MMM Group Limited

Site Servicing & Stormwater Management Report

5514 Manotick Main Street, Ottawa, ON

Revision 00

Prepared For:
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COMMUNITIES

TRANSPORTATION

BUILDINGS

INFRASTRUCTURE

March 2017 | 17M-00198-00

MMM GROUP

STANDARD LIMITATIONS

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This Standard Limitations statement is considered part of this report.

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1.0 INTRODUCTION

MMM Group Ltd. has been retained by 1846253 Ontario Inc. to prepare a site servicing and stormwater management design in support of a site plan approval for the commercial development at 5514 Manotick Main Street, in the City of Ottawa; see Figure 1 for site location. This report will provide sufficient detail to demonstrate that the proposed development can be supported by the existing municipal infrastructure services, such as watermain, sanitary and storm sewers and that the servicing design conforms to the applicable standards and guidelines. It will also include stormwater management section detailing stormwater management approach, addressing the quantity control and quality measures in accordance with the applicable guidelines. The report will also include measures to be taken during the construction to minimize erosion and sedimentation.

Figure 1: Site Location

2.0 SITE DESCRIPTION

The subject site is 935.1 m^2 in size (ultimately 1242 m^2 described in the section 3.0 below), is located in the southwest corner of Manotick Main St. and Maple Ave. intersection, bounded by 2-storey residential townhomes to the east and a 1-storey commercial building to the West. The site is located as part of Lot 1 Concession A and part of common element Ottawa-Carleton Standard Condominium Plan 790 in the Geographic Township of North Gower in the City of Ottawa (refer to Appendix F for the survey plan). The existing site was occupied with two building footprints (residential and wood shed) in the central and east portions of the site. However, these two buildings have now been demolished for future development and the site is currently vacant consisting of gravelled surface and some vegetation.

Based on the topographic survey plan, there is approximately 0.5 m grade difference between the north-west corner and east entrance of the site. The drainage from the site currently sheet drains towards adjacent streets. The domestic water to the site was connected off Manotick Main St. existing municipal watermain, which has now been capped at the standpipe during the demolition of the buildings on site. The sewage from the site was discharged to the on-site holding tank, which is also now decommissioned.

The following municipal services are available within Manotick Main St, and Maple Ave adjacent to the development as recorded from the following as-built drawings received from the City of Ottawa registry:

Manotick Main St:

- 400mm watermain, 450 mm storm sewer and 600 mm concrete sanitary sewer.

Maple Ave

- 300 mm watermain, 675 mm storm sewer, 600 mm concrete sanitary sewer

City Registry drawing: Village of Manotick Municipal Servicing Commercial Core, Contract No. ISB06-2055, Plan No. 14121

Manotick Water Distribution System, Drawing No.: 3708-MU-101, 3708-MU-113

Paterson Group Inc. completed a geotechnical investigation report of the subject property. Based on the report, bedrock was encountered at depths ranging from 5 m to 15m below the existing ground surface. No removal of bedrock is anticipated for proposed sewer installations.

3.0 PROPOSED DEVELOPMENT

The proponent has acquired portion of the adjacent lot (1157 Maple Ave.) to facilitate the construction of the proposed development. The proposed development involves the construction of a 3 – storey mixed-use office building with a retail space on the main floor of the building. The building will have a flat roof and a footprint area of 300 m^2. The property has been proposed to access from Maple Ave. The total site area with the additional acquired lot sums up to 1242 m^2.

Prior to the construction existing capped water service at the standpipe will be further removed and capped at the main as per the City of Ottawa standards.

4.0 WATER DISTRIBUTION AND FIRE FLOW PROTECTION

The existing commercial development was serviced by a 19mm copper service off Manotick Main St. This service was capped at the standpipe during the demolition work. The service will further be abandoned and blanked at the existing main prior to the new development. The proposed development will be serviced by a 150mm watermain, off Maple Ave. The proposed development is below the basic day demand of 50m^3/day, therefore, a second watermain connection will not be needed. The proposed building will be fully sprinkled and fire protection will be provided with the fire department Siamese connection located within 45m of a proposed fire hydrant. The proposed fire hydrant to be installed along Maple Ave, approximately 26m from the proposed building north entrance.

Domestic water demands from the development have been determined in accordance with Section 4.28 of the City of Ottawa Water Distribution Guidelines and the fire flow demands have been estimated based on the Fire Underwriter's Survey (FUS). The projected domestic water and firefighting demands from the development are listed in Table 1 below. Detailed calculations of the following are shown in Appendix A:

Table 1: Projected Water and Fire Demands from Site

	5514 Manotick Main St
Water Demand Rate	28,000 L/gross ha/d
Area	1242 m^2
Factors	Max Daily Factor = 1.5 L/gross ha/d Max Hour Factor = 1.8 L/gross ha/d
Average Day Demand (L/s)	0.04
Maximum Daily Demand (L/s)	0.06
Peak Hour Demand (L/s)	0.11
FUS Fire Flow Required (L/s)	50

The site has been analyzed as summarized below and in Table 2 to ensure all the City of Ottawa minimum criteria for water pressures are met for the three conditions (maximum day + fire flow, peak hour and maximum HGL). The analysis was carried out using EPANET hydraulic and water quality analysis based on the boundary conditions provided by the City of Ottawa. The detailed EPANET output results are also included in the Appendix A.

With respect to a maximum daily demand of 0.06 L/s and a maximum fire flow of 50 L/s for the proposed development. The model indicated that both the pressure drop and the velocities in the pipe were acceptable and were within the City of Ottawa's minimum pressure requirements.

With respect to a peak hour demand of 0.11 L/s, the model indicated that both the pressure drop and the velocities in the pipe were acceptable and within the City of Ottawa's minimum pressure requirements.

With respect to Max HGL criteria, due to the high pressure at the building, a pressure reducing valve will be installed inside the building. Therefore, in view of the above considerations, the water services designed should be adequate enough to meet both the domestic and firefighting demands of the proposed development.

Table 2: Summary of Water Pressure

Criteria	City of Ottawa Boundary Conditions -Head (m)	EPANET Results (psi)		Allowable Pressure per City Guidelines (psi)
	5514 Manotick Main St	At Building	At fire hydrant	
Peak Hour	133.6	65.87	-	40 to 80 psi

Max Day + Fire	134.3	66.83	66.64	20 to 80 psi
Max HGL	159.9	103.30	-	20 to 80 psi

Refer to site servicing plans C.02 in Appendix D for details on the water servicing of the development.

5.0 SANITARY SERVICING

The proposed development will be serviced by a new 150 mm sanitary service and a sanitary monitoring manhole SMH1 off existing 300mm sanitary sewer along Maple Ave. The new service will be installed with a backwater valve as per the City of Ottawa requirements.

The projected sanitary flows have been estimated according to Section 4.4.1 of the City of Ottawa Sewer Design Guidelines – 2012 as summarised in the table below. Detailed calculations are included in appendix B.

Table 3: Projected Sanitary Demands from Site

	5514 Manotick Main St
Water Demand Rate	50,000 L/gross ha/d
Site Area	0.1242 ha
Peaking Factors	1.5
Average Daily Flow (L/s)	0.07
Peak Daily Flow (L/s)	0.11
Peak Extraneous Flow (L/s)	0.03
Total Peak Design Flow (L/s)	**0.14**

The proposed development will produce a total peak sanitary flow of **0.14 L/s**. The estimated flows can easily be conveyed by the proposed service connection. The hydraulic analysis of the pipe demonstrated that the capacity of the 150 mm pipe at 1.0% while not under pressure is 15.23 L/s. The internal plumbing design will be carried out by a mechanical engineer.

The capacity of the existing 600mm municipal sewer along Maple Ave between existing SANMH 221 and SANMH 224 as per City of Ottawa plan 14121 (contract no. ISB06-2055), has a capacity of 237.81 L/s at a slope of 0.15%. Currently, the sanitary discharge from the existing development was directed to the on-site holding tank, therefore, there were no connections to the existing municipal system. The new sanitary flow of 0.14 L/s from the proposed development represents an increase of 0.06%. As per City of Ottawa plan 14121 (contract no. ISB06-2055), there are no other sanitary service connections between SANMH 221 and SAN MH 224. In view of this, the negligible increase in sanitary flow from the proposed development does not have adverse impact on the pipe. Therefore, the existing sewers should have more than an adequate capacity to convey the estimated peak flows from the proposed development.

Refer to site servicing plans C.02 in Appendix D for details on the sanitary sewer servicing of the development.

6.0 STORM SERVICING

Storm discharge to the existing storm sewer located east of the proposed development will be controlled upon redevelopment as described in the section below. The release rate will be less than under the current uncontrolled condition. The proposed storm sewer service has been designed to be in general conformance with the City of Ottawa Sewer Design Guidelines (November 2004). Specifically, storm sewer was sized using Manning's Equation, assuming a roughness coefficient n= 0.013, to accommodate the free flow from each catchment area. The capacity of the 200 mm storm at 1.0 % is 32.8 L/s. Refer to Appendix D for storm drainage area plan C.03 for details on the catchment areas with associated runoff coefficient and uncontrolled runoff rates and for servicing plan C.02 for details on the storm sewer servicing the development.

As per recommendations from the Geotechnical Investigation Report prepared by Paterson Group, foundation drainage shall be provided for the proposed structure. A separate gravity storm connection will be connected to the proposed 675mm storm sewer located east of the proposed development to discharge runoff collected by the perimeter foundation drainage.

7.0 STORMWATER MANAGEMENT

7.1 Design Criteria

The City of Ottawa confirmed the following stormwater management criteria applicable to the subject site during the pre-consultation meeting held on January 23rd, 2017;

- The pre-development runoff coefficient to be calculated based on the existing conditions of the site
- Time of concentration, Tc of 10 minutes to be used for pre-development flows
- Consultation with the Rideau Valley Conservation Authority (RVCA) would be required
- Consultation with the Ministry of the Environment and Climate Change (MOECC) would not be required

7.2 Pre-Development Flows

The pre-development flow from the proposed site were determined for the 5-year and 100-year storms using an existing average runoff coefficient C-value of 0.47 and a time of concentration (Tc) of 10 minutes. Using the Rational Method, the pre-development flows from the subject site have been calculated to be 16.9 L/s for the 5-year and 36.2 L/s for the 100-year events (appendix C).

7.3 Post-Development Flows

Quantity Control

Post development flows have been calculated using the rational method and a time of concentration (Tc) of 10 minutes. For 5-year event runoff coefficient for asphalt, concrete sidewalk and roof areas were taken as 0.90 and for grassed areas as 0.20. An increase of 25% has been applied for the 100-year event runoff as per City of Ottawa guidelines. The storm drainage areas are illustrated in drawing C-03. A total of 5 drainage boundaries are outlined in this drawing. A total of 3 boundaries will be controlled prior to discharging into the existing municipal main on Maple Ave. Please refer to Appendix C for a complete summary of flows of the subject site.

The total 5-year and 100-year post development flows are 28.4 /s and 58.6 L/s, respectively. These flows will be restricted to 16.9 L/s for 5-year and 100-year storm design. The two uncontrolled boundaries represent 7.1 L/s of the total post development flow. Therefore, as per City of Ottawa Guidelines, this amount of flow will be deducted from the total pre-development rate (16.9 L/s) resulting in a maximum allowable release rate for the controlled areas for the 100-year storm to **9.8** L/s.

Runoff from the building roof will be restricted to a total release rate of 1.7 L/s for the 100-year storm, using roof drain restrictors RD-100-CP by WATT's drainage. A total of 1 roof drain will be proposed. Please see appendix C for roof drain specification. The max ponding depth will be 135 mm for the 100-year storm event. The total storage required on the rooftop based on the release rate and surface area is 5.6 m^3 for the 5-year storm event and 11.0 m^3 for the 100-year storm event, see appendix C. The building roof drain will outlet from the east side of the building and discharge into the proposed free flow storm system. Please refer to appendix C.

The parking area will be restricted to total release rate of 8.1 L/s for the 100-year storm. The max ponding depth will be 240 mm. The total storage required for the parking areas (A1, A2) based on the release rate and surface area is 12.06 m^3 for the 5-year storm event and 26.34 m^3 for the 100-year storm event, see appendix C. The maximum available storage in the parking lot at a 100-year event elevation is estimated to be 26.45 m^3. Therefore, it can be concluded that the storage available on the parkade is sufficient to provide adequate storage for up to 100-year storm event. Refer to Table 5 for release rate summary of the proposed site.

Table 4: Release Rate Summary

		100-year Release Rate (L/s)
Controlled	Parking Areas (A1, A2)	8.1
	Roof (Bldg)	1.7
Allowable Release Rate		**16.9**
Uncontrolled		7.1
Total		16.9

Storm events exceeding the 100-year event will be directed to Maple Avenue via overland flow route. It should be noted that as per the current site grading, all runoff exceeding the minor system capacity directs all stormwater away from the buildings.

A swale has been proposed 0.30m south of the subject site property line in order to intercept external drainage from the adjacent property entering the subject site. Based on the review of the general topography and existing grades, it is our opinion that the majority of the drainage from the adjacent site during minor events generally infiltrates in the ground. The proposed swale has been provided to eliminate any overland drainage that were to enter the subject site. The swale will be connected to the existing swale outside the western property line, see drawing C.01 in appendix D for details.

7.4 Quality Control

The RVCA were contacted to determined quality treatment requirements for the site. It was confirmed that the Rideau River requires minimum 80% of average annual TSS removal. As per the Stormceptor Sizing Report (appendix C) an STC 300 is required, however, due the size of the existing inline pipe, the Stormceptor had to be upgraded to Model STC 750 to facilitate the connection and to provide water quality treatment. See appendix C for STC 750 details. The tributary area to the Stormceptor is 1056 ha, which will achieve removal of approximately 95% of the annual total suspended solids. See appendix E for email correspondence with RVCA.

8.0 EROSION AND SEDIMENT CONTROL

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction. Catch basins and manholes will have silt sack filter installed under the grate during construction to protect from silt entering the storm sewer system. A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.

Erosion and sediment controls must be in place during construction. Recommendations to the contractor will be included in the erosion and sediment control plan C.01 and are summarized below:

During all construction activities, erosion and sedimentation shall be controlled by the following techniques:

Prior to start of construction:

- Install silt sack filters in all the catchbasins and manholes that exist within the vicinity of the site

During construction:

- Minimize the extent of disturbed areas and the duration of exposure and impacts to existing grading.
- Protect disturbed areas from overland flow by providing temporary swales to the satisfaction of the field engineer. Tie-in temporary swale to existing catchbasins as required.
- Provide temporary cover such as seeding or mulching if disturbed area will not be rehabilitated within 30 days.
- Inspect silt sack filters and catch basin sumps weekly and within 24 hours after a storm event. Clean and repair when necessary.
- Drawing to be reviewed and revised as required during construction.

- Erosion control fencing to be also installed around the base of all stockpiles.
- Do not locate topsoil piles and excavation material closer than 2.5m from any paved surface, or one which is to be paved before the pile is removed. All topsoil piles are to be seeded if they are to remain on site long enough for seeds to grow (longer than 30 days).
- Control wind-blown dust off site by seeding topsoil piles and other areas temporarily (provide watering as required and to the satisfaction of the engineer).
- No alternate methods of erosion protection shall be permitted unless approved by the field engineer.
- City roadway and sidewalk to be cleaned of all sediment from vehicular tracking as required.
- Provide gravel entrance (mud mat) wherever equipment leaves the site to provide mud tracking onto paved surfaces.
- During wet conditions, tires of all vehicles/equipment leaving the site are to be scrapped.
- Any mud/material tracked onto the road shall be removed immediately by hand or rubber tire loader.
- Take all necessary steps to prevent building material, construction debris or waste being spilled or tracked onto abutting properties or public streets during construction and proceed immediately to clean up any areas so affected.
- All erosion control structure to remain in place until all disturbed ground surfaces have been stabilized either by paving or restoration of vegetative ground cover.
- During the course of construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer.
- The contractor shall implement best management practices, to provide for protection of the area drainage system and the receiving watercourse, during construction activities. The contractor acknowledges that failure to implement appropriate erosion and sediment control measures may be subject to penalties imposed by any applicable regulatory agency.

9.0 CONCLUSIONS

The current analysis concludes that the existing municipal infrastructures have sufficient capacity to support the proposed development. During construction best management practices related to sediment and erosion control are recommended in order to reduce impact on downstream watercourses.

10.0 CORPORATE AUTHORIZATION

This document entitled "5514 Manotick Main Street Site Servicing and Stormwater Management Report" was prepared by MMM Group Limited (MMM) for the account of Stephen Philip. The material in it reflects MMM's best judgment in light of the information available to them at the time of preparation. Any use a third party makes of this report, or reliance on or decisions made based on it, are the responsibilities of such third parties. MMM accepts no responsibilities for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

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APPENDIX A – WATERMAIN DESIGN

WATER DISTRIBUTION - PROPOSED DOMESTIC DEMANDS

Demand Type		Amount	Units	
Average Day Demand				
Residential	=	350	L/c/d	
Light Industrial	=	35000	L/gross ha/d	
Heavy Industrial	=	55000	L/gross ha/d	
Hotels	=	225	L/(bed-space/d)	
Tourist Commercial	=	28000	L/gross ha/d	
Other Commercial	=	28000	L/gross ha/d	

Maximum Daily Demand:				
Residential	=	2.5 x	average day	L/c/d
Industrial	=	1.5 x	average day	L/gross ha/d
Commercial	=	1.5 x	average day	L/gross ha/d
Institutional	=	1.5 x	average day	L/gross ha/d

Maximum Hour Demand:				
Residential	=	2.2 x	maximum day	L/c/d
Industrial	=	1.8 x	maximum day	L/gross ha/d
Commercial	=	1.8 x	maximum day	L/gross ha/d
Institutional	=	1.8 x	maximum day	L/gross ha/d

		5514 Manotick Main Street		
Demand Type	=	Other Commercial		
Average Day Demand	=	28,000		L/gross ha/d
Site Area	=	0.1242		
	=	28,000	x	0.1242
	=	3,478		L/day
Average Daily Flow	=	**0.04**		**L/s**
Daily Demand Type	=	Commercial		
Max. Daily Factor	=	1.5		L/gross ha/d
	=	1.5	x	Average Daily Flow
	=	1.5	x	3,478
	=	5,216		L/day
Maximum Daily Demand	=	**0.06**		**L/s**
Hour Demand Type	=	Commercial		
Max. Hour Factor	=	1.8		L/gross ha/d
	=	1.8	x	Max Daily Flow
	=	1.8	x	5,216
	=	9,390		L/day
Maximum Hour Demand	=	**0.11**		**L/s**

WATER DISTRIBUTION - PROPOSED FIRE FLOW DEMANDS

F = 220 C √ A

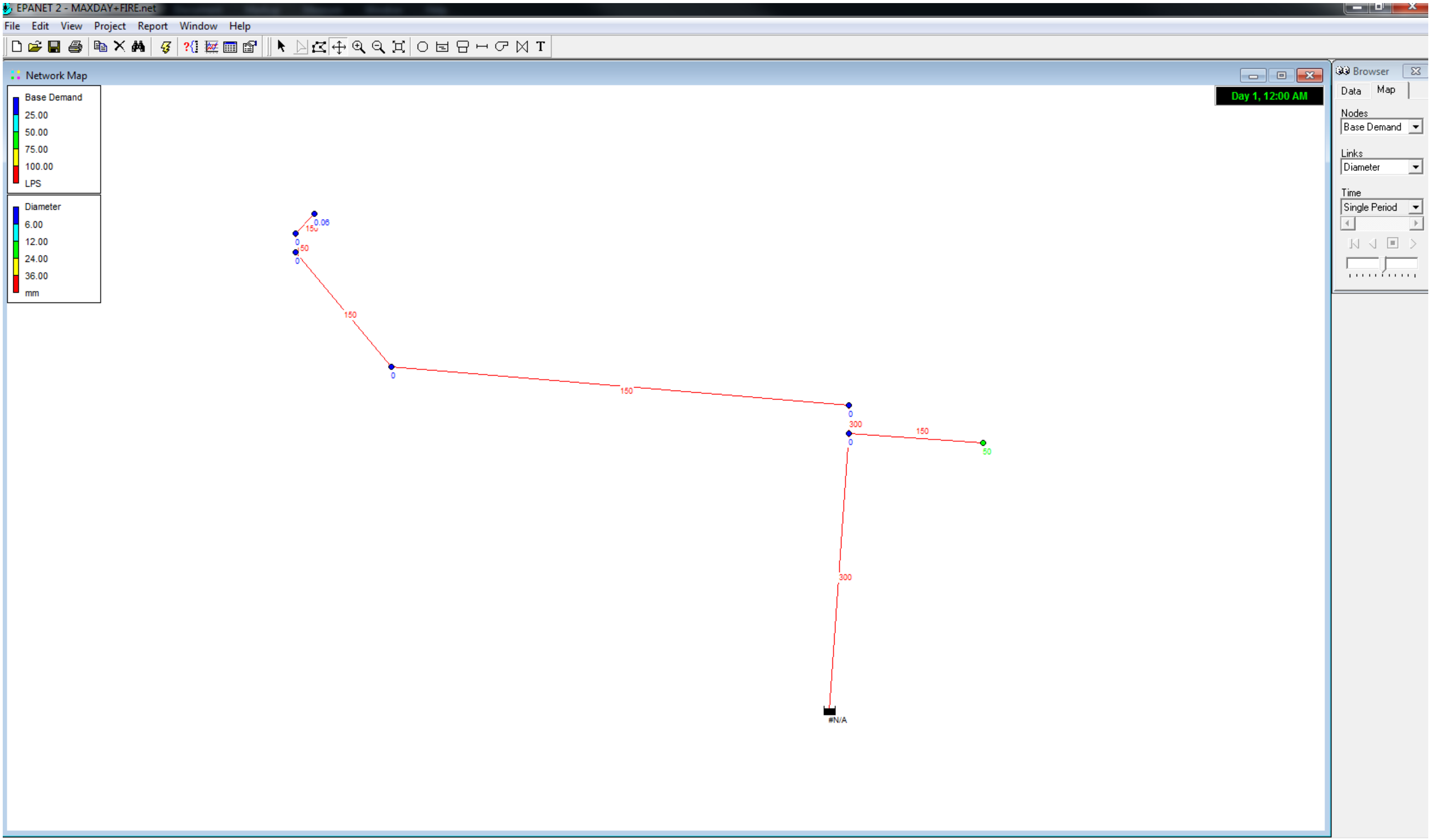
Type of Construction Coefficient:		Comments
Wood Frame	1.5	(all structurally combustible)
Ordinary	1.0	(brick, masonry wall, combustible floor and interior)
Non-Combustible	0.8	(unprotected metal structural component, masonry or metal walls)
Fire Resistive	0.6	(fully protected frame, floors and roof)

Combustibility:		
Non-Combustible	-25%	
Limited Combustible	-15%	
Combustible	0%	
Free Burning	15%	
Rapid Burning	25%	

Sprinkler Protection:		
Complete Sprinkler System	-50%	(max.)
NFPA 13 Conformed	-30%	(max.)
If Water Supply Standard for Both System and Fire Lines	-10%	additional (max.)
Fully Supervised System	-10%	additional (max.)
None	0%	

	5514 Manotick Main Street		
Type of Construction Coefficient	Non-Combustible		
	0.8		
Gross Floor Area (m^2)	695	m2	
Fire Flow, F (L/min)	4,641	L/min	
	5,000	L/min	
Combustibility	Non-Combustible		
	-25%		
F	3,750	L/min	
Sprinkler Protection	Complete Sprinkler System		
	-50%		
Additional Credit	None		
	0		
F	1,875	L/min	
Exposure Distances			
North	>45	m	0%
South	16.9	m	15%
East	>45	m	0%
West	10	m	20%
		=	35%
FF Adjustment Factor	1.35		
Total Required FF, F	1,875	x	1.35
F	3,000	L/min	
F	**50**	**L/s**	

5514 MANOTICK MAIN ST - EPANET MODEL



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*                                E P A N E T                         *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                           Version 2.0                              *
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Input File: MAXDAY+FIRE.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	7	9	14.57	300
2	7	8	7.02	150
3	7	1	1.50	300
4	1	3	24.08	150
5	3	4	7.81	150
6	4	5	1.00	150
7	5	6	1.41	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.00	134.27	49.82	0.00	
3	0.00	134.27	49.86	0.00	
4	0.00	134.27	49.59	0.00	
5	0.00	134.27	49.59	0.00	
6	0.06	134.27	46.97	0.00	
7	0.00	134.27	49.83	0.00	
8	50.00	133.68	46.84	0.00	
9	-50.06	134.30	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	-50.06	0.71	2.07	Open
2	50.00	2.83	84.68	Open
3	0.06	0.00	0.00	Open
4	0.06	0.00	0.00	Open
5	0.06	0.00	0.00	Open
6	0.06	0.00	0.00	Open
7	0.06	0.00	0.00	Open

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**********************************************************************
*                             E P A N E T                            *
*                    Hydraulic and Water Quality                     *
*                    Analysis for Pipe Networks                      *
*                          Version 2.0                               *
**********************************************************************
```

Input File: MAX HGL.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	7	9	14.57	300
2	7	8	7.02	150
3	7	1	1.50	300
4	1	3	24.08	150
5	3	4	7.81	150
6	4	5	1.00	150
7	5	6	1.41	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.00	159.90	75.45	0.00	
3	0.00	159.90	75.49	0.00	
4	0.00	159.90	75.22	0.00	
5	0.00	159.90	75.22	0.00	
6	0.00	159.90	72.60	0.00	
7	0.00	159.90	75.46	0.00	
8	0.00	159.90	73.06	0.00	
9	0.00	159.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	0.00	0.00	0.00	Open
2	0.00	0.00	0.00	Open
3	0.00	0.00	0.00	Open
4	0.00	0.00	0.00	Open
5	0.00	0.00	0.00	Open
6	0.00	0.00	0.00	Open
7	0.00	0.00	0.00	Open

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**********************************************************************
*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
**********************************************************************
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Input File: PKHR.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	7	9	14.57	300
2	7	8	7.02	150
3	7	1	1.50	300
4	1	3	24.08	150
5	3	4	7.81	150
6	4	5	1.00	150
7	5	6	1.41	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.00	133.60	49.15	0.00	
3	0.00	133.60	49.19	0.00	
4	0.00	133.60	48.92	0.00	
5	0.00	133.60	48.92	0.00	
6	0.11	133.60	46.30	0.00	
7	0.00	133.60	49.16	0.00	
8	0.00	133.60	46.76	0.00	
9	-0.11	133.60	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	-0.11	0.00	0.00	Open
2	0.00	0.00	0.00	Open
3	0.11	0.00	0.00	Open
4	0.11	0.01	0.00	Open
5	0.11	0.01	0.00	Open
6	0.11	0.01	0.00	Open
7	0.11	0.01	0.00	Open

APPENDIX B – SANITARY DESIGN

SANITARY SEWAGE - PROPOSED SANITARY FLOWS

Average Wastewater Flows:		
Residential	350	L/c/d
Hotel	270	L/c/d
Commercial	**50,000**	**L/gross ha/d**
Institutional	50,000	L/gross ha/d
Light Industrial	35,000	L/gross ha/d
Heavy Industrial	55,000	L/gross ha/d

Peaking Factors:	
Residential	Harmon Equation
Commercial	**1.5**
Institutional	1.5
Industrial	Per Figure in Appendix 4-B

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * K$$

where P = population

K = correction factor = 1

Peak Extraneous Flows:	
Infiltration Allowance	0.28
Less than 10 ha:	
Foundation Drain Allowance	5.0
10 ha - 100 ha:	
Foundation Drain Allowance	3.0
Greater than 100 ha:	
Foundation Drain Allowance	2.0

	5514 Manotick Main Street		
Demand Type=	Commercial		
Average Day Demand=	50,000		L/gross ha/d
Population	-		
Site Area (ha)	0.1242		
	50,000	x	0.1242
	6,210		L/day
Average Daily Flow=	**0.07**		**L/s**
Peaking Factor Type	Commercial		
Peaking Factor	1.5		
	1.5	x	average day
	1.5	x	6,210
	9,315		L/day
Peak Daily Flow=	**0.11**		**L/s**
Infiltration Allowance	0.28		
	0.28	x	lot area
	0.28	x	0.1242
Peak Extraneous Flow=	**0.03**		**L/s**
	peak daily flow	+	extraneous flow
	0.11	+	0.03
Total Peak Design Flow=	**0.14**		**L/s**

APPENDIX C – STORMWATER MANAGEMENT

TABLE 1- PRE-DEVELOPMENT AVERAGE RUNOFF COEFFICIENT

Catchment Reference	Controlled/ Uncontrolled	Total Catchment Area (m^2)	Roof (m^2)	Asphalt Area (m^2)	Gravel (m^2)	Landscaping Area (m^2)	Weighted Runoff Coefficient
Runoff Coefficient			**0.9**	**0.9**	**0.7**	**0.2**	
EXISTING SITE	uncontrolled	1242	200	193	121	728	**0.47**

TABLE 2 - ALLOWABLE RUNOFF

Area Description	Area (ha)	Time of Conc, Tc (min)	5-YR STORM EVENT			100-YR STORM EVENT		
			I_5 (mm/hr)	Cavg	Q_5 (L/sec)	I_{100} (mm/hr)	Cavg	Q_{100}(L/sec)
Existing Site	0.1242	10	104.19	0.47	**16.9**	178.56	0.59	36.2
Allowable Capture Rate is based on 5-year storm at Tc=10 mins								
Q_5 (L/sec) = 2.78 C I A								

5-year Storm	$C_{ASPH/ROOF/CONC}$	0.9	C_{GRASS} =	0.2
100-year Storm	$C_{ASPH/ROOF/CONC}$	1	C_{GRASS} =	0.25

* 25% increase to C value for 100 year storm

TABLE 3 - POST-DEVELOPMENT AVERAGE RUNOFF COEFFICIENTS

Area No.	Total Area (m^2)	Asphalt/ Roof Area (m2)	A * C(asph)	Grass Area (m2)	A * C(grass)	Sum A * C	C_{5-yr}	C_{100-yr}
BLDG	300	300	270	0	0	270	0.90	1.00
A1	480	389.5	351	90.5	18.1	369	0.77	0.96
A2	276	244.3	220	31.7	6.34	226	0.82	1.00
A3	30	0	0	30	6	6	0.20	0.25
A4	156	110.6	100	45.4	9.08	109	0.70	0.87
Controlled	1,056	934		122		865		
Total	1,242	1,044		198		979		
Average Runoff Coefficient (Post Development-Controlled flows)								
$C_{AVG(5yr)}$ =	**865 / 1,056**	**=**	**0.82**	**$C_{AVG(100yr)}$ =**		**1.00**		

TABLE 4 - POST-DEVELOPMENT RUNOFF

Area No.	Area (ha)	Storm = 5 yr				Storm = 100 yr			
		I_5 (mm/hr)	C_{AVG}	Q_{UNCONT} (l/s)	Q_{CONT} (l/s)	I_{100} (mm/hr)	C_{AVG}	Q_{UNCONT} (l/s)	Q_{CONT} (l/s)
BLDG	0.0300	104.19	0.90	7.8	1.4	178.56	1.00	14.9	**1.7**
A1	0.0480	104.19	0.77	10.7	10.7	178.56	0.96	22.9	**1.1**
A2	0.0276	104.19	0.82	6.6	6.6	178.56	1.00	13.7	**7.0**
A3	0.0030	104.19	0.20	0.2	0.2	178.56	0.25	0.4	**0.4**
A4	0.0156	104.19	0.70	3.1	3.1	178.56	0.87	6.7	**6.7**
Totals	0.1242			28.4	21.9			58.6	**16.9**
Q_{CONT} (l/s) = Q_5 - Sum of Q_{100-yr} uncontrolled									
$I_5 = 998.071 / (Tc + 6.053)^{0.814}$								Total Q_{cont}	9.8
$I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$								Total Q_{uncon}	7.1
Time of Concentration, Tc = 10 mins								Total $Q_{Combined}$	**16.9**

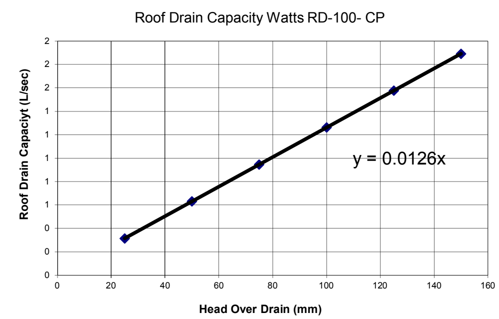
TABLE 5: 5&100 YEAR ROOF DRAIN STORAGE REQUIREMENT															
Roof Drain #				5-year Event			100-year Event			Storage Required		Maximum storage available		
	Runoff Coeff (C-5yr)	Runoff Coeff (C-100yr)	Drainage Area (ha)	Runoff Rate (L/sec)	Ponding Depth (mm)	Roof Drain Capacity (L/sec)	Runoff Rate (L/sec)	Ponding Depth (mm)	Roof Drain Capacity (L/sec)	5-year (m^3)	100-year (m^3)	Area (m^2)	Depth (m)	Volume (m^3)
RD1	0.9	1.0	0.0300	7.8	108	1.4	14.9	135	1.7	5.6	11.0	300	0.150	15.0
Total (Roof Drains)			**0.0300**			**1.4**			**1.7**	**5.6**	**11.0**	**300.0**		**15.0**

Runoff Based on the Following:

Time of Conc (mins) =		10	10			
Storm Frequency (years) =		5	100			
Storm Intensity (mm/hr) =		104.19	178.56			

Roof Drains have following Flow Rates:

Head (mm)	25	50	75	100	125	150
No Weir Slots	1	1	1	1	1	1
Flow per Weir	5	10	15	20	25	30
Flow Rate (uspgm)	5	10	15	20	25	30
Flow Rate (L/sec)	0	0.63	0.95	1	1.58	1.89
Eqn for Flow, Q at depth, d		Q =0.0126 * d				



STORAGE VOLUME REQUIRED (5-YEAR and 100-YEAR STORMS)
A1

C_{AVG} = 0.96
Time Interval = 5 (mins)
Drainage Area = 0.04800 (hectares)

Time (min)	Intensity, I (mm/hr)	Peak Flow (L/s)	Release Rate (L/s)	Storage Rate (L/s)	Storage Volume (m^3)	Intensity, I (mm/hr)	Peak Flow (L/s)	Release Rate (L/s)	Storage Rate (L/s)	Storage Volume (m^3)
	Release Rate = 1.1 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, B = 0.814, C = 6.053; (I = A/(T_c+C))					Release Rate = 1.1 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, B = 0.820, C = 6.014; (I = A/(T_c+C))				
0	230.5	29.5	1.14	28.4	0.00	399	51.1	1.140	49.9	0.00
5	141.2	18.1	1.14	16.9	5.08	243	31.1	1.140	30.0	8.99
10	104.2	13.3	1.14	12.2	7.32	179	22.9	1.140	21.7	13.04
15	83.6	10.7	1.14	9.6	8.61	143	18.3	1.140	17.2	15.45
20	70.3	9.0	1.14	7.9	9.43	120	15.4	1.140	14.2	17.07
25	60.9	7.8	1.14	6.7	9.99	104	13.3	1.140	12.2	18.25
30	53.9	6.9	1.14	5.8	10.38	92	11.8	1.140	10.6	19.13
35	48.5	6.2	1.14	5.1	10.66	83	10.6	1.140	9.4	19.82
40	44.2	5.7	1.14	4.5	10.85	75	9.6	1.140	8.5	20.37
45	40.6	5.2	1.14	4.1	10.97	69	8.8	1.140	7.7	20.81
50	37.7	4.8	1.14	3.7	11.05	64	8.2	1.140	7.1	21.16
55	35.1	4.5	1.14	3.4	11.09	60	7.6	1.140	6.5	21.44
60	32.9	4.2	1.14	3.1	11.09	56	7.2	1.140	6.0	21.67
65	31.0	4.0	1.14	2.8	11.06	53	6.7	1.140	5.6	21.86
70	29.4	3.8	1.14	2.6	11.02	50	6.4	1.140	5.2	22.00
75	27.9	3.6	1.14	2.4	10.95	47	6.1	1.140	4.9	22.11
80	26.6	3.4	1.14	2.3	10.86	45	5.8	1.140	4.6	22.19
85	25.4	3.2	1.14	2.1	10.76	43	5.5	1.140	4.4	22.25
90	24.3	3.1	1.14	2.0	10.65	41	5.3	1.140	4.1	22.28
95	23.3	3.0	1.14	1.8	10.52	39	5.1	1.140	3.9	22.30
100	22.4	2.9	1.14	1.7	10.38	38	4.9	1.140	3.7	22.29
105	21.6	2.8	1.14	1.6	10.24	36	4.7	1.140	3.5	22.27
110	20.8	2.7	1.14	1.5	10.08	35	4.5	1.140	3.4	22.24
115	20.1	2.6	1.14	1.4	9.92	34	4.4	1.140	3.2	22.19
120	19.5	2.5	1.14	1.4	9.75	33	4.2	1.140	3.1	22.13
Max =					**11.09**					**22.30**

Notes
1) Peak flow is equal to 2.78 x C x I x A
2) Intensity, I = $A/(Tc+C)^B$
3) Release Rate = Min (Release Rate, Peak Flow)
4) Storage Rate = Peak Flow - Release Rate
5) Storage = Time x Storage Rate
6) Maximum Storage = Max Storage Over Time

STORAGE VOLUME REQUIRED (5-YEAR and 100-YEAR STORMS)

A2

C_{AVG} = 1.00

Time Interval = 5 (mins)

Drainage Area = 0.02760 (hectares)

	5-Year					100-Year				
	Release Rate = **7.0** (L/sec)					Release Rate = **7.0** (L/sec)				
	Return Period = 5 (years)					Return Period = 100 (years)				
	IDF Parameters, A = 998.071, B = 0.814					IDF Parameters, A = 1735.688, B = 0.820				
	($I = A/(T_c+C)$), C = 6.053					($I = A/(T_c+C)$), C = 6.014				
Time (min)	**Intensity, I (mm/hr)**	**Peak Flow (L/s)**	**Release Rate (L/s)**	**Storage Rate (L/s)**	**Storage Volume (m^3)**	**Intensity, I (mm/hr)**	**Peak Flow (L/s)**	**Release Rate (L/s)**	**Storage Rate (L/s)**	**Storage Volume (m^3)**
0	230.5	17.7	6.96	10.7	0.00	399	30.6	6.962	23.6	0.00
5	141.2	10.8	6.96	3.9	1.16	243	18.6	6.962	11.7	3.50
10	104.2	8.0	6.96	1.0	0.62	179	13.7	6.962	6.7	4.04
15	83.6	6.4	6.96	-0.6	-0.50	143	11.0	6.962	4.0	3.60
20	70.3	5.4	6.96	-1.6	-1.89	120	9.2	6.962	2.2	2.69
25	60.9	4.7	6.96	-2.3	-3.43	104	8.0	6.962	1.0	1.51
30	53.9	4.1	6.96	-2.8	-5.08	92	7.0	6.962	0.1	0.16
35	48.5	3.7	6.96	-3.2	-6.80	83	6.3	6.962	-0.6	-1.31
40	44.2	3.4	6.96	-3.6	-8.57	75	5.8	6.962	-1.2	-2.87
45	40.6	3.1	6.96	-3.8	-10.38	69	5.3	6.962	-1.7	-4.49
50	37.7	2.9	6.96	-4.1	-12.22	64	4.9	6.962	-2.1	-6.16
55	35.1	2.7	6.96	-4.3	-14.08	60	4.6	6.962	-2.4	-7.88
60	32.9	2.5	6.96	-4.4	-15.96	56	4.3	6.962	-2.7	-9.62
65	31.0	2.4	6.96	-4.6	-17.86	53	4.0	6.962	-2.9	-11.40
70	29.4	2.3	6.96	-4.7	-19.77	50	3.8	6.962	-3.1	-13.19
75	27.9	2.1	6.96	-4.8	-21.70	47	3.6	6.962	-3.3	-15.01
80	26.6	2.0	6.96	-4.9	-23.63	45	3.5	6.962	-3.5	-16.85
85	25.4	1.9	6.96	-5.0	-25.58	43	3.3	6.962	-3.7	-18.70
90	24.3	1.9	6.96	-5.1	-27.53	41	3.2	6.962	-3.8	-20.56
95	23.3	1.8	6.96	-5.2	-29.49	39	3.0	6.962	-3.9	-22.43
100	22.4	1.7	6.96	-5.2	-31.45	38	2.9	6.962	-4.1	-24.32
105	21.6	1.7	6.96	-5.3	-33.43	36	2.8	6.962	-4.2	-26.22
110	20.8	1.6	6.96	-5.4	-35.40	35	2.7	6.962	-4.3	-28.12
115	20.1	1.5	6.96	-5.4	-37.38	34	2.6	6.962	-4.4	-30.03
120	19.5	1.5	6.96	-5.5	-39.37	33	2.5	6.962	-4.4	-31.95
Max =					**1.16**					**4.04**

Notes

1) Peak flow is equal to 2.78 x C x I x A

2) Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Time x Storage Rate

6) Maximum Storage = Max Storage Over Time

LOCATION					FLOW					SEWER DATA												
SUB-CATCHMENT AREAS	FROM MH	TO MH	Coefficient	Area (m2)	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (l/s)	Pipe Diameter (mm, nominal)	Pipe Diameter (mm, actual)	Type	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of flow (min.)	Ratio (Q/Q_{FULL})	Controlled / Uncontrolled	Controlled Flow	ICD
A1	CB1	EXISTING	0.77	480	0.102	0.102	10.00	104.19	**10.7**	200	200.00	PVC	1.00%	14.1	**32.80**	1.04	0.23	0.33	Controlled	1.1	40SVH-1
A2	CB2	EXISTING	0.82	276	0.06	0.165	10.00	104.19	**6.6**	200	200.00	PVC	1.00%	7.2	**32.80**	1.04	0.11	0.20	Controlled	7.0	75SVH-1

DESIGN PARAMETERS

Q = 2.78CIA where,
Q = Peak flow in litres per second (l/s)
A = Drainage area in hectares (Ha)
I = Rainfall intensity (mm/hr)
C = Runoff coefficient

Ottawa IDF curve
IDF Curve Equation (5 year event)
$I = 998.071 / (T_c + 6.053)^{0.814}$
Min. velocity = 0.80 m/s
Manning's "n" = 0.013

Designed:	PROJECT:		
D.G	5514 Manotick Main Street		
Checked:	LOCATION:		
I.J	5514 Manotick Main Street		
Dwg. Reference:	File Ref.:	Date:	Sheet No.
C-02	17M-00198-00	Feb 28, 2017	1 of 1

® HYDROVEX®

SVHV Vertical Vortex Flow Regulator

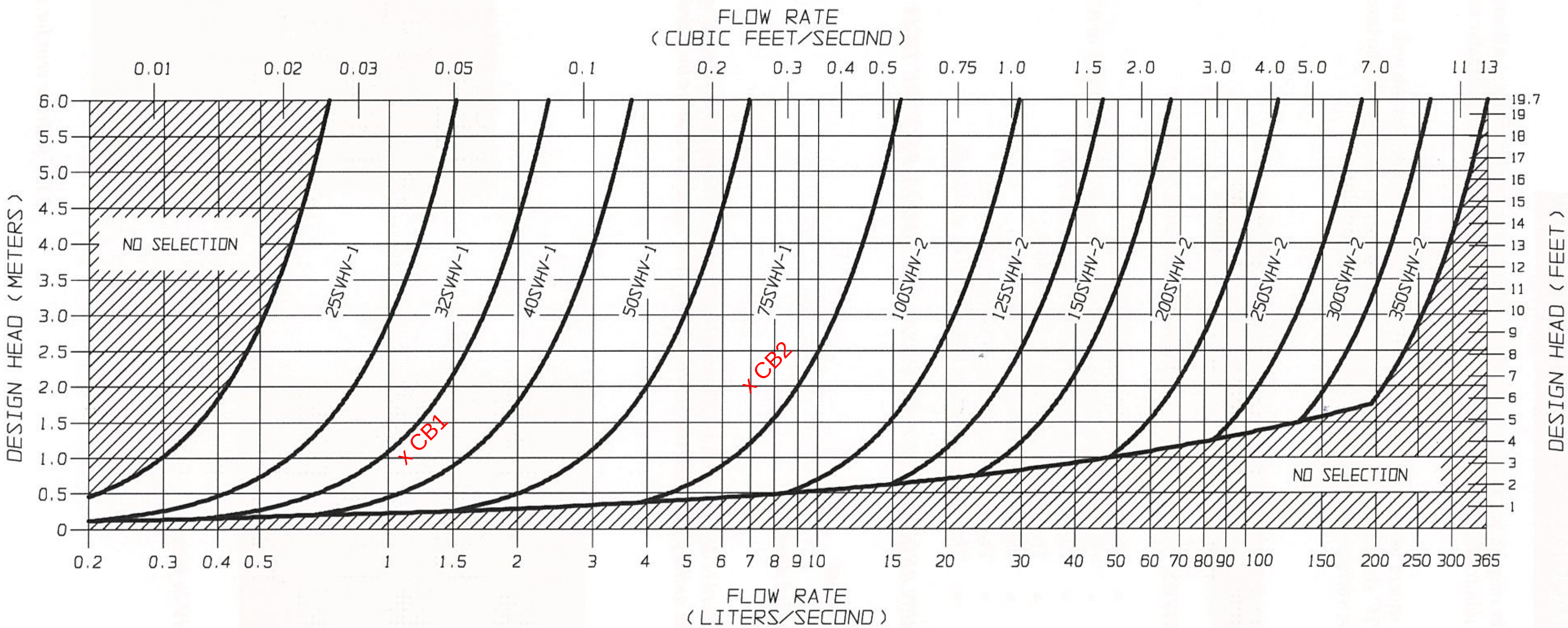


FIGURE 2 - SVHV

JOHN MEUNIER

Stormceptor Sizing Detailed Report

PCSWMM for Stormceptor

Project Information

Date	27/02/2017
Project Name	David Grinchpoun
Project Number	17M-00198-00
Location	5514 Manotick Main St

Stormwater Quality Objective

This report outlines how Stormceptor System can achieve a defined water quality objective through the removal of total suspended solids (TSS). Attached to this report is the Stormceptor Sizing Summary.

Stormceptor System Recommendation

The Stormceptor System model STC 300 achieves the water quality objective removing 92% TSS for a CLOCA (clay, silt and sand) particle size distribution.

The Stormceptor System

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for all rainfall events, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Stormceptor is the only oil and sediment separator on the market sized to remove TSS for a wide range of particle sizes, including fine sediments (clays and silts), that are often overlooked in the design of other stormwater treatment devices.

Small storms dominate hydrologic activity, US EPA reports

"*Early efforts in stormwater management focused on flood events ranging from the 2-yr to the 100-yr storm. Increasingly stormwater professionals have come to realize that small storms (i.e. < 1 in. rainfall) dominate watershed hydrologic parameters typically associated with water quality management issues and BMP design. These small storms are responsible for most annual urban runoff and groundwater recharge. Likewise, with the exception of eroded sediment, they are responsible for most pollutant washoff from urban surfaces. Therefore, the small storms are of most concern for the stormwater management objectives of ground water recharge, water quality resource protection and thermal impacts control.*"

"*Most rainfall events are much smaller than design storms used for urban drainage models. In any given area, most frequently recurrent rainfall events are small (less than 1 in. of daily rainfall).*"

"Continuous simulation offers possibilities for designing and managing BMPs on an individual site-by-site basis that are not provided by other widely used simpler analysis methods. Therefore its application and use should be encouraged."

– US EPA Stormwater Best Management Practice Design Guide, Volume 1 – General Considerations, 2004

Design Methodology

Each Stormceptor system is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology from up-to-date local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective.

The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing (summary of analysis presented in Appendix 2):

- Site parameters
- Continuous historical rainfall, including duration, distribution, peaks (Figure 1)
- Interevent periods
- Particle size distribution
- Particle settling velocities (Stokes Law, corrected for drag)
- TSS load (Figure 2)
- Detention time of the system

The Stormceptor System maintains continuous positive TSS removal for all influent flow rates. Figure 3 illustrates the continuous treatment by Stormceptor throughout the full range of storm events analyzed. It is clear that large events do not significantly impact the average annual TSS removal. There is no decline in cumulative TSS removal, indicating scour does not occur as the flow rate increases.

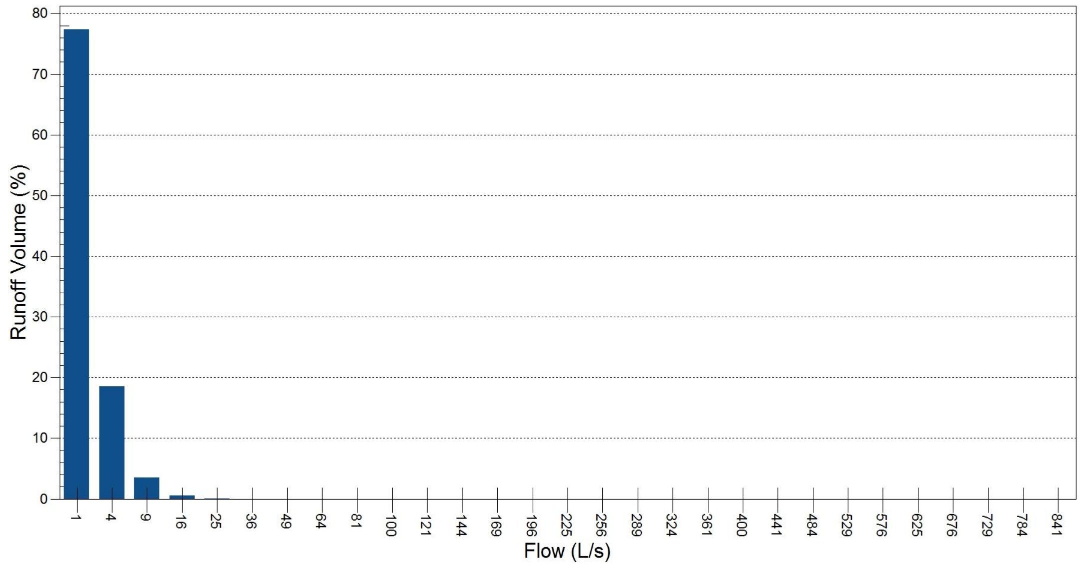


Figure 1. Runoff Volume by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – ON 6000, 1967 to 2003 for 0.11 ha, 82% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

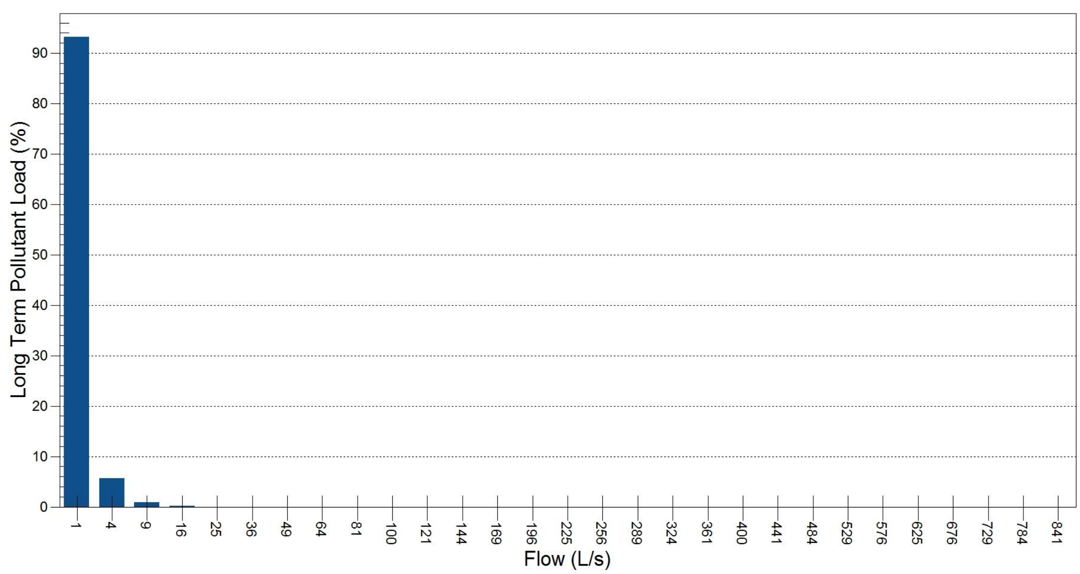
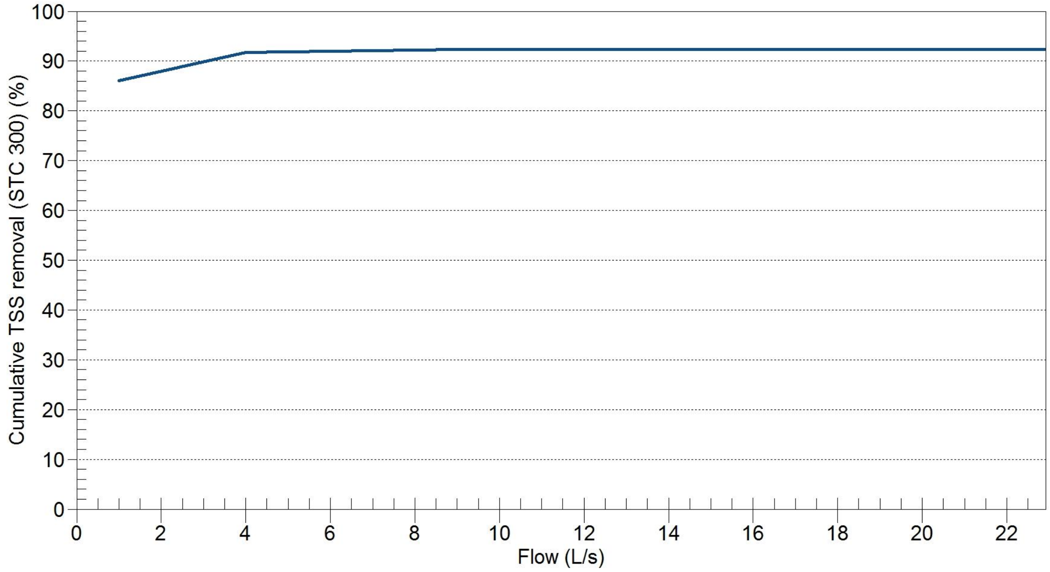


Figure 2. Long Term Pollutant Load by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003 for 0.11 ha, 82% impervious. The majority of the annual pollutant load is transported by small frequent storm events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 300	Drainage Area (ha)	0.11
TSS Removal (%)	92	Impervious (%)	82

Figure 3. Cumulative TSS Removal by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003. Stormceptor continuously removes TSS throughout the full range of storm events analyzed. Note that large events do not significantly impact the average annual TSS removal. Therefore no decline in cumulative TSS removal indicates scour does not occur as the flow rate increases.

Stormceptor®

Appendix 1
Stormceptor Design Summary

Project Information

Date	27/02/2017
Project Name	David Grinchpoun
Project Number	17M-00198-00
Location	5514 Manotick Main St

Designer Information

Company	WSP/MMM Group
Contact	N/A

Notes

N/A

Drainage Area

Total Area (ha)	0.11
Imperviousness (%)	82

The Stormceptor System model STC 300 achieves the water quality objective removing 92% TSS for a CLOCA (clay, silt and sand) particle size distribution.

Rainfall

Name	OTTAWA MACDONALD-CARTIER INT'L A
State	ON
ID	6000
Years of Records	1967 to 2003
Latitude	45°19'N
Longitude	75°40'W

Water Quality Objective

TSS Removal (%)	80

Upstream Storage

Storage (ha-m)	Discharge (L/s)
0	0

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 300	**92**
STC 750	95
STC 1000	95
STC 1500	96
STC 2000	97
STC 3000	97
STC 4000	98
STC 5000	98
STC 6000	98
STC 9000	99
STC 10000	99
STC 14000	99

Stormceptor®

Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

CLOCA (clay, silt and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
850	3.3	2.65	0.1465		50	3.9	2.65	0.0022
425	23.4	2.65	0.0698		36	2.6	2.65	0.0012
300	17.5	2.65	0.0439		22	1.3	2.65	0.0004
250	6.5	2.65	0.0335		12	1.9	2.65	0.0004
212	6.5	2.65	0.0259		9	0	2.65	0.0004
150	11.7	2.65	0.0145		6.5	1.3	2.65	0.0004
125	5.2	2.65	0.0105		3	1.3	2.65	0.0004
100	3.9	2.65	0.0070		1.5	1.3	2.65	0.0004
75	3.9	2.65	0.0040		1	4.5	2.65	0.0004

Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor version 1.0
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 300 is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 750 to STC 6000 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 300	STC 750 to STC 6000	STC 9000 to STC 14000
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Imbrium Systems Inc., 1-800-565-4801.

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Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ha)	0.11	Imperviousness (%)	82

Surface Characteristics

Width (m)	66
Slope (%)	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/h)	61.98
Min. Infiltration Rate (mm/h)	10.16
Decay Rate (s^{-1})	0.00055
Regeneration Rate (s^{-1})	0.01

Maintenance Frequency

Sediment build-up reduces the storage volume for sedimentation. Frequency of maintenance is assumed for TSS removal calculations.

Maintenance Frequency (months)	12

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (L/s)	No

Upstream Attenuation

Stage-storage and stage-discharge relationship used to model attenuation upstream of the Stormceptor System is identified in the table below.

Storage ha-m	Discharge L/s
0	0

PARTICLE SIZE DISTRIBUTION

Particle Size Distribution

Removing fine particles from runoff ensures the majority of pollutants, such as heavy metals, hydrocarbons, free oils and nutrients are not discharged into natural water resources. The table below identifies the particle size distribution selected to define TSS removal for the design of the Stormceptor System.

CLOCA (clay, silt and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
850	3.3	2.65	0.1465		50	3.9	2.65	0.0022
425	23.4	2.65	0.0698		36	2.6	2.65	0.0012
300	17.5	2.65	0.0439		22	1.3	2.65	0.0004
250	6.5	2.65	0.0335		12	1.9	2.65	0.0004
212	6.5	2.65	0.0259		9	0	2.65	0.0004
150	11.7	2.65	0.0145		6.5	1.3	2.65	0.0004
125	5.2	2.65	0.0105		3	1.3	2.65	0.0004
100	3.9	2.65	0.0070		1.5	1.3	2.65	0.0004
75	3.9	2.65	0.0040		1	4.5	2.65	0.0004

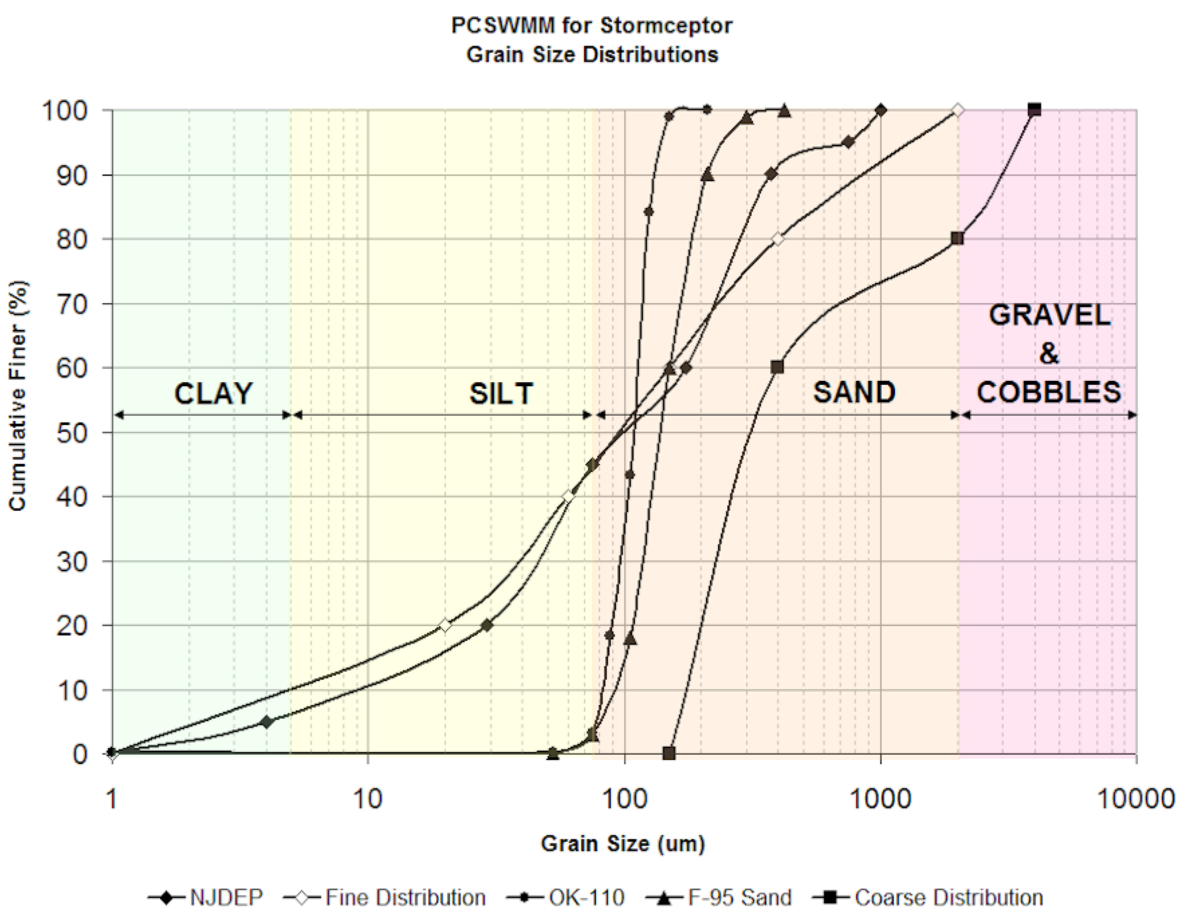

Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

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TSS LOADING

TSS Loading Parameters

TSS Loading Function	Buildup / Washoff

Parameters

Target Event Mean Concentration (EMC) (mg/L)	125
Exponential Buildup Power	0.4
Exponential Washoff Exponential	0.2

HYDROLOGY ANALYSIS

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of the Stormceptor System are based on the average annual removal of TSS for the selected site parameters. The Stormceptor System is engineered to capture fine particles (silts and sands) by focusing on average annual runoff volume ensuring positive removal efficiency is maintained during all rainfall events, while preventing the opportunity for negative removal efficiency (scour).

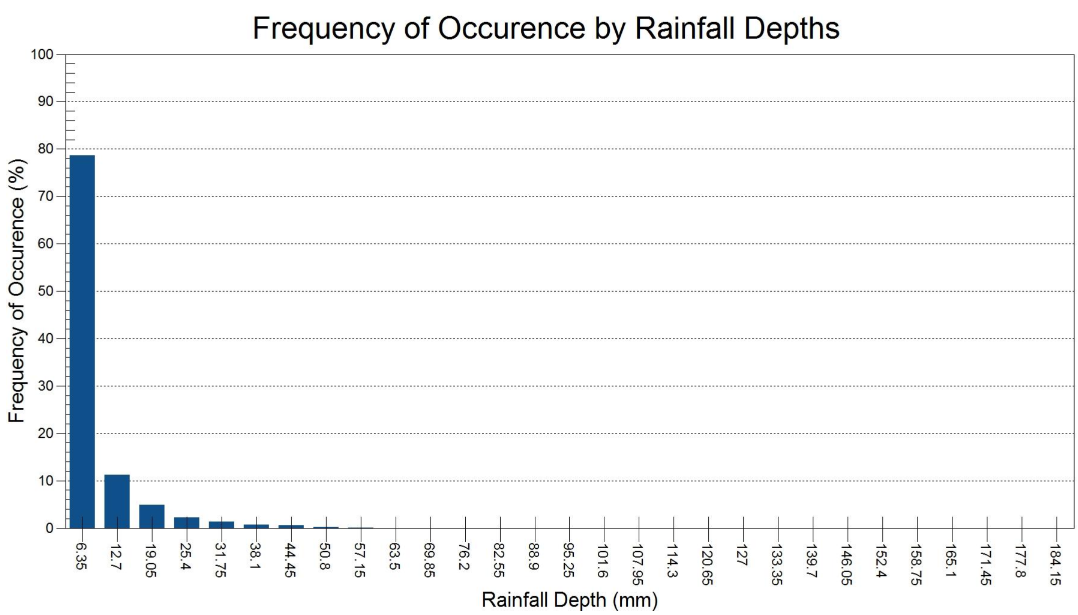
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A		
Rainfall File Name	ON6000.NDC	Total Number of Events	4537
Latitude	45°19'N	Total Rainfall (mm)	20978.1
Longitude	75°40'W	Average Annual Rainfall (mm)	567.0
Elevation (m)		Total Evaporation (mm)	1493.0
Rainfall Period of Record (y)	37	Total Infiltration (mm)	3764.5
Total Rainfall Period (y)	37	Percentage of Rainfall that is Runoff (%)	75.5

Rainfall Event Analysis

Rainfall Depth mm	No. of Events	Percentage of Total Events %	Total Volume mm	Percentage of Annual Volume %
6.35	3564	78.6	5671	27.0
12.70	508	11.2	4533	21.6
19.05	223	4.9	3434	16.4
25.40	102	2.2	2244	10.7
31.75	60	1.3	1704	8.1
38.10	33	0.7	1145	5.5
44.45	28	0.6	1165	5.6
50.80	9	0.2	416	2.0
57.15	5	0.1	272	1.3
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	1	0.0	109	0.5
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0
133.35	0	0.0	0	0.0
139.70	0	0.0	0	0.0
146.05	0	0.0	0	0.0
152.40	0	0.0	0	0.0
158.75	0	0.0	0	0.0
165.10	0	0.0	0	0.0
171.45	0	0.0	0	0.0
177.80	0	0.0	0	0.0
184.15	0	0.0	0	0.0
190.50	0	0.0	0	0.0
196.85	0	0.0	0	0.0
203.20	0	0.0	0	0.0
209.55	0	0.0	0	0.0
>209.55	0	0.0	0	0.0



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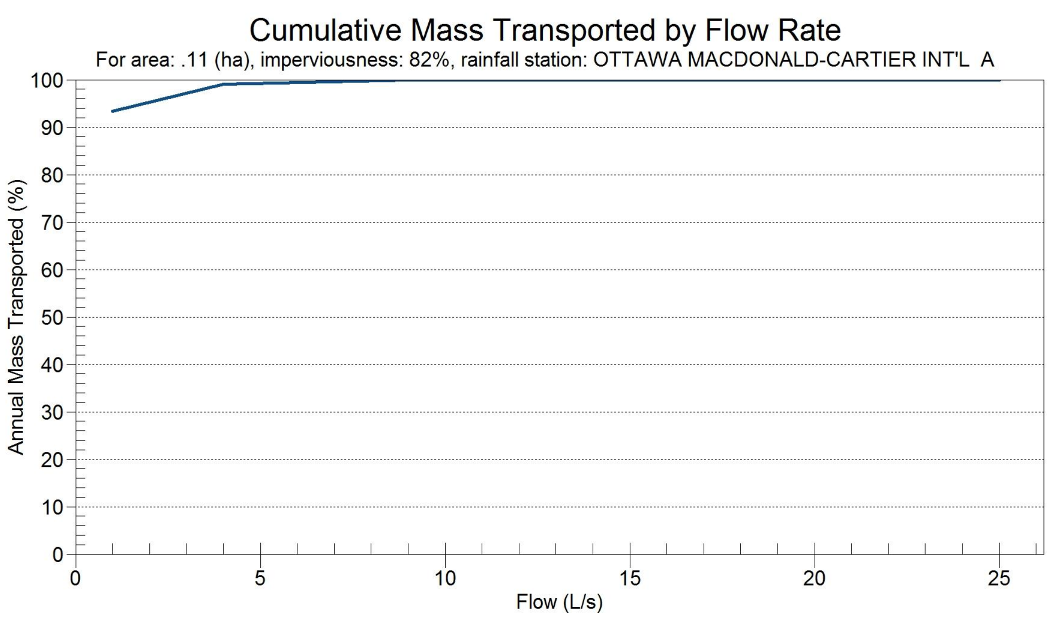
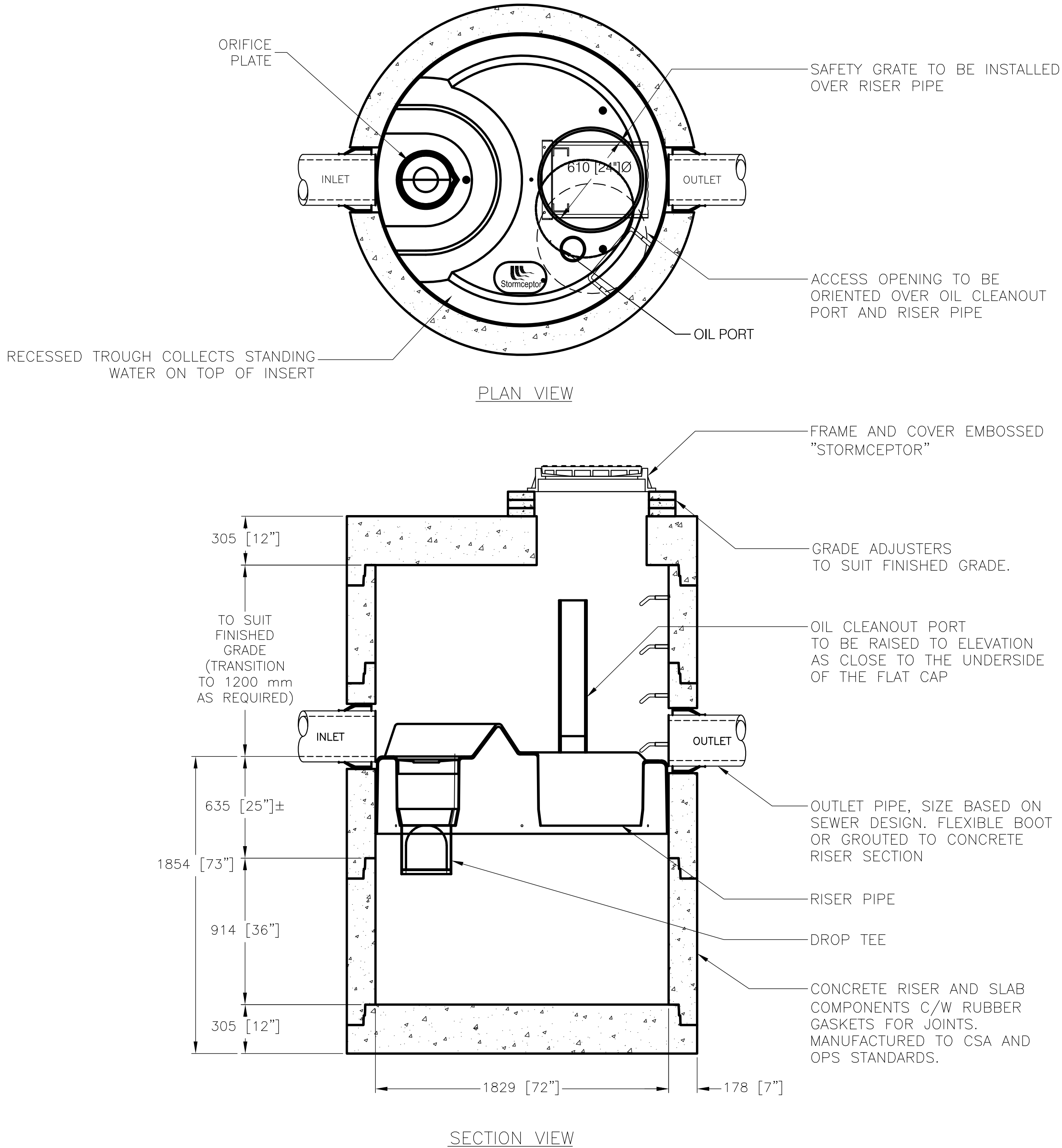
Pollutograph

Flow Rate L/s	Cumulative Mass %
1	93.3
4	99.0
9	99.9
16	100.0
25	100.0
36	100.0
49	100.0
64	100.0
81	100.0
100	100.0
121	100.0
144	100.0
169	100.0
196	100.0
225	100.0
256	100.0
289	100.0
324	100.0
361	100.0
400	100.0
441	100.0
484	100.0
529	100.0
576	100.0
625	100.0
676	100.0
729	100.0
784	100.0
841	100.0
900	100.0



DRAWING NOT TO BE USED FOR CONSTRUCTION

THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING PATENTS:
United States Patent No. 5,753,115 • 5,849,181 • 6,068,765 • 6,371,690 • 7,582,216 • 7,666,303 | Australia Patent No. 729,096 • 779,401 • 2008,279,378 • 2008,288,900 |
Canadian Patent No. 2,206,338 • 2,327,768 • 2,694,159 • 2,697,287 | European Paten No. EP 2,176,171 | Indonesian Patent No. 0,007,058 | Japan Patent No. 3,581,233 • 9-11476 • 5,555,160 |
Korea Patent No. 10-1451593 • 0519,212 | Malaysia Patent No. 118,987 | New Zealand Patent No. 314,646 • 583,583 • 583,008 | South African Patent No. 2010,00683 • 2010,01796 |



Stormceptor

imbrium
WWW.IMBRIUMSYSTEMS.COM
7037 RIDGE ROAD SUITE 350, HANOVER, MD 21076
USA 888-279-8826 CA 800-565-4801 INTL +1-416-960-9900

STC 750
STANDARD MODEL
####

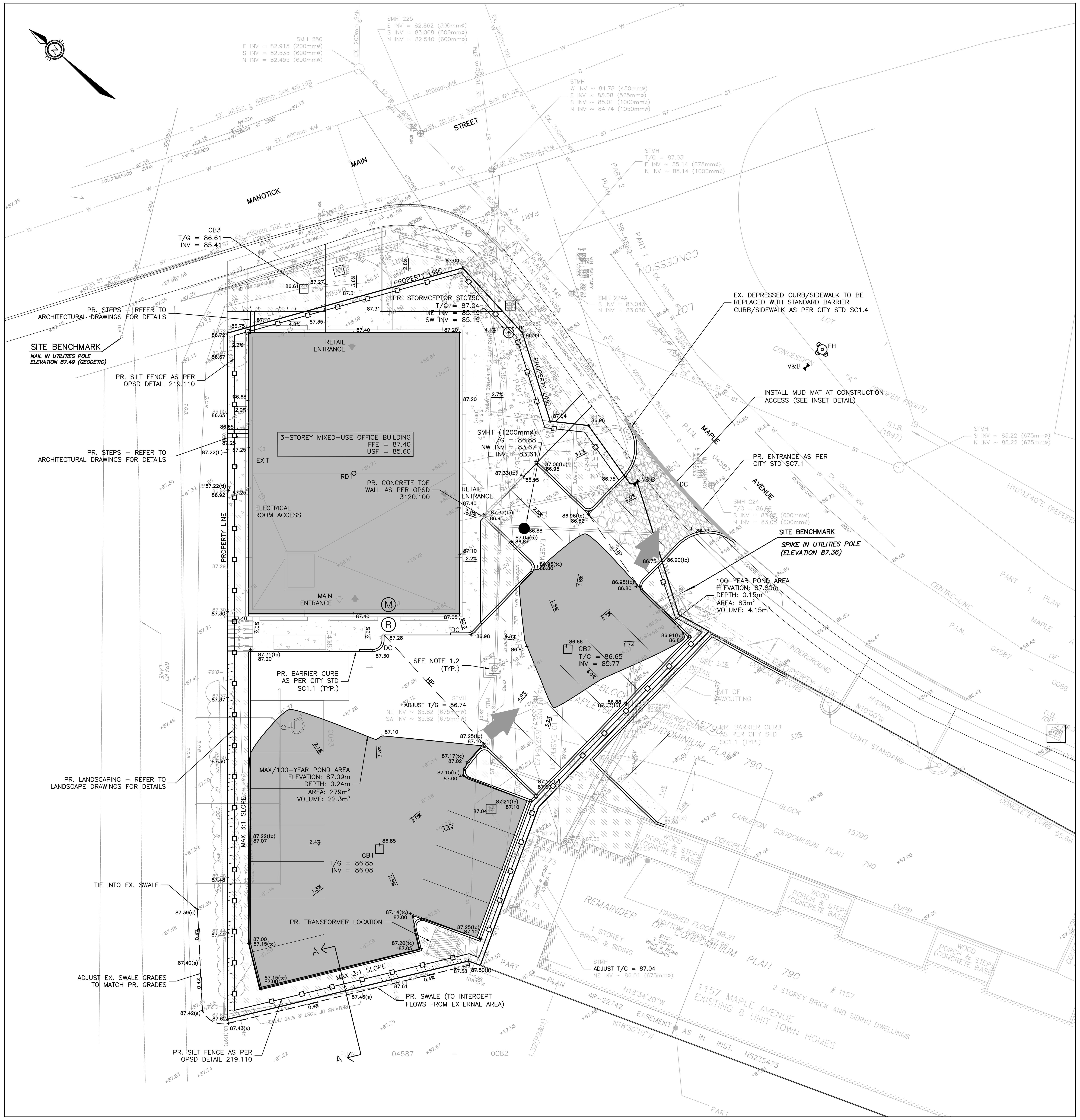
REV #	DATE	REVISION DESCRIPTION	BY

SHEET NUMBER 1 OF 1

DATE:######## SCALE: 40 PROJECT No.: ##### DRAWN: ### CHECKED: ###

\AD.CONTECH-CPI.COM\ROOT\CORPORATE\MARKETING\IMBRIUM\CAD & PDF\STORMCEPTOR\CANADIAN\STC 750.DWG 8/8/2016 9:21 AM

APPENDIX D – DESIGN DRAWINGS



NOTES: GENERAL

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2. THE POSITION OF EXISTING POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES, STRUCTURES AND APPURTENANCES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL SATISFY HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM DURING THE COURSE OF CONSTRUCTION. ANY RELOCATION OF EXISTING UTILITIES REQUIRED BY THE DEVELOPMENT OF SUBJECT LANDS IS TO BE UNDERTAKEN AT CONTRACTOR'S EXPENSE.
3. THE CONTRACTOR MUST NOTIFY ALL EXISTING UTILITY COMPANY OFFICIALS FIVE (5) BUSINESS DAYS PRIOR TO START OF CONSTRUCTION AND HAVE ALL EXISTING UTILITIES AND SERVICES LOCATED IN THE FIELD OR EXPOSED PRIOR TO THE START OF CONSTRUCTION, INCLUDING BUT NOT LIMITED TO HYDRO, BELL, CABLE TV, AND CONSUMERS GAS LINES.
4. ALL TRENCHING AND EXCAVATIONS TO BE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
5. REFER TO ARCHITECTS PLANS FOR BUILDING DIMENSIONS AND LAYOUT. REFER TO LANDSCAPE PLAN FOR LANDSCAPED DETAILS AND OTHER RELEVANT INFORMATION. ALL INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. TOPOGRAPHIC SURVEY COMPLETED AND PROVIDED BY H.A. KEN SHIPMAN SURVEYING LTD. DATED FEBRUARY 2, 2017. CONTRACTOR TO VERIFY IN THE FIELD PRIOR TO CONSTRUCTION OF ANY WORK AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
7. THE LOCATION OF UNDERGROUND SERVICES ARE BASED ON THE SURVEY PROVIDED BY H.A. KEN SHIPMAN SURVEYING LTD. TOGETHER WITH THE INFORMATION FROM THE CITY OF OTTAWA ASBUILT PLAN NO. 14121 (CONTRACT NO: 1SB06-2055, SHEETS 17, 18, 23 AND 42) BY J.L.RICHARDS. HOWEVER, CONTRACTOR MUST ENSURE THAT THIS INFORMATION IS VERIFIED PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
8. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
9. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE OR CATCH BASIN OUTLETS ARE PROVIDED.
10. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW CUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT. PAVEMENT REINSTATEMENT SHALL BE WITH STEP JOINTS OF 500mm WIDTH MINIMUM.
11. ALL DISTURBED AREAS OUTSIDE PROPOSED GRADING LIMITS TO BE RESTORED TO ORIGINAL ELEVATIONS AND CONDITIONS UNLESS OTHERWISE SPECIFIED. ALL RESTORATION SHALL BE COMPLETED WITH THE GEOTECHNICAL REQUIREMENTS FOR BACKFILL AND COMPACTION.
12. ALL MATERIAL SUPPLIED AND PLACED FOR PARKING LOT AND ACCESS ROAD CONSTRUCTION SHALL BE TO OPSS STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED. CONSTRUCTION TO OPSS 206, 310 & 314. MATERIALS TO OPSS 1001, 1003 & 1010.
13. ABUTTING PROPERTY GRADES TO BE MATCHED UNLESS SPECIFIED OTHERWISE.
14. MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING THE EXECUTION OF ALL WORKS.
15. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE DIRECTED FROM THE ENGINEER. EXCAVATE AND REMOVE ALL ORGANIC MATERIAL AND DEBRIS LOCATED WITHIN THE PROPOSED BUILDING, PARKING AND ROADWAY LOCATIONS.
16. AT PROPOSED UTILITY CONNECTION POINTS AND CROSSINGS (I.E. STORM SEWER, SANITARY SEWER, WATER, ETC.) THE CONTRACTOR SHALL DETERMINE THE PRECISE LOCATION AND DEPTH OF EXISTING UTILITIES AND REPORT ANY DISCREPANCIES OR CONFLICTS TO THE ENGINEER BEFORE COMMENCING WORK.
17. SERVICE TRENCHES ON MUNICIPAL RIGHT OF WAY TO BE REINSTATED AS PER CITY OF OTTAWA DETAIL R10.
18. PRIOR TO CONSTRUCTION, A GEOTECHNICAL ENGINEER REGISTERED IN THE PROVINCE OF ONTARIO IS TO INSPECT ALL SUB-SURFACES FOR FOOTINGS, SERVICES AND PAVEMENT STRUCTURES.
19. FOR ANY SOILS RELATED INFORMATION, REFER TO THE GEOTECHNICAL INVESTIGATION REPORT BY PATERSON GROUP DATED JANUARY 18, 2017.
20. LIGHT DUTY PAVEMENT STRUCTURE SHALL CONSIST OF:
    300 mm - OPSS GRANULAR B TYPE II COMPACTED TO 100% SPD.
    150 mm - OPSS GRANULAR A COMPACTED TO 100% SPD.
    50 mm - HL3 OR SUPERPAVE 12.5 COMPACTED TO 96% MARSHALL DENSITY
21. HEAVY DUTY PAVEMENT STRUCTURE SHALL CONSIST OF:
    450 mm - OPSS GRANULAR B TYPE II COMPACTED TO 100% SPD.
    150 mm - OPSS GRANULAR A COMPACTED TO 100% SPD.
    50 mm - HL8 OR SUPER[PAVE 19.0 COMPACTED TO 96% MARSHALL DENSITY
    40mm - HL3 OR SUPER[PAVE 12.5 COMPACTED TO 96% MARSHALL DENSITY

NOTES: EROSION AND SEDIMENT CONTROL

1. PRIOR TO START OF CONSTRUCTION:
- 1.1. INSTALL SILT FENCE ALONG THE PERIMETER OF THE PROPERTY LINE (SEE PLAN FOR LOCATION).
- 1.2. INSTALL SILT SACK FILTERS IN ALL THE STRUCTURES NOTED ON THE DRAWING.
- 1.3. INSPECT MEASURES IMMEDIATELY AFTER INSTALLATION.

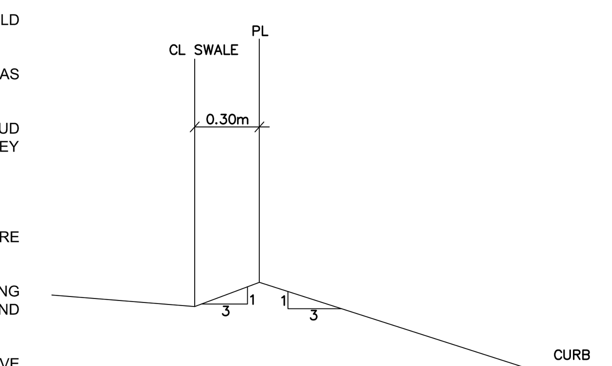
2. DURING CONSTRUCTION:
- 2.1. MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE AND IMPACTS TO EXISTING GRADING.
- 2.2. PERIMETER VEGETATION TO REMAIN IN PLACE UNTIL PERMANENT STORM WATER MANAGEMENT IS IN PLACE. OTHERWISE, IMMEDIATELY INSTALL SILT FENCE WHEN THE EXISTING SITE IS DISTURBED AT THE PERIMETER.
- 2.3. PROTECT DISTURBED AREAS FROM OVERLAND FLOW BY PROVIDING TEMPORARY SWALES TO THE SATISFACTION OF THE FIELD ENGINEER. TIE-IN TEMPORARY SWALE TO EXISTING CB'S AS REQUIRED.
- 2.4. PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILITATED WITHIN 30 DAYS.
- 2.5. INSPECT SILT FENCES, SILT SACK FILTERS AND CATCH BASIN SUMPS WEEKLY AND WITHIN 24 HOURS AFTER A STORM EVENT. CLEAN AND REPAIR WHEN NECESSARY.
- 2.6. DRAWING TO BE REVIEWED AND REVISED AS REQUIRED DURING CONSTRUCTION.
- 2.7. EROSION CONTROL FENCING TO BE ALSO INSTALLED AROUND THE BASE OF ALL STOCKPILES AS SHOWN.
- 2.8. DO NOT LOCATE TOPSOIL PILES AND EXCAVATION MATERIAL CLOSER THAN 2.5m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE THE PILE IS REMOVED. ALL TOPSOIL PILES ARE TO BE SEEDED IF THEY ARE TO REMAIN ON SITE LONG ENOUGH FOR SEEDS TO GROW (LONGER THAN 30 DAYS).
- 2.9. CONTROL WIND-BLOWN DUST OFF SITE BY SEEDING TOPSOIL PILES AND OTHER AREAS TEMPORARILY (PROVIDE WATERING AS REQUIRED AND TO THE SATISFACTION OF THE ENGINEER).
- 2.10. NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THE FIELD ENGINEER.
- 2.11. CITY ROADWAY AND SIDEWALK TO BE CLEANED OF ALL SEDIMENT FROM VEHICULAR TRACKING AS REQUIRED.
- 2.12. PROVIDE GRAVEL ENTRANCE (MUD MAT) WHEREVER EQUIPMENT LEAVES THE SITE TO PROVIDE MUD TRACKING ONTO PAVED SURFACES. IN THE EVENT ADDITIONAL EGRESS POINTS ARE REQUIRED THEY SHOULD BE CONSTRUCTED IN ACCORDANCE WITH THE MUD MAT DETAIL (SEE TYPICAL DETAIL).
- 2.13. DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPED.
- 2.14. ANY MUD/MATERIAL TRACKED ONTO THE ROAD SHALL BE REMOVED IMMEDIATELY BY HAND OR RUBBER TIRE LOADER.
- 2.15. TAKE ALL NECESSARY STEPS TO PREVENT BUILDING MATERIAL, CONSTRUCTION DEBRIS OR WASTE BEING SPILLED OR TRACKED ONTO ABUTTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.
- 2.16. ALL EROSION CONTROL STRUCTURE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
- 2.17. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

LEGEND:

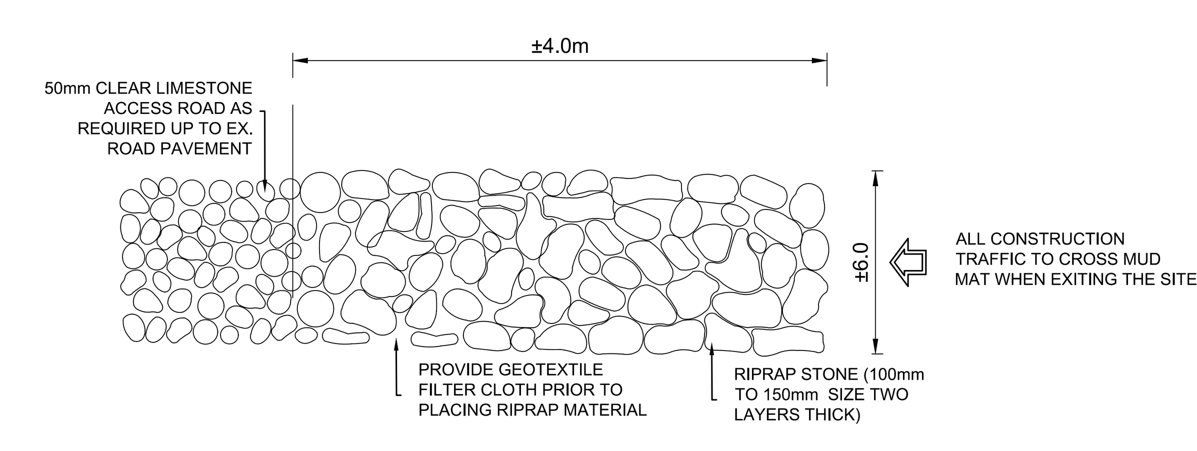
- PROPERTY LINE
- EXISTING WATERMAIN
- EXISTING FIRE HYDRANT
- EXISTING V&VB
- EXISTING VALVE CHAMBER
- PROPOSED WATERMAIN
- FH — PROPOSED FIRE HYDRANT
- V&B — PROPOSED V&VB
- PROPOSED REMOTE METER
- PROPOSED METER
- EXISTING SANITARY SEWER AND MANHOLE
- SMH — PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING STORM SEWER AND MANHOLE
- STMH — PROPOSED STORM SEWER AND MANHOLE
- CB — PROPOSED DECK DRAINS OR CATCHBASINS
- RD — PROPOSED ROOF DRAINS
- EXISTING CONCRETE CURB
- PROPOSED CONCRETE CURB
- DC — PROPOSED DEPRESSED CURB
- EXISTING BUILDING OR STRUCTURE
- PROPOSED BUILDING OR STRUCTURE
- 86.55× — EXISTING GRADE
- 87.21× — PROPOSED GRADE
- 87.35(tc)× — PROPOSED GRADE (TOP OF CURB)
- 87.87(tw)× — PROPOSED GRADE (TOP OF WALL)
- 87.87(s)× — PROPOSED GRADE (SWALE)
- 87.87(tl)× — PROPOSED GRADE (TOP OF LANDING)
- 0.4% — PROPOSED DIRECTION OF FLOW AND SLOPE
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED MUD MAT
- PROPOSED TERRACING
- EXISTING SERVICE TO BE REMOVED
- PROPOSED DRAINAGE BOUNDARY
- OVERLAND MAJOR FLOW ROUTE
- HI-40 STYROFOAM INSULATION
- HEAVY DUTY ASPHALT PAVEMENT (NOTE 21)

A-XX UNCONTROLLED / A | R

A-XX DENOTES WATERSHED NAME
A DENOTES AREA IN m²
R DENOTES RUNOFF COEFFICIENT



SECTION A-A
(NTS)

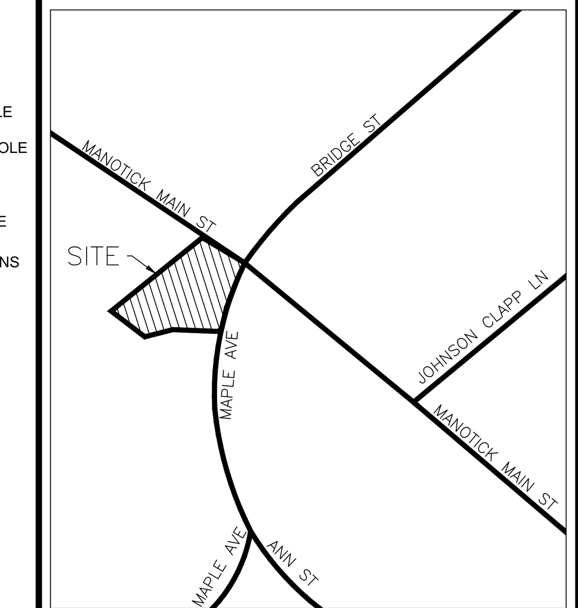


MUD MAT DETAIL
(N.T.S)

GENERAL NOTES:

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.



KEY PLAN
(N.T.S)

APPROVED ☐ REFUSED ☐

THIS_____ DAY OF ____________, 20____

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

No.	REVISIONS	BY	DATE
01	ISSUED FOR SPC & ZBA	D.G.	MAR 2, 2017

HORIZONTAL SCALE:
3.0m 1.5 0 3.0 6.0m
SCALE: 1:150

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

REGISTERED PROFESSIONAL ENGINEER
I. M. JAFFERJEE
100164153
Mar 2, 2017
PROVINCE OF ONTARIO

NOT VALID UNLESS SIGNED AND DATED

MMM GROUP
2611 Queensview Dr. Ottawa, ON Canada K2B 8K2
t: 613.829.2800 f: 613.829.8299 www.wspgroup.com

CLIENT
1846253 ONTARIO INC.
STEPHEN PHILIP
5572 CARRISON DRIVE
MANOTICK, ON K4M 1K7
TEL: (613) 608-7216

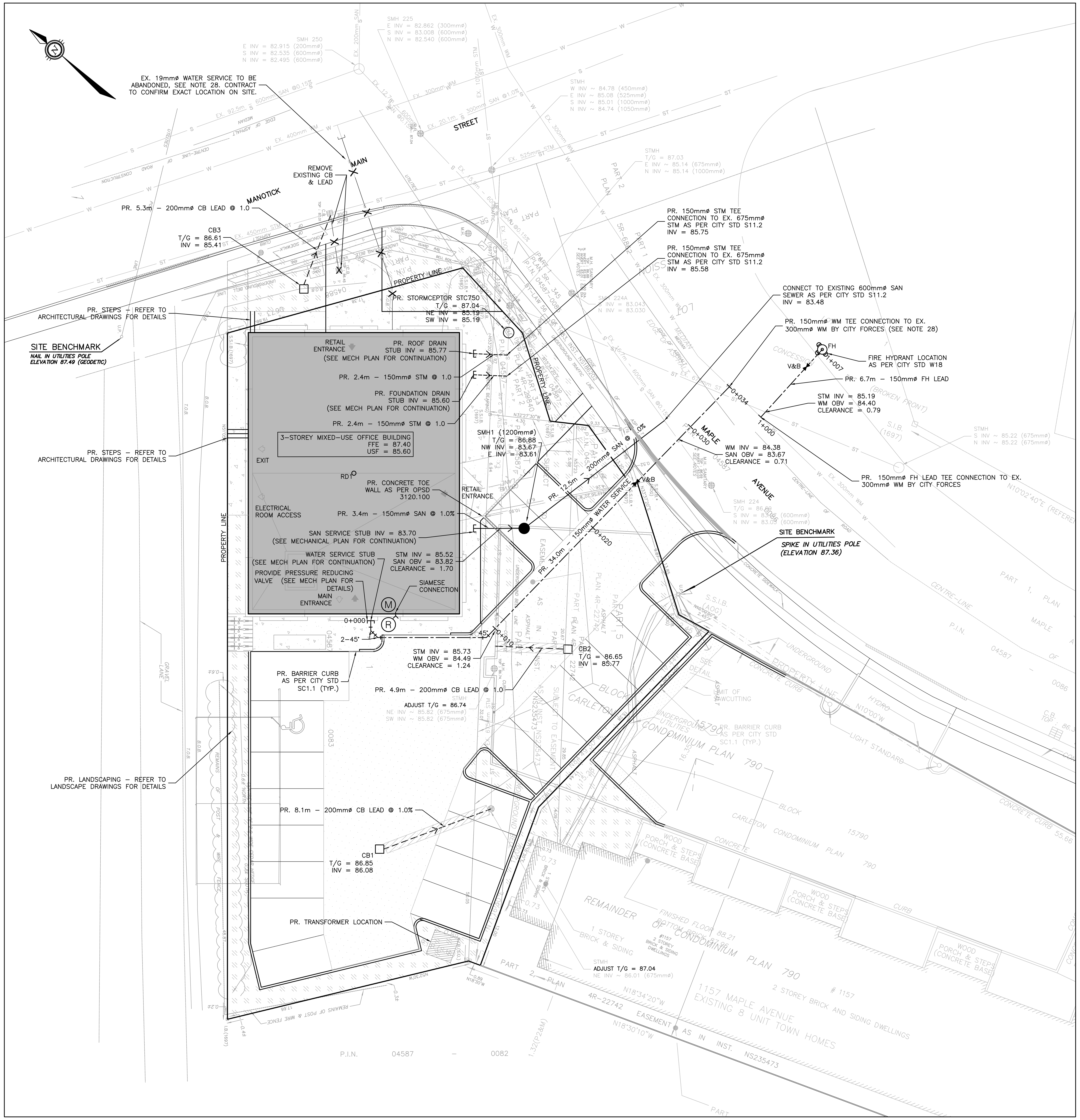
DESIGNED BY:	DRAWN BY:	APPROVED BY:
D.G.	I.J.	I.J.

PROJECT
MANOTICK MIXED-USE OFFICE BUILDING
5514 MANOTICK MAIN ST.,
MANOTICK, ONTARIO

DRAWING TITLE
EROSION & SEDIMENT CONTROL AND GRADING & DRAINAGE PLAN

PROJECT NO. 17M-00198-00
DRAWING NO. C.01

D07-XX-XX-XXXX



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3. THE CONTRACTOR MUST NOTIFY ALL EXISTING UTILITY COMPANY OFFICIALS FIVE (5) BUSINESS DAYS PRIOR TO START OF CONSTRUCTION AND HAVE ALL EXISTING UTILITIES AND SERVICES LOCATED IN THE FIELD OR EXPOSED PRIOR TO THE START OF CONSTRUCTION, INCLUDING BUT NOT LIMITED TO HYDRO, BELL, CABLE TV, AND CONSUMERS GAS LINES.
4. ALL TRENCHING AND EXCAVATIONS TO BE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
5. REFER TO ARCHITECTS PLANS FOR BUILDING DIMENSIONS AND LAYOUT. REFER TO LANDSCAPE PLAN FOR LANDSCAPED DETAILS AND OTHER RELEVANT INFORMATION. ALL INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. TOPOGRAPHIC SURVEY COMPLETED AND PROVIDED BY H.A. KEN SHIPMAN SURVEYING LTD. DATED FEBRUARY 2, 2017. CONTRACTOR TO VERIFY IN THE FIELD PRIOR TO CONSTRUCTION OF ANY WORK AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
7. THE LOCATION OF UNDERGROUND SERVICES ARE BASED ON THE SURVEY PROVIDED BY H.A. KEN SHIPMAN SURVEYING LTD. TOGETHER WITH THE INFORMATION FROM THE CITY OF OTTAWA ASBUILT PLAN NO. 14121 (CONTRACT NO: 1SB06-2055, SHEETS 17, 18, 23 AND 42) BY J.L.RICHARDS. HOWEVER, CONTRACTOR MUST ENSURE THAT THIS INFORMATION IS VERIFIED PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
8. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
9. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE OR CATCH BASIN OUTLETS ARE PROVIDED.
10. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW CUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT. PAVEMENT REINSTATEMENT SHALL BE WITH STEP JOINTS OF 500mm WIDTH MINIMUM.
11. ALL DISTURBED AREAS OUTSIDE PROPOSED GRADING LIMITS TO BE RESTORED TO ORIGINAL ELEVATIONS AND CONDITIONS UNLESS OTHERWISE SPECIFIED. ALL RESTORATION SHALL BE COMPLETED WITH THE GEOTECHNICAL REQUIREMENTS FOR BACKFILL AND COMPACTION.
12. ALL MATERIAL SUPPLIED AND PLACED FOR PARKING LOT AND ACCESS ROAD CONSTRUCTION SHALL BE TO OPSS STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED. CONSTRUCTION TO OPSS 206, 310 & 314. MATERIALS TO OPSS 1001, 1003 & 1010.
13. ABUTTING PROPERTY GRADES TO BE MATCHED UNLESS SPECIFIED OTHERWISE.
14. MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING THE EXECUTION OF ALL WORKS.
15. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE DIRECTED FROM THE ENGINEER. EXCAVATE AND REMOVE ALL ORGANIC MATERIAL AND DEBRIS LOCATED WITHIN THE PROPOSED BUILDING, PARKING AND ROADWAY LOCATIONS.
16. AT PROPOSED UTILITY CONNECTION POINTS AND CROSSINGS (I.E. STORM SEWER, SANITARY SEWER, WATER, ETC.) THE CONTRACTOR SHALL DETERMINE THE PRECISE LOCATION AND DEPTH OF EXISTING UTILITIES AND REPORT ANY DISCREPANCIES OR CONFLICTS TO THE ENGINEER BEFORE COMMENCING WORK.
17. SERVICE TRENCHES ON MUNICIPAL RIGHT OF WAY TO BE REINSTATED AS PER CITY OF OTTAWA DETAIL R10.
18. PRIOR TO CONSTRUCTION, A GEOTECHNICAL ENGINEER REGISTERED IN THE PROVINCE OF ONTARIO IS TO INSPECT ALL SUB-SURFACES FOR FOOTINGS, SERVICES AND PAVEMENT STRUCTURES.
19. FOR ANY SOILS RELATED INFORMATION, REFER TO THE GEOTECHNICAL INVESTIGATION REPORT BY PATERSON GROUP DATED JANUARY 18, 2017.
20. LIGHT DUTY PAVEMENT STRUCTURE SHALL CONSIST OF:
    - 300 mm - OPSS GRANULAR B TYPE II COMPACTED TO 100% SPD.
    - 150 mm - OPSS GRANULAR A COMPACTED TO 100% SPD.
    - 50 mm - HL3 OR SUPERPAVE 12.5 COMPACTED TO 96% MARSHALL DENSITY
21. HEAVY DUTY PAVEMENT STRUCTURE SHALL CONSIST OF:
    - 450 mm - OPSS GRANULAR B TYPE II COMPACTED TO 100% SPD.
    - 150 mm - OPSS GRANULAR A COMPACTED TO 100% SPD.
    - 50 mm - HL8 OR SUPER[PAVE 19.0 COMPACTED TO 96% MARSHALL DENSITY
    - 40mm - HL3 OR SUPER[PAVE 12.5 COMPACTED TO 96% MARSHALL DENSITY

NOTES: WATERMAIN

22. ALL WATERMAIN AND WATERMAIN APPURTANANCES, MATERIALS, CONSTRUCTION AND TESTING METHODS SHALL CONFORM TO THE CURRENT CITY OF OTTAWA AND MINISTRY OF ENVIRONMENT STANDARDS AND SPECIFICATIONS.
23. THE WATERMAIN SHALL BE POLY VINYL CHLORIDE (PVC) CLASS 150 DR 18 MEETING AWWA SPECIFICATION C900.
24. ALL WATERMAIN TO BE INSTALLED AT MINIMUM COVER OF 2.4m BELOW FINISHED GRADE. WHERE WATERMAINS CROSS OVER OTHER UTILITIES, A MINIMUM 0.25m CLEARANCE SHALL BE MAINTAINED; WHERE WATERMAINS CROSS UNDER OTHER UTILITIES, A MINIMUM 0.50m CLEARANCE SHALL BE MAINTAINED. WHERE THE MINIMUM SEPARATION CANNOT BE ACHIEVED, THE WATERMAIN SHALL BE INSTALLED AS PER CITY OF OTTAWA STANDARDS W25 AND W25.2. WHERE 2.4m MINIMUM DEPTH CANNOT BE ACHIEVED, THERMAL INSULATION SHALL BE PROVIDED AS PER CITY OF OTTAWA STANDARD W22.
25. WATERMAIN BEDDING TO BE AS PER CITY OF OTTAWA STANDARD W17.
26. VALVE AND VALVE BOX TO BE AS PER CITY OF OTTAWA STANDARD W24.
27. FIRE HYDRANTS TO BE AS PER CITY OF OTTAWA STANDARD W19.
28. CATHODIC PROTECTION REQUIRED FOR ALL IRON FITTINGS AS PER CITY OF OTTAWA STANDARD W40 & W42.
29. ALL CONNECTIONS OF NEW WATERMAIN TO EXISTING WATERMAIN & ALL BLANKINGS OF EXISTING MAINS AND SERVICES SHALL BE PERFORMED BY CITY OF OTTAWA FORCES. THE CONTRACTOR SHALL PROVIDE EXCAVATION, BACKFILL AND REINSTATEMENT. THE CONTRACTOR SHALL CONSTRUCT WATER SERVICES APPURTENANCES AS PER CITY OF OTTAWA SPECIFICATIONS & SHALL COORDINATE AND PAY ALL RELATED COST OF CONNECTION, INSPECTION AND DISINFECTION BY CITY FORCES.

NOTES: SANITARY SEWER AND MANHOLES

30. ALL SANITARY SEWER, SANITARY SEWER APPURTANANCES AND CONSTRUCTION METHODS SHALL CONFORM TO THE CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.
31. SANITARY SEWER PIPE SIZE 150mm DIAMETER AND GREATER TO BE PVC SDR-35 (UNLESS SPECIFIED OTHERWISE) WITH RUBBER GASKET TYPE JOINTS IN CONFORMANCE WITH CSA B-182.2,3,4.
32. SEWER BEDDING AS PER CITY OF OTTAWA DETAIL S6.
33. ALL WORK SHALL BE PERFORMED, AS APPLICABLE IN ACCORDANCE WITH OPSS 407, AND 410.
34. ALL SANITARY MANHOLES 1200mm IN DIAMETER TO BE AS PER OPSD 701.01. FRAME AND COVER TO BE AS PER CITY OF OTTAWA STANDARD S25 AND S24.

NOTES: STORM SEWERS AND STRUCTURES

35. ALL STORM SEWER MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.
36. STORM SEWERS 450mm DIAMETER AND SMALLER SHALL BE PVC SDR-35, WITH RUBBER GASKET PER CSA A-257.3. STORM SEWERS 525mm DIAMETER AND LARGER SHALL BE CONCRETE CLASS CL-100D.
37. SEWER BEDDING AS PER CITY OF OTTAWA DETAIL S6.
38. ALL STORM MANHOLES 1200mm IN DIAMETER TO BE AS PER OPSD 701.01. FRAME AND COVER TO BE AS PER CITY OF OTTAWA STANDARD S25 AND S24.1.
39. CATCH BASINS TO BE AS PER OPSD 705.010 WITH FRAME AND COVERS TO OPSD 400.010. ALL CATCH BASIN MANHOLES TO BE OPSD 701.010 WITH FRAME AND COVER TO CITY OF OTTAWA STANDARD S25 AND S28.1.
40. ALL CATCHBASIN LEADS TO BE MINIMUM 200mm DIAMETER AT MINIMUM 1.0% SLOPE UNLESS OTHERWISE SPECIFIED.
41. ROOF DRAINS SHALL BE BY WATTS DRAINAGE. DRAINS SHALL BE SELECTED BASED ON THE RELEASE RATES.

ROOF DRAIN SUMMARY

Drainage Area	Deck Drain	5 Year Event			100 Year Event		
		5-YR Peak Flow (L/s)	5-YR Ponding Depth (mm)	5-YR Ponding Volume (m^3)	100-YR Peak Flow (L/s)	100-YR Ponding Depth (mm)	100-YR Ponding Volume (m^3)
BLDG	RD1	1.4	108	5.6	1.7	135	11.0

INLET CONTROL DEVICES SUMMARY

	CB1	CB2
RELEASE RATE (L/s)	1.1	7.0
HEAD (m)	1.01	2.03
HYDROVEX TYPE	40SVHV-1	75SVHV-1

LEGEND:

- PROPERTY LINE
- EXISTING WATERMAIN
- EXISTING FIRE HYDRANT
- EXISTING V&VB
- EXISTING VALVE CHAMBER
- PROPOSED WATERMAIN
- FH — PROPOSED FIRE HYDRANT
- V&B — PROPOSED V&VB
- R — PROPOSED REMOTE METER
- M — PROPOSED METER
- EXISTING SANITARY SEWER AND MANHOLE
- SMH — PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING STORM SEWER AND MANHOLE
- STMH — PROPOSED STORM SEWER AND MANHOLE
- CB — PROPOSED DECK DRAINS OR CATCHBASINS
- RD — PROPOSED ROOF DRAINS
- EXISTING CONCRETE CURB
- PROPOSED CONCRETE CURB
- DC — PROPOSED DEPRESSED CURB
- EXISTING BUILDING OR STRUCTURE
- PROPOSED BUILDING OR STRUCTURE
- 86.55 — EXISTING GRADE
- 87.21 — PROPOSED GRADE
- 87.35(tc) — PROPOSED GRADE (TOP OF CURB)
- 87.87(tw) — PROPOSED GRADE (TOP OF WALL)
- 87.87(s) — PROPOSED GRADE (SWALE)
- 87.87(tl) — PROPOSED GRADE (TOP OF LANDING)
- 0.4% — PROPOSED DIRECTION OF FLOW AND SLOPE
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED MUD MAT
- PROPOSED TERRACING
- EXISTING SERVICE TO BE REMOVED
- PROPOSED DRAINAGE BOUNDARY
- OVERLAND MAJOR FLOW ROUTE
- HI-40 STYROFOAM INSULATION
- HEAVY DUTY ASPHALT PAVEMENT (NOTE 21)

A-XX UNCONTROLLED / A / R

- A-XX DENOTES WATERSHED NAME
- A DENOTES AREA IN m²
- R DENOTES RUNOFF COEFFICIENT

150mm WATERMAIN SCHEDULE

CHAINAGES	DESCRIPTION	TOP OF GROUND	TOP OF WATERMAIN
0+000	STUB AT BUILDING	87.39	84.99
0+001	45° BEND	87.42	85.02
0+002	45° BEND	87.43	85.03
0+009	45° BEND	86.93	84.53
0+010	675mm STORM CROSSING	86.89	84.49
0+020		86.81	84.41
0+024	VALVEBOX	86.74	84.34
0+029	600mm SANITARY CROSSING	86.78	84.38
0+030		86.81	84.41
0+034	TEE CONNECTION TO EXISTING 300mm	86.87	84.47

FIRE HYDRANT LEAD SCHEDULE

CHAINAGES	DESCRIPTION	TOP OF GROUND	TOP OF WATERMAIN
1+000	TEE CONNECTION TO EXISTING 300mm	86.82	84.42
1+001	675mm STORM CROSSING	86.80	84.40
1+005	VALVEBOX	86.74	84.34
1+007	FIRE HYDRANT	86.70	84.30

GENERAL NOTES:

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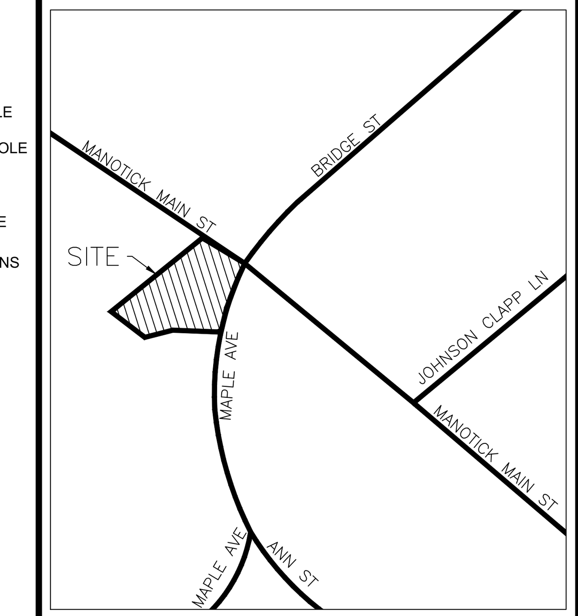
CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.



KEY PLAN
(N.T.S)

APPROVED ☐ REFUSED ☐

THIS_____ DAY OF ____________, 20____

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

No.	REVISIONS	BY	DATE
01	ISSUED FOR SPC & ZBA	D.G.	MAR 2, 2017

HORIZONTAL SCALE:
3.0m 1.5 0 3.0 6.0m
SCALE: 1:150

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

REGISTERED PROFESSIONAL ENGINEER
I. M. JAFFERJEE
100164153
Mar 2, 2017
PROVINCE OF ONTARIO

NOT VALID UNLESS SIGNED AND DATED

MMM GROUP
2611 Queensview Dr. Ottawa, ON Canada K2B 8K2
t: 613.829.2800 f: 613.829.8299 www.wspgroup.com

CLIENT
1846253 ONTARIO INC.
STEPHEN PHILIP
5572 CARRISON DRIVE
MANOTICK, ON K4M 1K7
TEL: (613) 608-7216

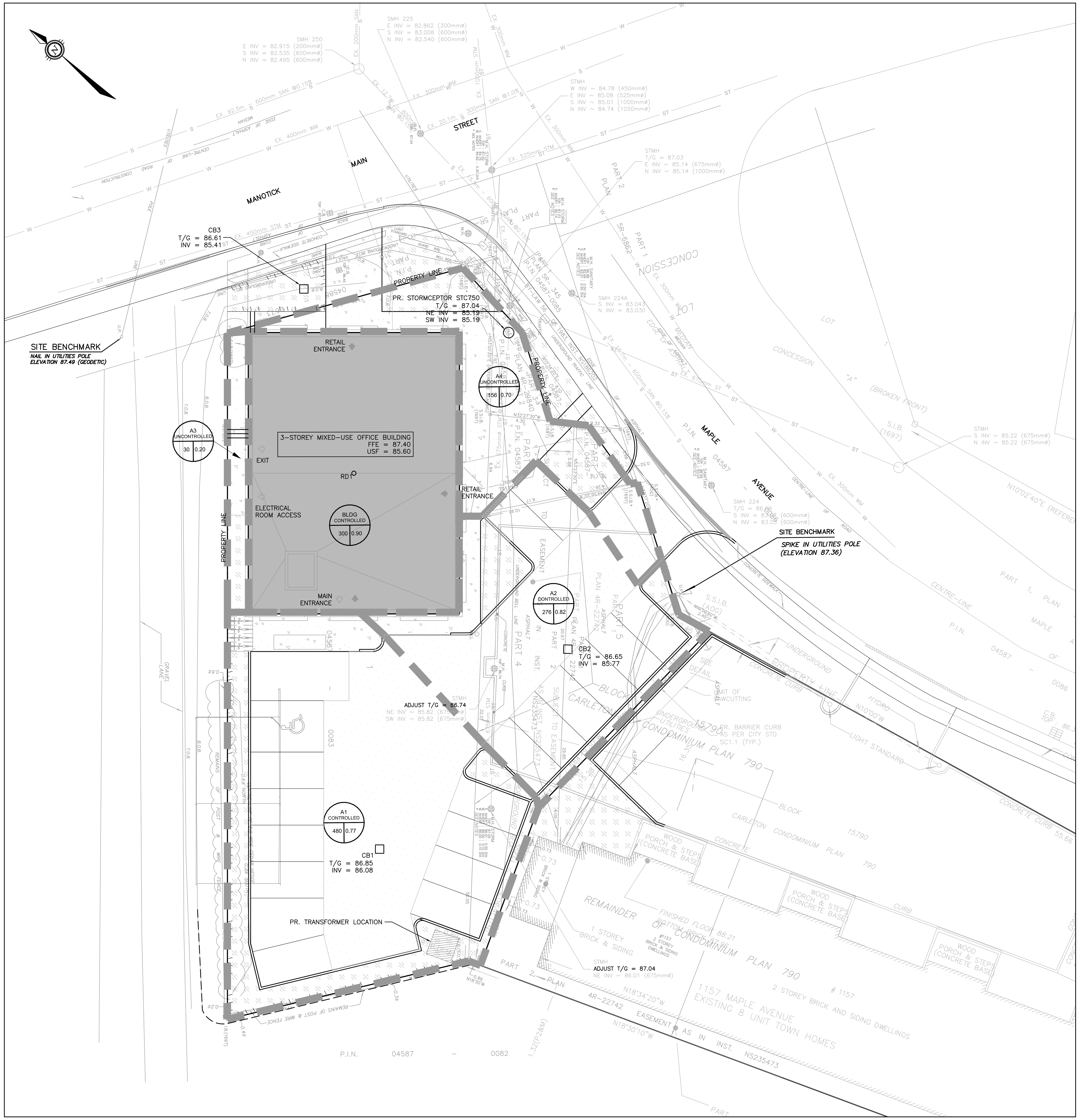
DESIGNED BY:	DRAWN BY:	APPROVED BY:
D.G.	I.J.	I.J.

PROJECT
MANOTICK MIXED-USE OFFICE BUILDING
5514 MANOTICK MAIN ST.,
MANOTICK, ONTARIO

DRAWING TITLE
SITE SERVICING PLAN

PROJECT NO. 17M-00198-00
DRAWING NO. C.02

D07-XX-XX-XXXX



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A-XX UNCONTROLLED | A | R

A-XX DENOTES WATERSHED NAME
A DENOTES AREA IN m²
R DENOTES RUNOFF COEFFICIENT

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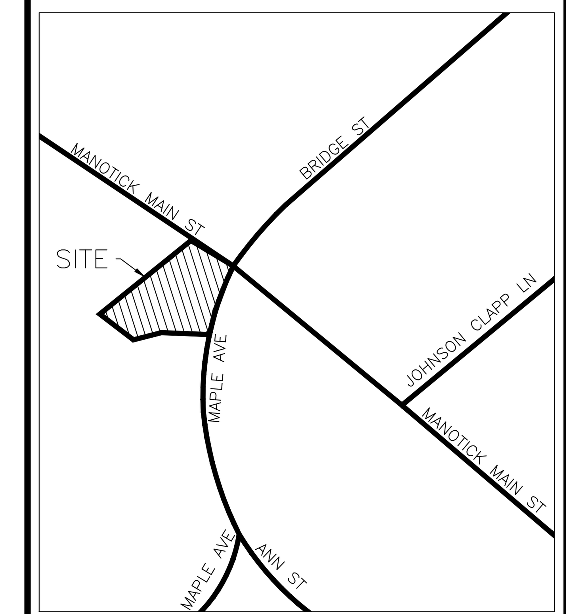

KEY PLAN
(N.T.S)

APPROVED ☐ REFUSED ☐

THIS_____ DAY OF ___________, 20____

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

No.	REVISIONS	BY	DATE
01	ISSUED FOR SPC & ZBA	D.G.	MAR 2, 2017

HORIZONTAL SCALE:
3.0m 1.5 0 3.0 6.0m
SCALE: 1:150

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

REGISTERED PROFESSIONAL ENGINEER
I. M. JAFFERJEE
100164153
Mar 2, 2017
PROVINCE OF ONTARIO

NOT VALID UNLESS SIGNED AND DATED

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CLIENT
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MANOTICK, ON K4M 1K7
TEL: (613) 608-7216

DESIGNED BY:	DRAWN BY:	APPROVED BY:
D.G.	I.J.	I.J.

PROJECT
MANOTICK MIXED-USE OFFICE BUILDING
5514 MANOTICK MAIN ST.,
MANOTICK, ONTARIO

DRAWING TITLE
STORM DRAINAGE AREA PLAN

PROJECT NO. 17M-00198-00
DRAWING NO. C.03

D07-XX-XX-XXXX

APPENDIX E – RVCA CORRESPONDENCE

Grinchpoun, David

From:	Glen McDonald <glen.mcdonald@rvca.ca>
Sent:	February-21-17 2:21 PM
To:	Grinchpoun, David
Cc:	Jafferjee, Ishaque
Subject:	RE: 5514 Manotick Main Street - RVCA Requirements

David:

The existing stormsewer on Maple Avenue discharges to the stormsewer on Bridge Street which ultimately outlets to the Rideau River back channel at the north side of the bridge (approximately 250 m from the site). I have not researched water quality data downstream of the outlet (if any is available) but visual observation during runoff events would suggest that water quality is compromised due the observable sediment plume. Therefore efforts should be made during site redevelopment to improve the quality of runoff from this site. The Rideau River requires 80% average annual TSS removal. Given that most of the site will be covered by the building and asphalt, there would appear to be limited opportunity to use source and conveyance controls to accomplish this objective (although they should be explored). In the absence of these controls, separator units might be the best option.

Glen

Glen McDonald MCIP RPP
Director of Planning
Rideau Valley Conservation Authority
PO Box 599
3889 Rideau Valley Drive
Manotick, Ontario
K4M 1A5
613-692-3571 ext. 1133
glen.mcdonald@rvca.ca
www.rvca.ca

1966–2016
Years of Conservation in the Rideau Valley

From: Grinchpoun, David [mailto:GrinchpounD@mmm.ca]
Sent: Tuesday, February 21, 2017 11:25 AM
To: Glen McDonald <glen.mcdonald@rvca.ca>

Cc: Jafferjee, Ishaque <JafferjeeI@mmm.ca>; Jocelyn Chandler <jocelyn.chandler@rvca.ca>
Subject: RE: 5514 Manotick Main Street - RVCA Requirements

Hi Glen,

I was wondering if you had a chance to look at the email below regarding RVCA requirements at the proposed development at 5514 Manotick Main Street.

Thank you,

David Grinchpoun
Designer (EIT)
T (613) 690-3922 | C (613) 608-2210

From: Grinchpoun, David
Sent: January-23-17 1:44 PM
To: 'glen.mcdonald@rvca.ca'
Cc: 'Jocelyn Chandler'; Jafferjee, Ishaque
Subject: 5514 Manotick Main Street - RVCA Requirements

Hi Glen,

We have been retained to carry out a servicing and stormwater management design for the site plan approval of the proposed 3 storey office building located at 5514 Manotick Main St in the city of Ottawa. The concept plan from the Architect is attached for information. The existing site is currently vacant as the existing 2 storey building has been demolished. The current topography shows the subject site currently drains towards Maple Avenue, east of the proposed building. The proposed property will connect to the existing storm sewer along Maple Avenue.

We would like to touch base with you to confirm whether there are any storm water quality requirements needed to be met for this application. Please advise.

Should you have any other questions, please do not hesitate to give me a call.

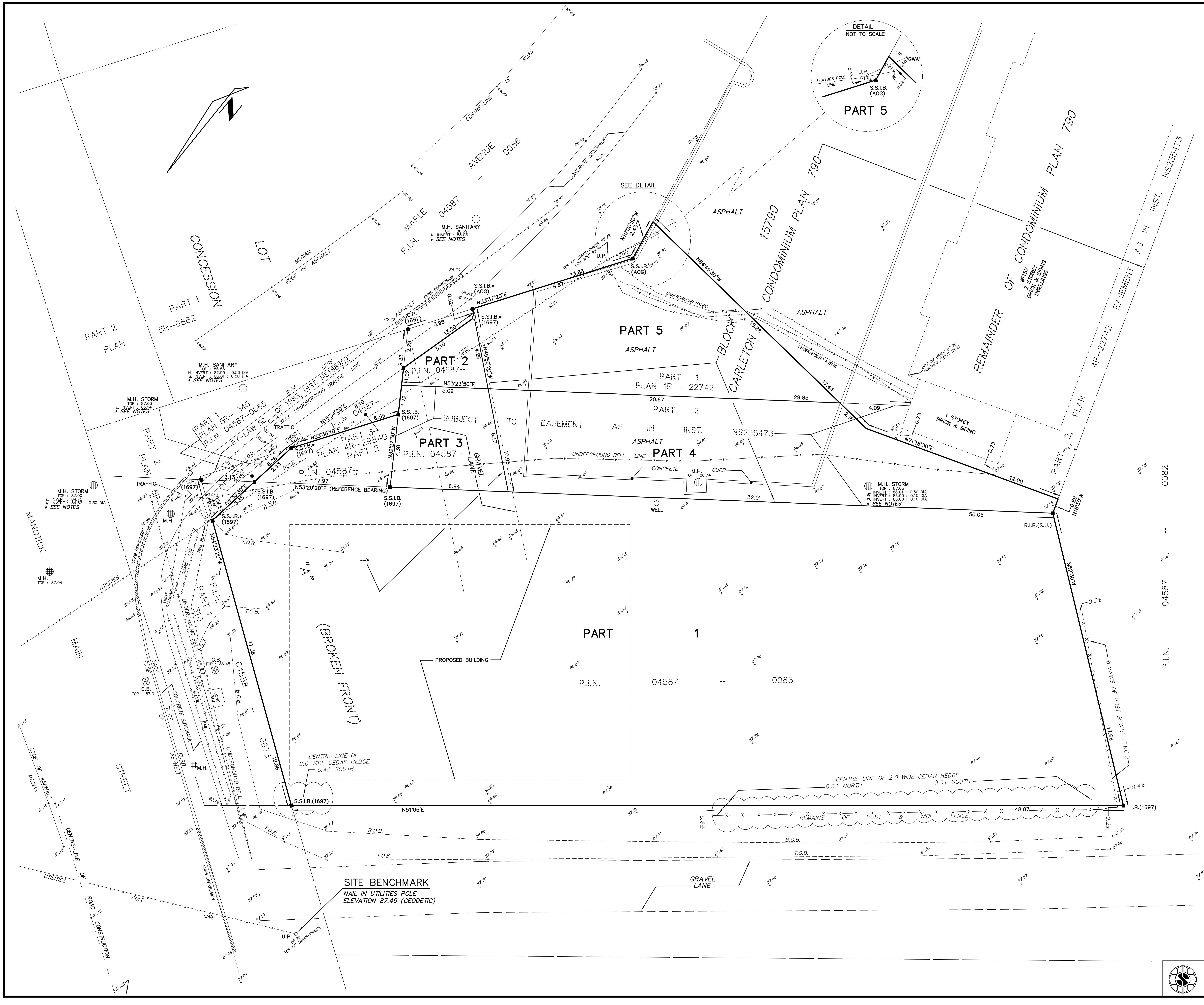
Thank you,

David Grinchpoun
Designer (EIT)

MMM Group Limited
2611 Queensview Drive, Suite 300
Ottawa, Ontario K2B 8K2 Canada
T (613) 690-3922 | C (613) 608-2210
grinchpound@mmm.ca

www.mmmgrouplimited.com | www.wspgroup.ca

APPENDIX F – LEGAL SURVEY



TOPOGRAPHIC SURVEY SHOWING

PART OF LOT 1 CONCESSION "A" (BROKEN FRONT) AND PART OF COMMON ELEMENT OTTAWA-CARLETON STANDARD CONDOMINIUM PLAN 790

GEOGRAPHIC TOWNSHIP OF NORTH GOWER
CITY OF OTTAWA
SCALE 1:100

0 1 2 3 4 6 8 10
METRES

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

NOTES

BEARINGS SHOWN ON THIS PLAN ARE ASTRONOMIC, DERIVED FROM THE SOUTHEASTERLY LIMIT OF P.I.N. 04587-0083 AS SHOWN ON PLAN 4R-29840, HAVING A BEARING OF N53°20'20"E.

S.I.B.	DENOTES 0.025 SQ., 1.2 LONG, STANDARD IRON BAR
S.S.I.B.	DENOTES 0.025 SQ., 0.6 LONG, SHORT STANDARD IRON BAR
S.S.I.B.*	DENOTES 0.025 SQ., 0.3 LONG, IRON BAR
I.B.	DENOTES 0.016 SQ., 0.6 LONG, IRON BAR
■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT PLANTED
WIT.	DENOTES WITNESS
S.U.	DENOTES SOURCE UNKNOWN
AOG	DENOTES ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
1697	DENOTES J.P. SHIPMAN, O.L.S.
B.O.B.	DENOTES BOTTOM OF BANK
T.O.B.	DENOTES TOP OF BANK
U.P.	DENOTES UTILITIES POLE
GWA	DENOTES GUY WIRE ANCHOR
M.H.	DENOTES MAN HOLE
C.B.	DENOTES CATCH BASIN

UNDERGROUND LOCATES: BELL, HYDRO, GAS, TRAFFIC PROVIDED BY PROMARK TELECON 02/01/2017

* SUBTERRANEAN STRUCTURE MEASUREMENTS PROVIDED BY DEEPVIEW UTILITY LOCATES. SEE REPORT FOR 5514 MANOTICK MAIN / 1157 MAPLE AVE. DATED FEB 2, 2017.

ELEVATION NOTES

1. ELEVATIONS ARE IN METRES AND ARE GEODETIC, DERIVED FROM GSC BENCHMARK 583-G (UNITED CHURCH, MANOTICK MAIN STREET.)
2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THIS DRAWING.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM;

(2) THE SURVEY WAS COMPLETED ON THE 28th DAY OF NOVEMBER, 2016.

DATE

J.P. SHIPMAN
ONTARIO LAND SURVEYOR

H.A.KEN SHIPMAN SURVEYING LTD.
P.O. BOX 53, NORTH GOWER, ONT. K0A 2T0

REF No. : N.G.-1184
FILE No. : 16-10913 C