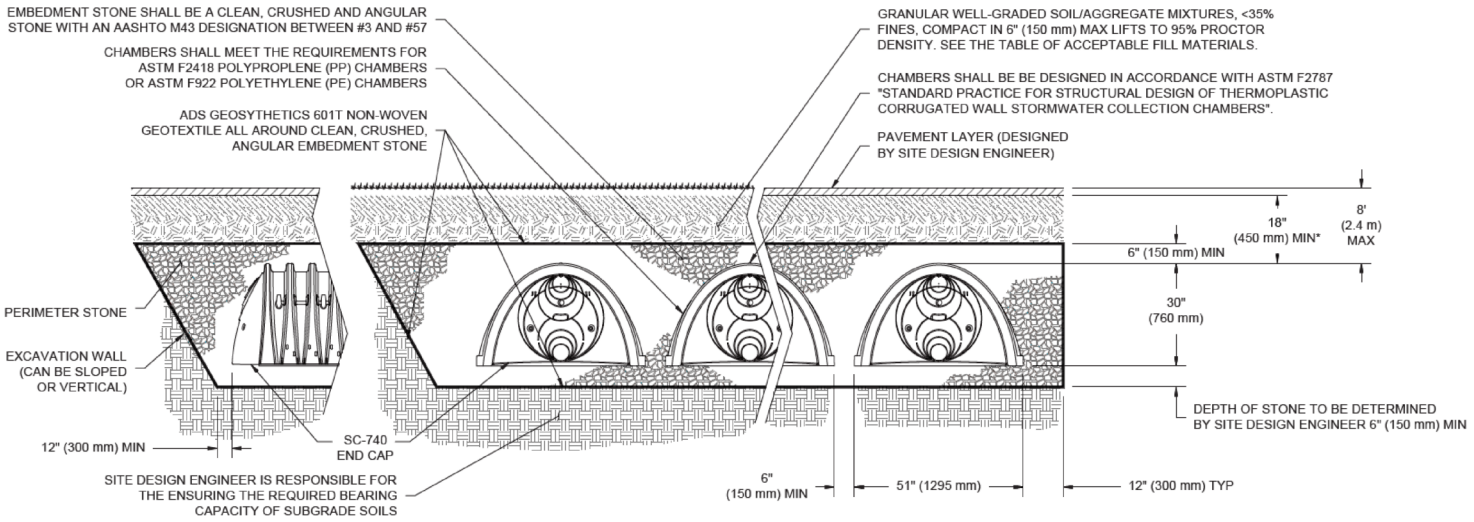
Results

System Volume and Bed Size

Installed Storage Volume:	32.46 cubic meters.
Storage Volume Per Chamber:	1.30 cubic meters.
Number Of Chambers Required:	12
Number Of End Caps Required:	4
Chamber Rows:	2
Maximum Length:	15.31 m.
Maximum Width:	3.54 m.
Approx. Bed Size Required:	54.13 square meters.

System Components

Amount Of Stone Required:	42.15 cubic meters
Volume Of Excavation (Not Including Fill):	57.75 cubic 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 -	5	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	81.51	m
Amount of Stone Above Chambers -	152	mm
Amount of Stone Below Chambers -	152	mm
	22.76	sq.meters

Min. Area - 15.7 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)*
1067	0.00	0.00	0.23	0.23	13.616	82.58
1041	0.00	0.00	0.23	0.23	13.385	82.55
1016	0.00	0.00	0.23	0.23	13.154	82.53
991	0.00	0.00	0.23	0.23	12.922	82.50
965	0.00	0.00	0.23	0.23	12.691	82.48
940	0.00	0.00	0.23	0.23	12.460	82.45
914	0.00	0.01	0.23	0.24	12.229	82.42
889	0.00	0.02	0.22	0.25	11.993	82.40
864	0.01	0.04	0.22	0.26	11.748	82.37
838	0.02	0.09	0.20	0.28	11.492	82.35
813	0.02	0.11	0.19	0.30	11.210	82.32
787	0.03	0.13	0.18	0.31	10.911	82.30
762	0.03	0.15	0.17	0.32	10.599	82.27
737	0.03	0.17	0.16	0.33	10.276	82.25
711	0.04	0.18	0.16	0.34	9.944	82.22
686	0.04	0.19	0.15	0.35	9.606	82.20
660	0.04	0.21	0.15	0.35	9.259	82.17
635	0.04	0.22	0.14	0.36	8.905	82.15
610	0.04	0.22	0.14	0.37	8.544	82.12
584	0.05	0.23	0.14	0.37	8.178	82.09
559	0.05	0.24	0.14	0.38	7.807	82.07
533	0.05	0.25	0.13	0.38	7.432	82.04
508	0.05	0.26	0.13	0.38	7.052	82.02
483	0.05	0.26	0.13	0.39	6.667	81.99
457	0.05	0.27	0.12	0.39	6.278	81.97
432	0.05	0.27	0.12	0.40	5.886	81.94
406	0.06	0.28	0.12	0.40	5.491	81.92
381	0.06	0.28	0.12	0.40	5.092	81.89
356	0.06	0.29	0.12	0.40	4.690	81.87
330	0.06	0.29	0.11	0.41	4.285	81.84
305	0.06	0.30	0.11	0.41	3.877	81.81
279	0.06	0.30	0.11	0.41	3.467	81.79
254	0.06	0.30	0.11	0.41	3.055	81.76
229	0.06	0.31	0.11	0.42	2.640	81.74
203	0.06	0.31	0.11	0.42	2.224	81.71
178	0.06	0.31	0.11	0.42	1.806	81.69
152	0.00	0.00	0.23	0.23	1.388	81.66
127	0.00	0.00	0.23	0.23	1.156	81.64
102	0.00	0.00	0.23	0.23	0.925	81.61
76	0.00	0.00	0.23	0.23	0.694	81.59
51	0.00	0.00	0.23	0.23	0.463	81.56
25	0.00	0.00	0.23	0.23	0.231	81.54

Project:

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

54.1 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	0.55	0.55	35.737	82.45
1194	0.00	0.00	0.55	0.55	35.188	82.42
1168	0.00	0.00	0.55	0.55	34.638	82.40
1143	0.00	0.00	0.55	0.55	34.089	82.37
1118	0.00	0.00	0.55	0.55	33.540	82.35
1092	0.00	0.00	0.55	0.55	32.990	82.32
1067	0.00	0.00	0.55	0.55	32.441	82.30
1041	0.00	0.00	0.55	0.55	31.892	82.27
1016	0.00	0.00	0.55	0.55	31.342	82.25
991	0.00	0.00	0.55	0.55	30.793	82.22
965	0.00	0.00	0.55	0.55	30.244	82.20
940	0.00	0.00	0.55	0.55	29.694	82.17
914	0.00	0.02	0.54	0.56	29.145	82.14
889	0.00	0.06	0.53	0.58	28.584	82.12
864	0.01	0.10	0.51	0.61	28.002	82.09
838	0.02	0.21	0.47	0.67	27.395	82.07
813	0.02	0.27	0.44	0.71	26.723	82.04
787	0.03	0.32	0.42	0.74	26.010	82.02
762	0.03	0.37	0.40	0.77	25.267	81.99
737	0.03	0.40	0.39	0.79	24.498	81.97
711	0.04	0.43	0.38	0.81	23.708	81.94
686	0.04	0.46	0.37	0.83	22.901	81.92
660	0.04	0.49	0.35	0.85	22.075	81.89
635	0.04	0.52	0.34	0.86	21.229	81.87
610	0.04	0.54	0.33	0.87	20.369	81.84
584	0.05	0.56	0.33	0.88	19.497	81.81
559	0.05	0.58	0.32	0.90	18.613	81.79
533	0.05	0.60	0.31	0.91	17.717	81.76
508	0.05	0.61	0.30	0.92	16.810	81.74
483	0.05	0.63	0.30	0.93	15.894	81.71
457	0.05	0.64	0.29	0.94	14.966	81.69
432	0.05	0.66	0.29	0.94	14.031	81.66
406	0.06	0.67	0.28	0.95	13.087	81.64
381	0.06	0.68	0.28	0.96	12.135	81.61
356	0.06	0.69	0.27	0.97	11.176	81.59
330	0.06	0.71	0.27	0.97	10.210	81.56
305	0.06	0.72	0.26	0.98	9.237	81.53
279	0.06	0.72	0.26	0.98	8.259	81.51
254	0.06	0.73	0.26	0.99	7.275	81.48
229	0.06	0.74	0.25	0.99	6.286	81.46
203	0.06	0.75	0.25	1.00	5.293	81.43
178	0.06	0.75	0.25	1.00	4.295	81.41
152	0.00	0.00	0.55	0.55	3.296	81.38
127	0.00	0.00	0.55	0.55	2.747	81.36
102	0.00	0.00	0.55	0.55	2.197	81.33
76	0.00	0.00	0.55	0.55	1.648	81.31
51	0.00	0.00	0.55	0.55	1.099	81.28
25	0.00	0.00	0.55	0.55	0.549	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
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K1R 7Y2

Prepared by:

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Consulting Engineers, Architects & Planners
864 Lady Ellen Place
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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 :

1. UPON COMPLETION OF THE STORMWATER DETENTION POND NORTH EAST OF PHASE 6 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.
2. 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....)

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

LICENSED PROFESSIONAL ENGINEER L.J.A. JABLONSKI 16/09/03 PROVINCE OF ONTARIO

SCALE
0 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	

Ottawa

minto

MORGAN'S GRANT SUBDIVISION
MASTER DRAINAGE PLAN (STORM)

DATED SEPT. 2003
DWG. No. 17730-ST

OLD CARP ROAD

2nd LINE ROAD

MARCH ROAD

KLONDIKE ROAD

HYDRO EASEMENT

MARCH REGIONAL ROAD (No. 49)

OUTLET

SWM POND

PARK

MINTO LANDS

8A
3ha
TP

8B
5.8ha
20%
OSD
500 m³

9
12.7ha
33%
OSD
1120m³

10
11.8ha
36%
OSD
850 m³

11
6.4ha
TP

1B
16.6
25%
OSD
1050m³

2
13.8ha
27%
OSD
1496m³

3
14.4ha
36%
OSD
819 m³

1A
2ha
TP

4
7.1ha
40%
OSD
470 m³

5
3.5ha
40%
OSD
240 m³

6
5.2ha
36%
OSD
134 m³

PHASE 1

PHASE 2

PHASE 3

PHASE 4

PHASE 5A

PHASE 5B

PHASE 5C

PHASE 6

PHASE 7

PHASE 8

PHASE 9

INCLUDED IN PHASE 8

INCLUDED IN KLONDIKE RD FLOWS

INCLUDED IN PHASE 9

INCLUDED IN KLONDIKE RD FLOWS

OTHER OWNER
McMARTRY JOHN, C
PIN 04477-0367
PLAN 4R-11217

OTHER OWNER
McMARTRY JOHN, C
PIN 04477-0368
PLAN 4R-3611

OTHER OWNER
CORPORATION TOWNSHIP OF MARCH
PIN 04526-0212

MARSHALL CAIWT & HOWARD
PIN 04526-0213

SCISSONS, AMBROSE
PIN 04526-0214

BURKE, PATRICK & GERTRUDE
PIN 04526-0215

OTHER OWNER
SHUMAN, WILDON AS BARRY
PIN 04526-0211

OTHER OWNER
92.7% ONTARIO INC.
ALLAN MAN INSURANCE LTD.

EXISTING RESIDENTIAL

NOTES:

OTTHYMO MODEL CONNECTIVITY

MAIN SEWER

MAJOR OVERFLOW

TOTAL FLOW

MINOR FLOW

ID No. — 0

AREA — 0.0 ha

COMPOSITE IMP OR TP — 0%

Ottawa

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

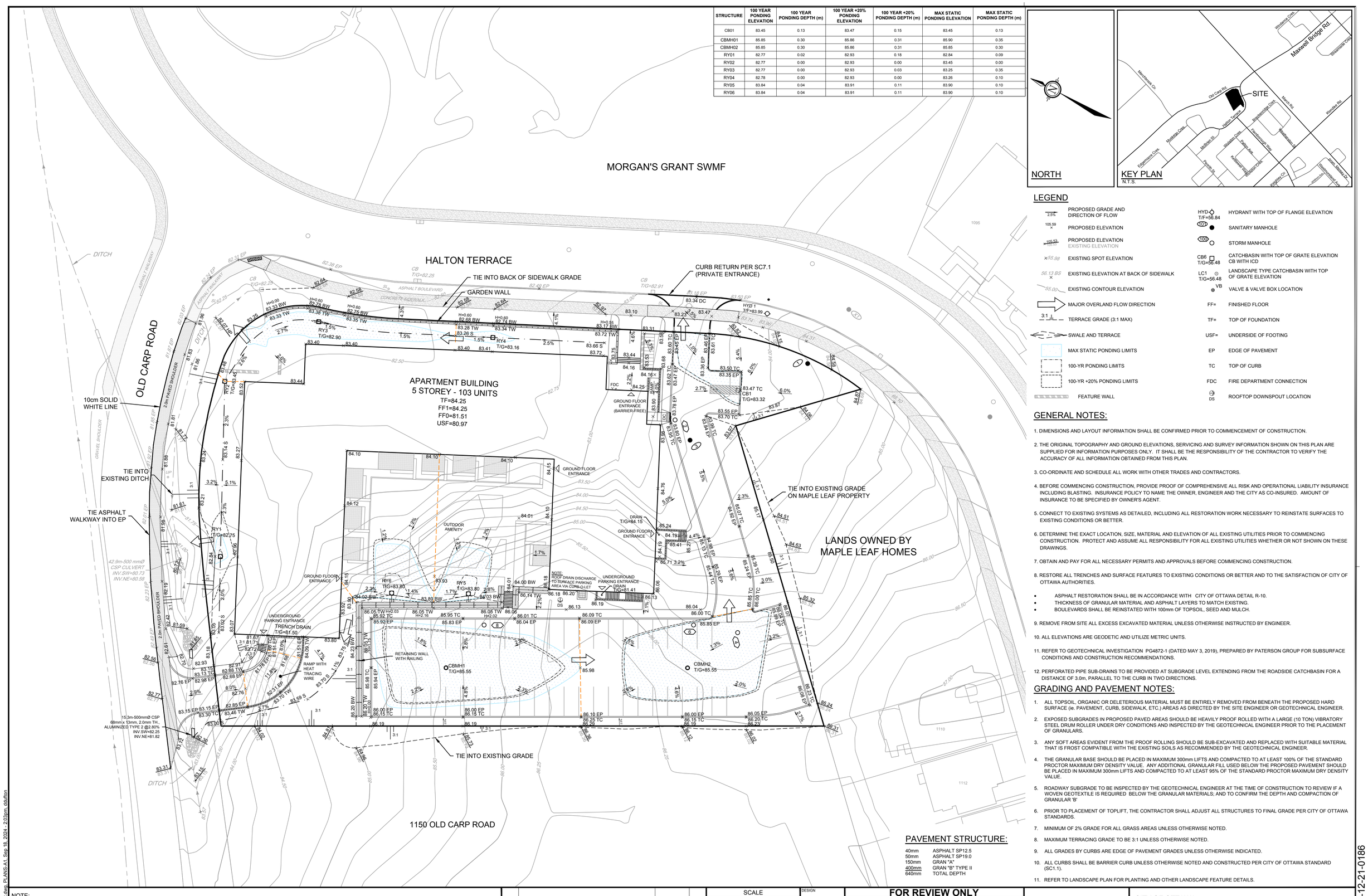
MORGAN'S GRANT SUBDIVISION

MASTER STORM DRAINAGE PLAN

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

```
                    PEAK   FLOW   REDUCTION [Qout/Qin] (%)=   99.602
                    TIME SHIFT OF PEAK FLOW          (min)=     3.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=.4825E-02

001:0063----------
*
--------------------
| ROUTE RESERVOIR  |     Requested routing time step =  3.0 min.
|  IN>07:(000100)  |
| OUT<08:(000100)  |     =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW     STORAGE     OUTFLOW     STORAGE
                          (cms)     (ha.m.)       (cms)     (ha.m.)
                           .000  .0000E+00         .042  .4300E-01
      *** WARNING: Inflow hydrograph is dry.

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (000100)        .00      .000      .000       .000
     OUTFLOW<08: (000100)        .00      .000      .000       .000

*** WARNING: Inflow and ouflow hydrographs are dry.

001:0064----------
*
*#=====================
*#  FLOW POINT "D"    ||
*#=====================
*
--------------------
| ADD HYD (000132) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)     (cms)
                  ID1 03:000100   11.80     .481   12.30   28.69     .000
                 +ID2 02:000100   21.50     .893   12.40   26.35     .000
                  ======================================================
                  SUM 01:000132   33.30    1.356   12.40   27.18     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

001:0065----------
*
*#============================
*#  SWM FACILITY Minor Flow ||
*#============================
*
--------------------
| ADD HYD (000214) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)     (cms)
                  ID1 01:000132   33.30    1.356   12.40   27.18     .000
                 +ID2 04:000100   57.40    2.194   12.50   27.41     .000
                  ======================================================
                  SUM 02:000214   90.70    3.487   12.45   27.33     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

001:0066----------
*
--------------------
| ROUTE RESERVOIR  |     Requested routing time step =  3.0 min.
|  IN>02:(000214)  |
| OUT<04:(000100)  |     =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW     STORAGE     OUTFLOW     STORAGE
                          (cms)     (ha.m.)       (cms)     (ha.m.)
                           .000  .0000E+00        3.500  .1890E+00
                          1.100  .1165E+00        7.000  .2500E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (000214)       90.70    3.487    12.450     27.326
     OUTFLOW<04: (000100)       90.70    3.386    12.550     27.326
    OVERFLOW<01: (000100)         .00     .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin] (%)=   97.085
                  TIME SHIFT OF PEAK FLOW          (min)=     6.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.1856E+00

001:0067----------
*
--------------------
| ADD HYD (000389) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)     (cms)
                  ID1 01:000100     .00      .000     .00    .00     .000 **DRY**
                 +ID2 04:000100   90.70    3.386   12.55  27.33     .000
                  ======================================================
                  SUM 05:000389   90.70    3.386   12.55  27.33     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

001:0068----------
*
*#============================================
*# AREA 11  (Park Adjacent to SWM Facility  ||
*#============================================
*
----------------------
| CALIB NASHYD       |   Area    (ha)=    6.40   Curve Number    (CN)=85.00
| 01:000100 DT= 3.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=    1.222

     PEAK FLOW       (cms)=     .339 (i)
     TIME TO PEAK    (hrs)=   12.100
     RUNOFF VOLUME    (mm)=   21.796
     TOTAL RAINFALL   (mm)=   45.500
     RUNOFF COEFFICIENT    =    .479

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

001:0069----------
*
*#============================
*#  SWM FACILITY Major Flow ||
*#============================
*
--------------------
| ADD HYD (000389) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)     (cms)
                  ID1 08:000100     .00      .000     .00    .00     .000 **DRY**
                 +ID2 09:000100     .00      .000     .00    .00     .000 **DRY**
                  ======================================================
                  SUM 03:000389     .00      .000     .00    .00     .000 **DRY**

001:0070----------
*
--------------------
| ADD HYD (000461) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)     (cms)
                  ID1 06:000798     .00      .000     .00    .00     .000 **DRY**
                 +ID2 01:000100    6.40      .339   12.10  21.80     .000
                  ======================================================
                  SUM 04:000461    6.40      .339   12.10  21.80     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

001:0071----------
*
*
--------------------
| ADD HYD (000643) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)     (cms)
                  ID1 04:000461    6.40      .339   12.10  21.80     .000
                 +ID2 03:000389     .00      .000     .00    .00     .000 **DRY**
                  ======================================================
                  SUM 06:000643    6.40      .339   12.10  21.80     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

001:0072----------
*
*#============================
*#  SWM FACILITY Total Flow ||
*#============================
*
--------------------
| ADD HYD (000162) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)     (cms)
                  ID1 06:000643    6.40      .339   12.10  21.80     .000
                 +ID2 05:000389   90.70    3.386   12.55  27.33     .000
                  ======================================================
                  SUM 01:000162   97.10    3.483   12.55  26.96     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

001:0073----------
*
--------------------
| ROUTE RESERVOIR  |     Requested routing time step =  3.0 min.
|  IN>01:(000162)  |
| OUT<02:(000100)  |     =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW     STORAGE     OUTFLOW     STORAGE
                          (cms)     (ha.m.)       (cms)     (ha.m.)
                           .000  .0000E+00        3.000  .8600E+00
                          1.800  .6100E+00        5.500  .1320E+01

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (000162)       97.10    3.483    12.550     26.962
     OUTFLOW<02: (000100)       97.10    1.959    13.100     26.962

                  PEAK   FLOW   REDUCTION [Qout/Qin] (%)=   56.242
                  TIME SHIFT OF PEAK FLOW          (min)=    33.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.6436E+00

001:0074----------
*
*#
*#
*#
*#
*#
*#
*#
*#
*#
*#============================================================
*#                  5 YEAR STM SCS II 24 HRS 12 MIN
*#============================================================
*
--------------------
| MASS STORM       |     Filename: c:\PROGRA~1\SWMHYMO\PROJECTS\SCS12.24H
| Ptotal= 57.10 mm |     Comments: SCS TYPE II - 24 HOURS DURATION, 12 MIN.
--------------------

                  Duration of storm        =   24.00 hrs
                  Mass curve time step     =   12.00 min
                  Selected storm time step =   12.00 min
                  Volume of derived storm  =   57.10 mm

      TIME   RAIN |   TIME   RAIN |   TIME   RAIN |   TIME   RAIN
       hrs  mm/hr |    hrs  mm/hr |    hrs  mm/hr |    hrs  mm/hr
       .20   .571 |   6.20  1.142 |  12.20 11.420 |  18.20  1.142
       .40   .571 |   6.40  1.142 |  12.40  7.137 |  18.40  1.142
       .60   .571 |   6.60  1.142 |  12.60  5.139 |  18.60  1.142
       .80   .571 |   6.80  1.142 |  12.80  4.854 |  18.80  1.142
      1.00   .571 |   7.00  1.142 |  13.00  3.426 |  19.00  1.142
      1.20   .571 |   7.20  1.142 |  13.20  2.855 |  19.20   .857
      1.40   .571 |   7.40  1.142 |  13.40  2.855 |  19.40   .856
      1.60   .571 |   7.60  1.142 |  13.60  2.855 |  19.60   .857
      1.80   .571 |   7.80  1.142 |  13.80  2.855 |  19.80   .856
      2.00   .571 |   8.00  1.142 |  14.00  2.855 |  20.00   .857
      2.20   .571 |   8.20  1.713 |  14.20  1.713 |  20.20   .857
      2.40   .571 |   8.40  1.713 |  14.40  1.713 |  20.40   .856
      2.60   .571 |   8.60  1.713 |  14.60  1.713 |  20.60   .857
      2.80   .571 |   8.80  1.713 |  14.80  1.713 |  20.80   .857
      3.00   .571 |   9.00  1.713 |  15.00  1.713 |  21.00   .856
      3.20   .571 |   9.20  1.713 |  15.20  1.713 |  21.20   .571
      3.40   .571 |   9.40  1.713 |  15.40  1.713 |  21.40   .571
      3.60   .571 |   9.60  1.713 |  15.60  1.713 |  21.60   .571
      3.80   .571 |   9.80  1.713 |  15.80  1.713 |  21.80   .571
      4.00   .571 |  10.00  1.713 |  16.00  1.713 |  22.00   .571
      4.20  1.142 |  10.20  3.140 |  16.20  1.142 |  22.20   .571
      4.40  1.142 |  10.40  3.141 |  16.40  1.142 |  22.40   .571
      4.60  1.142 |  10.60  3.140 |  16.60  1.142 |  22.60   .571
      4.80  1.142 |  10.80  3.141 |  16.80  1.142 |  22.80   .571
      5.00  1.142 |  11.00  3.140 |  17.00  1.142 |  23.00   .571
      5.20  1.142 |  11.20  4.282 |  17.20  1.142 |  23.20   .571
      5.40  1.142 |  11.40  6.281 |  17.40  1.142 |  23.40   .571
      5.60  1.142 |  11.60 14.275 |  17.60  1.142 |  23.60   .200
      5.80  1.142 |  11.80 31.405 |  17.80  1.142 |  23.80   .200
      6.00  1.142 |  12.00 65.665 |  18.00  1.142 |  24.00   .171

001:0075----------
*
*#==================================
*# AREA 1A  (External Area)       ||
*#==================================
*
----------------------
| CALIB NASHYD       |   Area    (ha)=    2.00   Curve Number    (CN)=85.00
| 02:000100 DT= 3.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .250

     Unit Hyd Qpeak  (cms)=     .306

     PEAK FLOW       (cms)=     .132 (i)
```

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	83.45	0.13	83.47	0.15	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	82.77	0.02	82.93	0.18	82.84	0.09
RY02	82.77	0.00	82.93	0.00	83.45	0.00
RY03	82.77	0.00	82.93	0.03	83.25	0.35
RY04	82.78	0.00	82.93	0.00	83.26	0.10
RY05	83.84	0.04	83.91	0.11	83.90	0.10
RY06	83.84	0.04	83.91	0.11	83.90	0.10



LEGEND

- PROPOSED GRADE AND DIRECTION OF FLOW (2.5%)
- PROPOSED ELEVATION (105.59)
- PROPOSED ELEVATION / EXISTING ELEVATION (105.53 / 105.63)
- EXISTING SPOT ELEVATION (55.98)
- EXISTING ELEVATION AT BACK OF SIDEWALK (56.13 BS)
- EXISTING CONTOUR ELEVATION (55.00)
- MAJOR OVERLAND FLOW DIRECTION
- TERRACE GRADE (3:1 MAX)
- SWALE AND TERRACE
- MAX STATIC PONDING LIMITS
- 100-YR PONDING LIMITS
- 100-YR +20% PONDING LIMITS
- FEATURE WALL
- HYDRANT WITH TOP OF FLANGE ELEVATION (HYD T/F=56.84)
- SANITARY MANHOLE (MH)
- STORM MANHOLE (100)
- CATCHBASIN WITH TOP OF GRATE ELEVATION CB WITH ICD (CB6 T/G=56.48)
- LANDSCAPE TYPE CATCHBASIN WITH TOP OF GRATE ELEVATION (LC1 T/G=56.48)
- VALVE & VALVE BOX LOCATION (VB)
- FINISHED FLOOR (FF=)
- TOP OF FOUNDATION (TF=)
- UNDERSIDE OF FOOTING (USF=)
- EDGE OF PAVEMENT (EP)
- TOP OF CURB (TC)
- FIRE DEPARTMENT CONNECTION (FDC)
- ROOFTOP DOWNSPOUT LOCATION (DS)

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. 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.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. 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.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. 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.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. 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.
9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. REFER TO GEOTECHNICAL INVESTIGATION PG4872-1 (DATED MAY 3, 2019), PREPARED BY PATERSON GROUP FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
12. 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:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED HARD SURFACE (ie. PAVEMENT, CURB, SIDEWALK, ETC.) AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. 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.
3. 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.
4. 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.
5. 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'
6. PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE PER CITY OF OTTAWA STANDARDS.
7. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
8. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
9. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
10. ALL CURBS SHALL BE BARRIER CURB UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.1).
11. 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, WATERMAINS, 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
3.	CITY SUBMISSION	SEP 18/24	MAB
2.	CITY SUBMISSION	NOV 3/23	MAB
1.	CITY SUBMISSION	OCT 19/21	MAB

SCALE: 1:300

1:300
0 3 6 9 12

DESIGN: DTD
CHECKED: LWR
DRAWN: DTD
CHECKED: MAB
APPROVED: JGR

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
L. R. WILSON
100160065
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2024.09.18
PROVINCE OF ONTARIO

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CITY OF OTTAWA
1104 HALTON TERRACE

GRADING PLAN

PROJECT No. 119024
REV REV # 3
DRAWING No. 119024-GR

PLAN #18654 D07-12-21-0186

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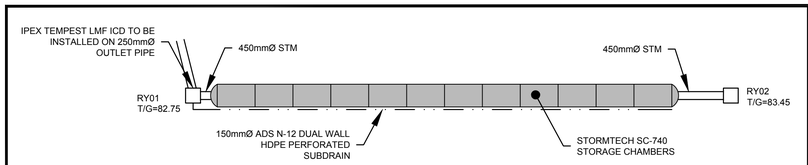
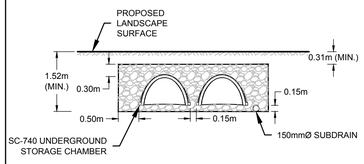
PLANA1.DWG - 341mmx594mm



TYPICAL UDERGROUND STORAGE CHAMBERS
SCALE 1:175



TYPICAL CHAMBER CROSS-SECTION
SCALE 1:75

ICD TABLE

STRUCTURE ID	ICD TYPE	INVERT (m)	100-YR HEAD (m)	100-YR PEAK FLOW (L/s)
CBMH2	TEMPEST LMF	SE=82.88 NW=83.48	2.97	6.7
CB1	112mm	NW=82.32	1.13	23.7
RY1	TEMPEST LMF	NE=81.38 NW=81.23	1.55	9.4
6	TEMPEST LMF	NW=82.70 SE=82.70	1.14	7.0

WATERMAIN TABLE

Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
1+000.00	83.34	80.94	200x300 TEE
1+008.86	83.46	81.07	VB1
1+022.15	83.71	81.31	45° H.BEND
1+023.89	83.79	81.39	45° H.BEND
1+029.31	83.90	81.50	CAP

CATCHBASIN TABLE

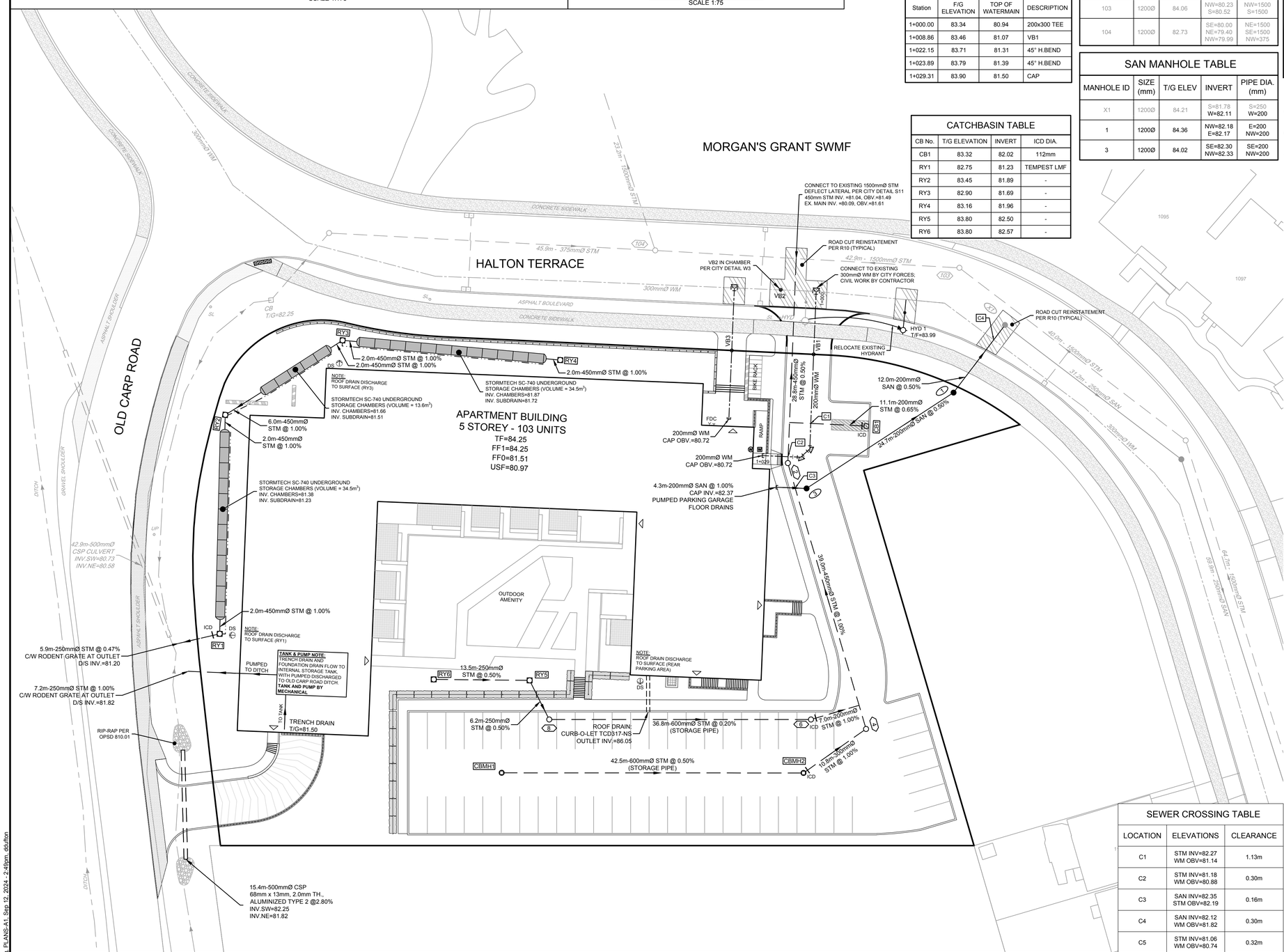
CB No.	T/G ELEVATION	INVERT	ICD DIA.
CB1	83.32	82.02	112mm
RY1	82.75	81.23	TEMPEST LMF
RY2	83.45	81.89	-
RY3	82.90	81.69	-
RY4	83.16	81.96	-
RY5	83.80	82.50	-
RY6	83.80	82.57	-

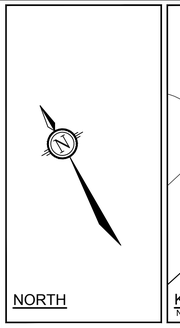
STM MANHOLE TABLE

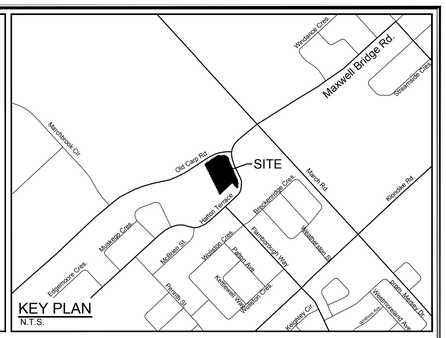
MANHOLE ID	SIZE (mm)	T/G ELEV	INVERT	PIPE DIA. (mm)
CBMH2	1800Ø	85.55	SE=82.88 NW=83.48	SE=300 NW=600
CBMH1	1800Ø	85.55	SE=83.69	SE=600
2	1200Ø	83.79	NE=81.18 SW=81.78	NE=450 SW=450
4	1200Ø	85.74	NE=82.17 NW=82.77	NE=450 NW=300
8	1200Ø	84.17	SE=82.77 NE=82.77	SE=600 NE=250
103	1200Ø	84.06	NW=80.23 S=80.52	NW=1500 S=1500
104	1200Ø	82.73	SE=80.00 NE=79.40 NW=79.99	NE=1500 SE=1500 NW=375

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







LEGEND

- SANITARY MANHOLE, SEWER & DIRECTION OF FLOW
- STORM MANHOLE, SEWER & DIRECTION OF FLOW
- 300mmØ — WATERMAIN AND DIAMETER
- VB — VALVE & VALVE BOX
- BEND AND THRUST BLOCK
- HYD — HYDRANT C/W VALVE & LEAD
- CAP
- FEATURE WALL
- CB1 — ROAD CATCHBASIN
- CB1 — ROAD CATCHBASIN WITH ICD
- LC-1 — LANDSCAPE TYPE CATCHBASIN
- RY1 — REAR YARD CATCH BASIN
- UNDERGROUND STORAGE CHAMBERS WITH SUBDRAIN
- DS — ROOFTOP DOWNSPOUT LOCATION
- P — PUMP OUTLET LOCATION
- FDC — FIRE DEPARTMENT CONNECTION
- W — WATER METER
- M — REMOTE METER

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. 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.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. 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.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. 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.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF MUNICIPAL AUTHORITIES.
9. REMOVE FROM SITE ALL DEBRIS AND EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. REFER TO GEOTECHNICAL INVESTIGATION PG4872-1 (DATED MAY 3, 2019), PREPARED BY PATERSON GROUP INC. FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
12. 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:

1. 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	

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO PROPERTY LINE AT MINIMUM SLOPE OF 1.0% (2.0% IS PREFERRED).
4. 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.
5. SEWER SERVICE CONNECTIONS PER CITY OF OTTAWA DETAILS S11 AND S11.1.
6. THE SITE SERVICING CONTRACTOR SHALL PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 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.
7. STORM MANHOLES AND CBMHS SHALL HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
8. CONTRACTOR TO TELEVISE (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:

1. 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

2. THE WATERMAIN SHALL BE PVC DR 18 IN ACCORDANCE WITH MATERIAL SPECIFICATION MW-18.1, UNLESS OTHERWISE INDICATED.
3. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
4. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
5. 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:
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3.	CITY SUBMISSION	SEP 18/24	MAB
2.	CITY SUBMISSION	NOV 3/23	MAB
1.	CITY SUBMISSION	OCT 19/21	MAB

SCALE
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DESIGN DTD
CHECKED LWR
DRAWN DTD
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — L. R. WILSON — 100160065 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — M.A. BISSETT — 2024.09.18 — PROVINCE OF ONTARIO

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CITY OF OTTAWA
1104 HALTON TERRACE

GENERAL PLAN OF SERVICES

PROJECT No. 119024
REV REV # 3
DRAWING No. 119024-GP

PLAN #18654 D07-12-21-0186

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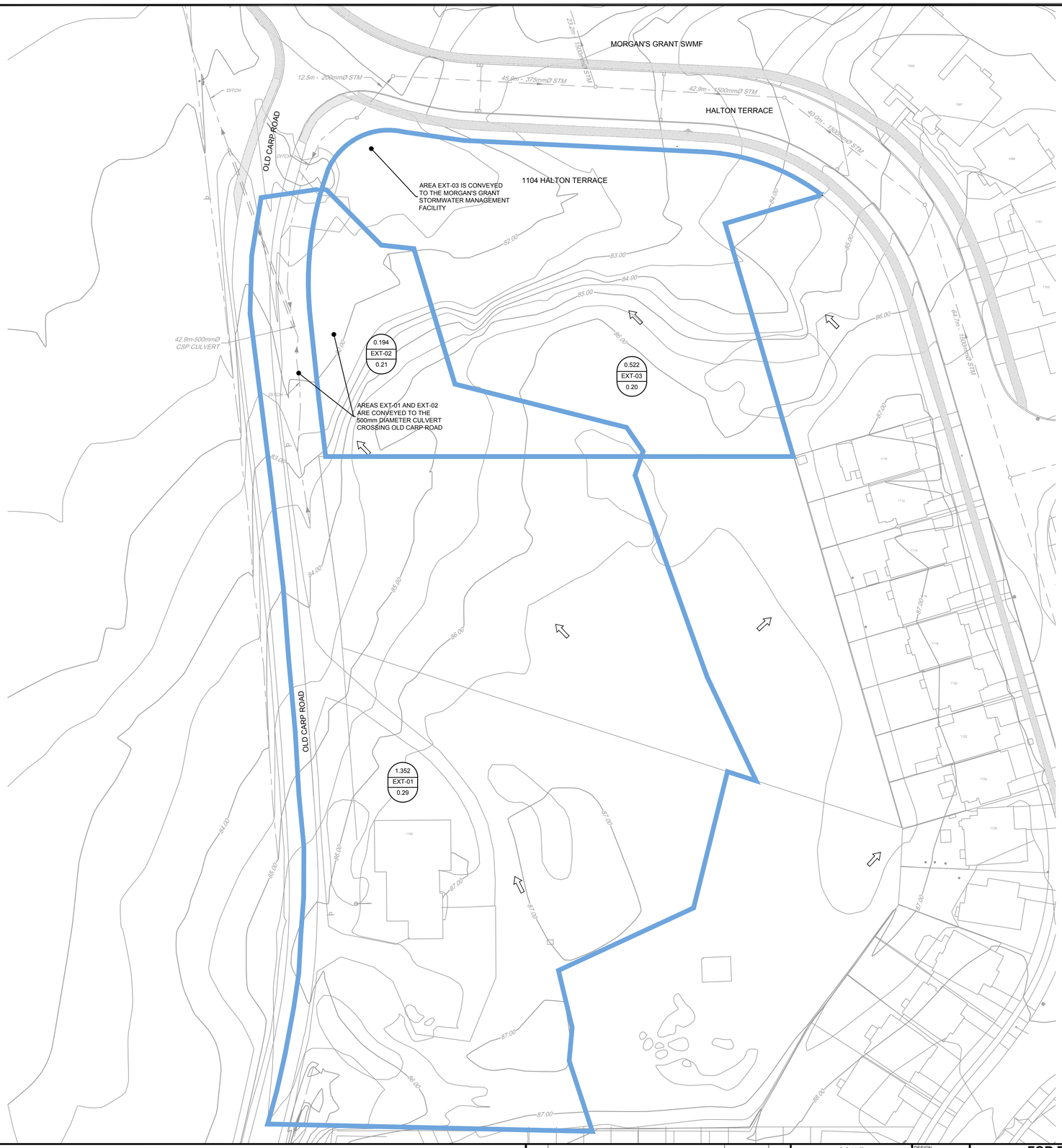

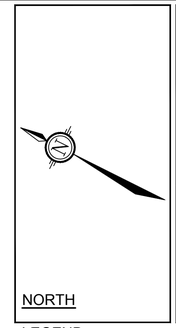

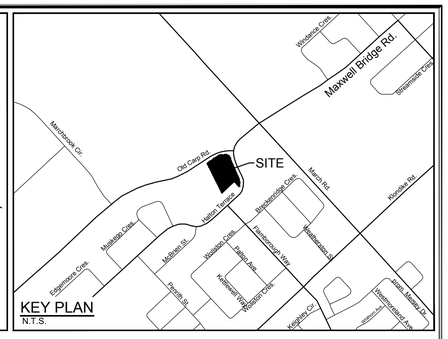

LEGEND

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

NOTE:
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DESIGN: DTD
CHECKED: LWR
DRAWN: DTD
CHECKED: MAB
APPROVED: JGR

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CITY OF OTTAWA
1104 HALTON TERRACE

PRE-DEVELOPMENT
STORM DRAINAGE AREA PLAN

PROJECT No. 119024
REV REV # 2
DRAWING No. 119024-STM1

PLAN #18654 D07-12-21-0186

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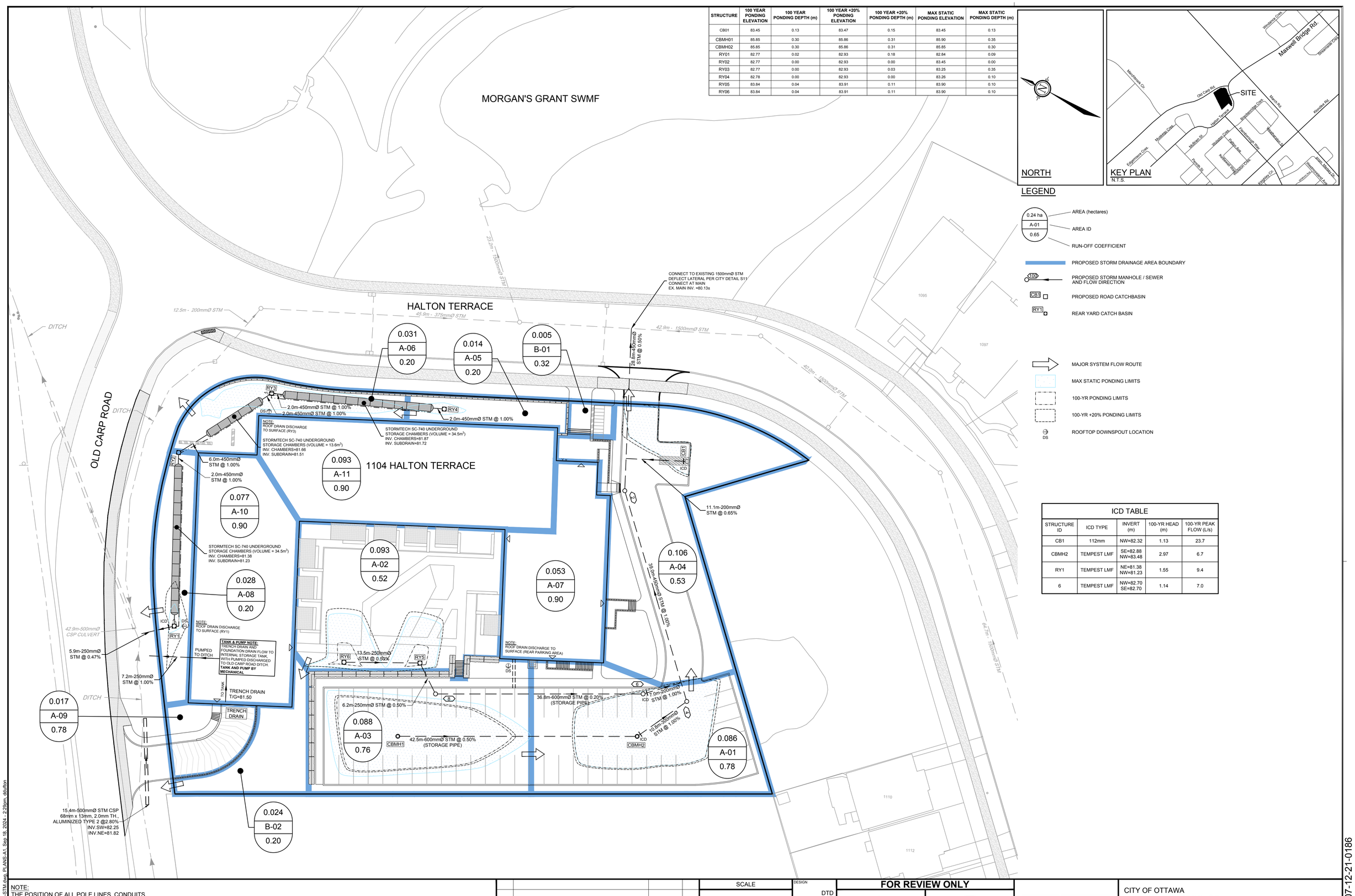
STRUCTURE	100 YEAR PONDING ELEVATION	100 YEAR PONDING DEPTH (m)	100 YEAR +20% PONDING ELEVATION	100 YEAR +20% PONDING DEPTH (m)	MAX STATIC PONDING ELEVATION	MAX STATIC PONDING DEPTH (m)
CB01	83.45	0.13	83.47	0.15	83.45	0.13
CBMH01	85.85	0.30	85.86	0.31	85.90	0.35
CBMH02	85.85	0.30	85.86	0.31	85.85	0.30
RY01	82.77	0.02	82.93	0.18	82.84	0.09
RY02	82.77	0.00	82.93	0.00	83.45	0.00
RY03	82.77	0.00	82.93	0.03	83.25	0.35
RY04	82.78	0.00	82.93	0.00	83.26	0.10
RY05	83.84	0.04	83.91	0.11	83.90	0.10
RY06	83.84	0.04	83.91	0.11	83.90	0.10



LEGEND

- 0.24 ha / A-01 / 0.65 — AREA (hectares) / AREA ID / RUN-OFF COEFFICIENT
- PROPOSED STORM DRAINAGE AREA BOUNDARY
- 100 — PROPOSED STORM MANHOLE / SEWER AND FLOW DIRECTION
- CB1 — PROPOSED ROAD CATCHBASIN
- RY1 — REAR YARD CATCH BASIN
- MAJOR SYSTEM FLOW ROUTE
- MAX STATIC PONDING LIMITS
- 100-YR PONDING LIMITS
- 100-YR +20% PONDING LIMITS
- DS — ROOFTOP DOWNSPOUT LOCATION

ICD TABLE				
STRUCTURE ID	ICD TYPE	INVERT (m)	100-YR HEAD (m)	100-YR PEAK FLOW (L/s)
CB1	112mm	NW=82.32	1.13	23.7
CBMH2	TEMPEST LMF	SE=82.88 NW=83.48	2.97	6.7
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CITY OF OTTAWA
1104 HALTON TERRACE

STORM DRAINAGE AREA PLAN

PROJECT No. 119024
REV REV # 3
DRAWING No. 119024-STM2

PLAN #18654 D07-12-21-0186

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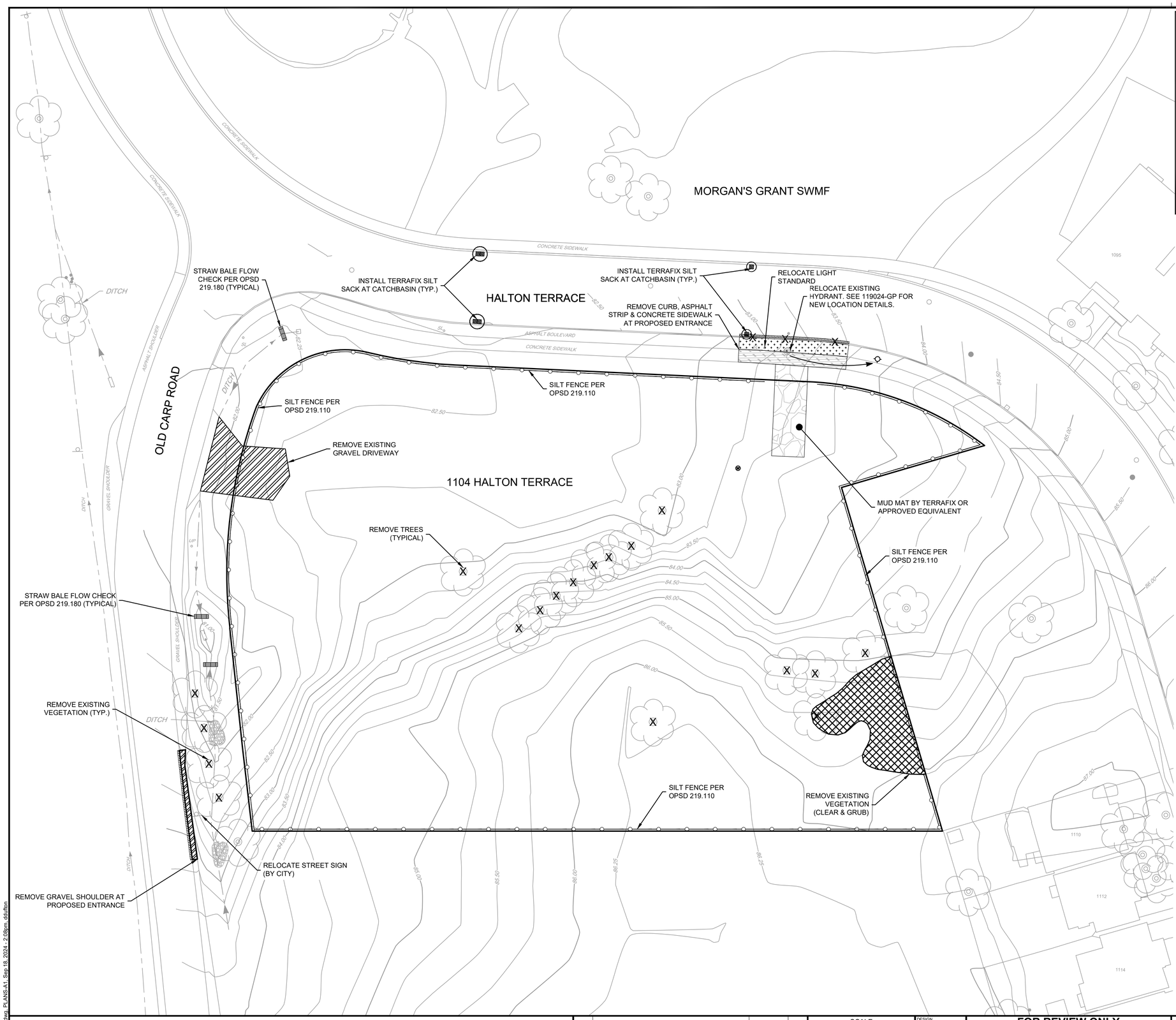

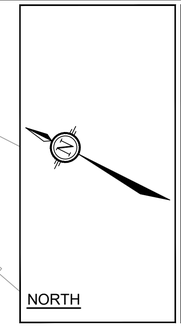

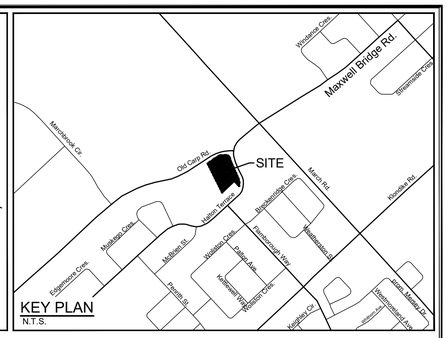

LEGEND

- CLEARING AND GRUBBING
- GRAVEL SHOULDER & DRIVEWAY REMOVAL
- REMOVE ASPHALT
- REMOVALS
- SILT FENCE PER OSPD 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 MAINTENANACE 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:
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3.	CITY SUBMISSION	SEP 18/24	MAB
2.	CITY SUBMISSION	NOV 3/23	MAB
1.	CITY SUBMISSION	OCT 19/21	MAB

SCALE
1:300
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DESIGN DTD
CHECKED LWR
DRAWN DTD
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

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SITE REMOVALS, EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 119024
REV REV # 3
DRAWING No. 119024-ESC

PLAN #18654 D07-12-21-0186

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