

FUNCTIONAL SERVICING REPORT

Water, Sanitary, and Stormwater Management

PROPOSED FOUR-STOREY RESIDENTIAL BUILDING

233 ROBINSON STREET
TOWN OF OAKVILLE

OUR FILE: 1793

PREPARED FOR AVA DESIGN STUDIO

MAY 2025

Functional Servicing Report
Proposed Four-Storey Residential Building
233 Robinson Street Oakville

Our File: 1793

REVISION HISTORY

DATE	REVISION	SUBMISSION
May 2025	1	Issued for Site Alteration Permit

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1.0 INTRODUCTION

1.1 Scope of Functional Servicing Report

This report has been prepared in support of the Site Alteration Permit application for a four-storey, multi-unit residential building located at 233 Robinson Street between Dunn Street and George Street in the Town of Oakville. This report discusses how the site can be serviced by the existing infrastructure for water, wastewater, and stormwater. A copy of the site plan is included in Appendix 'A' for reference. This report should be read in conjunction with architectural plans and landscape plans prepared for the project.

For the purposes of this report, north is defined as running parallel to Dunn Street.

1.2 Existing Condition

The site is surrounded by commercial developments including restaurants to the north and east, and residential buildings to the south and west.

The site area is 392.4 m² and is currently occupied by a two-storey commercial building containing law offices including a grass covered yard at the back of the property. The property has frontage along Robinson Street. A copy of the topographic survey is provided in Appendix 'A' for reference.

1.3 Proposed Condition

The proposed site includes a three unit four-storey residential building with an at-grade parking garage accessed from Robinson Street. The proposed site will also include a rooftop terrace, as well as balconies for each unit. The proposed site will no longer have any grass covered area.

2.0 MUNICIPAL WATER AND WASTEWATER

The location of the existing services was determined through the review of record drawings provided by the Region of Halton and Town of Oakville, and topographic survey completed by Cunningham McConnell Limited.

All proposed services must be in accordance with the Ontario Building Code, Town of Oakville, and Region of Halton standards and requirements. A copy of the Grading and Servicing Plan is included in Appendix 'F' and should be read in conjunction with this report. Existing and proposed servicing is discussed in further detail in the following sections.

2.1 Water

Record drawings indicate that there is an existing 300 mm diameter PVC watermain and a 900 mm diameter CPP watermain on the north side of Robinson Street. The site is currently serviced from the 300 mm diameter PVC watermain. It should be noted there is a municipal fire hydrant along Robinson Street in front of the site, which will need to be lowered to accommodate boulevard grading.

Using the development area and Region of Halton design criteria for a development consisting of 'Stacked Townhouses, Low/Mid-Rise Apartments outside Strategic Growth Areas' (420 persons per hectare), the estimated water demand is determined with five persons and 265 L/cap. day (see Appendix 'C' for supporting calculations).

The fire flow was estimated for demand purposes only using the Fire Underwriter's Survey methodology. Fire flows should be confirmed at the building permit stage by the sprinkler consultant. The estimated flows are summarized below, with detailed calculations shown in Appendix 'C'.

Table 1: Estimated Water Demands (L/min)

Average Daily Demand	3
Minimum Hourly Demand	3
Maximum Hourly Demand	13
Maximum Daily Demand	7
Estimated Fire Demand (FUS 1999)	3000
Maximum Daily Plus Fire Demand	3007

A flow test was undertaken (November 11, 2022) using the base hydrant at the south-east corner of Dunn Street and Robinson Street. The results of the flow test are included in Appendix 'C' and are summarized as follows:

Table 2: Base Hydrant at Dunn St and Robinson St

Static Pressure	69 psig
Flow 1,088 usgpm (69 L/s)	residual 67 psig
Flow 1,840 usgpm (116 L/s)	residual 65 psig
Theoretical Flow 7,119 usgpm (449 L/s)	residual 20 psig
Estimated Max. Daily Plus Fire Service Pressure	68 psig

The proposed building will be connected to the existing 300 mm diameter PVC watermain on Robinson Street with a 200 mm fire line and a 100 mm domestic water line as per Region Standard RH 409.010; sizing to be confirmed by the mechanical consultant at the building permit stage.

2.2 Wastewater

Record drawings indicate that there is an existing 200 mm sanitary sewer near the centreline of Robinson Street. The sanitary sewer drains west towards George Street. There are two existing service connections to the site that will be disconnected and abandoned per Region of Halton Standards. Capacity of the local sewer in Robinson Street is discussed in Section 2.2.3.

2.2.1 Estimated Flows

Using the development area and Region of Halton design criteria for commercial lands (90 persons per hectare), the estimated existing sanitary discharge is determined with four persons and 360 L/cap. day (see Appendix 'D' for supporting calculations).

Table 3: Estimated Existing Wastewater Flow (L/s)

Average Daily Dry Weather Flow	0.01
Modified Harmon Peaking Factor	-
Infiltration Allowance (0.26 L/s-ha)	0.01
Peak Daily Flow	0.02

Using the development area and the Region of Halton design criteria for a development consisting of 'Stacked Townhouses, Low/Mid-Rise Apartments outside Strategic Growth Areas' (420 persons per hectare), the estimated sanitary discharge is determined with approximately 17 persons and 360 L/cap. day (see Appendix 'D' for supporting calculations).

Table 4: Estimated Proposed Wastewater Flow (L/s)

Average Daily Dry Weather Flow	0.07
Modified Harmon Peaking Factor	4.39
Infiltration Allowance (0.26 L/s-ha)	0.01
Peak Daily Flow	0.30

Although there is an increase over the existing condition, the estimated proposed flows are small in context of the system capacity, which is discussed in Section 2.2.3 below.

2.2.2 Service Lateral Connection

Using Table 3-6 of the Region's Linear Design Manual and considering a 'Stacked Townhouse, Low/Mid-Rise Apartments outside Strategic Growth Areas' with three units there is a total of 60 fixture units. From Table 3-5 of the Region's Linear Design Manual, a 125 mm diameter service lateral with a minimum slope of 2% is the minimum diameter required for 60 fixture units. A new

150 mm diameter PVC sanitary lateral complete with a property line inspection manhole is proposed to service the development. The lateral will connect to the existing 200 mm diameter sanitary sewer on Robinson Street and drain in a westerly direction to George Street.

The possibility of reusing one of the existing sanitary laterals was investigated and the CCTV report has been included in Appendix 'E'. The CCTV report confirmed that the western sanitary lateral was in good condition, while the eastern sanitary lateral looked to be damaged and abandoned. Preliminary discussions with the Service Permit group indicate that a 150 mm diameter sanitary lateral would be required for the proposed site.

2.2.3 Navy Street Pumping Station Capacity

The proposed site drains towards the Navy Street Pumping Station (PS). The firm capacity of the pumping station is 52.0 L/s, as confirmed by the Region of Halton. The proposed peak daily sanitary flow of 0.3 L/s is a negligible increase compared to the existing flows and the pumping station capacity. Therefore, under dry weather flow conditions there is sufficient capacity of the expected flows from the proposed site, however, we are aware that there are capacity restraints under wet weather flow conditions.

3.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

3.1 Existing Storm Drainage

There is a 375 mm diameter storm sewer running along Robinson Street parallel to the site. The sewer runs west along Robinson Street to George Street. The George Street sewer runs south and discharges to Lake Ontario.

The topographic survey for the site indicates that the site generally slopes from north to south along the eastern edge of the property and drains towards Robinson Street. At this point drainage is captured by catch basins along Robinson Street. There is a low point in the middle of the grass covered yard where water will pond. There are roof drains that drain to the side yard, along the eastern property line, and then drain towards Robinson Street.

The site is located within an established urban area with minimal vegetative cover. It is predominately paved in the existing condition with a pervious area at the rear and east side of the site. Approximately 64% of the existing site is impervious with a composite curve number of $CN = 85$ (based on an impervious $CN = 98$ and pervious $CN = 61$ for grass cover > 75% and hydrologic soil group (HSG) B).

3.2 Proposed Storm Drainage

A 150 mm diameter storm connection to the existing 375 mm diameter storm sewer along Robinson Street is proposed. Roof drainage is proposed to intercept the 100-year event and direct flow to the stormwater management tank located beneath the at-grade parking garage. Building mechanical is to be sized to convey the 100-year event. Stormwater management requirements are discussed in further detail in Section 3.3.

The proposed site will result in a 100% impervious surface with a curve number of CN = 98.

3.3 Stormwater Management

3.3.1 Stormwater Quantity Control (Peak Flow Control)

The Town of Oakville generally requires developments to manage their drainage to the lesser of pre-development levels for each event up to the 100-year (or as otherwise identified by the appropriate subwatershed study), or the receiving system capacity. In this case, due to the sewer and major system capacity issues identified in the Town's Stormwater Management Master Plan, we propose to control all events to the 5-year pre-development rate. This is generally consistent with developments of this type regardless of sewer constraints.

Pre-development flow rates are calculated based on a 24-hour Chicago storm distribution and the Town of Oakville IDF data. The pre-development composite curve number is calculated based on the current condition of the site which consists of a two-storey building (CN = 98) and a grass covered backyard (CN = 61) for a composite curve number of CN = 85.

Post-development flow rates are calculated based on a 24-hour Chicago storm distribution and the same IDF data. The curve number for the proposed site is CN = 98. The curve number and associated tank sizing may be refined as detailed design progresses. A comparison of pre- and post-development flow is provided in the table below.

Table 5: Stormwater Peak Flows

Return	Pre-Dev Total (L/s)	Post-Dev Tank Inflow (L/s)	Post-Dev Release (L/s)	Storage Required (m ³)
5-yr	6	12	8	8.3
10-yr	8	14	8	9.7
25-yr	11	17	8	11.3
50-yr	13	19	8	12.6
100-yr	15	21	8	13.4

In order to control the post-development flow to the pre-development rate of $Q = 0.006 \text{ m}^3/\text{s}$, approximately 13.4 m^3 of storage is required for the 100-year event. The proposed tank as per the mechanical drawings will be approximately $3.70 \text{ m} \times 3.00 \text{ m} \times 3.05 \text{ m}$ deep (sizing to be confirmed by mechanical) to provide the required storage. Due to the elevation of the storm sewer on Robinson Street and the depth of the tank, discharge must be pumped. Pumps shall be designed by the mechanical consultant and the peak discharge must not exceed the allowable rate. An emergency backup power/auxiliary pump is recommended.

In case of an emergency and the pumps stop working, the tank will overflow and spill to grade via the perforated access lid within the driveway. The grading of the driveway conveys flow away from the face of the building and towards the municipal right-of-way. Building mechanical systems must be designed to withstand surcharge.

3.3.2 Stormwater Quality Control

The Town of Oakville requires that the development meet MECP Enhanced protection (80% long-term removal of TSS). In this case, the proposed site's drainage area is entirely made up of roof area which is considered to be clean. Therefore, no specific water quality control measures are proposed.

3.3.3 Water Balance

The 25 mm storm event runoff volume for the site is 9.8 m^3 . There is no opportunity to infiltrate 25 mm event on site as the building footprint extends to the property lines. There is no practical application to re-use the entire 25 mm storm event runoff volume. A 'best-efforts' approach was taken to achieve the water balance requirement through retention on the roof top. The building rooftop has a green roof – see landscape plans in Appendix 'A' and green roof specifications (provided and specified by others) in Appendix 'D' for further details. The proposed green roof has a plan area of 153 m^2 and a retention capacity of 40 L/m^2 as per the specifications. The green roof is able to provide 6.1 m^3 of retention to address water balance requirement, which is 62% of the required 9.8 m^3 .

4.0 SITE GRADING

The majority of the site is covered by the proposed building, leaving little grading work to be completed. Along the west, north, and east property lines the existing grades will be maintained. Along the southern property line, the grades will be adjusted to ensure the boulevard grades are between 2 and 4%. If the stormwater management tank overflows, the overflow will also drain towards Robinson Street.

A copy of the Preliminary Grading and Servicing Plan is provided in Appendix 'F' and should be read in conjunction with this report.

5.0 CONCLUSION

The information presented in this Functional Servicing Report demonstrates that the proposed development can be serviced by the existing infrastructure for water, wastewater, and stormwater and can meet the Town of Oakville stormwater management criteria. The following is a summary of the report findings:

1. Regional services, water and wastewater, have sufficient capacity to support the proposed development.
2. The site's domestic (50 and 100 mm diameter) and fire service (200 mm diameter) water connection will be connected to the existing 300 mm diameter watermain on Robinson Street.
3. The site's sanitary lateral (150 mm diameter) will be connected to the existing 200 mm diameter sanitary sewer on Robinson Street. A 1200 mm diameter manhole will be installed on the existing 200 mm diameter sanitary sewer.
4. Stormwater quantity controls are proposed to control post-development flows from the 100-year event to the 5-year pre-development event. Runoff is to be stored within a stormwater management tank below the driveway and pumped to a maximum allowable rate of 6 L/s, to the storm lateral (150 mm diameter) which is connected to the existing 375 mm diameter storm sewer. The emergency spill from the tank is to grade by way of a perforated lid and conveyed towards the municipal right-of-way.
5. The quantity control volume required is 13.4 m³. The water balance requirement for the site has been addressed with a 'best-efforts' approach via retention from the proposed green roof, providing 6.1 m³ of retention.

Based on the above, we support the proposed development from a civil engineering perspective for Site Alteration Permit. Should you have any questions, do not hesitate to contact the undersigned.

PREPARED BY TRAFALGAR ENGINEERING LTD.



Andy Prejs, MAsC, EIT
Senior Designer

J.T. Nelson, P.Eng.
Principal, Design Services

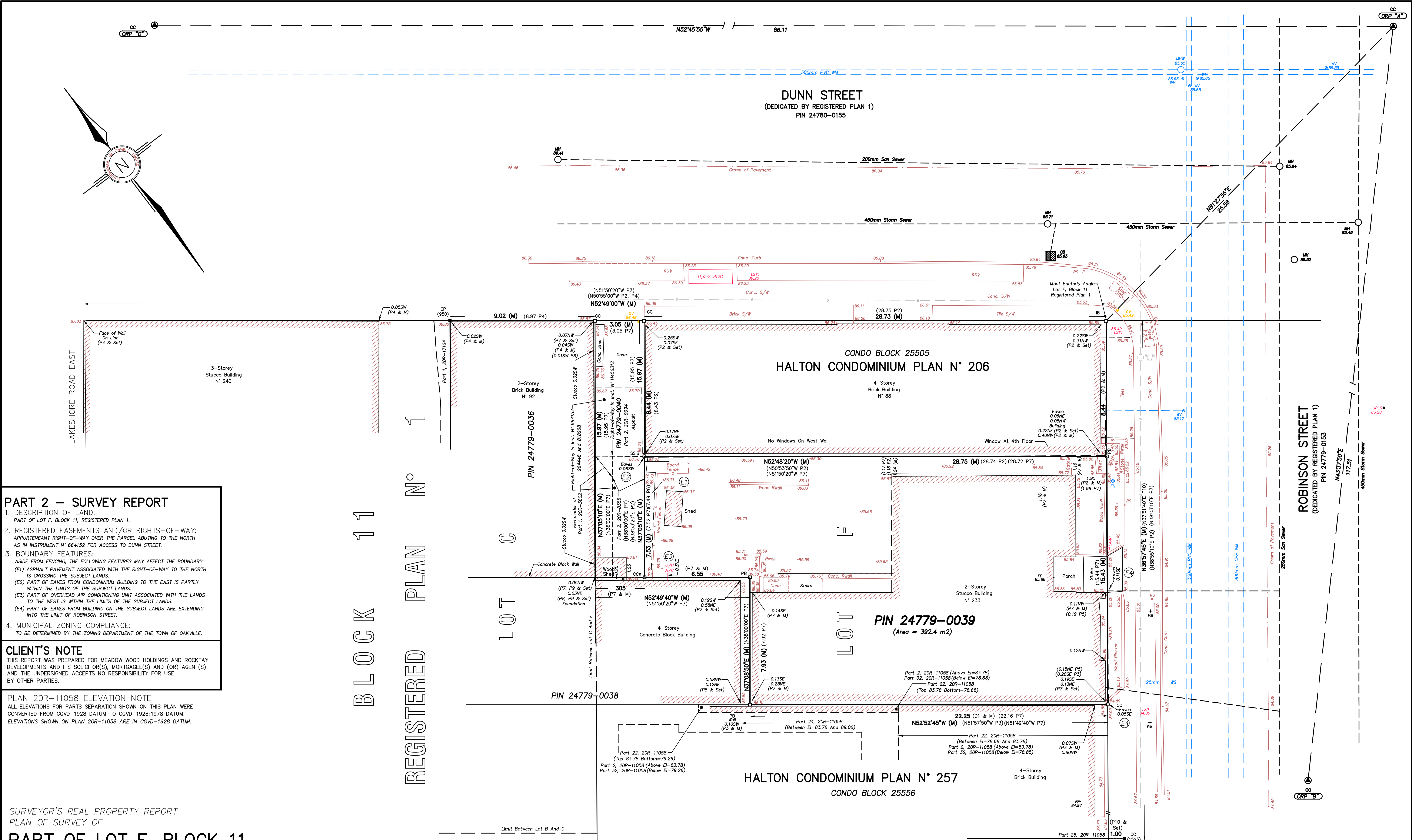


APPENDIX 'A'

Architectural Site Plan, AVA Design Studio

Landscape Concept Plan, Daniel J. O'Brien & Associates Ltd.

Topographic Survey, Cunningham McConnell Limited



PART 2 – SURVEY REPORT

- DESCRIPTION OF LAND:
PART OF LOT F, BLOCK 11, REGISTERED PLAN 1.
- REGISTERED EASEMENTS AND/OR RIGHTS-OF-WAY:
APPURTENANT RIGHT-OF-WAY OVER THE PARCEL ABUTTING TO THE NORTH AS IN INSTRUMENT N° 664152 FOR ACCESS TO DUNN STREET.
- BOUNDARY FEATURES:
ASIDE FROM FENCING, THE FOLLOWING FEATURES MAY AFFECT THE BOUNDARY:
(E1) ASPHALT PAVEMENT ASSOCIATED WITH THE RIGHT-OF-WAY TO THE NORTH IS CROSSING THE SUBJECT LANDS.
(E2) PART OF EAVES FROM CONDOMINIUM BUILDING TO THE EAST IS PARTLY WITHIN THE LIMITS OF THE SUBJECT LANDS.
(E3) PART OF OVERHEAD AIR CONDITIONING UNIT ASSOCIATED WITH THE LANDS TO THE WEST IS WITHIN THE LIMITS OF THE SUBJECT LANDS.
(E4) PART OF EAVES FROM BUILDING ON THE SUBJECT LANDS ARE EXTENDING INTO THE LIMIT OF ROBINSON STREET.
- MUNICIPAL ZONING COMPLIANCE:
TO BE DETERMINED BY THE ZONING DEPARTMENT OF THE TOWN OF OAKVILLE.

CLIENT'S NOTE

THIS REPORT WAS PREPARED FOR MEADOW WOOD HOLDINGS AND ROCKFAY DEVELOPMENTS AND ITS SOLICITOR(S), MORTGAGEE(S) AND (OR) AGENT(S) AND THE UNDERSIGNED ACCEPTS NO RESPONSIBILITY FOR USE BY OTHER PARTIES.

PLAN 20R-11058 ELEVATION NOTE

ALL ELEVATIONS FOR PARTS SEPARATION SHOWN ON THIS PLAN WERE CONVERTED FROM CGVD-1928 DATUM TO CGVD-1928:1978 DATUM.
ELEVATIONS SHOWN ON PLAN 20R-11058 ARE IN CGVD-1928 DATUM.

SURVEYOR'S REAL PROPERTY REPORT
PLAN OF SURVEY OF

PART OF LOT F, BLOCK 11
REGISTERED PLAN 1

TOWN OF OAKVILLE
REGIONAL MUNICIPALITY OF HALTON

SCALE 1 : 100



ASSOCIATION OF ONTARIO
LAND SURVEYORS
PLAN SUBMISSION FORM
V-29523

THIS PLAN IS NOT VALID
UNLESS IT IS AN EMBOSSED
ORIGINAL COPY
ISSUED BY THE SURVEYOR
IN ACCORDANCE WITH
REGULATION 1026, SECTION 29(3).

INTEGRATION DATA		
BEARINGS ARE UTM GRID, DERIVED FROM THE OBSERVED REFERENCE POINTS "A", "B" AND "C" BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS-2010.0)		
OBSERVED REFERENCE POINTS (ORP): UTM ZONE 17, NAD-83 (CSRS-2010.0). CO-ORDINATES TO URBAN ACCURACY PER SEC. 14(2) OF O.R.E.G. 216/10.		
POINT N°	NORTHING	EASTING
"A"	4,811,217.45	607,911.74
"B"	4,811,132.42	607,830.67
"C"	4,811,269.55	607,843.19
CO-ORDINATES CAN NOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		
ALL BEARINGS IN COMPARISONS ARE ASTRONOMIC/MAGNETIC.		

DISTANCE NOTE
DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED INTO GRID DISTANCES BY MULTIPLYING BY A SCALE FACTOR OF 0.9997355055.

METRIC NOTE
ALL DISTANCES SHOWN HEREON ARE IN METRES AND CAN BE CONVERTED INTO FEET BY DIVIDING BY 0.3048.

DIMENSION NOTE
ALL BEARINGS AND DISTANCES SHOWN HEREON ARE MEASURED UNLESS OTHERWISE NOTED.

ELEVATION NOTE
ALL ELEVATIONS SHOWN HEREON ARE GEODETIC AND WERE DERIVED FROM THE TOWN OF OAKVILLE BENCHMARK O-251 HAVING AN ELEVATION OF 118.729m (CGVD-1928:1978).

LEGEND

■ DENOTES SURVEY MONUMENT FOUND
■ DENOTES SURVEY MONUMENT SET
■ DENOTES STANDARD IRON BAR
■ DENOTES STANDARD IRON PIPE
■ DENOTES IRON BAR
■ DENOTES CUT CROSS
■ DENOTES CONCRETE PIN
■ DENOTES PROPERTY IDENTIFICATION NUMBER
■ DENOTES ENCROACHMENT REFERENCE
■ DENOTES R.A.V.S. O.L.S.
■ DENOTES MEASURED
■ DENOTES WITNESS
■ DENOTES INSTRUMENT N° 664152

P-1 DENOTES REGISTERED PLAN 1
P-2 DENOTES HCP-206
P-3 DENOTES HCP-257
P-4 DENOTES PLAN 20R-17164
P-5 DENOTES PLAN 20R-9994
P-6 DENOTES PLAN 20R-8335
P-7 DENOTES PLAN BY F.O. CUNNINGHAM JANUARY 20, 1966
P-8 DENOTES PLAN BY SEWELL & SEWELL APRIL 21, 1987
P-9 DENOTES PLAN BY SEWELL & SEWELL NOVEMBER 17, 1965
P-10 DENOTES PLAN 20R-11058

TOPOGRAPHIC LEGEND

AW DENOTES ANCHOR WIRE(S)
BB DENOTES BELL BOX
B DENOTES U/G BELL CABLE
CON-0.20 DENOTES CONIFEROUS TREE 0.20 DIA
DEC-0.20 DENOTES DECIDUOUS TREE 0.20 DIA
FI DENOTES FIRE HYDRANT
GM DENOTES GAS METER
GV DENOTES GAS VALVE
G DENOTES U/G GAS MAIN
H DENOTES U/G HYDRO CABLE
LS DENOTES LIGHT STANDARD (LAMP)
M DENOTES MANHOLE
OW DENOTES OVER HEAD WIRE(S)
S-SAN DENOTES SANITARY SEWER
S-SM DENOTES STORM SEWER
UP DENOTES UTILITY POLE
W DENOTES WATER VALVE (KEY)
W DENOTES U/G WATER MAIN

UNDERGROUND SERVICES NOTE
ONLY UNDERGROUND SERVICES VISIBLE ON THE GROUND WERE LOCATED FOR THIS PLAN.
THE USER OF THIS PLAN SHALL CONTACT THE LOCAL UTILITY COMPANIES FOR LOCATIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

- THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
- THE SURVEY WAS COMPLETED ON AUGUST 29, 2022.

DATE: AUGUST 31, 2022

JARO A. LEGAT, M.Sc.
ONTARIO LAND SURVEYOR

CUNNINGHAM McCONNELL LIMITED
ONTARIO LAND SURVEYORS

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FAX: (905) 878-6872
Milton.office@cmllandsurveyors.ca

PLOT PAPER SIZE = 914mm BY 609mm | PLAN 70-22-1

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APPENDIX 'B'

Estimated Water Demand

Estimated Demand Pressure

Fire Flow Test

TRAFALGAR ENGINEERING LTD.

ESTIMATED PROPOSED WATER DEMAND

Project: 233 Robinson St
Desc: 1st Submission Site Alt Permit

Project No.: 1793
Prepared By: AJP
Checked By: JN

Occupancy Data						Peaking Factors			Demand Flow		
Land Use / Occupancy Type	GFA (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/cap. Day)	Average Daily Demand (L/min)	Min. Hour	Peak Hour	Max. Daily	Min. Hour Demand (L/min)	Max. Hour Demand (L/min)	Max. Daily Demand (L/min)
Apartment - six stories or less	0.0392	420.0	17	265	3.1	1.00	4.00	2.25	3	13	7
*Per Cap. Demand based on O.B.C. Table 8.2.1.3.B. -- 5 L/1.0m ² Stores											
TOTAL	0		17		3				3	13	7

Fire Flow

Using Fire Underwriters Survey Methodology:

Average Daily Demand: 3 (L/min)
Minimum Hourly Demand: 3 (L/min)
Maximum Hourly Demand: 13 (L/min)
Maximum Daily Demand: 7 (L/min)
Max. Daily Plus Fire: 3007 (L/min)

- An estimate of the fire flow is given by the formula $F = 220C\sqrt{A}$
 Where:
 F = The required fire flow in litres per minute
 C = Coefficient related to the type of construction
 A = The total floor area in square metres (including all storeys but excluding basements at least 50% below grade)

Type of Construction: **Fire-Resistive** Coefficient: 0.60 Total Floor Area: **588.6** (m²)
 F = **3000** (L/min) Adequately Protected Vertical Openings: **No**

- Adjust the value in No. 1 for occupancy surcharge/reduction

Occupancy Contents: **Limited Combustible** Factor: -15%
 F = **2550** (L/min)

- Adjust the value in No. 2 for sprinkler

NFPA 13 Sprinkler:	Yes	Reduction:	20%
Standard Water Supply:	Yes	Reduction:	10%
Fully Supervised:	Yes	Reduction:	10%
Total Reduction:			40%
Sprinkler Reduction:			1020 (L/min)

- Adjust the value in No. 2 for exposure

	Separation (m)	Charge
North	0	25%
East	0	25%
South	50	0%
West	0	25%
Total Charge:		75%
Exposure Charge:		1913 (L/min)

Area Note: For fire resistive buildings, consider the two largest adjoining floors plus 50% of the remaining floors up to eight, when openings are inadequately protected. For adequately protected vertical openings consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors

- Estimated Fire Flow is value in No. 2 less *Sprinkler Reduction* plus *Exposure Charge*, rounded to the nearest 1000

F = **3000** (L/min)

TRAFALGAR ENGINEERING LTD.

ESTIMATED DEMAND PRESSURE (AT MAIN)

Project: 233 Robinson St
Desc: 1st Submission Site Alt Permit

Project No.: 1793
Prepared By: AJP
Checked By: JN

Hydrant Residual Flow (Refer to Attached Flow Test Results)

Coefficient	$C =$	0.9	
Port Diameter	$D =$	2.5	(inch)
Pitot Pressure	$P_{pit} =$	42	(psig)
Residual Flow	$Q_R =$	1088	(us gpm)
Residual Flow	$Q_R =$	4118	(L/min)

Hydrant Theoretical Flow (Refer to Attached Flow Test Results)

Static Pressure	$P_{stat} =$	69	(psig)
Residual Pressure	$P_{res} =$	67	(psig)
Theoretical Pressure	$P_{theo} =$	20	(psig)
Theoretical Flow	$Q_T =$	7119	(us gpm)
Theoretical Flow	$Q_T =$	26945	(L/min)

Max. Demand Pressure

Maximum Demand	$Q_D =$	3007	(L/min)
Maximum Demand	$Q_D =$	794	(us gpm)
Calculated Pressure	$P =$	68	(psig)

Where:

$$Q_R = 29.84 \times C \times D^2 \times P_{pit}^{0.5}$$

$$Q_T = Q_R \times [(P_{stat} - P_{theo}) / (P_{stat} - P_{res})]^{0.54}$$

$$P = P_{stat} - (Q_D / Q_R)^{1.852} \times (P_{stat} - P_{res})$$

Notes:

Refer to attached hydrant flow test results for 300mm main on Robinson Street prepared by Aquacom Contracting dated November 11, 2022.



81 Todd Road Suite 202 Georgetown Ont. L7G 4R8
(o) 905-467-5853 (c) 905-971-9956 (e) mark@aquacom.ca

November 24, 2022

Andy Prejs
Trafalgar Engineering
#1-481 Morden Road
Oakville, Ontario
L6K 3W6

**Reference: 233 Robinson Street
Town of Oakville, Region of Halton
Hydrant Flow Testing**

The flow testing was completed Friday 11 November 2022 as scheduled.

We advised the Region of Halton operations staff of this schedule, and they provided an operator to assist with the operation of the municipal hydrants and to assist with the test.

Please find the attached summary of test results. For your information;

the hydrant was flowed from one than two nozzles, using flow diffusers

residual pressures were recorded from an upstream fire hydrant on the municipal system

theoretical flows were produced from the attached chart, using a .90 nozzle coefficient

all discharge water was dechlorinated as per Ministry requirements

the hydrants were not colour coded at the time of the test

If you should require any further information please do not hesitate to contact the undersigned.

Sincerely yours,

Aquacom Contracting
Mark Kilbourne

SITE NAME

233 ROBINSON STREET

TEST DATE TIME

FRIDAY 11 NOVEMBER 2022 @ 1110

SITE ADDRESS

233 ROBINSON STREET

TECHNICIANS

MARC COULTER & PATRICK FORAN

COMMENTS

MUNICIPAL HYDRANTS

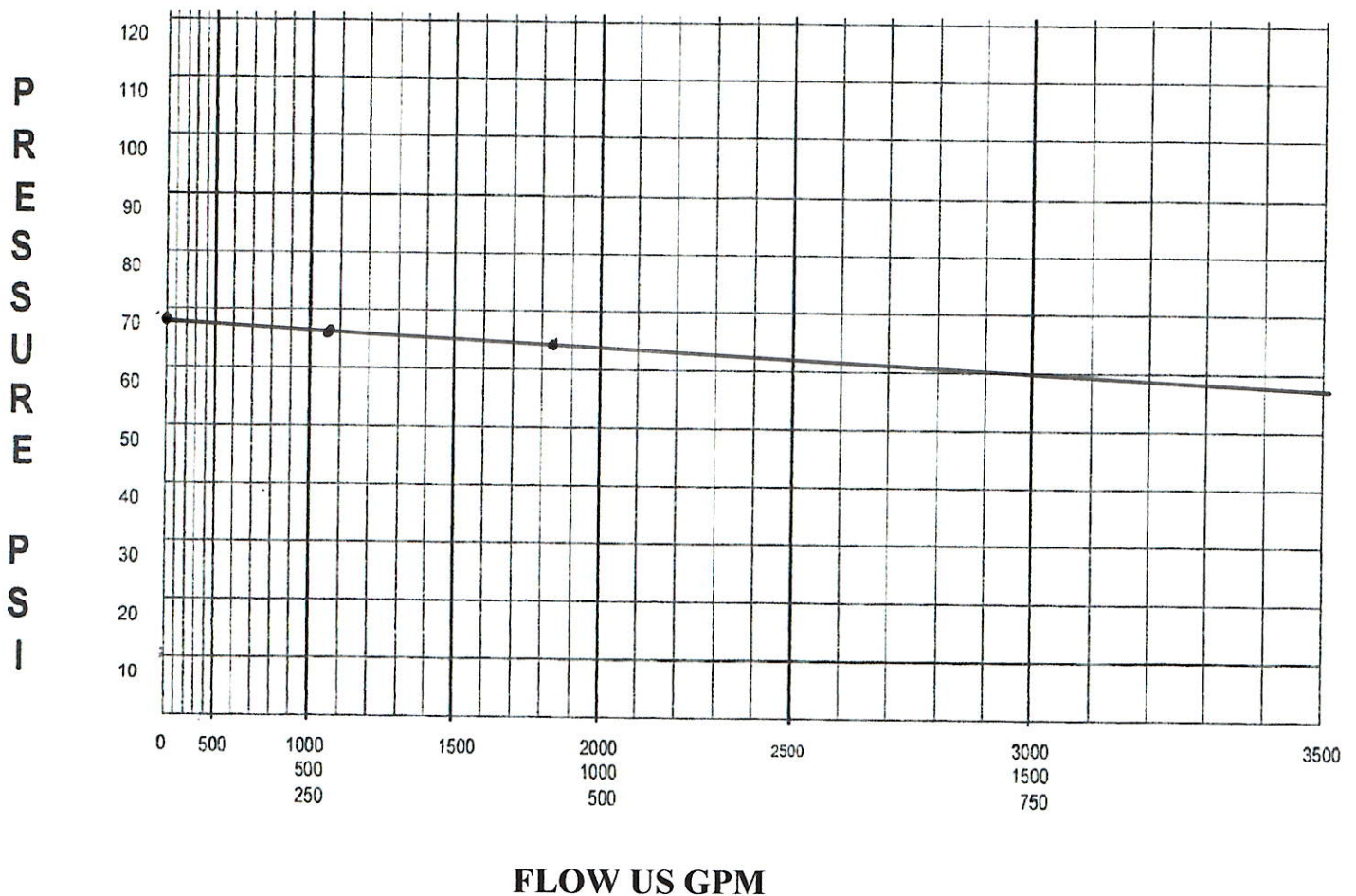
LOCATION OF FLOW HYDRANT

NE CRNR ROBINSON & GEORGE

LOCATION OF RESIDUAL HYDRANT

NW CRNR ROBINSON & DUNN

# OUTLETS	SIZE INCHES	PITO PSI	FLOW USGPM	RESIDUAL PSI	STATIC PSI	PIPE DIA. MM
ONE	2.50	42	1088	67	69	300MM
TWO	2.50	30	1840	65		PVC
		THEORETICAL	7119	20	TEST #	ONE
NOZZLE COEFF.		.90				





HYDRANT FLOW TEST REPORT

81 Todd Road Suite 202 Georgetown Ont. L7G 4R8
(o) 905-467-5853 (c) 905-971-9956 (e) mark@aquacom.ca

	HYDRANT	SEC. VALVE	TECH.	TIME	STATIC	PITO 1-2.50"	FLOW 1-2.50"	RESIDUAL 1-2.50"	PITO 2-2.50"	FLOW 2-2.50"	RESIDUAL 2-2.50"	COLOUR
	MAKE	CONDITION			PSI	PSI	US GPM	PSI	PSI	US GPM	PSI	CODE
F1	NE CRNR ROBINSON & GEORGE	MUELLER	OK/OPEN	MC	11:10		42	1088		30	1840	BLUE
R1	NW CRNR ROBINSON AND DUNDAS	MUELLER	OK/OPEN	PF		69		67			65	
F2												
R2												
F3												
R3												
F4												
R4												
F5												
R5												

CUSTOMER

TRAFALGAR ENGINEERING

LOCATION

233 ROBINSON STREET

TOWN OF OAKVILLE

CONTACTS ON SITE

REGION OF HALTON OPERATOR

APPENDIX 'C'

Estimated Existing Sanitary Flow

Estimated Proposed Sanitary Flow

TRAFALGAR ENGINEERING LTD.

ESTIMATED EXISTING SANITARY FLOW

Project: 233 Robinson St
Desc: 1st Submission Site Alt Permit

Project No.: 1793
Prepared By: AJP
Checked By: JN

Residential

Land Use / Occupancy Type	Unit Count	Population Density (pers/unit)	Eq. Population (cap.)	Per Cap. Demand (L/cap. Day)	Average Daily Dry Weather Flow (L/s)
TOTAL	0		0		0.00

Industrial / Commercial / Institutional

Land Use / Occupancy Type	Area (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/cap. Day)	Average Daily Dry Weather Flow (L/s)
Light Commercial Area - Law Office	0.0392	90.0	4	360	0.01
TOTAL	0.0392		4		0.01

Residential Peaking Factor: 4.50
ICI Peaking Factor: 4.45
Include ICI Peaking? **No**
Tributary Area: **0.04** (ha)
Infiltration Allowance: **0.26** (L/s ha)
Foundation Drain Allowance: **0.00** (L/s ha)

Infiltration Average Flow: 0.01 (L/s)
ICI Average Flow: 0.01 (L/s)
Groundwater Discharge: (L/s)
Total Average Flow: 0.02 (L/s)

Infiltration Peak Flow: 0.01 (L/s)
ICI Peak Flow: 0.01 (L/s)
Groundwater Discharge: 0.00 (L/s)
Total Peak Flow: 0.02 (L/s)

TRAFALGAR ENGINEERING LTD.

ESTIMATED PROPOSED SANITARY FLOW

Project: 233 Robinson St
Desc: 1st Submission Site Alt Permit

Project No.: 1793
Prepared By: AJP
Checked By: JN

Residential

Land Use / Occupancy Type	Area (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/cap. Day)	Average Daily Dry Weather Flow (L/s)
Apartments - six stories or less	0.0392	420	17	360	0.07
TOTAL	0.0392		17		0.07

Industrial / Commercial / Institutional

Land Use / Occupancy Type	GFA	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/Ha. Day)	Average Daily Dry Weather Flow (L/s)
TOTAL	0		0		0.0

Residential Peaking Factor: 4.39
ICI Peaking Factor: 4.50
Include ICI Peaking? **No**
Tributary Area: **0.04** (ha)
Infiltration Allowance: **0.26** (L/s ha)
Foundation Drain Allowance: **0.00** (L/s ha)

Residential Average Flow: 0.08 (L/s)
ICI Average Flow: 0.00 (L/s)
Groundwater Discharge: (L/s)
Total Average Flow: 0.08 (L/s)

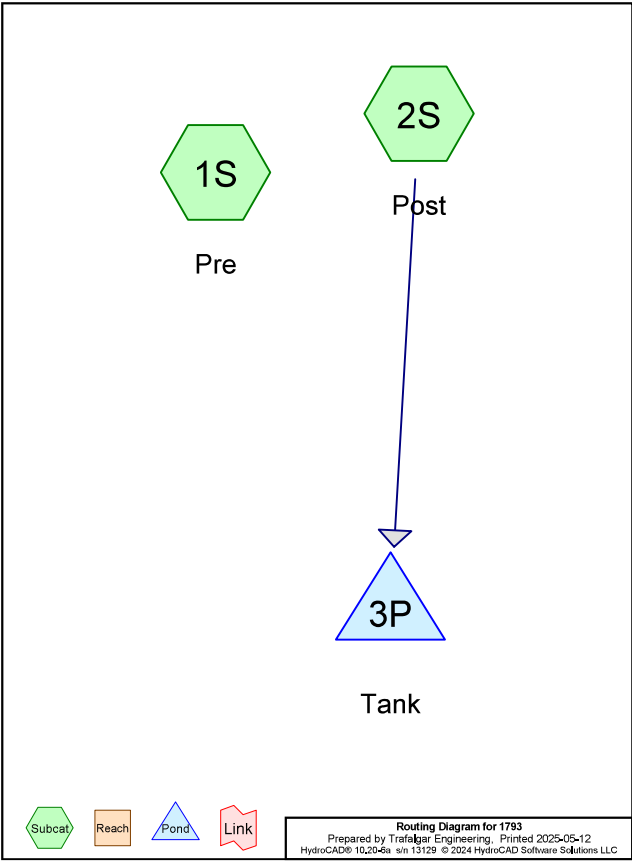
Residential Peak Flow: 0.30 (L/s)
ICI Peak Flow: 0.00 (L/s)
Groundwater Discharge: 0.00 (L/s)
Total Peak Flow: 0.30 (L/s)

APPENDIX 'D'

HydroCAD Results Report

Figure 1, Storm Drainage Plan

ZinCo Green Roof Specifications



Project Notes

Copied 6 events from ON Oakville 24hr storm

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (mm)	AMC
1	2-Year	ON Oakville 24hr	2-Year	Default	24.00	1	48	2
2	5-Year	ON Oakville 24hr	5-Year	Default	24.00	1	60	2
3	10-Year	ON Oakville 24hr	10-Year	Default	24.00	1	70	2
4	25-Year	ON Oakville 24hr	25-Year	Default	24.00	1	82	2
5	50-Year	ON Oakville 24hr	50-Year	Default	24.00	1	89	2
6	100-Year	ON Oakville 24hr	100-Year	Default	24.00	1	97	2

Area Listing (all nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
0.0392	98	(2S)
0.0141	61	>75% Grass cover, Good, HSG B (1S)
0.0251	98	Paved parking, HSG B (1S)
0.0784	91	TOTAL AREA

Soil Listing (all nodes)		
Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	1S
0.0392	HSG B	
0.0000	HSG C	
0.0000	HSG D	
0.0392	Other	2S
0.0784	TOTAL AREA	

Ground Covers (all nodes)						
HSG-A (hectares)	HSG-B (hectares)	HSG-C (hectares)	HSG-D (hectares)	Other (hectares)	Total (hectares)	Ground Cover
0.0000	0.0000	0.0000	0.0000	0.0392	0.0392	>75% Grass cover, Good
0.0000	0.0141	0.0000	0.0000	0.0000	0.0141	
0.0000	0.0251	0.0000	0.0000	0.0000	0.0251	Paved parking
0.0000	0.0392	0.0000	0.0000	0.0392	0.0784	TOTAL AREA

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Pre Runoff Area=392.0 m² 64.03% Impervious Runoff Depth=18 mm
Tc=10.0 min CN=85 Runoff=0.003 m³/s 0.007 MI

Subcatchment 2S: Post Runoff Area=392.0 m² 100.00% Impervious Runoff Depth=43 mm
Tc=10.0 min CN=98 Runoff=0.008 m³/s 0.017 MI

Pond 3P: Tank Peak Elev=82.261 m Storage=6.5 m³ Inflow=0.008 m³/s 0.017 MI
Outflow=0.006 m³/s 0.011 MI

Total Runoff Area = 0.0784 ha Runoff Volume = 0.024 MI Average Runoff Depth = 30 mm
17.98% Pervious = 0.0141 ha 82.02% Impervious = 0.0643 ha

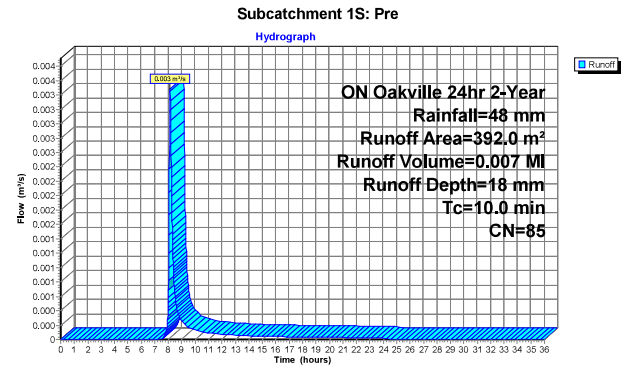
Summary for Subcatchment 1S: Pre

Runoff = 0.003 m³/s @ 8.14 hrs, Volume= 0.007 MI, Depth= 18 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
ON Oakville 24hr 2-Year Rainfall=48 mm

Area (m²)	CN	Description
141.0	61	>75% Grass cover, Good, HSG B
251.0	98	Paved parking, HSG B
392.0	85	Weighted Average
141.0		35.97% Pervious Area
251.0		64.03% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,



Hydrograph for Subcatchment 1S: Pre

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	48	18	0.000
0.50	0	0	0.000	26.50	48	18	0.000
1.00	1	0	0.000	27.00	48	18	0.000
1.50	1	0	0.000	27.50	48	18	0.000
2.00	1	0	0.000	28.00	48	18	0.000
2.50	2	0	0.000	28.50	48	18	0.000
3.00	2	0	0.000	29.00	48	18	0.000
3.50	2	0	0.000	29.50	48	18	0.000
4.00	3	0	0.000	30.00	48	18	0.000
4.50	3	0	0.000	30.50	48	18	0.000
5.00	4	0	0.000	31.00	48	18	0.000
5.50	5	0	0.000	31.50	48	18	0.000
6.00	5	0	0.000	32.00	48	18	0.000
6.50	6	0	0.000	32.50	48	18	0.000
7.00	8	0	0.000	33.00	48	18	0.000
7.50	10	0	0.000	33.50	48	18	0.000
8.00	22	3	0.001	34.00	48	18	0.000
8.50	35	10	0.001	34.50	48	18	0.000
9.00	37	11	0.000	35.00	48	18	0.000
9.50	39	12	0.000	35.50	48	18	0.000
10.00	40	12	0.000	36.00	48	18	0.000
10.50	40	13	0.000				
11.00	41	13	0.000				
11.50	42	14	0.000				
12.00	42	14	0.000				
12.50	43	14	0.000				
13.00	43	15	0.000				
13.50	43	15	0.000				
14.00	44	15	0.000				
14.50	44	15	0.000				
15.00	44	16	0.000				
15.50	45	16	0.000				
16.00	45	16	0.000				
16.50	45	16	0.000				
17.00	46	16	0.000				
17.50	46	17	0.000				
18.00	46	17	0.000				
18.50	46	17	0.000				
19.00	46	17	0.000				
19.50	47	17	0.000				
20.00	47	17	0.000				
20.50	47	17	0.000				
21.00	47	18	0.000				
21.50	47	18	0.000				
22.00	48	18	0.000				
22.50	48	18	0.000				
23.00	48	18	0.000				
23.50	48	18	0.000				
24.00	48	18	0.000				
24.50	48	18	0.000				
25.00	48	18	0.000				
25.50	48	18	0.000				

Hydrograph for Subcatchment 2S: Post

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	48	43	0.000
0.50	0	0	0.000	26.50	48	43	0.000
1.00	1	0	0.000	27.00	48	43	0.000
1.50	1	0	0.000	27.50	48	43	0.000
2.00	1	0	0.000	28.00	48	43	0.000
2.50	2	0	0.000	28.50	48	43	0.000
3.00	2	0	0.000	29.00	48	43	0.000
3.50	2	0	0.000	29.50	48	43	0.000
4.00	3	0	0.000	30.00	48	43	0.000
4.50	3	1	0.000	30.50	48	43	0.000
5.00	4	1	0.000	31.00	48	43	0.000
5.50	5	1	0.000	31.50	48	43	0.000
6.00	5	2	0.000	32.00	48	43	0.000
6.50	6	3	0.000	32.50	48	43	0.000
7.00	8	4	0.000	33.00	48	43	0.000
7.50	10	6	0.000	33.50	48	43	0.000
8.00	22	17	0.003	34.00	48	43	0.000
8.50	35	29	0.001	34.50	48	43	0.000
9.00	37	32	0.000	35.00	48	43	0.000
9.50	39	33	0.000	35.50	48	43	0.000
10.00	40	34	0.000	36.00	48	43	0.000
10.50	40	35	0.000				
11.00	41	35	0.000				
11.50	42	36	0.000				
12.00	42	36	0.000				
12.50	43	37	0.000				
13.00	43	37	0.000				
13.50	43	38	0.000				
14.00	44	38	0.000				
14.50	44	38	0.000				
15.00	44	39	0.000				
15.50	45	39	0.000				
16.00	45	39	0.000				
16.50	45	40	0.000				
17.00	46	40	0.000				
17.50	46	40	0.000				
18.00	46	40	0.000				
18.50	46	41	0.000				
19.00	46	41	0.000				
19.50	47	41	0.000				
20.00	47	41	0.000				
20.50	47	41	0.000				
21.00	47	42	0.000				
21.50	47	42	0.000				
22.00	48	42	0.000				
22.50	48	42	0.000				
23.00	48	42	0.000				
23.50	48	42	0.000				
24.00	48	43	0.000				
24.50	48	43	0.000				
25.00	48	43	0.000				
25.50	48	43	0.000				

Summary for Subcatchment 2S: Post

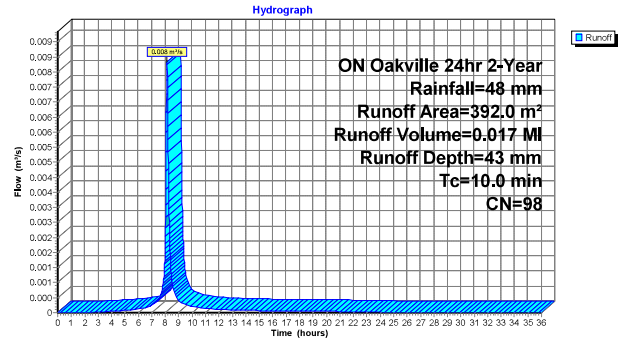
Runoff = 0.008 m³/s @ 8.13 hrs, Volume= 0.017 MI, Depth= 43 mm
Routed to Pond 3P : Tank

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
ON Oakville 24hr 2-Year Rainfall=48 mm

Area (m²)	CN	Description
* 392.0	98	
392.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 2S: Post



Summary for Pond 3P: Tank

Inflow Area = 0.0392 ha, 100.00% Impervious, Inflow Depth = 43 mm for 2-Year event
Inflow = 0.008 m³/s @ 8.13 hrs, Volume= 0.017 MI
Outflow = 0.006 m³/s @ 8.20 hrs, Volume= 0.011 MI, Atten= 26%, Lag= 4.2 min
Primary = 0.006 m³/s @ 8.20 hrs, Volume= 0.011 MI

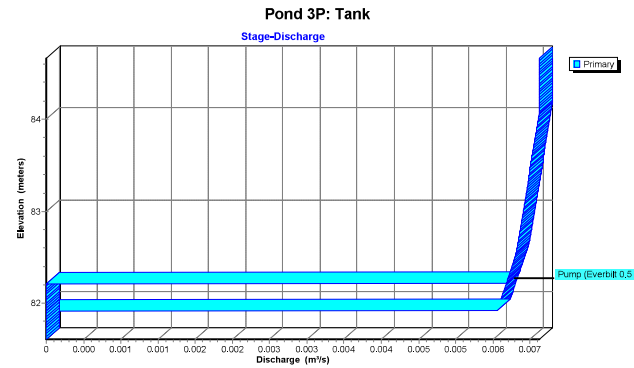
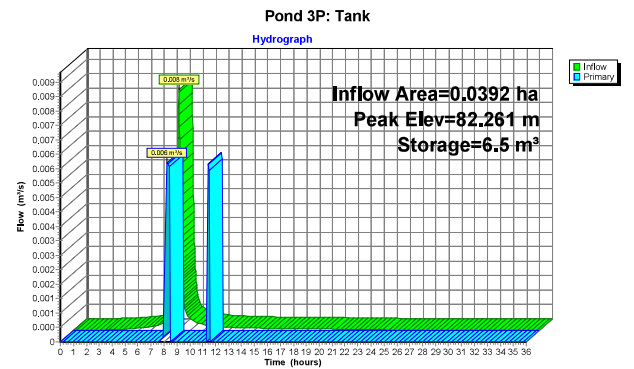
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 82.261 m @ 8.20 hrs Surf.Area= 10.0 m² Storage= 6.5 m³

Plug-Flow detention time= 85.1 min calculated for 0.011 MI (66% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	81.610 m	30.5 m³	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
81.610	10.0	0.0	0.0
84.660	10.0	30.5	30.5

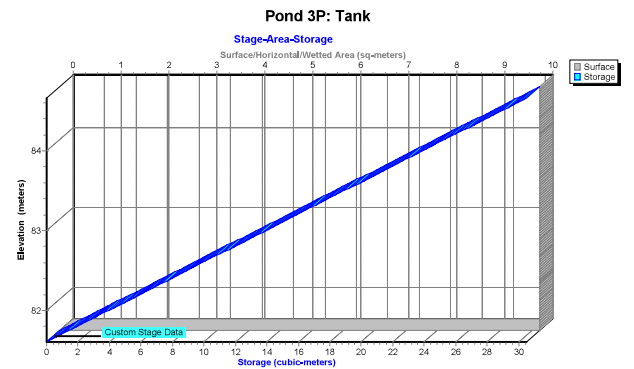
Device	Routing	Invert	Outlet Devices (Turned on 2 times)
#1	Primary	82.210 m	Pump (Everbilt 0.5 hp) X 1.50 Discharges@84.660 m Turns Off<81.920 m 150 mm Diam. x 2.50 m Long Discharge, Hazen-Williams C= 130 Flow (l/min)= 75.7 151.4 201.7 227.1 252.5 264.9 Head (meters)= 7.620 6.096 4.572 3.048 1.524 0.000 -Loss (meters)= 0.000 0.001 0.001 0.001 0.001 0.001 =Lift (meters)= 7.620 6.095 4.571 3.047 1.523 -0.001

Primary OutFlow Max=0.006 m³/s @ 8.20 hrs HW=82.261 m (Free Discharge)
1=Pump (Everbilt 0.5 hp) (Pump Controls 0.006 m³/s)



Hydrograph for Pond 3P: Tank

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Primary (m³/s)
0.00	0.000	0.0	81.610	0.000
1.00	0.000	0.0	81.610	0.000
2.00	0.000	0.0	81.610	0.000
3.00	0.000	0.0	81.615	0.000
4.00	0.000	0.2	81.626	0.000
5.00	0.000	0.4	81.648	0.000
6.00	0.000	0.7	81.683	0.000
7.00	0.000	1.4	81.746	0.000
8.00	0.003	3.7	81.975	0.000
9.00	0.000	4.2	82.030	0.000
10.00	0.000	5.2	82.131	0.000
11.00	0.000	5.8	82.192	0.000
12.00	0.000	3.2	81.930	0.000
13.00	0.000	3.6	81.966	0.000
14.00	0.000	3.9	81.995	0.000
15.00	0.000	4.1	82.021	0.000
16.00	0.000	4.3	82.044	0.000
17.00	0.000	4.5	82.065	0.000
18.00	0.000	4.7	82.084	0.000
19.00	0.000	4.9	82.101	0.000
20.00	0.000	5.1	82.117	0.000
21.00	0.000	5.2	82.132	0.000
22.00	0.000	5.4	82.146	0.000
23.00	0.000	5.5	82.159	0.000
24.00	0.000	5.6	82.172	0.000
25.00	0.000	5.6	82.174	0.000
26.00	0.000	5.6	82.174	0.000
27.00	0.000	5.6	82.174	0.000
28.00	0.000	5.6	82.174	0.000
29.00	0.000	5.6	82.174	0.000
30.00	0.000	5.6	82.174	0.000
31.00	0.000	5.6	82.174	0.000
32.00	0.000	5.6	82.174	0.000
33.00	0.000	5.6	82.174	0.000
34.00	0.000	5.6	82.174	0.000
35.00	0.000	5.6	82.174	0.000
36.00	0.000	5.6	82.174	0.000



Stage-Discharge for Pond 3P: Tank

Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)	Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)
81.610	0.000	0.000	84.210	0.007	0.007
81.660	0.000	0.000	84.260	0.007	0.007
81.710	0.000	0.000	84.310	0.007	0.007
81.760	0.000	0.000	84.360	0.007	0.007
81.810	0.000	0.000	84.410	0.007	0.007
81.860	0.000	0.000	84.460	0.007	0.007
81.910	0.000	0.000	84.510	0.007	0.007
81.960	0.000	0.006	84.560	0.007	0.007
82.010	0.000	0.006	84.610	0.007	0.007
82.060	0.000	0.006	84.660	0.007	0.007
82.110	0.000	0.006			
82.160	0.000	0.006			
82.210	0.000	0.006			
82.260	0.006	0.006			
82.310	0.006	0.006			
82.360	0.006	0.006			
82.410	0.006	0.006			
82.460	0.006	0.006			
82.510	0.006	0.006			
82.560	0.006	0.006			
82.610	0.006	0.006			
82.660	0.006	0.006			
82.710	0.006	0.006			
82.760	0.006	0.006			
82.810	0.006	0.006			
82.860	0.006	0.006			
82.910	0.006	0.006			
82.960	0.006	0.006			
83.010	0.006	0.006			
83.060	0.006	0.006			
83.110	0.006	0.006			
83.160	0.006	0.006			
83.210	0.006	0.006			
83.260	0.006	0.006			
83.310	0.006	0.006			
83.360	0.006	0.006			
83.410	0.006	0.006			
83.460	0.007	0.007			
83.510	0.007	0.007			
83.560	0.007	0.007			
83.610	0.007	0.007			
83.660	0.007	0.007			
83.710	0.007	0.007			
83.760	0.007	0.007			
83.810	0.007	0.007			
83.860	0.007	0.007			
83.910	0.007	0.007			
83.960	0.007	0.007			
84.010	0.007	0.007			
84.060	0.007	0.007			
84.110	0.007	0.007			
84.160	0.007	0.007			

Stage-Area-Storage for Pond 3P: Tank					
Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)	Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)
81,610	10.0	0.0	84,210	10.0	26.0
81,660	10.0	0.5	84,260	10.0	26.5
81,710	10.0	1.0	84,310	10.0	27.0
81,760	10.0	1.5	84,360	10.0	27.5
81,810	10.0	2.0	84,410	10.0	28.0
81,860	10.0	2.5	84,460	10.0	28.5
81,910	10.0	3.0	84,510	10.0	29.0
81,960	10.0	3.5	84,560	10.0	29.5
82,010	10.0	4.0	84,610	10.0	30.0
82,060	10.0	4.5	84,660	10.0	30.5
82,110	10.0	5.0			
82,160	10.0	5.5			
82,210	10.0	6.0			
82,260	10.0	6.5			
82,310	10.0	7.0			
82,360	10.0	7.5			
82,410	10.0	8.0			
82,460	10.0	8.5			
82,510	10.0	9.0			
82,560	10.0	9.5			
82,610	10.0	10.0			
82,660	10.0	10.5			
82,710	10.0	11.0			
82,760	10.0	11.5			
82,810	10.0	12.0			
82,860	10.0	12.5			
82,910	10.0	13.0			
82,960	10.0	13.5			
83,010	10.0	14.0			
83,060	10.0	14.5			
83,110	10.0	15.0			
83,160	10.0	15.5			
83,210	10.0	16.0			
83,260	10.0	16.5			
83,310	10.0	17.0			
83,360	10.0	17.5			
83,410	10.0	18.0			
83,460	10.0	18.5			
83,510	10.0	19.0			
83,560	10.0	19.5			
83,610	10.0	20.0			
83,660	10.0	20.5			
83,710	10.0	21.0			
83,760	10.0	21.5			
83,810	10.0	22.0			
83,860	10.0	22.5			
83,910	10.0	23.0			
83,960	10.0	23.5			
84,010	10.0	24.0			
84,060	10.0	24.5			
84,110	10.0	25.0			
84,160	10.0	25.5			

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Pre

Runoff Area=392.0 m² 64.03% Impervious Runoff Depth=27 mm
Tc=10.0 min CN=85 Runoff=0.006 m³/s 0.011 MI

Subcatchment 2S: Post

Runoff Area=392.0 m² 100.00% Impervious Runoff Depth=55 mm
Tc=10.0 min CN=98 Runoff=0.012 m³/s 0.021 MI

Pond 3P: Tank

Peak Elev=82.436 m Storage=8.3 m³ Inflow=0.012 m³/s 0.021 MI
Outflow=0.006 m³/s 0.016 MI

Total Runoff Area = 0,0784 ha Runoff Volume = 0,032 MI Average Runoff Depth = 41 mm

17.98% Pervious = 0,0141 ha 82.02% Impervious = 0,0643 ha

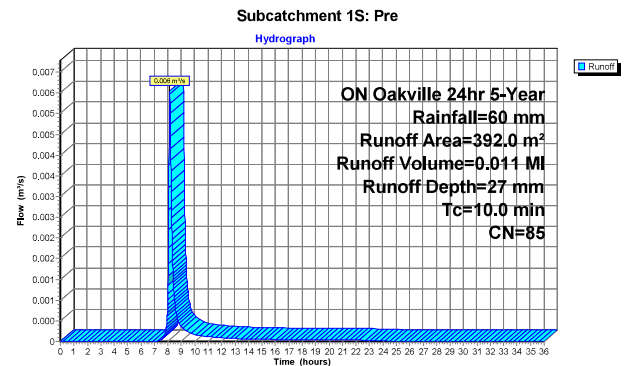
Summary for Subcatchment 1S: Pre

Runoff = 0.006 m³/s @ 8.14 hrs, Volume= 0.011 MI, Depth= 27 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
ON Oakville 24hr 5-Year Rainfall=60 mm

Area (m²)	CN	Description
141.0	61	>75% Grass cover, Good, HSG B
251.0	98	Paved parking, HSG B
392.0	85	Weighted Average
141.0		35.97% Pervious Area
251.0		64.03% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,



Hydrograph for Subcatchment 1S: Pre

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	60	27	0.000
0.50	0	0	0.000	26.50	60	27	0.000
1.00	1	0	0.000	27.00	60	27	0.000
1.50	1	0	0.000	27.50	60	27	0.000
2.00	1	0	0.000	28.00	60	27	0.000
2.50	2	0	0.000	28.50	60	27	0.000
3.00	2	0	0.000	29.00	60	27	0.000
3.50	3	0	0.000	29.50	60	27	0.000
4.00	3	0	0.000	30.00	60	27	0.000
4.50	4	0	0.000	30.50	60	27	0.000
5.00	4	0	0.000	31.00	60	27	0.000
5.50	5	0	0.000	31.50	60	27	0.000
6.00	6	0	0.000	32.00	60	27	0.000
6.50	7	0	0.000	32.50	60	27	0.000
7.00	9	0	0.000	33.00	60	27	0.000
7.50	11	0	0.000	33.50	60	27	0.000
8.00	29	6	0.001	34.00	60	27	0.000
8.50	46	17	0.001	34.50	60	27	0.000
9.00	48	18	0.000	35.00	60	27	0.000
9.50	50	20	0.000	35.50	60	27	0.000
10.00	51	20	0.000	36.00	60	27	0.000
10.50	52	21	0.000				
11.00	53	22	0.000				
11.50	53	22	0.000				
12.00	54	23	0.000				
12.50	54	23	0.000				
13.00	55	23	0.000				
13.50	55	24	0.000				
14.00	56	24	0.000				
14.50	56	24	0.000				
15.00	56	24	0.000				
15.50	57	25	0.000				
16.00	57	25	0.000				
16.50	57	25	0.000				
17.00	58	25	0.000				
17.50	58	25	0.000				
18.00	58	26	0.000				
18.50	58	26	0.000				
19.00	59	26	0.000				
19.50	59	26	0.000				
20.00	59	26	0.000				
20.50	59	27	0.000				
21.00	59	27	0.000				
21.50	60	27	0.000				
22.00	60	27	0.000				
22.50	60	27	0.000				
23.00	60	27	0.000				
23.50	60	27	0.000				
24.00	60	27	0.000				
24.50	60	27	0.000				
25.00	60	27	0.000				
25.50	60	27	0.000				

Summary for Subcatchment 2S: Post

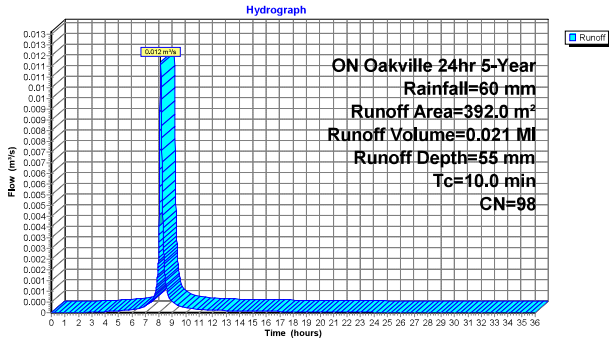
Runoff = 0.012 m³/s @ 8.13 hrs, Volume= 0.021 MI, Depth= 55 mm
Routed to Pond 3P : Tank

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
ON Oakville 24hr 5-Year Rainfall=60 mm

Area (m²)	CN	Description
* 392.0	98	
392.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 2S: Post



Summary for Pond 3P: Tank

Inflow Area = 0.0392 ha, 100.00% Impervious, Inflow Depth = 55 mm for 5-Year event
Inflow = 0.012 m³/s @ 8.13 hrs, Volume= 0.021 MI
Outflow = 0.006 m³/s @ 8.25 hrs, Volume= 0.016 MI, Atten= 46%, Lag= 6.9 min
Primary = 0.006 m³/s @ 8.25 hrs, Volume= 0.016 MI

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 82.436 m @ 8.25 hrs Surf.Area= 10.0 m² Storage= 8.3 m³

Plug-Flow detention time= 66.6 min calculated for 0.016 MI (73% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1 81.610 m		30.5 m³	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
81.610	10.0	0.0	0.0
84.660	10.0	30.5	30.5

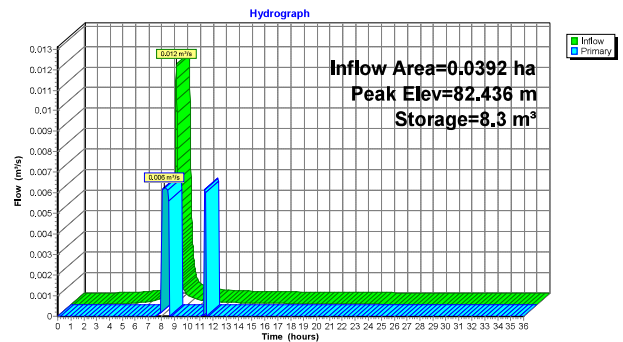
Device	Routing	Invert	Outlet Devices (Turned on 2 times)
#1	Primary	82.210 m	Pump (Everbilt 0.5 hp) X 1.50 Discharges@84.060 m Turns Off<81.920 m 150 mm Diam. x 2.50 m Long Discharge, Hazen-Williams C= 130 Flow (l/min)= 75.7 151.4 201.7 227.1 252.5 264.9 Head (meters)= 7.620 6.096 4.572 3.048 1.524 0.000 -Loss (meters)= 0.000 0.001 0.001 0.001 0.001 0.001 =Lift (meters)= 7.620 6.095 4.571 3.047 1.523 -0.001

Primary OutFlow Max=0.006 m³/s @ 8.25 hrs HW=82.436 m (Free Discharge)
1=Pump (Everbilt 0.5 hp) (Pump Controls 0.006 m³/s)

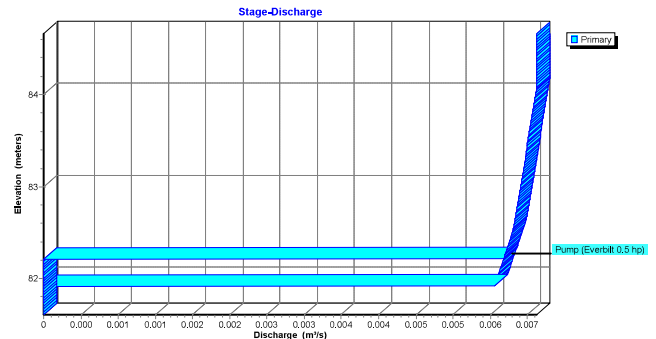
Hydrograph for Subcatchment 2S: Post

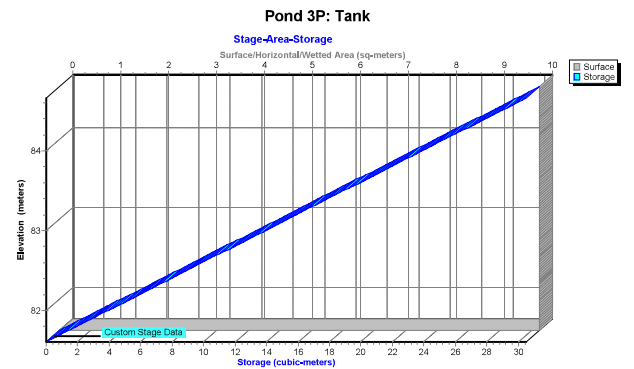
Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	60	55	0.000
0.50	0	0	0.000	26.50	60	55	0.000
1.00	1	0	0.000	27.00	60	55	0.000
1.50	1	0	0.000	27.50	60	55	0.000
2.00	1	0	0.000	28.00	60	55	0.000
2.50	2	0	0.000	28.50	60	55	0.000
3.00	2	0	0.000	29.00	60	55	0.000
3.50	3	0	0.000	29.50	60	55	0.000
4.00	3	1	0.000	30.00	60	55	0.000
4.50	4	1	0.000	30.50	60	55	0.000
5.00	4	1	0.000	31.00	60	55	0.000
5.50	5	2	0.000	31.50	60	55	0.000
6.00	6	2	0.000	32.00	60	55	0.000
6.50	7	3	0.000	32.50	60	55	0.000
7.00	9	5	0.000	33.00	60	55	0.000
7.50	11	7	0.001	33.50	60	55	0.000
8.00	29	23	0.004	34.00	60	55	0.000
8.50	46	40	0.001	34.50	60	55	0.000
9.00	48	43	0.001	35.00	60	55	0.000
9.50	50	44	0.000	35.50	60	55	0.000
10.00	51	45	0.000	36.00	60	55	0.000
10.50	52	46	0.000				
11.00	53	47	0.000				
11.50	53	48	0.000				
12.00	54	48	0.000				
12.50	54	49	0.000				
13.00	55	49	0.000				
13.50	55	50	0.000				
14.00	56	50	0.000				
14.50	56	50	0.000				
15.00	56	51	0.000				
15.50	57	51	0.000				
16.00	57	51	0.000				
16.50	57	52	0.000				
17.00	58	52	0.000				
17.50	58	52	0.000				
18.00	58	52	0.000				
18.50	58	53	0.000				
19.00	59	53	0.000				
19.50	59	53	0.000				
20.00	59	53	0.000				
20.50	59	53	0.000				
21.00	59	54	0.000				
21.50	60	54	0.000				
22.00	60	54	0.000				
22.50	60	54	0.000				
23.00	60	54	0.000				
23.50	60	54	0.000				
24.00	60	55	0.000				
24.50	60	55	0.000				
25.00	60	55	0.000				
25.50	60	55	0.000				

Pond 3P: Tank



Pond 3P: Tank





Hydrograph for Pond 3P: Tank				
Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Primary (m³/s)
0.00	0.000	0.0	81.610	0.000
1.00	0.000	0.0	81.610	0.000
2.00	0.000	0.0	81.610	0.000
3.00	0.000	0.1	81.616	0.000
4.00	0.000	0.2	81.629	0.000
5.00	0.000	0.4	81.654	0.000
6.00	0.000	0.8	81.694	0.000
7.00	0.000	1.6	81.769	0.000
8.00	0.004	4.6	82.074	0.000
9.00	0.001	4.0	82.006	0.000
10.00	0.000	5.2	82.125	0.000
11.00	0.000	5.8	82.193	0.000
12.00	0.000	3.2	81.934	0.000
13.00	0.000	3.6	81.973	0.000
14.00	0.000	4.0	82.005	0.000
15.00	0.000	4.2	82.033	0.000
16.00	0.000	4.5	82.057	0.000
17.00	0.000	4.7	82.079	0.000
18.00	0.000	4.9	82.098	0.000
19.00	0.000	5.1	82.116	0.000
20.00	0.000	5.2	82.133	0.000
21.00	0.000	5.4	82.148	0.000
22.00	0.000	5.5	82.163	0.000
23.00	0.000	5.7	82.176	0.000
24.00	0.000	5.8	82.189	0.000
25.00	0.000	5.8	82.191	0.000
26.00	0.000	5.8	82.191	0.000
27.00	0.000	5.8	82.191	0.000
28.00	0.000	5.8	82.191	0.000
29.00	0.000	5.8	82.191	0.000
30.00	0.000	5.8	82.191	0.000
31.00	0.000	5.8	82.191	0.000
32.00	0.000	5.8	82.191	0.000
33.00	0.000	5.8	82.191	0.000
34.00	0.000	5.8	82.191	0.000
35.00	0.000	5.8	82.191	0.000
36.00	0.000	5.8	82.191	0.000

Stage-Discharge for Pond 3P: Tank			
Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)	
81.610	0.000	0.000	
81.660	0.000	0.000	
81.710	0.000	0.000	
81.760	0.000	0.000	
81.810	0.000	0.000	
81.860	0.000	0.000	
81.910	0.000	0.000	
81.960	0.000	0.006	
82.010	0.000	0.006	
82.060	0.000	0.006	
82.110	0.000	0.006	
82.160	0.000	0.006	
82.210	0.000	0.006	
82.260	0.006	0.006	
82.310	0.006	0.006	
82.360	0.006	0.006	
82.410	0.006	0.006	
82.460	0.006	0.006	
82.510	0.006	0.006	
82.560	0.006	0.006	
82.610	0.006	0.006	
82.660	0.006	0.006	
82.710	0.006	0.006	
82.760	0.006	0.006	
82.810	0.006	0.006	
82.860	0.006	0.006	
82.910	0.006	0.006	
82.960	0.006	0.006	
83.010	0.006	0.006	
83.060	0.006	0.006	
83.110	0.006	0.006	
83.160	0.006	0.006	
83.210	0.006	0.006	
83.260	0.006	0.006	
83.310	0.006	0.006	
83.360	0.006	0.006	
83.410	0.006	0.006	
83.460	0.007	0.007	
83.510	0.007	0.007	
83.560	0.007	0.007	
83.610	0.007	0.007	
83.660	0.007	0.007	
83.710	0.007	0.007	
83.760	0.007	0.007	
83.810	0.007	0.007	
83.860	0.007	0.007	
83.910	0.007	0.007	
83.960	0.007	0.007	
84.010	0.007	0.007	
84.060	0.007	0.007	
84.110	0.007	0.007	
84.160	0.007	0.007	

Stage-Area-Storage for Pond 3P: Tank					
Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)	Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)
81.610	10.0	0.0	84.210	10.0	26.0
81.660	10.0	0.5	84.260	10.0	26.5
81.710	10.0	1.0	84.310	10.0	27.0
81.760	10.0	1.5	84.360	10.0	27.5
81.810	10.0	2.0	84.410	10.0	28.0
81.860	10.0	2.5	84.460	10.0	28.5
81.910	10.0	3.0	84.510	10.0	29.0
81.960	10.0	3.5	84.560	10.0	29.5
82.010	10.0	4.0	84.610	10.0	30.0
82.060	10.0	4.5	84.660	10.0	30.5
82.110	10.0	5.0			
82.160	10.0	5.5			
82.210	10.0	6.0			
82.260	10.0	6.5			
82.310	10.0	7.0			
82.360	10.0	7.5			
82.410	10.0	8.0			
82.460	10.0	8.5			
82.510	10.0	9.0			
82.560	10.0	9.5			
82.610	10.0	10.0			
82.660	10.0	10.5			
82.710	10.0	11.0			
82.760	10.0	11.5			
82.810	10.0	12.0			
82.860	10.0	12.5			
82.910	10.0	13.0			
82.960	10.0	13.5			
83.010	10.0	14.0			
83.060	10.0	14.5			
83.110	10.0	15.0			
83.160	10.0	15.5			
83.210	10.0	16.0			
83.260	10.0	16.5			
83.310	10.0	17.0			
83.360	10.0	17.5			
83.410	10.0	18.0			
83.460	10.0	18.5			
83.510	10.0	19.0			
83.560	10.0	19.5			
83.610	10.0	20.0			
83.660	10.0	20.5			
83.710	10.0	21.0			
83.760	10.0	21.5			
83.810	10.0	22.0			
83.860	10.0	22.5			
83.910	10.0	23.0			
83.960	10.0	23.5			
84.010	10.0	24.0			
84.060	10.0	24.5			
84.110	10.0	25.0			
84.160	10.0	25.5			

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Pre

Runoff Area=392.0 m² 64.03% Impervious Runoff Depth=35 mm

Tc=10.0 min CN=85 Runoff=0.008 m³/s 0.014 MI

Subcatchment 2S: Post

Runoff Area=392.0 m² 100.00% Impervious Runoff Depth=64 mm

Tc=10.0 min CN=98 Runoff=0.014 m³/s 0.025 MI

Pond 3P: Tank

Peak Elev=82.580 m Storage=9.7 m³ Inflow=0.014 m³/s 0.025 MI

Outflow=0.006 m³/s 0.022 MI

Total Runoff Area = 0.0784 ha Runoff Volume = 0.039 MI Average Runoff Depth = 49 mm

17.98% Pervious = 0.0141 ha 82.02% Impervious = 0.0643 ha

Summary for Subcatchment 1S: Pre

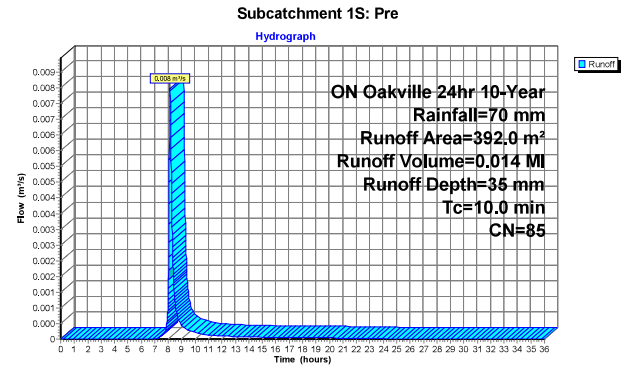
Runoff = 0.008 m³/s @ 8.14 hrs, Volume= 0.014 MI, Depth= 35 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

ON Oakville 24hr 10-Year Rainfall=70 mm

Area (m²)	CN	Description
141.0	61	>75% Grass cover, Good, HSG B
251.0	98	Paved parking, HSG B
392.0	85	Weighted Average
141.0		35.97% Pervious Area
251.0		64.03% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,



Hydrograph for Subcatchment 1S: Pre

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	70	35	0.000
0.50	0	0	0.000	26.50	70	35	0.000
1.00	1	0	0.000	27.00	70	35	0.000
1.50	1	0	0.000	27.50	70	35	0.000
2.00	1	0	0.000	28.00	70	35	0.000
2.50	2	0	0.000	28.50	70	35	0.000
3.00	2	0	0.000	29.00	70	35	0.000
3.50	3	0	0.000	29.50	70	35	0.000
4.00	3	0	0.000	30.00	70	35	0.000
4.50	4	0	0.000	30.50	70	35	0.000
5.00	5	0	0.000	31.00	70	35	0.000
5.50	6	0	0.000	31.50	70	35	0.000
6.00	7	0	0.000	32.00	70	35	0.000
6.50	8	0	0.000	32.50	70	35	0.000
7.00	10	0	0.000	33.00	70	35	0.000
7.50	13	0	0.000	33.50	70	35	0.000
8.00	33	8	0.002	34.00	70	35	0.000
8.50	53	22	0.001	34.50	70	35	0.000
9.00	56	24	0.000	35.00	70	35	0.000
9.50	58	26	0.000	35.50	70	35	0.000
10.00	59	27	0.000	36.00	70	35	0.000
10.50	60	27	0.000				
11.00	61	28	0.000				
11.50	62	29	0.000				
12.00	62	29	0.000				
12.50	63	30	0.000				
13.00	64	30	0.000				
13.50	64	30	0.000				
14.00	64	31	0.000				
14.50	65	31	0.000				
15.00	65	31	0.000				
15.50	66	32	0.000				
16.00	66	32	0.000				
16.50	66	32	0.000				
17.00	67	32	0.000				
17.50	67	33	0.000				
18.00	67	33	0.000				
18.50	67	33	0.000				
19.00	68	33	0.000				
19.50	68	33	0.000				
20.00	68	34	0.000				
20.50	68	34	0.000				
21.00	69	34	0.000				
21.50	69	34	0.000				
22.00	69	34	0.000				
22.50	69	34	0.000				
23.00	69	35	0.000				
23.50	70	35	0.000				
24.00	70	35	0.000				
24.50	70	35	0.000				
25.00	70	35	0.000				
25.50	70	35	0.000				

Summary for Subcatchment 2S: Post

Runoff = 0.014 m³/s @ 8.13 hrs, Volume= 0.025 MI, Depth= 64 mm

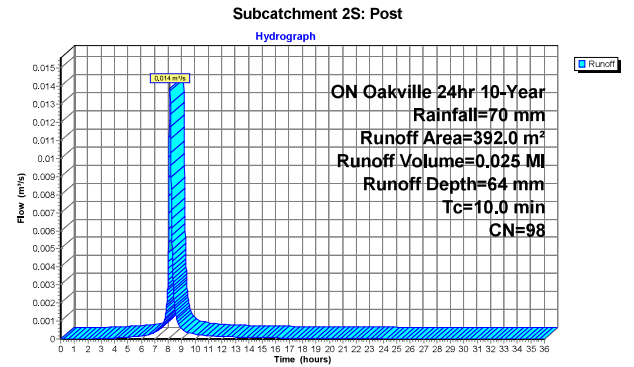
Routed to Pond 3P: Tank

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

ON Oakville 24hr 10-Year Rainfall=70 mm

Area (m²)	CN	Description
392.0	98	
392.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,



Hydrograph for Subcatchment 2S: Post

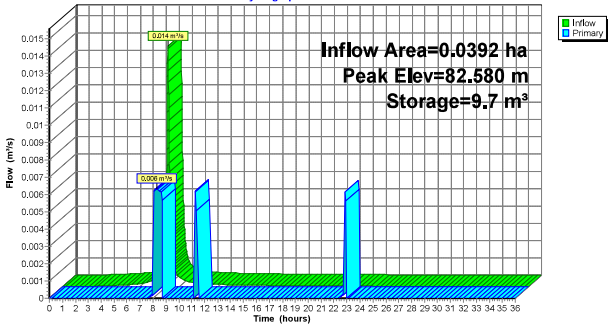
Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	70	64	0.000
0.50	0	0	0.000	26.50	70	64	0.000
1.00	1	0	0.000	27.00	70	64	0.000
1.50	1	0	0.000	27.50	70	64	0.000
2.00	1	0	0.000	28.00	70	64	0.000
2.50	2	0	0.000	28.50	70	64	0.000
3.00	2	0	0.000	29.00	70	64	0.000
3.50	3	0	0.000	29.50	70	64	0.000
4.00	3	1	0.000	30.00	70	64	0.000
4.50	4	1	0.000	30.50	70	64	0.000
5.00	5	2	0.000	31.00	70	64	0.000
5.50	6	2	0.000	31.50	70	64	0.000
6.00	7	3	0.000	32.00	70	64	0.000
6.50	8	4	0.000	32.50	70	64	0.000
7.00	10	5	0.000	33.00	70	64	0.000
7.50	13	8	0.001	33.50	70	64	0.000
8.00	33	27	0.004	34.00	70	64	0.000
8.50	53	47	0.002	34.50	70	64	0.000
9.00	56	50	0.001	35.00	70	64	0.000
9.50	58	52	0.000	35.50	70	64	0.000
10.00	59	53	0.000	36.00	70	64	0.000
10.50	60	54	0.000				
11.00	61	55	0.000				
11.50	62	56	0.000				
12.00	62	57	0.000				
12.50	63	57	0.000				
13.00	64	58	0.000				
13.50	64	58	0.000				
14.00	64	59	0.000				
14.50	65	59	0.000				
15.00	65	59	0.000				
15.50	66	60	0.000				
16.00	66	60	0.000				
16.50	66	60	0.000				
17.00	67	61	0.000				
17.50	67	61	0.000				
18.00	67	61	0.000				
18.50	67	62	0.000				
19.00	68	62	0.000				
19.50	68	62	0.000				
20.00	68	62	0.000				
20.50	69	62	0.000				
21.00	69	63	0.000				
21.50	69	63	0.000				
22.00	69	63	0.000				
22.50	69	63	0.000				
23.00	69	63	0.000				
23.50	70	64	0.000				
24.00	70	64	0.000				
24.50	70	64	0.000				
25.00	70	64	0.000				
25.50	70	64	0.000				

Summary for Pond 3P: Tank

Inflow Area =	0.0392 ha,100.00% Impervious, Inflow Depth =	64 mm	for 10-Year event
Inflow =	0.014 m³/s @	8.13 hrs, Volume=	0.025 MI
Outflow =	0.006 m³/s @	8.27 hrs, Volume=	0.022 MI, Atten= 55%, Lag= 8.2 min
Primary =	0.006 m³/s @	8.27 hrs, Volume=	0.022 MI
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs			
Peak Elev= 82.580 m @ 8.27 hrs Surf.Area= 10.0 m² Storage= 9.7 m³			
Plug-Flow detention time= 160.6 min calculated for 0.022 MI (87% of inflow)			
Center-of-Mass det. time= 97.4 min (646.6 - 549.2)			
Volume Invert Avail.Storage Storage Description			
#1	81.610 m	30.5 m³	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (meters) Surf.Area (sq-meters) Inc.Store (cubic-meters) Cum.Store (cubic-meters)			
81.610	10.0	0.0	0.0
84.660	10.0	30.5	30.5
Device Routing Invert Outlet Devices (Turned on 3 times)			
#1	Primary	82.210 m	Pump (Everbilt 0.5 hp) X 1.50
Discharges@84.060 m Turns Off-81.920 m			
150 mm Diam. x 2.50 m Long Discharge, Hazen-Williams C= 130			
Flow (l/min)= 75.7 151.4 201.7 252.5 264.9			
Head (meters)= 7.620 6.096 4.572 3.048 1.524 0.000			
-Loss (meters)= 0.000 0.001 0.001 0.001 0.001 0.001			
=Lift (meters)= 7.620 6.095 4.571 3.047 1.523 -0.001			
Primary OutFlow Max=0.006 m³/s @ 8.27 hrs HW=82.580 m (Free Discharge)			
1=Pump (Everbilt 0.5 hp) (Pump Controls 0.006 m³/s)			

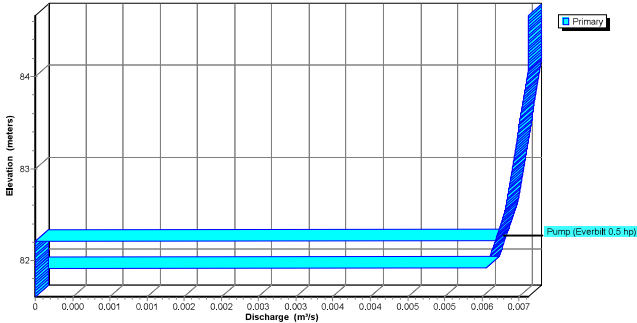
Pond 3P: Tank

Hydrograph



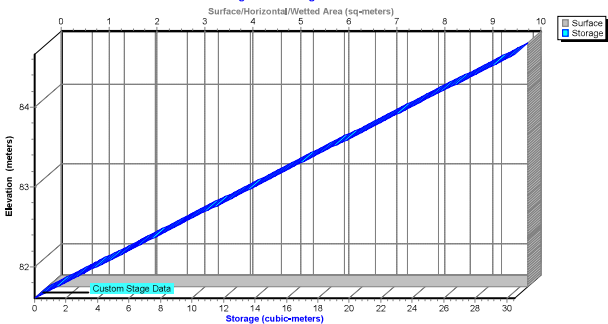
Pond 3P: Tank

Stage-Discharge



Pond 3P: Tank

Stage-Area-Storage



Hydrograph for Pond 3P: Tank

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Primary (m³/s)
0.00	0.000	0.0	81,610	0.000
1.00	0.000	0.0	81,610	0.000
2.00	0.000	0.0	81,611	0.000
3.00	0.000	0.1	81,619	0.000
4.00	0.000	0.3	81,636	0.000
5.00	0.000	0.6	81,666	0.000
6.00	0.000	1.0	81,715	0.000
7.00	0.000	1.9	81,803	0.000
8.00	0.004	5.5	82,162	0.000
9.00	0.001	3.7	81,982	0.000
10.00	0.000	5.1	82,118	0.000
11.00	0.000	5.9	82,195	0.000
12.00	0.000	3.3	81,941	0.000
13.00	0.000	3.7	81,985	0.000
14.00	0.000	4.1	82,021	0.000
15.00	0.000	4.4	82,052	0.000
16.00	0.000	4.7	82,079	0.000
17.00	0.000	4.9	82,103	0.000
18.00	0.000	5.2	82,125	0.000
19.00	0.000	5.4	82,146	0.000
20.00	0.000	5.5	82,164	0.000
21.00	0.000	5.7	82,181	0.000
22.00	0.000	5.9	82,198	0.000
23.00	0.000	3.0	81,915	0.000
24.00	0.000	3.2	81,929	0.000
25.00	0.000	3.2	81,931	0.000
26.00	0.000	3.2	81,931	0.000
27.00	0.000	3.2	81,931	0.000
28.00	0.000	3.2	81,931	0.000
29.00	0.000	3.2	81,931	0.000
30.00	0.000	3.2	81,931	0.000
31.00	0.000	3.2	81,931	0.000
32.00	0.000	3.2	81,931	0.000
33.00	0.000	3.2	81,931	0.000
34.00	0.000	3.2	81,931	0.000
35.00	0.000	3.2	81,931	0.000
36.00	0.000	3.2	81,931	0.000

Stage-Discharge for Pond 3P: Tank

Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)	Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)
81,610	0.000	0.000	84,210	0.007	0.007
81,660	0.000	0.000	84,260	0.007	0.007
81,710	0.000	0.000	84,310	0.007	0.007
81,760	0.000	0.000	84,360	0.007	0.007
81,810	0.000	0.000	84,410	0.007	0.007
81,860	0.000	0.000	84,460	0.007	0.007
81,910	0.000	0.000	84,510	0.007	0.007
81,960	0.000	0.006	84,560	0.007	0.007
82,010	0.000	0.006	84,610	0.007	0.007
82,060	0.000	0.006	84,660	0.007	0.007
82,110	0.000	0.006			
82,160	0.000	0.006			
82,210	0.000	0.006			
82,260	0.006	0.006			
82,310	0.006	0.006			
82,360	0.006	0.006			
82,410	0.006	0.006			
82,460	0.006	0.006			
82,510	0.006	0.006			
82,560	0.006	0.006			
82,610	0.006	0.006			
82,660	0.006	0.006			
82,710	0.006	0.006			
82,760	0.006	0.006			
82,810	0.006	0.006			
82,860	0.006	0.006			
82,910	0.006	0.006			
82,960	0.006	0.006			
83,010	0.006	0.006			
83,060	0.006	0.006			
83,110	0.006	0.006			
83,160	0.006	0.006			
83,210	0.006	0.006			
83,260	0.006	0.006			
83,310	0.006	0.006			
83,360	0.006	0.006			
83,410	0.006	0.006			
83,460	0.007	0.007			
83,510	0.007	0.007			
83,560	0.007	0.007			
83,610	0.007	0.007			
83,660	0.007	0.007			
83,710	0.007	0.007			
83,760	0.007	0.007			
83,810	0.007	0.007			
83,860	0.007	0.007			
83,910	0.007	0.007			
83,960	0.007	0.007			
84,010	0.007	0.007			
84,060	0.007	0.007			
84,110	0.007	0.007			
84,160	0.007	0.007			

Stage-Area-Storage for Pond 3P: Tank

Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)	Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)
81,610	10.0	0.0	84,210	10.0	26.0
81,660	10.0	0.5	84,260	10.0	26.5
81,710	10.0	1.0	84,310	10.0	27.0
81,760	10.0	1.5	84,360	10.0	27.5
81,810	10.0	2.0	84,410	10.0	28.0
81,860	10.0	2.5	84,460	10.0	28.5
81,910	10.0	3.0	84,510	10.0	29.0
81,960	10.0	3.5	84,560	10.0	29.5
82,010	10.0	4.0	84,610	10.0	30.0
82,060	10.0	4.5	84,660	10.0	30.5
82,110	10.0	5.0			
82,160	10.0	5.5			
82,210	10.0	6.0			
82,260	10.0	6.5			
82,310	10.0	7.0			
82,360	10.0	7.5			
82,410	10.0	8.0			
82,460	10.0	8.5			
82,510	10.0	9.0			
82,560	10.0	9.5			
82,610	10.0	10.0			
82,660	10.0	10.5			
82,710	10.0	11.0			
82,760	10.0	11.5			
82,810	10.0	12.0			
82,860	10.0	12.5			
82,910	10.0	13.0			
82,960	10.0	13.5			
83,010	10.0	14.0			
83,060	10.0	14.5			
83,110	10.0	15.0			
83,160	10.0	15.5			
83,210	10.0	16.0			
83,260	10.0	16.5			
83,310	10.0	17.0			
83,360	10.0	17.5			
83,410	10.0	18.0			
83,460	10.0	18.5			
83,510	10.0	19.0			
83,560	10.0	19.5			
83,610	10.0	20.0			
83,660	10.0	20.5			
83,710	10.0	21.0			
83,760	10.0	21.5			
83,810	10.0	22.0			
83,860	10.0	22.5			
83,910	10.0	23.0			
83,960	10.0	23.5			
84,010	10.0	24.0			
84,060	10.0	24.5			
84,110	10.0	25.0			
84,160	10.0	25.5			

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Pre Runoff Area=392.0 m² 64.03% Impervious Runoff Depth=45 mm
Tc=10.0 min CN=85 Runoff=0.011 m³/s 0.018 MI

Subcatchment 2S: Post Runoff Area=392.0 m² 100.00% Impervious Runoff Depth=76 mm
Tc=10.0 min CN=98 Runoff=0.017 m³/s 0.030 MI

Pond 3P: Tank Peak Elev=82,744 m Storage=11.3 m³ Inflow=0.017 m³/s 0.030 MI
Outflow=0.006 m³/s 0.026 MI

Total Runoff Area = 0.0784 ha Runoff Volume = 0.047 MI Average Runoff Depth = 61 mm
17.98% Pervious = 0.0141 ha 82.02% Impervious = 0.0643 ha

Summary for Subcatchment 1S: Pre

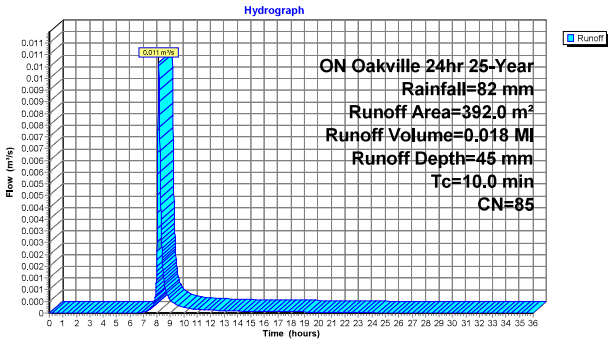
Runoff = 0.011 m³/s @ 8.14 hrs, Volume= 0.018 MI, Depth= 45 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
ON Oakville 24hr 25-Year Rainfall=82 mm

Area (m²)	CN	Description
141.0	61	>75% Grass cover, Good, HSG B
251.0	98	Paved parking, HSG B
392.0	85	Weighted Average
141.0		35.97% Pervious Area
251.0		64.03% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 1S: Pre



Summary for Subcatchment 2S: Post

Runoff = 0.017 m³/s @ 8.13 hrs, Volume= 0.030 MI, Depth= 76 mm

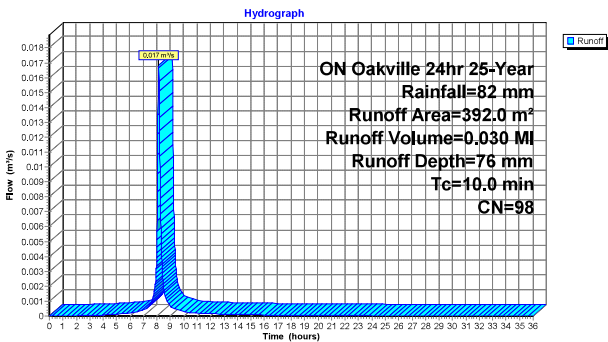
Routed to Pond 3P : Tank

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
ON Oakville 24hr 25-Year Rainfall=82 mm

Area (m²)	CN	Description
392.0	98	
392.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 2S: Post



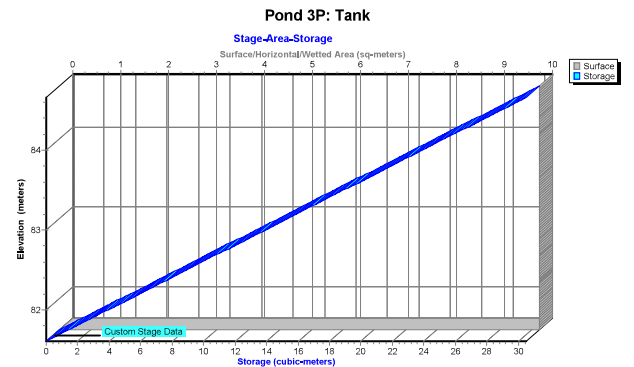
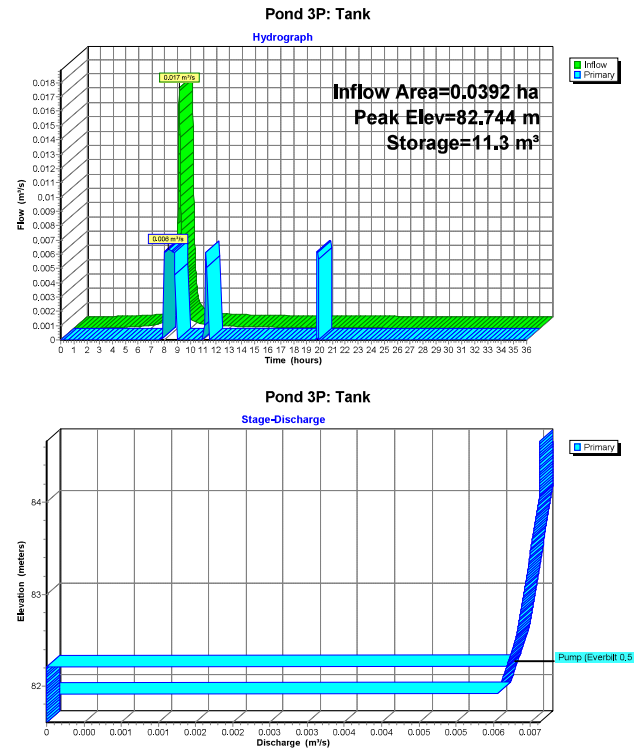
Hydrograph for Subcatchment 1S: Pre

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	82	45	0.000
0.50	0	0	0.000	26.50	82	45	0.000
1.00	1	0	0.000	27.00	82	45	0.000
1.50	1	0	0.000	27.50	82	45	0.000
2.00	2	0	0.000	28.00	82	45	0.000
2.50	2	0	0.000	28.50	82	45	0.000
3.00	3	0	0.000	29.00	82	45	0.000
3.50	3	0	0.000	29.50	82	45	0.000
4.00	4	0	0.000	30.00	82	45	0.000
4.50	5	0	0.000	30.50	82	45	0.000
5.00	6	0	0.000	31.00	82	45	0.000
5.50	7	0	0.000	31.50	82	45	0.000
6.00	8	0	0.000	32.00	82	45	0.000
6.50	9	0	0.000	32.50	82	45	0.000
7.00	11	0	0.000	33.00	82	45	0.000
7.50	15	1	0.000	33.50	82	45	0.000
8.00	39	12	0.002	34.00	82	45	0.000
8.50	63	29	0.002	34.50	82	45	0.000
9.00	66	32	0.001	35.00	82	45	0.000
9.50	68	34	0.000	35.50	82	45	0.000
10.00	70	35	0.000	36.00	82	45	0.000
10.50	71	36	0.000				
11.00	72	37	0.000				
11.50	73	38	0.000				
12.00	74	38	0.000				
12.50	74	39	0.000				
13.00	75	39	0.000				
13.50	75	40	0.000				
14.00	76	40	0.000				
14.50	76	40	0.000				
15.00	77	41	0.000				
15.50	77	41	0.000				
16.00	78	41	0.000				
16.50	78	42	0.000				
17.00	78	42	0.000				
17.50	79	42	0.000				
18.00	79	43	0.000				
18.50	79	43	0.000				
19.00	79	43	0.000				
19.50	80	43	0.000				
20.00	80	44	0.000				
20.50	80	44	0.000				
21.00	80	44	0.000				
21.50	81	44	0.000				
22.00	81	44	0.000				
22.50	81	45	0.000				
23.00	81	45	0.000				
23.50	82	45	0.000				
24.00	82	45	0.000				
24.50	82	45	0.000				
25.00	82	45	0.000				
25.50	82	45	0.000				

Hydrograph for Subcatchment 2S: Post

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	82	76	0.000
0.50	0	0	0.000	26.50	82	76	0.000
1.00	1	0	0.000	27.00	82	76	0.000
1.50	1	0	0.000	27.50	82	76	0.000
2.00	2	0	0.000	28.00	82	76	0.000
2.50	2	0	0.000	28.50	82	76	0.000
3.00	3	0	0.000	29.00	82	76	0.000
3.50	3	1	0.000	29.50	82	76	0.000
4.00	4	1	0.000	30.00	82	76	0.000
4.50	5	2	0.000	30.50	82	76	0.000
5.00	6	2	0.000	31.00	82	76	0.000
5.50	7	3	0.000	31.50	82	76	0.000
6.00	8	4	0.000	32.00	82	76	0.000
6.50	9	5	0.000	32.50	82	76	0.000
7.00	11	7	0.000	33.00	82	76	0.000
7.50	15	10	0.001	33.50	82	76	0.000
8.00	39	33	0.005	34.00	82	76	0.000
8.50	63	57	0.002	34.50	82	76	0.000
9.00	66	60	0.001	35.00	82	76	0.000
9.50	68	62	0.000	35.50	82	76	0.000
10.00	70	64	0.000	36.00	82	76	0.000
10.50	71	65	0.000				
11.00	72	66	0.000				
11.50	73	67	0.000				
12.00	74	68	0.000				
12.50	74	68	0.000				
13.00	75	69	0.000				
13.50	75	69	0.000				
14.00	76	70	0.000				
14.50	76	70	0.000				
15.00	77	71	0.000				
15.50	77	71	0.000				
16.00	78	72	0.000				
16.50	78	72	0.000				
17.00	78	72	0.000				
17.50	79	73	0.000				
18.00	79	73	0.000				
18.50	79	73	0.000				
19.00	79	74	0.000				
19.50	80	74	0.000				
20.00	80	74	0.000				
20.50	80	74	0.000				
21.00	80	75	0.000				
21.50	81	75	0.000				
22.00	81	75	0.000				
22.50	81	75	0.000				
23.00	81	76	0.000				
23.50	82	76	0.000				
24.00	82	76	0.000				
24.50	82	76	0.000				
25.00	82	76	0.000				
25.50	82	76	0.000				

Summary for Pond 3P: Tank				
Inflow Area =	0.0392 ha,100.00% Impervious,		Inflow Depth =	76 mm for 25-Year event
Inflow =	0.017 m³/s @	8.13 hrs,	Volume=	0.030 MI
Outflow =	0.006 m³/s @	8.29 hrs,	Volume=	0.026 MI, Atten= 62%, Lag= 9.6 min
Primary =	0.006 m³/s @	8.29 hrs,	Volume=	0.026 MI
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs				
Peak Elev= 82.744 m @ 8.29 hrs Surf.Area= 10.0 m² Storage= 11.3 m³				
Plug-Flow detention time= 119.5 min calculated for 0.026 MI (87% of inflow)				
Center-of-Mass det. time= 57.3 min (603.4 - 546.1)				
Volume	Invert	Avail.Storage	Storage Description	
#1	81.610 m	30.5 m³	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	
81.610	10.0	0.0	0.0	
84.660	10.0	30.5	30.5	
Device	Routing	Invert	Outlet Devices (Turned on 3 times)	
#1	Primary	82.210 m	Pump (Everbilt 0.5 hp) X 1.50	
Discharges@84.060 m Turns Off-81.920 m				
150 mm Diam. x 2.50 m Long Discharge, Hazen-Williams C= 130				
Flow (l/min)= 75.7 151.4 201.7 227.1 252.5 264.9				
Head (meters)= 7.620 6.096 4.572 3.048 1.524 0.000				
-Loss (meters)= 0.000 0.001 0.001 0.001 0.001 0.001				
=Lift (meters)= 7.620 6.095 4.571 3.047 1.523 -0.001				
Primary OutFlow Max=0.006 m³/s @ 8.29 hrs HW=82.744 m (Free Discharge)				
1=Pump (Everbilt 0.5 hp) (Pump Controls 0.006 m³/s)				



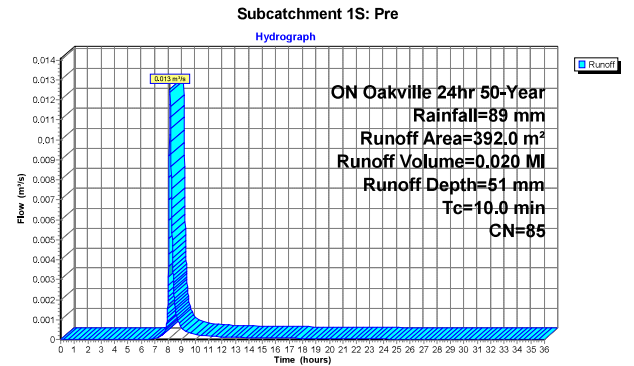
Hydrograph for Pond 3P: Tank				
Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Primary (m³/s)
0.00	0.000	0.0	81.610	0.000
1.00	0.000	0.0	81.610	0.000
2.00	0.000	0.0	81.612	0.000
3.00	0.000	0.1	81.624	0.000
4.00	0.000	0.4	81.647	0.000
5.00	0.000	0.7	81.685	0.000
6.00	0.000	1.3	81.745	0.000
7.00	0.000	2.4	81.851	0.000
8.00	0.005	5.8	82.190	0.006
9.00	0.001	3.4	81.955	0.000
10.00	0.000	5.0	82.112	0.000
11.00	0.000	5.9	82.201	0.000
12.00	0.000	3.5	81.957	0.000
13.00	0.000	4.0	82.007	0.000
14.00	0.000	4.4	82.049	0.000
15.00	0.000	4.7	82.085	0.000
16.00	0.000	5.1	82.116	0.000
17.00	0.000	5.3	82.144	0.000
18.00	0.000	5.6	82.170	0.000
19.00	0.000	5.8	82.193	0.000
20.00	0.000	3.0	81.915	0.000
21.00	0.000	3.2	81.935	0.000
22.00	0.000	3.4	81.953	0.000
23.00	0.000	3.6	81.971	0.000
24.00	0.000	3.8	81.987	0.000
25.00	0.000	3.8	81.990	0.000
26.00	0.000	3.8	81.990	0.000
27.00	0.000	3.8	81.990	0.000
28.00	0.000	3.8	81.990	0.000
29.00	0.000	3.8	81.990	0.000
30.00	0.000	3.8	81.990	0.000
31.00	0.000	3.8	81.990	0.000
32.00	0.000	3.8	81.990	0.000
33.00	0.000	3.8	81.990	0.000
34.00	0.000	3.8	81.990	0.000
35.00	0.000	3.8	81.990	0.000
36.00	0.000	3.8	81.990	0.000

Stage-Discharge for Pond 3P: Tank					
Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)	Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)
81,610	0,000	0,000	84,210	0,007	0,007
81,660	0,000	0,000	84,260	0,007	0,007
81,710	0,000	0,000	84,310	0,007	0,007
81,760	0,000	0,000	84,360	0,007	0,007
81,810	0,000	0,000	84,410	0,007	0,007
81,860	0,000	0,000	84,460	0,007	0,007
81,910	0,000	0,000	84,510	0,007	0,007
81,960	0,000	0,006	84,560	0,007	0,007
82,010	0,000	0,006	84,610	0,007	0,007
82,060	0,000	0,006	84,660	0,007	0,007
82,110	0,000	0,006			
82,160	0,000	0,006			
82,210	0,000	0,006			
82,260	0,006	0,006			
82,310	0,006	0,006			
82,360	0,006	0,006			
82,410	0,006	0,006			
82,460	0,006	0,006			
82,510	0,006	0,006			
82,560	0,006	0,006			
82,610	0,006	0,006			
82,660	0,006	0,006			
82,710	0,006	0,006			
82,760	0,006	0,006			
82,810	0,006	0,006			
82,860	0,006	0,006			
82,910	0,006	0,006			
82,960	0,006	0,006			
83,010	0,006	0,006			
83,060	0,006	0,006			
83,110	0,006	0,006			
83,160	0,006	0,006			
83,210	0,006	0,006			
83,260	0,006	0,006			
83,310	0,006	0,006			
83,360	0,006	0,006			
83,410	0,006	0,006			
83,460	0,007	0,007			
83,510	0,007	0,007			
83,560	0,007	0,007			
83,610	0,007	0,007			
83,660	0,007	0,007			
83,710	0,007	0,007			
83,760	0,007	0,007			
83,810	0,007	0,007			
83,860	0,007	0,007			
83,910	0,007	0,007			
83,960	0,007	0,007			
84,010	0,007	0,007			
84,060	0,007	0,007			
84,110	0,007	0,007			
84,160	0,007	0,007			

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points	
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN	
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method	
Subcatchment 1S: Pre	Runoff Area=392,0 m² 64,03% Impervious Runoff Depth=51 mm Tc=10,0 min CN=85 Runoff=0,013 m³/s 0,020 MI
Subcatchment 2S: Post	Runoff Area=392,0 m² 100,00% Impervious Runoff Depth=83 mm Tc=10,0 min CN=98 Runoff=0,019 m³/s 0,032 MI
Pond 3P: Tank	Peak Elev=82,870 m Storage=12,6 m³ Inflow=0,019 m³/s 0,032 MI Outflow=0,006 m³/s 0,029 MI
Total Runoff Area = 0,0784 ha Runoff Volume = 0,053 MI Average Runoff Depth = 67 mm 17,98% Pervious = 0,0141 ha 82,02% Impervious = 0,0643 ha	

Stage-Area-Storage for Pond 3P: Tank					
Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)	Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)
81,610	10,0	0,0	84,210	10,0	26,0
81,660	10,0	0,5	84,260	10,0	26,5
81,710	10,0	1,0	84,310	10,0	27,0
81,760	10,0	1,5	84,360	10,0	27,5
81,810	10,0	2,0	84,410	10,0	28,0
81,860	10,0	2,5	84,460	10,0	28,5
81,910	10,0	3,0	84,510	10,0	29,0
81,960	10,0	3,5	84,560	10,0	29,5
82,010	10,0	4,0	84,610	10,0	30,0
82,060	10,0	4,5	84,660	10,0	30,5
82,110	10,0	5,0			
82,160	10,0	5,5			
82,210	10,0	6,0			
82,260	10,0	6,5			
82,310	10,0	7,0			
82,360	10,0	7,5			
82,410	10,0	8,0			
82,460	10,0	8,5			
82,510	10,0	9,0			
82,560	10,0	9,5			
82,610	10,0	10,0			
82,660	10,0	10,5			
82,710	10,0	11,0			
82,760	10,0	11,5			
82,810	10,0	12,0			
82,860	10,0	12,5			
82,910	10,0	13,0			
82,960	10,0	13,5			
83,010	10,0	14,0			
83,060	10,0	14,5			
83,110	10,0	15,0			
83,160	10,0	15,5			
83,210	10,0	16,0			
83,260	10,0	16,5			
83,310	10,0	17,0			
83,360	10,0	17,5			
83,410	10,0	18,0			
83,460	10,0	18,5			
83,510	10,0	19,0			
83,560	10,0	19,5			
83,610	10,0	20,0			
83,660	10,0	20,5			
83,710	10,0	21,0			
83,760	10,0	21,5			
83,810	10,0	22,0			
83,860	10,0	22,5			
83,910	10,0	23,0			
83,960	10,0	23,5			
84,010	10,0	24,0			
84,060	10,0	24,5			
84,110	10,0	25,0			
84,160	10,0	25,5			

Summary for Subcatchment 1S: Pre					
Runoff	=	0,013 m³/s @ 8,14 hrs, Volume=	0,020 MI, Depth=	51 mm	
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36,00 hrs, dt= 0.01 hrs ON Oakville 24hr 50-Year Rainfall=89 mm					
Area (m²)	CN	Description			
141,0	61	>75% Grass cover, Good, HSG B			
251,0	98	Paved parking, HSG B			
392,0	85	Weighted Average			
141,0		35.97% Pervious Area			
251,0		64.03% Impervious Area			
Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10,0					Direct Entry,



Hydrograph for Subcatchment 1S: Pre

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	89	51	0.000
0.50	0	0	0.000	26.50	89	51	0.000
1.00	1	0	0.000	27.00	89	51	0.000
1.50	1	0	0.000	27.50	89	51	0.000
2.00	2	0	0.000	28.00	89	51	0.000
2.50	2	0	0.000	28.50	89	51	0.000
3.00	3	0	0.000	29.00	89	51	0.000
3.50	3	0	0.000	29.50	89	51	0.000
4.00	4	0	0.000	30.00	89	51	0.000
4.50	5	0	0.000	30.50	89	51	0.000
5.00	6	0	0.000	31.00	89	51	0.000
5.50	7	0	0.000	31.50	89	51	0.000
6.00	8	0	0.000	32.00	89	51	0.000
6.50	9	0	0.000	32.50	89	51	0.000
7.00	12	0	0.000	33.00	89	51	0.000
7.50	16	1	0.000	33.50	89	51	0.000
8.00	42	14	0.003	34.00	89	51	0.000
8.50	69	34	0.002	34.50	89	51	0.000
9.00	73	37	0.001	35.00	89	51	0.000
9.50	75	39	0.000	35.50	89	51	0.000
10.00	76	41	0.000	36.00	89	51	0.000
10.50	78	42	0.000				
11.00	79	42	0.000				
11.50	80	43	0.000				
12.00	80	44	0.000				
12.50	81	44	0.000				
13.00	82	45	0.000				
13.50	82	45	0.000				
14.00	83	46	0.000				
14.50	83	46	0.000				
15.00	84	47	0.000				
15.50	84	47	0.000				
16.00	84	47	0.000				
16.50	85	48	0.000				
17.00	85	48	0.000				
17.50	85	48	0.000				
18.00	86	49	0.000				
18.50	86	49	0.000				
19.00	86	49	0.000				
19.50	87	49	0.000				
20.00	87	50	0.000				
20.50	87	50	0.000				
21.00	87	50	0.000				
21.50	88	50	0.000				
22.00	88	50	0.000				
22.50	88	51	0.000				
23.00	88	51	0.000				
23.50	89	51	0.000				
24.00	89	51	0.000				
24.50	89	51	0.000				
25.00	89	51	0.000				
25.50	89	51	0.000				

Hydrograph for Subcatchment 2S: Post

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	89	83	0.000
0.50	0	0	0.000	26.50	89	83	0.000
1.00	1	0	0.000	27.00	89	83	0.000
1.50	1	0	0.000	27.50	89	83	0.000
2.00	2	0	0.000	28.00	89	83	0.000
2.50	2	0	0.000	28.50	89	83	0.000
3.00	3	0	0.000	29.00	89	83	0.000
3.50	3	1	0.000	29.50	89	83	0.000
4.00	4	1	0.000	30.00	89	83	0.000
4.50	5	2	0.000	30.50	89	83	0.000
5.00	6	2	0.000	31.00	89	83	0.000
5.50	7	3	0.000	31.50	89	83	0.000
6.00	8	4	0.000	32.00	89	83	0.000
6.50	9	5	0.000	32.50	89	83	0.000
7.00	12	7	0.000	33.00	89	83	0.000
7.50	16	11	0.001	33.50	89	83	0.000
8.00	42	37	0.006	34.00	89	83	0.000
8.50	69	63	0.002	34.50	89	83	0.000
9.00	73	67	0.001	35.00	89	83	0.000
9.50	75	69	0.000	35.50	89	83	0.000
10.00	76	71	0.000	36.00	89	83	0.000
10.50	78	72	0.000				
11.00	79	73	0.000				
11.50	80	74	0.000				
12.00	80	74	0.000				
12.50	81	75	0.000				
13.00	82	76	0.000				
13.50	82	76	0.000				
14.00	83	77	0.000				
14.50	83	77	0.000				
15.00	84	78	0.000				
15.50	84	78	0.000				
16.00	84	78	0.000				
16.50	85	79	0.000				
17.00	85	79	0.000				
17.50	85	80	0.000				
18.00	86	80	0.000				
18.50	86	80	0.000				
19.00	86	80	0.000				
19.50	87	81	0.000				
20.00	87	81	0.000				
20.50	87	81	0.000				
21.00	87	82	0.000				
21.50	88	82	0.000				
22.00	88	82	0.000				
22.50	88	82	0.000				
23.00	88	82	0.000				
23.50	89	83	0.000				
24.00	89	83	0.000				
24.50	89	83	0.000				
25.00	89	83	0.000				
25.50	89	83	0.000				

Summary for Subcatchment 2S: Post

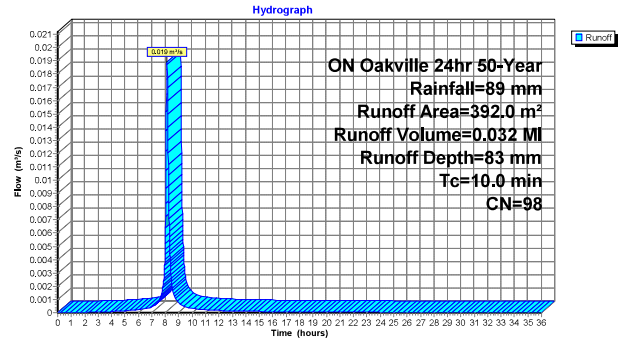
Runoff = 0.019 m³/s @ 8.13 hrs, Volume= 0.032 MI, Depth= 83 mm
Routed to Pond 3P : Tank

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
ON Oakville 24hr 50-Year Rainfall=89 mm

Area (m²)	CN	Description
* 392.0	98	
392.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 2S: Post



Summary for Pond 3P: Tank

Inflow Area = 0.0392 ha, 100.00% Impervious, Inflow Depth = 83 mm for 50-Year event
Inflow = 0.019 m³/s @ 8.13 hrs, Volume= 0.032 MI
Outflow = 0.006 m³/s @ 8.31 hrs, Volume= 0.029 MI, Att= 66%, Lag= 10.5 min
Primary = 0.006 m³/s @ 8.31 hrs, Volume= 0.029 MI

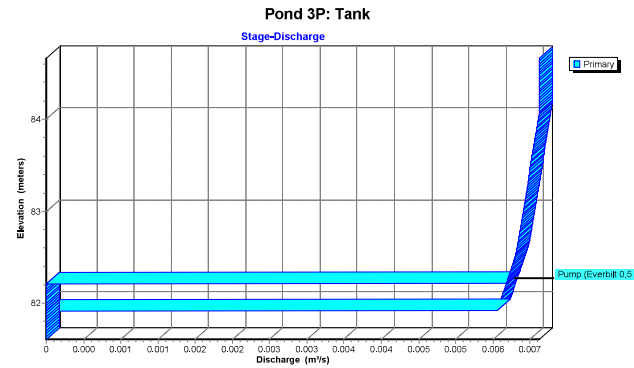
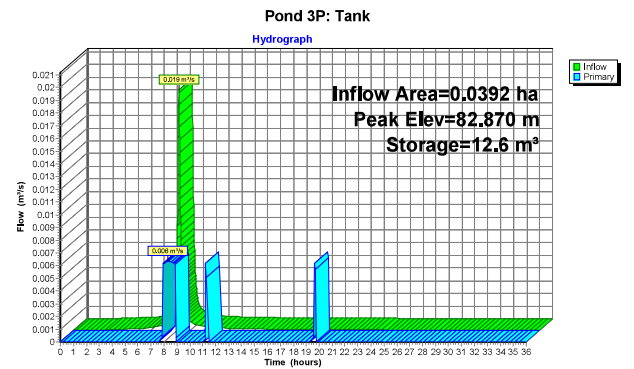
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 82.870 m @ 8.31 hrs Surf.Area= 10.0 m² Storage= 12.6 m³

Plug-Flow detention time= 110.0 min calculated for 0.029 MI (88% of inflow)
Center-of-Mass det. time= 52.3 min (594.4 - 542.1)

Volume	Invert	Avail.Storage	Storage Description
#1	81.610 m	30.5 m³	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
81.610	10.0	0.0	0.0
84.660	10.0	30.5	30.5

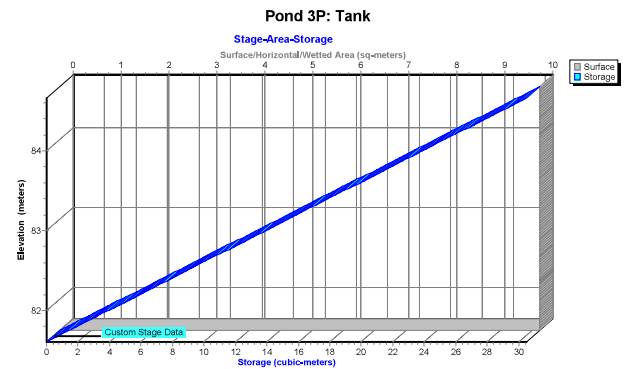
Device	Routing	Invert	Outlet Devices (Turned on 3 times)
#1	Primary	82.210 m	Pump (Everbilt 0.5 hp) X 1.50 Discharges@84.660 m Turns Off<81.920 m 150 mm Diam. x 2.50 m Long Discharge, Hazen-Williams C= 130 Flow (l/min)= 75.7 151.4 201.7 227.1 252.5 264.9 Head (meters)= 7.620 6.096 4.572 3.048 1.524 0.000 -Loss (meters)= 0.000 0.001 0.001 0.001 0.001 0.001 =Lift (meters)= 7.620 6.095 4.571 3.047 1.523 -0.001

Primary OutFlow Max=0.006 m³/s @ 8.31 hrs HW=82.870 m (Free Discharge)
1=Pump (Everbilt 0.5 hp) (Pump Controls 0.006 m³/s)



Hydrograph for Pond 3P: Tank

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Primary (m³/s)
0.00	0.000	0.0	81.610	0.000
1.00	0.000	0.0	81.610	0.000
2.00	0.000	0.0	81.612	0.000
3.00	0.000	0.1	81.624	0.000
4.00	0.000	0.4	81.649	0.000
5.00	0.000	0.8	81.689	0.000
6.00	0.000	1.4	81.751	0.000
7.00	0.000	2.5	81.864	0.000
8.00	0.006	5.5	82.164	0.006
9.00	0.001	3.3	81.938	0.000
10.00	0.000	4.9	82.105	0.000
11.00	0.000	5.9	82.198	0.000
12.00	0.000	3.5	81.955	0.000
13.00	0.000	4.0	82.007	0.000
14.00	0.000	4.4	82.050	0.000
15.00	0.000	4.8	82.086	0.000
16.00	0.000	5.1	82.118	0.000
17.00	0.000	5.4	82.147	0.000
18.00	0.000	5.6	82.173	0.000
19.00	0.000	5.9	82.197	0.000
20.00	0.000	3.1	81.919	0.000
21.00	0.000	3.3	81.939	0.000
22.00	0.000	3.5	81.958	0.000
23.00	0.000	3.7	81.975	0.000
24.00	0.000	3.8	81.992	0.000
25.00	0.000	3.8	81.995	0.000
26.00	0.000	3.8	81.995	0.000
27.00	0.000	3.8	81.995	0.000
28.00	0.000	3.8	81.995	0.000
29.00	0.000	3.8	81.995	0.000
30.00	0.000	3.8	81.995	0.000
31.00	0.000	3.8	81.995	0.000
32.00	0.000	3.8	81.995	0.000
33.00	0.000	3.8	81.995	0.000
34.00	0.000	3.8	81.995	0.000
35.00	0.000	3.8	81.995	0.000
36.00	0.000	3.8	81.995	0.000



Stage-Discharge for Pond 3P: Tank

Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)	Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)
81.610	0.000	0.000	84.210	0.007	0.007
81.660	0.000	0.000	84.260	0.007	0.007
81.710	0.000	0.000	84.310	0.007	0.007
81.760	0.000	0.000	84.360	0.007	0.007
81.810	0.000	0.000	84.410	0.007	0.007
81.860	0.000	0.000	84.460	0.007	0.007
81.910	0.000	0.000	84.510	0.007	0.007
81.960	0.000	0.006	84.560	0.007	0.007
82.010	0.000	0.006	84.610	0.007	0.007
82.060	0.000	0.006	84.660	0.007	0.007
82.110	0.000	0.006			
82.160	0.000	0.006			
82.210	0.000	0.006			
82.260	0.006	0.006			
82.310	0.006	0.006			
82.360	0.006	0.006			
82.410	0.006	0.006			
82.460	0.006	0.006			
82.510	0.006	0.006			
82.560	0.006	0.006			
82.610	0.006	0.006			
82.660	0.006	0.006			
82.710	0.006	0.006			
82.760	0.006	0.006			
82.810	0.006	0.006			
82.860	0.006	0.006			
82.910	0.006	0.006			
82.960	0.006	0.006			
83.010	0.006	0.006			
83.060	0.006	0.006			
83.110	0.006	0.006			
83.160	0.006	0.006			
83.210	0.006	0.006			
83.260	0.006	0.006			
83.310	0.006	0.006			
83.360	0.006	0.006			
83.410	0.006	0.006			
83.460	0.007	0.007			
83.510	0.007	0.007			
83.560	0.007	0.007			
83.610	0.007	0.007			
83.660	0.007	0.007			
83.710	0.007	0.007			
83.760	0.007	0.007			
83.810	0.007	0.007			
83.860	0.007	0.007			
83.910	0.007	0.007			
83.960	0.007	0.007			
84.010	0.007	0.007			
84.060	0.007	0.007			
84.110	0.007	0.007			
84.160	0.007	0.007			

Stage-Area-Storage for Pond 3P: Tank					
Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)	Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)
81,610	10.0	0.0	84,210	10.0	26.0
81,660	10.0	0.5	84,260	10.0	26.5
81,710	10.0	1.0	84,310	10.0	27.0
81,760	10.0	1.5	84,360	10.0	27.5
81,810	10.0	2.0	84,410	10.0	28.0
81,860	10.0	2.5	84,460	10.0	28.5
81,910	10.0	3.0	84,510	10.0	29.0
81,960	10.0	3.5	84,560	10.0	29.5
82,010	10.0	4.0	84,610	10.0	30.0
82,060	10.0	4.5	84,660	10.0	30.5
82,110	10.0	5.0			
82,160	10.0	5.5			
82,210	10.0	6.0			
82,260	10.0	6.5			
82,310	10.0	7.0			
82,360	10.0	7.5			
82,410	10.0	8.0			
82,460	10.0	8.5			
82,510	10.0	9.0			
82,560	10.0	9.5			
82,610	10.0	10.0			
82,660	10.0	10.5			
82,710	10.0	11.0			
82,760	10.0	11.5			
82,810	10.0	12.0			
82,860	10.0	12.5			
82,910	10.0	13.0			
82,960	10.0	13.5			
83,010	10.0	14.0			
83,060	10.0	14.5			
83,110	10.0	15.0			
83,160	10.0	15.5			
83,210	10.0	16.0			
83,260	10.0	16.5			
83,310	10.0	17.0			
83,360	10.0	17.5			
83,410	10.0	18.0			
83,460	10.0	18.5			
83,510	10.0	19.0			
83,560	10.0	19.5			
83,610	10.0	20.0			
83,660	10.0	20.5			
83,710	10.0	21.0			
83,760	10.0	21.5			
83,810	10.0	22.0			
83,860	10.0	22.5			
83,910	10.0	23.0			
83,960	10.0	23.5			
84,010	10.0	24.0			
84,060	10.0	24.5			
84,110	10.0	25.0			
84,160	10.0	25.5			

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Pre

Runoff Area=392.0 m² 64.03% Impervious Runoff Depth=59 mm
Tc=10.0 min CN=85 Runoff=0.015 m³/s 0.023 MI

Subcatchment 2S: Post

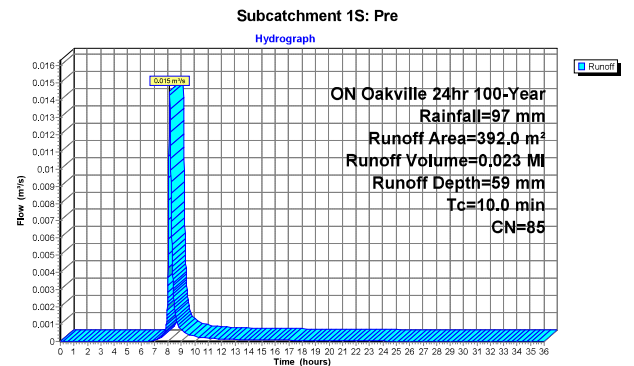
Runoff Area=392.0 m² 100.00% Impervious Runoff Depth=91 mm
Tc=10.0 min CN=98 Runoff=0.021 m³/s 0.036 MI

Pond 3P: Tank

Peak Elev=82,950 m Storage=13.4 m³ Inflow=0.021 m³/s 0.036 MI
Outflow=0.006 m³/s 0.032 MI

Total Runoff Area = 0,0784 ha Runoff Volume = 0,059 MI Average Runoff Depth = 75 mm
17,98% Pervious = 0,0141 ha 82,02% Impervious = 0,0643 ha

Summary for Subcatchment 1S: Pre					
Runoff	=	0.015 m³/s @ 8.14 hrs, Volume=	0.023 MI, Depth=	59 mm	
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs ON Oakville 24hr 100-Year Rainfall=97 mm					
Area (m²)	CN	Description			
141.0	61	>75% Grass cover, Good, HSG B			
251.0	98	Paved parking, HSG B			
392.0	85	Weighted Average			
141.0		35.97% Pervious Area			
251.0		64.03% Impervious Area			
Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

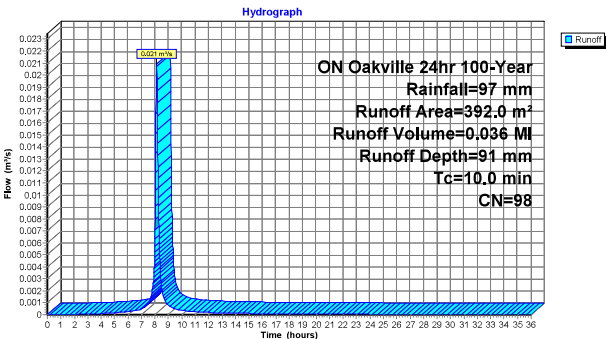


Hydrograph for Subcatchment 1S: Pre							
Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0,00	0	0	0,000	26,00	97	59	0,000
0,50	0	0	0,000	26,50	97	59	0,000
1,00	1	0	0,000	27,00	97	59	0,000
1,50	1	0	0,000	27,50	97	59	0,000
2,00	2	0	0,000	28,00	97	59	0,000
2,50	2	0	0,000	28,50	97	59	0,000
3,00	3	0	0,000	29,00	97	59	0,000
3,50	4	0	0,000	29,50	97	59	0,000
4,00	4	0	0,000	30,00	97	59	0,000
4,50	5	0	0,000	30,50	97	59	0,000
5,00	6	0	0,000	31,00	97	59	0,000
5,50	7	0	0,000	31,50	97	59	0,000
6,00	9	0	0,000	32,00	97	59	0,000
6,50	10	0	0,000	32,50	97	59	0,000
7,00	13	0	0,000	33,00	97	59	0,000
7,50	17	1	0,000	33,50	97	59	0,000
8,00	46	17	0.003	34,00	97	59	0,000
8,50	76	40	0.002	34,50	97	59	0,000
9,00	80	43	0,001	35,00	97	59	0,000
9,50	82	45	0,000	35,50	97	59	0,000
10,00	84	47	0,000	36,00	97	59	0,000
10,50	85	48	0,000				
11,00	86	49	0,000				
11,50	87	50	0,000				
12,00	88	51	0,000				
12,50	89	51	0,000				
13,00	90	52	0,000				
13,50	90	52	0,000				
14,00	91	53	0,000				
14,50	91	53	0,000				
15,00	92	54	0,000				
15,50	92	54	0,000				
16,00	93	54	0,000				
16,50	93	55	0,000				
17,00	93	55	0,000				
17,50	94	55	0,000				
18,00	94	56	0,000				
18,50	94	56	0,000				
19,00	95	56	0,000				
19,50	95	57	0,000				
20,00	95	57	0,000				
20,50	96	57	0,000				
21,00	96	57	0,000				
21,50	96	58	0,000				
22,00	96	58	0,000				
22,50	97	58	0,000				
23,00	97	58	0,000				
23,50	97	58	0,000				
24,00	97	59	0,000				
24,50	97	59	0,000				
25,00	97	59	0,000				
25,50	97	59	0,000				

Summary for Subcatchment 2S: Post

Runoff	=	0.021 m³/s @	8.13 hrs,	Volume=	0.036 MI,	Depth=	91 mm
Routed to Pond 3P : Tank							
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs							
ON Oakville 24hr 100-Year Rainfall=97 mm							
Area (m²)	CN	Description					
* 392.0	98						
392.0		100.00% Impervious Area					
Tc	Length	Slope	Velocity	Capacity	Description		
(min)	(meters)	(m/m)	(m/sec)	(m³/s)			
10.0					Direct Entry,		

Subcatchment 2S: Post



Summary for Pond 3P: Tank

Inflow Area =	0.0392 ha,	100.00% Impervious,	Inflow Depth =	91 mm	for 100-Year event
Inflow	=	0.021 m³/s @	8.13 hrs,	Volume=	0.036 MI
Outflow	=	0.006 m³/s @	8.32 hrs,	Volume=	0.032 MI, Atten= 69%, Lag= 11.3 min
Primary	=	0.006 m³/s @	8.32 hrs,	Volume=	0.032 MI

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 82.950 m @ 8.32 hrs Surf.Area= 10.0 m² Storage= 13.4 m³
Plug-Flow detention time= 93.9 min calculated for 0.032 MI (88% of inflow)
Center-of-Mass det. time= 35.8 min (576.8 - 541.0)

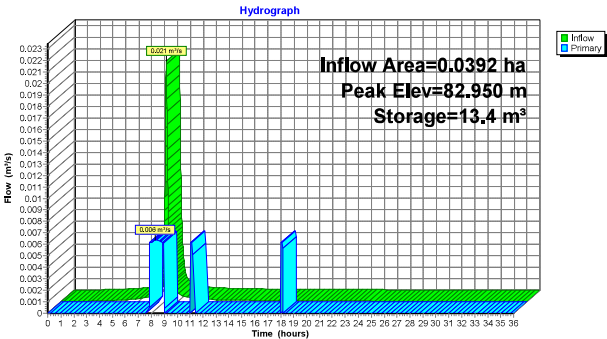
Volume	Invert	Avail.Storage	Storage Description
#1	81.610 m	30.5 m³	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
81.610	10.0	0.0	0.0
84.660	10.0	30.5	30.5
Device	Routing	Invert	Outlet Devices (Turned on 3 times)
#1	Primary	82.210 m	Pump (Everbilt 0.5 hp) X 1.50 Discharges@84.060 m Turns Off<81.920 m 150 mm Diam. x 2.50 m Long Discharge, Hazen-Williams C= 130 Flow (l/min)= 75.7 151.4 201.7 227.1 252.5 264.9 Head (meters)= 7.620 6.096 4.572 3.048 1.524 0.000 -Loss (meters)= 0.000 0.001 0.001 0.001 0.001 0.001 =Lift (meters)= 7.620 6.095 4.571 3.047 1.523 -0.001

Primary OutFlow Max=0.006 m³/s @ 8.32 hrs HW=82.950 m (Free Discharge)
1=Pump (Everbilt 0.5 hp) (Pump Controls 0.006 m³/s)

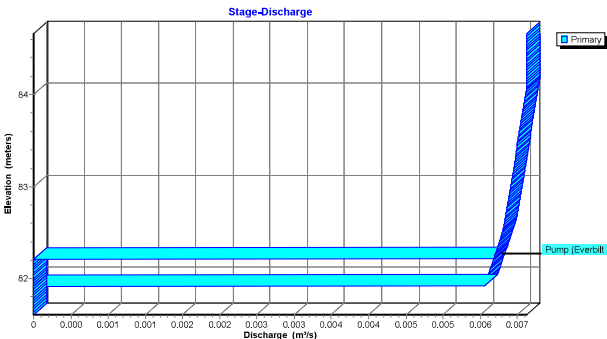
Hydrograph for Subcatchment 2S: Post

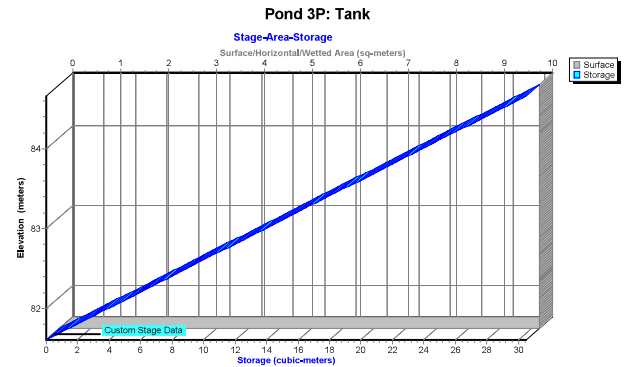
Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	26.00	97	91	0.000
0.50	0	0	0.000	26.50	97	91	0.000
1.00	1	0	0.000	27.00	97	91	0.000
1.50	1	0	0.000	27.50	97	91	0.000
2.00	2	0	0.000	28.00	97	91	0.000
2.50	2	0	0.000	28.50	97	91	0.000
3.00	3	1	0.000	29.00	97	91	0.000
3.50	4	1	0.000	29.50	97	91	0.000
4.00	4	1	0.000	30.00	97	91	0.000
4.50	5	2	0.000	30.50	97	91	0.000
5.00	6	3	0.000	31.00	97	91	0.000
5.50	7	3	0.000	31.50	97	91	0.000
6.00	9	5	0.000	32.00	97	91	0.000
6.50	10	6	0.000	32.50	97	91	0.000
7.00	13	8	0.001	33.00	97	91	0.000
7.50	17	12	0.001	33.50	97	91	0.000
8.00	46	41	0.006	34.00	97	91	0.000
8.50	76	70	0.002	34.50	97	91	0.000
9.00	80	74	0.001	35.00	97	91	0.000
9.50	82	76	0.000	35.50	97	91	0.000
10.00	84	78	0.000	36.00	97	91	0.000
10.50	85	79	0.000				
11.00	86	80	0.000				
11.50	87	81	0.000				
12.00	88	82	0.000				
12.50	89	83	0.000				
13.00	90	84	0.000				
13.50	90	84	0.000				
14.00	91	85	0.000				
14.50	91	85	0.000				
15.00	92	86	0.000				
15.50	92	86	0.000				
16.00	93	87	0.000				
16.50	93	87	0.000				
17.00	93	87	0.000				
17.50	94	88	0.000				
18.00	94	88	0.000				
18.50	94	88	0.000				
19.00	95	89	0.000				
19.50	95	89	0.000				
20.00	95	89	0.000				
20.50	96	90	0.000				
21.00	96	90	0.000				
21.50	96	90	0.000				
22.00	96	91	0.000				
22.50	97	91	0.000				
23.00	97	91	0.000				
23.50	97	91	0.000				
24.00	97	91	0.000				
24.50	97	91	0.000				
25.00	97	91	0.000				
25.50	97	91	0.000				

Pond 3P: Tank



Pond 3P: Tank





Hydrograph for Pond 3P: Tank

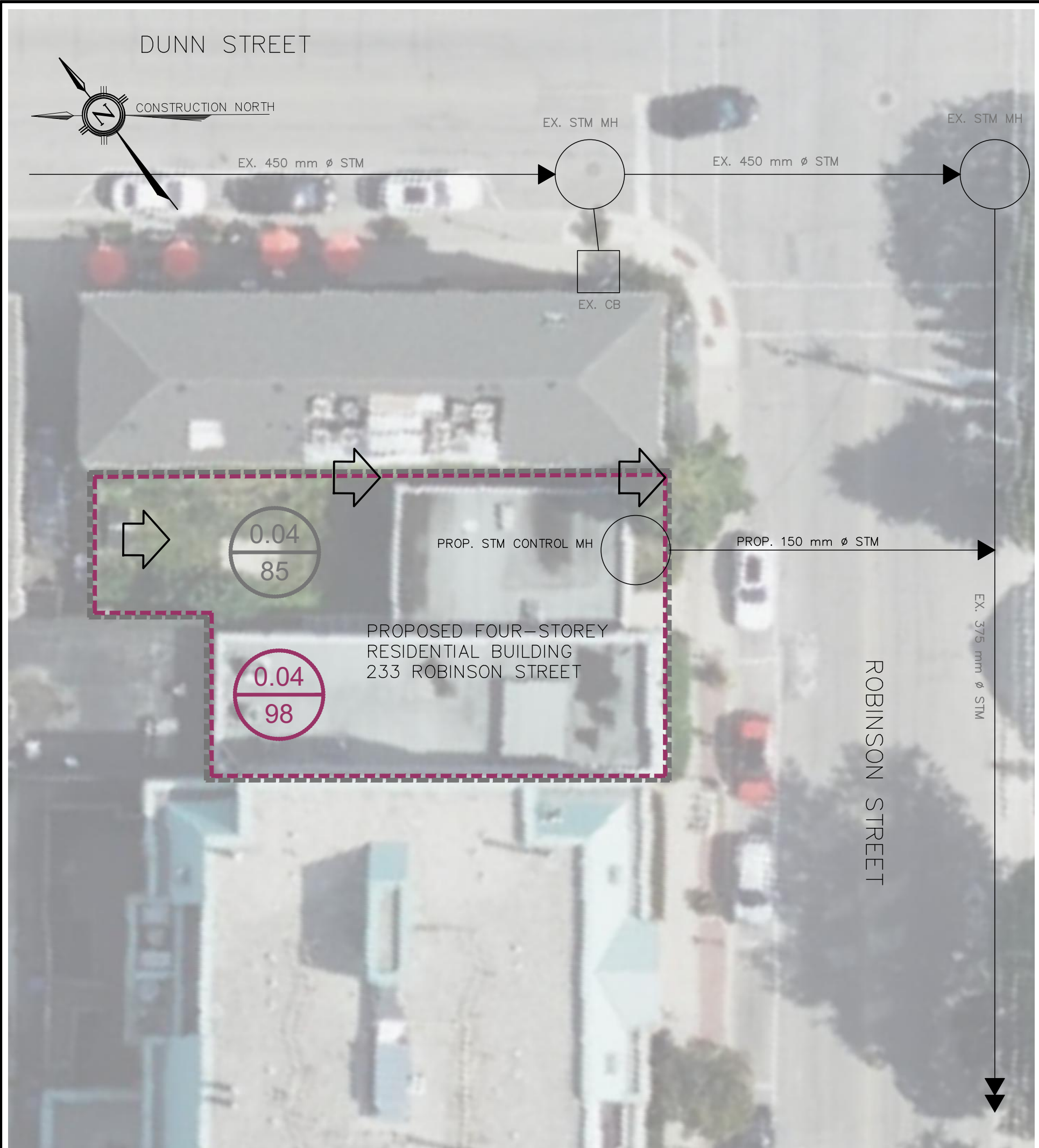
Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Primary (m³/s)
0.00	0.000	0.0	81.610	0.000
1.00	0.000	0.0	81.610	0.000
2.00	0.000	0.0	81.613	0.000
3.00	0.000	0.2	81.629	0.000
4.00	0.000	0.5	81.658	0.000
5.00	0.000	0.9	81.703	0.000
6.00	0.000	1.6	81.774	0.000
7.00	0.001	2.9	81.901	0.000
8.00	0.006	4.9	82.098	0.006
9.00	0.001	3.1	81.922	0.000
10.00	0.000	4.9	82.104	0.000
11.00	0.000	6.0	82.206	0.000
12.00	0.000	3.6	81.970	0.000
13.00	0.000	4.2	82.026	0.000
14.00	0.000	4.6	82.073	0.000
15.00	0.000	5.0	82.114	0.000
16.00	0.000	5.4	82.149	0.000
17.00	0.000	5.7	82.180	0.000
18.00	0.000	6.0	82.209	0.000
19.00	0.000	3.2	81.933	0.000
20.00	0.000	3.5	81.957	0.000
21.00	0.000	3.7	81.979	0.000
22.00	0.000	3.9	82.000	0.000
23.00	0.000	4.1	82.020	0.000
24.00	0.000	4.3	82.038	0.000
25.00	0.000	4.3	82.041	0.000
26.00	0.000	4.3	82.041	0.000
27.00	0.000	4.3	82.041	0.000
28.00	0.000	4.3	82.041	0.000
29.00	0.000	4.3	82.041	0.000
30.00	0.000	4.3	82.041	0.000
31.00	0.000	4.3	82.041	0.000
32.00	0.000	4.3	82.041	0.000
33.00	0.000	4.3	82.041	0.000
34.00	0.000	4.3	82.041	0.000
35.00	0.000	4.3	82.041	0.000
36.00	0.000	4.3	82.041	0.000

Stage-Discharge for Pond 3P: Tank

Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)	Elevation (meters)	Primary (m³/s)	Primary+ (m³/s)
81.610	0.000	0.000	84.210	0.007	0.007
81.660	0.000	0.000	84.260	0.007	0.007
81.710	0.000	0.000	84.310	0.007	0.007
81.760	0.000	0.000	84.360	0.007	0.007
81.810	0.000	0.000	84.410	0.007	0.007
81.860	0.000	0.000	84.460	0.007	0.007
81.910	0.000	0.000	84.510	0.007	0.007
81.960	0.000	0.006	84.560	0.007	0.007
82.010	0.000	0.006	84.610	0.007	0.007
82.060	0.000	0.006	84.660	0.007	0.007
82.110	0.000	0.006			
82.160	0.000	0.006			
82.210	0.000	0.006			
82.260	0.006	0.006			
82.310	0.006	0.006			
82.360	0.006	0.006			
82.410	0.006	0.006			
82.460	0.006	0.006			
82.510	0.006	0.006			
82.560	0.006	0.006			
82.610	0.006	0.006			
82.660	0.006	0.006			
82.710	0.006	0.006			
82.760	0.006	0.006			
82.810	0.006	0.006			
82.860	0.006	0.006			
82.910	0.006	0.006			
82.960	0.006	0.006			
83.010	0.006	0.006			
83.060	0.006	0.006			
83.110	0.006	0.006			
83.160	0.006	0.006			
83.210	0.006	0.006			
83.260	0.006	0.006			
83.310	0.006	0.006			
83.360	0.006	0.006			
83.410	0.006	0.006			
83.460	0.007	0.007			
83.510	0.007	0.007			
83.560	0.007	0.007			
83.610	0.007	0.007			
83.660	0.007	0.007			
83.710	0.007	0.007			
83.760	0.007	0.007			
83.810	0.007	0.007			
83.860	0.007	0.007			
83.910	0.007	0.007			
83.960	0.007	0.007			
84.010	0.007	0.007			
84.060	0.007	0.007			
84.110	0.007	0.007			
84.160	0.007	0.007			

Stage-Area-Storage for Pond 3P: Tank

Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)	Elevation (meters)	Surface (sq-meters)	Storage (cubic-meters)
81.610	10.0	0.0	84.210	10.0	26.0
81.660	10.0	0.5	84.260	10.0	26.5
81.710	10.0	1.0	84.310	10.0	27.0
81.760	10.0	1.5	84.360	10.0	27.5
81.810	10.0	2.0	84.410	10.0	28.0
81.860	10.0	2.5	84.460	10.0	28.5
81.910	10.0	3.0	84.510	10.0	29.0
81.960	10.0	3.5	84.560	10.0	29.5
82.010	10.0	4.0	84.610	10.0	30.0
82.060	10.0	4.5	84.660	10.0	30.5
82.110	10.0	5.0			
82.160	10.0	5.5			
82.210	10.0	6.0			
82.260	10.0	6.5			
82.310	10.0	7.0			
82.360	10.0	7.5			
82.410	10.0	8.0			
82.460	10.0	8.5			
82.510	10.0	9.0			
82.560	10.0	9.5			
82.610	10.0	10.0			
82.660	10.0	10.5			
82.710	10.0	11.0			
82.760	10.0	11.5			
82.810	10.0	12.0			
82.860	10.0	12.5			
82.910	10.0	13.0			
82.960	10.0	13.5			
83.010	10.0	14.0			
83.060	10.0	14.5			
83.110	10.0	15.0			
83.160	10.0	15.5			
83.210	10.0	16.0			
83.260	10.0	16.5			
83.310	10.0	17.0			
83.360	10.0	17.5			
83.410	10.0	18.0			
83.460	10.0	18.5			
83.510	10.0	19.0			
83.560	10.0	19.5			
83.610	10.0	20.0			
83.660	10.0	20.5			
83.710	10.0	21.0			
83.760	10.0	21.5			
83.810	10.0	22.0			
83.860	10.0	22.5			
83.910	10.0	23.0			
83.960	10.0	23.5			
84.010	10.0	24.0			
84.060	10.0	24.5			
84.110	10.0	25.0			
84.160	10.0	25.5			



LEGEND

- 0.04

85

PRE DEVELOPMENT DRAINAGE AREA IN HECTARES
PRE DEVELOPMENT COMPOSITE CURVE NUMBER
- 0.04

98

POST DEVELOPMENT DRAINAGE AREA IN HECTARES
POST DEVELOPMENT COMPOSITE CURVE NUMBER
- PRE DEVELOPMENT DRAINAGE AREA BOUNDARY
- POST DEVELOPMENT DRAINAGE AREA BOUNDARY
- PRE DEVELOPMENT OVERLAND FLOW

PROJECT TITLE	HICKS ROBINSON 233 ROBINSON STREET TOWN OF OAKVILLE	 TRAFALGAR ENGINEERING #1-481 MORDEN ROAD, OAKVILLE, ON, L6K 3W6 www.trafalgareng.com		
DRAWING TITLE	STORM DRAINAGE PLAN	DESIGN BY AJP	SCALE 1: 200	DRAWING No. FIG 3
		DRAWN BY AJP	DATE 2022/12/06	

Specification Suggestion

"Sedum Roof" with Fixodrain® XD 20

SPEC NOTE:

This guide specification gives general information about the ZinCo green roof assembly. It has to be clear, that the information that is shown must be understood as guide and recommendations.

It is possible that your green roof project need special technical requirements. Please contact us for further information regarding technical advice, specifications and budget cost.

ZinCo Canada Inc.

P.O.Box 29
Carlisle, ON Canada L0R 1H0
T. 1-905-690-1661
E. greenroof@zinco.ca
www.zinco.ca

PART 1 – GENERAL

TECHNICAL DATA

Depth:

80 or 100 mm (3"-4")

Saturated weight:

102 kg/m² (21 lbs/ft²)

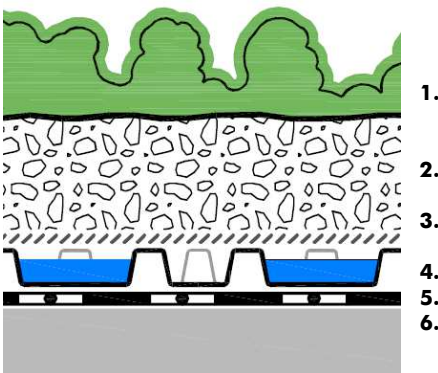
Water retention capacity:

40 L/m²

Slope:

2-5 degrees

SECTION



Section includes:

1. Plant Community: "Sedum Carpet"
2. Growing Medium ZinCo Blend-E.
Depth: 60 or 80 mm (2.5 or 3.0")
3. Filter Sheet ZinCo SF
4. Drainage Element ZinCo Fixodrain® XD 20
5. Separation Sheet ZinCo TSM32
6. Related Materials:
 - ZinCo Root Barrier WSF40
 - Inspection Chamber KS6
 - Gravel Retainer KL60/80
 - Gravel Strip

REFERENCES

- The ZinCo "Sedum Roof" assembly meets or exceed the requirements of the FLL-standards (Guideline for Planning, Execution and Upkeep of Green-Roof Sites, Release 2008).
- The ZinCo "Sedum Roof" meets or exceed the Toronto Green Roof Construction Standard (Toronto Municipal Code Chapter 492, Article IV).

DEFINITIONS

- **Green Roof:** A Green Roof is an innovative, multi-layered system that covers all types of waterproofed roof surfaces with growing medium and plant material.
- **Extensive Green Roof:** A vegetated ecological protection that is light weight, has a low growing medium depth, has a natural/native plant selection, and has low maintenance and low installation costs.
- **Sedum:** Sedum is a large and diverse group of durable Green Roof plants known for its fleshy succulent foliage and stalks of yellow, pink or white flowers. Sedum is very easy to care for, low maintenance plants and once established are drought tolerant.

SUBMITTALS

- Submit signed shop drawings showing that the roofing system, green roof assembly, materials, perimeter and penetration details and fall protection are accepted by the green roof manufacturer to ensure that the green roof system meets the necessary performance requirements.
- Submit a certification showing that all the components of the green roof assembly are supplied and warranted by the green roof manufacturer.
- Submit an inspection report, signed by the roof contractor and the green roof contractor, resulting from the quality control of the roofing system installation prior to the installation of the green roof assembly indicating that the roofing system is installed correctly.
- Submit references which indicate that the green roof manufacturer as well as the green roof contractor has recently successfully completed projects of similar scope and nature.
- **Installers Qualifications:** Work of this section shall be installed by a recognized green roof or landscape contractor, approved by ZinCo Canada Inc. The contractor shall have adequate equipment, skilled workers with extensive practical experience, skills and knowledge of plants horticulture techniques and overall landscape design requirements.
- Roof details such as flashing, roof edges, roof penetrations, outlets, roof fall and type of insulation must be adjusted to the Green Roof assembly used. ZinCo Canada Inc. provides consultation and engineering to (landscape) architects, roof contractors and green roof contractors to finalize these adjustments before construction of the roof commences, if requested.

Specification Suggestion

"Sedum Roof" with Fixodrain® XD 20

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- Prior to the installation of the green roof system, test the water tightness of the roofing system by flood testing for at least a 48 hour period or an electronic leak detection process performed by a qualified testing agency.
 - Submit documentation certifying that the load bearing capacity of the roof and building construction is tested and approved by a structural engineer, with regard to the extra weight of the Green Roof system.
 - Submit Wind uplift study in conformance with the National Building Code of Canada, sealed and signed by Professional Engineer.
- Store the materials in a dry area, out of direct sunlight, protected from freezing, staining or damage.
 - Stored plant materials have to be watched carefully. Watering the plants can be necessary during a long storage period.

WARRANTY

- Submit a 10-year (insurance backed) product manufacturing warranty according to the specifications of the green roof manufacturer which warrants all the components of the green roof assembly. (except the vegetation)

(EXTENDED WARRANTIES ARE AVAILABLE)

- Submit a 2-year workmanship warranty which warrants the installation of the green roof system according to the specifications.
- Submit a 2 year growing warranty to take effect immediately after the installation of the Green Roof. This warranty is to ensure that the vegetation properly encloses the roof area. After that a maintenance program has to be covering the full period of the warranty.

MAINTENANCE

- Provide a maintenance program for the duration of two growing seasons as per following maintenance measures:
 - Four visits in the first year.
 - Four visits in the second year.
 - The removal of coarse and unwanted weeds and the seedlings of trees; some 'newcomers' are quite acceptable.
 - The removal of vegetation from the gravel strips;
 - Visual inspection of the drain outlets; Maintaining a functioning drainage layer is critical to the establishment of the vegetation. Retained water will

stagnate and is detrimental to proper plant growth;

- Fertilizing the vegetation with a slow released chemical fertilizer;
 - type of fertilizer: slow release N-P-K: 20-6-11 75 % coated
 - recommended quantity: 25 gram per square meter. Soil testing may be required.
- Replace plant material that dies, as necessary;
- Replace lost growing medium from erosion through foot traffic, wind damage, or nesting animals. Use ZinCo growing medium.
- Removal of unwanted debris to ensure no damage to the vegetation.
- Irrigation if necessary;

Submit maintenance report to the owner at the end of the growing season.

ENVIRONMENTAL CONDITIONS

- The plant community should be chosen in consideration of the climatic circumstances and hardiness zone. Please contact ZinCo Canada Inc. for more information.
- Proceed with planting between spring and early fall so as to enable plants to take root in order to survive the winter months.
- Provide a temporary fall protection (safety railing or fall arrest) during the installation to ensure a safe and healthy work environment.
- Provide a permanent fall protection (safety railing or fall arrest) for maintenance to ensure a safe and healthy work environment.

DELIVERY, STORAGE & HANDLING

- By storage on the roof makes sure that the load of the materials does not exceed the load bearing capacity of the roof and building construction
-

PART 2 - PRODUCTS

Specified green roof assembly:
ZinCo Fixodrain® XD20: Sedum Roof

Supplier:

ZinCo Canada Inc.
P.O. Box 29
Carlisle, ON Canada, L0R 1H0

Phone: 905-690-1661
E-mail: greenroof@zinco.ca
Website: www.zinco.ca

1. ROOT BARRIER

- **ZinCo root barrier WSF 40** (Optional item if non root-resistant is waterproofing used.) made of special-polyethylene – Bitumen and Polystyrol resistant - Without plasticizer - UV-stabilized. Thickness: 0,34 mm. Weight: 320 g/m². Tensile strength: 40 – 47 N/mm². Density: 940 kg/m³.



Specification Suggestion

"Sedum Roof" with Fixodrain® XD 20

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2. SEPARATION/PROTECTIVE LAYER 4. FILTER LAYER

(PLEASE CHOOSE CONVENTIONAL OR INVERTED ASSEMBLY)

(CONVENTIONAL ROOF ASSEMBLY)

- **ZinCo separation and protection mat TSM 32** made of recycled non-rotting polyester fibers for water- and nutrient retention as well as a protection layer. Thickness: 3 mm. Weight approx. 350 g/m². Water retention capacity: 3 L/m². Bitumen resistant - Biologically and chemically neutral - Heat resistant. Melting Point: 260 °C. Penetration Force: > 2000 N.

Or

(INVERTED ROOF ASSEMBLY)

- Air and vapour permeable membrane **ZinCo diffusion membrane TGV21** made of thermal consolidated Polypropylene. Bitumen resistant – Biologically and Chemically neutral. Vapour opening size $S_d \leq 0,01$ m) Thickness: 0,55 mm. Weight: 80 g/m². Tensile strength: 167 N/50 mm. Air permeability at 1 mbar: 750 L/(m² x s). To be used as separation layer on inverted roofs and protection against small particle infiltration.

3. DRAINAGE – WATER STORAGE LAYER

- **ZinCo Drainage, water-storage and protection element Fixodrain® XD 20** for large scale extensive Green Roofs. Made of recycled polypropylene with attached filter sheet. Max. compressive strength > 50 kN/m². Water storage capacity: 3 l/m². Weight: approx. 1.0 kg/m². Height: 20 mm. Dimensions: 1,00 x 20,00 x 0,02 m. Including connectors on its long side.

- **ZinCo Filter Sheet SF** made of non-rotting thermal consolidated Polypropylene. Water flow rate: 155 /(m²s) if there is a water column of 100 mm. Apparent Opening size: d90%= 110 µm. Weight: 100 g/m². The filter sheet is attached to the Fixodrain element.

5. GROWING MEDIUM

- **Growing medium for extensive Green Roofs - ZinCo Blend-E**, produced using light weight recycled or re-used materials and minerals, enriched with high quality compost elements, resistant to flying sparks, frost-resistant, stable structure. Specially engineered by ZinCo Canada and meets the FLL-Standards for Planning, Execution and Upkeep of Green Roof sites. Depth: 60 - 80 mm.

(PLEASE CHOOSE REQUIRED DEPTH)

Particle Size Distribution

Proportion of silting components ($d < 0.063$ mm):
 ≤ 15 Mass %

Density Measurements

Bulk Density (at max. water-holding capacity): 1100 – 1500 kg/m³

Compression Factor: <20% Vol. %

Water/Air Measurements

Total Pore Volume: ≥ 65 Vol. %

Maximum water-holding capacity: $\geq 35\%$ Vol. %

Air-filled porosity at max water-holding: ≥ 10 Vol. %

Water permeability (saturated hydraulic conductivity)
 ≥ 0.001 cm/sec

pH

6.5 – 9.5

Organic Measurements

Organic matter content: $\leq 8\%$ mass%

Nutrients

Phosphorus, P205 (CAL): ≤ 200 mg/L

Potassium, K2O (CAL): ≤ 700 mg/L

Magnesium, Mg (CaCl2): ≥ 200 mg/L

Nitrate + Ammonium (CaCl2): ≤ 80 mg/L

6. PLANT MATERIAL

(PLEASE CHOOSE ONE OF THE PLANTING OPTIONS)

SEDUM CUTTINGS

- **Sedum cuttings** shall be harvested from healthy, vigorous plants while in a vegetative growth mode. They shall range in length from 1/2" to 3" and possess sufficient rooting nodes to allow for rapid root development once sown.

Sedum cuttings shall be mulched with a thin layer of compost.

PLUG PLANTS

- **Plug plants:** Plant material potted in 50 or 72 tray plugs in a mix of Sedums. Quantity: 20 - 25 plants/m².

(PLEASE CHOOSE REQUIRED PLANT DENSITY)

PRE-GROWN VEGETATION MATS

- **Pre-cultivated Vegetation Mats** with firmly rooted, for extensive green roofs suitable plant species, pre-cultivated over one growing season in the field. Delivery weight: approx. 16–20 kg/m² (3-5 lbs/ft²). Height: ca. 20–25 mm (0.75 - 1 inch) Supplying quantity: minimum 2.00 m². Standard dimensions: ca. 1.20 m x 2.00 m.

Plant types:

The basis vegetation mats are 12–14 adapted Sedum types, e.g. Sedum album, Sedum acre, Sedum spurium, Sedum floriferum, Sedum kamschaticum, Sedum reflexum, Sedum sexangulare, and Sedum hybridum. Various herbs and grasses are also available for extensive green roofs.



Specification Suggestion

"Sedum Roof" with Fixodrain® XD 20

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The coverage is at least 85% when shipped.

7. RELATED PRODUCTS

- **ZinCo inspection chamber KS 6** made of plastic coated galvanized steel with thermally insulated cover, resistant to compression. Height: 60 mm. To ensure accessibility of the roof drains at any time. Dimensions: 0.25 x 0.25 x 0.06 m. Weight: 3 kg.

- **ZinCo gravel retainer KL60/80** made of aluminum L-bracket with square slots for drainage. Designed as gravel retainer for gravel strips. Length: approx. 3 m. Height: 60 mm or 80 mm. Including joint connectors.

(PLEASE CHOOSE REQUIRED HEIGHT)

- **Gravel strip** to protect roofing details, using a 1"-2" round aggregate. Width: at least 30 cm. Depth: 60 or 80 mm.

(PLEASE CHOOSE REQUIRED DEPTH)

PART 3 – EXECUTION

1. INSPECTION

- Clean up the waterproofing membrane carefully (well-swept)
- Careful inspection of the waterproofing membrane including seams, penetrations and details after flood testing or electronic leak detection. If the waterproofing system and the Green Roof system are not carried out by the same company, the acceptance of the method used for waterproofing quality should be agreed by all the parties. Identified defects are to be reported in written form. Do not proceed until corrected.

2. ROOT BARRIER

- Deliver and install the **ZinCo root barrier WSF40** on top of the non root-

resistant waterproofing with a minimum overlap of 500 mm according to the manufacturer's instructions. The root barrier must be installed above the growing medium along the edges and roof penetrations.

3. SEPARATION / PROTECTIVE LAYER

(PLEASE CHOOSE CONVENTIONAL OR INVERTED ASSEMBLY)

(CONVENTIONAL ROOF ASSEMBLY)

Deliver and install the **ZinCo Separation Sheet TSM32** directly on the top of the root barrier with a minimum overlap of 100 mm, according to the manufacturer's instructions. The separation sheet must be installed above the growing medium along the edges and at roof penetrations.

Or

(INVERTED ROOF ASSEMBLY)

- In the case of an inverted roof: Deliver and install the **ZinCo diffusion membrane TGV21** directly on the top of the insulation with a minimum overlap of 100 mm, according to the manufacturer's instructions. The separation sheet must be installed above the growing medium along the edges and at roof penetrations.

4. DRAINAGE & WATER STORAGE LAYER

- Deliver and install the **ZinCo Drainage and water-storage element Fixodrain® XD20** including attached **ZinCo filter sheet SF** directly on the separation / protective layer according to the manufacturer's instructions. Install the Fixodrain rolls side by side with filter sheet facing up and fix the elements together with available interlocking studs. Cut the drain elements in place along the edges and roof penetrations. Fill the water retention cups of the drain layer once with

water.

5. GROWING MEDIUM

- Deliver and install the **growing medium for extensive Green Roofs ZinCo Blend-E** on the filter sheet. Spread out the growing medium equally to a depth of 60 mm – 80 mm. Check the depth on several places to ensure the right thickness. A tolerance of 1 cm is acceptable. Small amounts of growing medium will be delivered in big bags. Larger amounts will be delivered by a in bulk dumping trucks or blower truck.

6. PLANT MATERIAL

(PLEASE CHOOSE ONE OF THE PLANTING OPTIONS)

- Deliver and install the plant material in the growing medium according to the planting design and plant lists. Including one watering right after the installation.

SEDUM CUTTINGS:

Spread the sedum cuttings out over the growing medium at the recommended rate and apply them in the top 20 mm of the growing medium by raking. Cover the cuttings with a thin layer (10 mm) of compost mulch. Water the cuttings right after the installation. Keep the cuttings moist until they are firmly rooted in the growing medium.

PLUG PLANTS:

Take the plugs out of the plant trays and lay them out on the growing medium following the planting design. Dig a hole, the size of the root ball and apply the plug in the hole. Cover the root ball with growing medium and compact it gently in place. Water the plugs right after the installation. Keep the plugs moist until they are firmly rooted in the growing medium.

PRE-GROWN VEGETATION MAT:

Install mats same day as the delivery. Do not store without permission of the



Specification Suggestion

“Sedum Roof” with Fixodrain® XD 20

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grower. Do not place in full sun. During hot sunny days water/cool of the soil layer with 15-25 minutes of pre-watering. Hot scorching soil burns the roots and might damage the Sedum mats.

Starting in the corner, carefully place each roll at location and unroll the mats over the entire roof area. Make sure that the mats are in contact with the growing medium. Water immediately for 30-60 minutes after installation.

After installation: Water the first month according to the grower's specification depending on the season and time of year using automatic timers.

7. RELATED PRODUCTS

- **ZinCo inspection chamber KS 6**

Deliver and install the ZinCo Inspection Chamber on top of the drainage layer above the roof outlets. Install the ZinCo filter sheet SF on the flange of the inspection chamber.

- **ZinCo gravel retainer KL60/80**

Deliver and install the ZinCo gravel retainer on top of the filter fabric between the gravel strip and the growing medium.

- **Gravel strip**

Deliver and install a gravel strip along roof edges, flashing details and roof penetrations using a 1"-2" round aggregate. Depth: 60 or 80 mm.

8. COMPLETION

- Upon completion, water the plant material and leave the site in a neat, clean and workmanlike condition.

9. MAINTENANCE

- Execute the maintenance program as described on page 2.

END OF SECTION

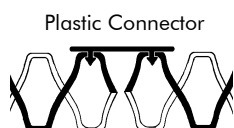


Product Data Sheet

Floradrain® FD 25-E



Pressure resistant drainage and water retention element of recycled polyolefin for use on extensive green roofs.



Technical Data

EDP No. 3028

Floradrain® FD 25-E

Drainage and water retention element of thermoformed recycled polyolefin.

Material:	Polyolefin, mainly PE (REC)	
Color:	dark grey	
Height:	ca. 1.0 in.	(ca. 25 mm)
Weight:	ca. 0.3 lbs/sq. ft.	(ca. 1.6 kg/m ²)
Diffusion opening:	ca. 0.1 in.	(ca. 2 mm)
Water retention capacity:	ca. 0.1 gal/sq. ft.	(ca. 3 l/m ²)
Filling volume:	ca. 0.2 gal/sq. ft.	(ca. 10 l/m ²)
Max. compressive strength (without filling):	ca. 40.0 psi	(ca. 270 kN/m ²)
In-plane Water Flow Rate:		
- roof slope 1 %:	ca. 2.8 gpm/ft.	(ca. 0.59 l/(s·m))
- roof slope 2 %:	ca. 4.1 gpm/ft.	(ca. 0.85 l/(s·m))
- roof slope 3 %:	ca. 5.1 gpm/ft.	(ca. 1.05 l/(s·m))
Dimensions:	ca. 3.3 ft. x 6.6 ft.	(ca. 1.00 m x 2.00 m)

Accessories:

Plastic Connector EDP No. 9620 (to be pressed into diffusion openings)

Material: POM (Polyoxymethylene)

Features

- tested and proven drainage capacity
- proven long-term reliability
- water retention, even on slightly sloped roofs
- walkable
- low profile height and light weight
- biologically neutral
- quick and easy installation
- connectors are also available for a more comfortable installation especially on gentle sloped roofs

Installation Instructions

Install the Drainage Element Floradrain® FD 25-E on the protection mat. The drainage elements are installed butt jointed, in green roof applications with the evaporation holes facing up, for hard landscape applications with the evaporation holes facing down and infilled with Zincoblend M. Cut the drainage

Element in situ at roof penetrations. Consider an allowance for wastage of ca. 3 %. Floradrain® FD 25-E is, included, but not limited to, installed according to manufacturer's instructions, not exposed to UV-light, completely covered. Call manufacturer for further options.

Health and Safety

This product does not require a material safety data sheet (MSDS) according to the OSHA Hazard Communication Standard (29 CFR 1910.1200). When used as recommended or under ordinary

conditions, it should not present a health and safety hazard. However, an MSDS can be provided as a courtesy in response to a customer request.

Product Data Sheet

Zincoblend E



Growing Media for extensive green roofs.



Technical Data

EDP No. 21673000 / 21673500 / 21674000

Zincoblend E

ZinCo engineered Growing Media, especially suitable for extensive green roofs with plants of the ZinCo extensive plant community.

Parameters:	Guiding Values*	Guiding Values (metric)*
Proportion of silting components:	≤ 15 mass %	
Volume weight apparent density		
- when dry:	40 - 60 lbs/cu. ft.	(0.64 - 0.96 g/cm ³)
- at max. water capacity:	65 - 85 lbs/cu. ft.	(1.04 - 1.36 g/cm ³)
Max. water capacity:	approx. 40 Vol. %	
Water permeability, mod. K _f :	0.024 - 2.4 in./min	(0.001 - 0.12 cm/s)
pH-Value:	6.5 - 8.0	
Salt content (water extract):	≤ 0.02 lbs/gal	(≤ 2.5 g/l)
Organic content:	≤ 0.54 lbs/gal	(≤ 65.0 g/l)

*tested at PennState University accord. to FLL-Guidelines resp. ASTM E 2399-05

Delivery options:

EDP No. 21673000:	bulk trailer
EDP No. 21673500:	super sack
EDP No. 21674000:	small bag

Features

- proven long-term reliability
- excellent water retention
- high air content – even at max. water capacity
- frost resistant
- stable in structure
- independent quality monitoring

Installation Instructions

Install the Growing Media Zincoblend E for the Green Roof System on the filter sheet equally in the necessary depth. Check the depth in several places to ensure a

continuous thickness. A tolerance of 0.5 in. (13 mm) is acceptable. Consider a settlement factor of 1.2.

Health and Safety

This product does not require a material safety data sheet (MSDS) according to the OSHA Hazard Communication Standard (29 CFR 1910.1200). When used as recommended or under ordinary

conditions, it should not present a health and safety hazard. However, an MSDS can be provided as a courtesy in response to a customer request.



APPENDIX 'E'

CCTV Report for Sanitary Laterals



**226 WILKINSON ROAD, BRAMPTON, ONTARIO L6T 4N7
(905) 792-8169**

SANITARY LATERAL VIDEO INSPECTION REPORT

125 MM DIAMETER SANITARY LATERALS

FOR

233 ROBINSON STREET

**TOWN OF OAKVILLE
REGION OF HALTON**

DVD # 22341

**CONSULTANT: TRAFALGAR ENGINEERING
CONSULTANT'S REPRESENTATIVE: ANDY PREJS
ARCHITECT: HICKS DESIGN STUDIO INC.
ARCHITECT'S REPRESENTATIVE: JULIE ODANSKI**

FRIDAY, NOVEMBER 18TH, 2022

INDEX:

- 1. TITLE PAGE AND INDEX**
- 2. SUMMARY REPORT AND CONCLUSIONS**
- 3. SKETCH OF SEWERS INSPECTED**
- 1. SEWER INSPECTION REPORTS**

**SEWER CLEANING, VIDEO INSPECTION, INSITU REPAIRS &
MUNICIPAL ENGINEERING SERVICES**

2. SUMMARY REPORT AND CONCLUSIONS:

The video inspection of the sanitary laterals for 233 Robinson Street was carried out by Ramsin Brikha of Aquaflow Technology Inc., and was authorized by Julie Odanski of Hicks Design Studio Inc. The video inspections were carried out on Friday, November 18th, 2022.

SANITARY LATERALS VIDEO INSPECTED:

DVD # 22341:	125 mm diameter Sanitary laterals inspected	<u>24.3 m</u>
--------------	--	---------------

TOTAL LENGTH OF SEWERS VIDEO INSPECTED: 24.3 M

The video inspection confirmed that all of the sewer lines inspected are in satisfactory condition, with the following summary comments. For detailed comments on each sewer run, please refer to the attached sewer video Inspection reports.

1. 233 Robinson Street, SAN-MAIN TO SAN-LAT-1, 125mm concrete, sanitary lateral: Dye test confirmed correct lateral, 24.7m downstream of EX-SAN-1 (survey #1).
2. 233 Robinson Street, SAN-MAIN TO SAN-LAT-2, 125mm concrete, sanitary lateral: Abandoned lateral, 15.7m downstream of EX-SAN-1 (survey #2).



View of sanitary cleanout in basement (storm left), looking south (towards Robinson).



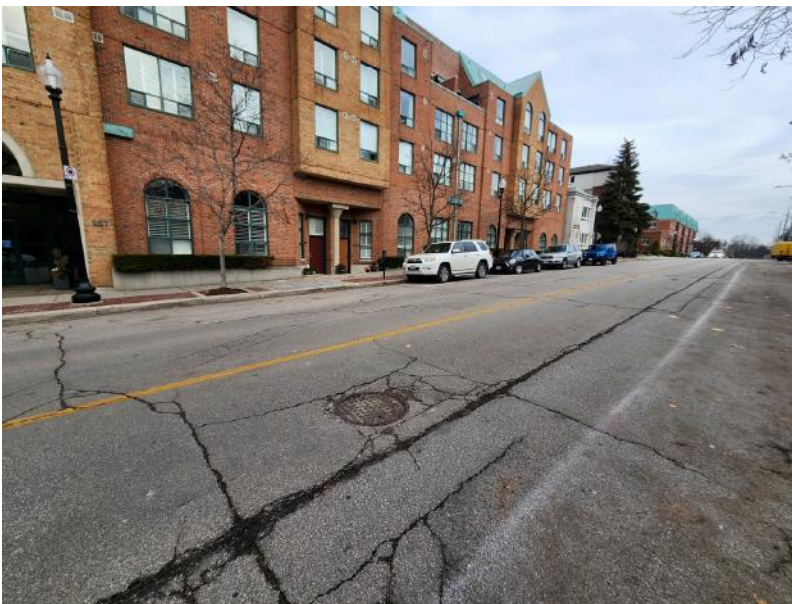
View of EX-SAN-1, looking west.



View of EX-STM & EX-SAN-1, looking west.



View of EX-SAN-1 & EX-SAN, looking north.



View of EX-SAN-2, looking east.

Report Prepared by:

Steven Lostracco, P. Eng



DUNN STREET
(DEDICATED BY REGISTERED PLAN 1)
PIN 24780-0155

CONDO BLOCK 25505
HALTON CONDOMINIUM PLAN N° 206

HALTON CONDOMINIUM PLAN N° 257
CONDO BLOCK 25556

PIN 24779-0039
(Area = 392.4 m²)

233 ROBINSON ST

88 DUNN ST

DUNN STREET

ROBINSON STREET

3. SKETCH OF SANITARY LATERALS
VIDEO INSPECTED
233 ROBINSON STREET
TOWN OF OAKVILLE

NOVEMBER 18TH, 2022

DVD # 22341 (SANITARY LATERALS)
(SANITARY MAINLINE)
(STORM MAINLINE)

EX-SAN-2

218 ROBINSON ST

EX-SAN-1

EX-STM

EX-SAN

NO PIPE CONNECTION

250Ø CONC SAN

30.3m

22.4m

11.3m

LAT SAN

LAT SAN

LAT SAN

(DEDICATED BY REGISTERED PLAN 1)
PIN 24779-015



Aquaflow Technology Inc.
226 Wilkinson Road
Brampton Ontario L6T 4N7
Phone: 905-792-8169
Fax: 905-487-2755

Main Inspections Summary

22341-HDS-233 ROBINSON ST-SANITARY LATERAL

Mainline ID	End date/time	Surveyed by	Start MH	Finish MH	Material	Height	Total length	Length
SAN- MAIN_SAN- LAT-1	2022-11-18 9:03 AM	RAMSIN	SAN-LAT-1	SAN-MAIN	CP	125 mm		11.9 m
SAN- MAIN_SAN- LAT-2	2022-11-18 9:35 AM	RAMSIN	SAN-LAT-2	SAN-MAIN	CP	125 mm		12.4 m
Sub-Total							0.0 m	24.3 m
Total							0.0 m	24.3 m

PACP Inspections

Surveyed by: RAMSIN	Certificate number: U-0119-70303735	Owner:	Customer: Aquaflow	Drainage area:	P/O number:	Sheet number:
Pipe segment ref.: SAN-MAIN_SAN-LAT-1	Start date/time: 20221118 08:37	Street: 233 ROBINSON STREET	City: OAKVILLE	Grade to invert:	Rim to grade:	
Location details:	Upstream MH No: SAN-LAT-1	Rim to invert:	Grade to invert:	Rim to grade:		
Sewer use: SS	Direction: U	Flow control:	Downstream MH No: SAN-MAIN	Rim to invert:	Grade to invert:	Rim to grade:
Height: 125 mm	Width:	Shape: C	Material: CP	Lining method:	Pipe joint length:	Total length: 11.9 m
Media label:	Purpose:	Sewer category:	Pre-cleaning: N	Date cleaned:	Work order no.:	Weather: 1
Project name: 22341-HDS-233 ROBINSON ST-SANITARY LATERAL	Additional info:					

Observations

Distance	Video Ref.	PACP Code	Continuous	S/M/L	Value Inches (mm) 1st 2nd	%	Joint	Circumferential Location At/From To	Image Ref.	Remarks
0.0 m	00:00:17	AMH					☐	/		SAN-MAIN
0.0 m	00:00:27	MWL				0	☐	/		
0.0 m	00:00:49	MGO					☐	/		VIEW OF SANITARY LATERAL FOR 233 ROBINSON STREET. 24.7M DOWNSTREAM OF SAN MH EX-SAN-1
0.0 m	00:01:51	MGO					☐	/		VIEW OF DYE TEST CONFIRMING CONNECTION TO SANTIARY SEWER

Observations

Distance	Video Ref.	PACP Code	Continuous	S/M/L	Value Inches (mm)		%	Joint	Circumferential Location		Image Ref.	Remarks
					1st	2nd			At/From	To		
5.4 m	00:04:54	MGO						☐	/			PIPE MATERIAL CHANGE FROM CP TO PVC, EXPOSED FERNCO COUPLER 12 O'CLOCK
5.4 m	00:05:32	MGO						☐	/			NO SIGN OF INFILTRATION, LOOKS OK
6.3 m	00:06:03	MGO						☐	/			VIEW OF PIPE MATERIAL CHANGE FROM PVC TO CP
9.6 m	00:07:00	MGO						☐	/			VIEW OF PIPE MATERIAL CHANGE FROM CP TO VCP
9.6 m	00:07:27	TF			125			☐	12	/		OBJECT IN CONNECTION 12 O'CLOCK
10.9 m	00:09:34	MGO						☐	/			CAMERA BLOCKED BY PIPE DIAMETER REDUCTION
11.0 m	00:08:10	MGO						☐	/			PIPE DIAMETER REDUCES
11.9 m	00:09:34	MGO						☐	/			VIEW AHEAD TO INSIDE OF BUILDING, SEWER OK
11.9 m	00:09:34	AMH						☐	/			SAN-LAT-1

PACP Inspections

Surveyed by: RAMSIN		Certificate number: U-0119-70303735		Owner:		Customer: Aquaflow		Drainage area:		P/O number:		Sheet number:	
Pipe segment ref.: SAN-MAIN_SAN-LAT-2				Start date/time: 20221118 09:17		Street: 233 ROBINSON STREET				City: OAKVILLE			
Location details:				Upstream MH No: SAN-LAT-2				Rim to invert:		Grade to invert:		Rim to grade:	
Sewer use: SS		Direction: U		Flow control:		Downstream MH No: SAN-MAIN				Rim to invert:		Grade to invert:	
Height: 125 mm		Width:		Shape: C		Material: CP		Lining method:		Pipe joint length:		Total length:	
Media label:		Purpose:		Sewer category:		Pre-cleaning: N		Date cleaned:		Work order no.:		Weather: 1	
Project name: 22341-HDS-233 ROBINSON ST-SANITARY LATERAL				Additional info:									

Observations

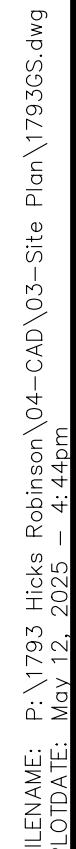
Distance	Video Ref.	PACP Code	Continuous	S/M/L	Value Inches (mm)		%	Joint	Circumferential Location		Image Ref.	Remarks
					1st	2nd			At/From	To		
0.0 m	00:00:19	AMH						☐	/			SAN-MAIN
0.0 m	00:00:44	MWL					0	☐	/			
0.0 m	00:00:51	MGO						☐	/			VIEW OF SANITARY LATERAL FOR 233 ROBINSON STREET. 15.5M DOWNSTREAM OF SAN MH EX-SAN-1
5.9 m	00:02:40	MGO						☐	/			PIPE MATERIAL CHANGE FROM CP TO PVC, EXPOSED FERNCO COUPLER, NO INFILTRATION
7.0 m	00:03:13	MGO						☐	/			PIPE MATERIAL CHANGE FROM PVC TO CP
8.0 m	00:03:47	DSGV					5	☐	6 /			STONE
9.5 m	00:04:37	DSF					5	☐	6 /			

Observations

Distance	Video Ref.	PACP Code	Continuous	S/M/L	Value Inches (mm)		%	Joint	Circumferential Location		Image Ref.	Remarks
					1st	2nd			At/From	To		
11.4 m	00:09:13	CC						☐	12	12		
11.9 m	00:08:18	RFJ						☒	12	12		
12.2 m	00:05:48	MGO						☐	/			STEEL POST THROUGH TOP OF PIPE
12.2 m	00:06:17	H						☐	12	/		
12.4 m	00:06:57	MGO						☐	/			PIPE LOOKS TO BE ABANDONED, 100% FULL AHEAD
12.4 m	00:12:03	AMH						☐	/			SAN-LAT-2

APPENDIX 'F'

Grading and Servicing Plan



1. ALL DIMENSIONS AND ELEVATIONS TO BE VERIFIED PRIOR TO CONSTRUCTION AND ANY DISCREPANCIES FOUND PRIOR TO OR DURING CONSTRUCTION SHALL BE CLARIFIED WITH THE ENGINEER.
2. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS OF THE REGIONAL MUNICIPALITY OF HALTON (INCLUDING REGION OF HALTON'S CONTRACTOR INFORMATION PACKAGE), THE TOWN OF OAKVILLE, AND THE ONTARIO BUILDING CODE (PART 7), ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS (OPSS & OPSD) SHALL BE USED IN ABSENCE OF LOCAL STANDARDS.
3. RESTORE ROAD AS PER THE TOWN OF OAKVILLE ROAD CUT PERMIT.
4. ALL INFORMATION SHOWING THE LOCATION AND SIZE FOR EXISTING UTILITIES AND/OR SERVICES HAS NOT BEEN VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF UTILITIES PRIOR TO CONSTRUCTION, AND PROTECTING AND MAINTAINING THE UTILITIES DURING CONSTRUCTION.
5. ALL REMOVED OR DAMAGED CURBS, SIDEWALK, GRANULARS, ASPHALT AND SOD RESULTING FROM SERVICE INSTALLATION SHALL BE REINSTATED BY SERVICING CONTRACTOR TO THE TOWN OF OAKVILLE STANDARDS.
6. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL, MECHANICAL AND LANDSCAPE DRAWINGS.
7. THE CONTRACTOR SHALL CHECK AND VERIFY ALL GIVEN GRADES AND ELEVATIONS, PRIOR TO CONSTRUCTION AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
8. ALL GRADING CHANGES SHALL BE APPROVED BY THE ENGINEER AND TOWN OF OAKVILLE PRIOR TO IMPLEMENTATION.
9. THE CONTRACTOR SHALL CLEAN ALL MUD TRACKED ON TO ADJACENT ROADWAYS.
10. CONTRACTOR SHALL FLUSH AND VIDEO STORM AND SANITARY SEWERS UPON INSTALLATION AND PROVIDE VIDEO TO THE ENGINEER.
11. CONTRACTOR SHALL PROVIDE A DIGITAL AS-BUILT SURVEY OF ALL UNDERGROUND AND ABOVEGROUND WORKS TO THE SATISFACTION OF THE ENGINEER.

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS OF THE REGIONAL MUNICIPALITY OF HALTON INCLUDING REGION OF HALTON CONTRACTOR INFORMATION PACKAGE, TOWN OF OKAVILLE AND THE ONTARIO BUILDING CODE (PART 7), ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS (SPSS & OSD) SHALL BE USED IN ABSENCE OF LOCAL STANDARDS.
2. ALL SERVICES SHALL BE BACKFILLED WITH APPROVED NATIVE BACKFILL COMPACTED TO 98% S.P.M.D.D. BEDDING AND COVER MATERIAL SHALL BE PER THE APPLICABLE OSD.
3. SERVICE TRENCH RESTORATION WITHIN MUNICIPAL ROAD ALLOWANCE SHALL BE PER TOWN STD.
4. WATER SERVICE TO BE COPPER TYPE 'K' SOFT COPPER TUBING.
5. SANITARY LATERAL INVERT TO BE CONFIRMED PRIOR TO FOUNDATION CONSTRUCTION.
6. ALL SINGLE CATCHBASIN LEADS TO BE 250mm² PVC DR-35 @ 1.0%.
7. WATER SERVICE LATERALS ARE TO HAVE A MINIMUM COVER OF 1.7m AND MAINTAIN A HORIZONTAL DISTANCE OF 1.2m FROM THEMSELVES & OTHER UTILITIES.
8. WATER SERVICE LATERALS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.30m OVER/0.50m UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING OR IN PARALLEL INSTALLATIONS.

1. ALL SANITARY SEWERS SHALL BE PVC SDR35 AND BEDDING PER OPSPD 802.010*.
2. ALL SANITARY MANHOLES SHALL BE 1200mmØ PER OPSPD 701.010 c/w COVER PER OPSPD 401.010, UNLESS OTHERWISE NOTED.
3. SERVICE LATERALS ARE TO BE 125mmØ PVC PIPE AT 2.0% MINIMUM (UNLESS OTHERWISE NOTED) SLOPED TO BUILDING, SDR-28 AND SHALL BE GREEN AS PER REGION OF HALTON STANDARDS.
4. BENCHING IN MANHOLES IS THROUGHOUT TO THE CROWN OF ALL PIPES ON A VERTICAL PROJECTION FROM SPRING LINE.
5. ASTERISK (*) INDICATES OPSPD CAN BE USED MODIFIED BY REGION OF HALTON.

1. WATER SERVICE CONNECTION SHALL BE 38mm² COPPER, TYPE 'K' SOFT COPPER TUBING.
2. BEDDING ON WATER SERVICE SHALL BE PER OPSD 802.010¹.
3. COVER SHALL BE 1.7m MIN. UNLESS OTHERWISE NOTED.
4. MINIMUM LATERAL SEPARATION FROM OTHER UTILITIES IS 2.5m.
5. ANODE INSTALLATION PER RH 420.04.
6. WATERMAIN SHALL BE PRESSURE TESTED TO 150psi FOR 3 HOURS AND WITNESSED BY REGION OF HALTON.
7. WATERMAIN SHALL BE TESTED AND DISINFECTED AS PER REGION OF HALTON REQUIREMENTS.

1. ALL TOPSOIL SHALL BE STRIPPED PRIOR TO GRADING.
2. ALL FILL PLACEMENT SHALL BE DONE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERS RECOMMENDATIONS.
3. ALL DISTURBED AREAS SHALL BE REINSTATED WITH SEED OVER 200-300mm OF TOPSOIL.
4. ALL DISTURBED AREAS WITH PUBLIC R.O.W. TO BE REINSTATED WITH 200mm TOPSOIL AND SOD.
5. ALL CURBING SHALL BE BARRIER CURB PER OSPD 600.110 (150mm HIGH), UNLESS OTHERWISE NOTED.
6. ASPHALT DRIVEWAY PAVEMENT STRUCTURE SHALL BE THE GREATER OF THE EXISTING, OR 75mm H₂LA OVER 150mm 19mm CRCL, OR AS OTHERWISE DIRECTED BY THE GEOTECHNICAL CONSULTANT.

- I. ALL EROSION AND SEDIMENT CONTROLS SHALL BE TO BE INSTALLED ACCORDING TO THE APPROVED PLANS PRIOR TO COMMENCEMENT OF ANY EARTH MOVING WORK ON THE SITE. ALL MATERIAL SHALL REMAIN IN PLACE UNTIL ALL DISTURBED AREAS ARE STABILIZED WITH THE INTENDED DRAIN COVER.
2. EROSION AND SEDIMENT CONTROLS SHALL BE INSPECTED BY THE CONTRACTOR:
 - I. WEEKLY
 - II. BEFORE AND AFTER ANY PREDICTED RAINFALL EVENT
 - III. FOLLOWING AN UNPREDICTED RAINFALL EVENT
 - IV. DAILY, DURING EXTENDED DURATION RAINFALL EVENTS
 - V. AFTER SIGNIFICANT SNOW MELT EVENTS
3. EROSION AND SEDIMENT CONTROLS SHALL BE MAINTAINED IN PROPER WORKING ORDER AT ALL TIMES. DAMAGED OR CLOGGED DEVICES SHALL BE REPAIRED WITHIN 48 HOURS.
4. WHERE A SITE REQUIRES DEWATERING AND WHERE THE EXPELLED WATER CAN BE FREELY RELEASED TO A SUITABLE RECEIVER, THE EXPELLED WATER SHALL BE TREATED TO CAPTURE SUSPENDED PARTICLES GREATER THAN 40 MICRON IN SIZE. THE CAPTURED SEDIMENT SHALL BE DISPOSED OF PROPERLY PER MOST GUIDELINES. THE CLEAN EXPELLED WATER SHALL FREELY RELEASE TO A SUITABLE RECEIVER THAT DOES NOT CREATE DOWNSTREAM ISSUES INCLUDING BUT NOT LIMITED TO EROSION, FLOODING – NOT ONLY DOWNSTREAM ISSUES INCLUDING BUT NOT LIMITED TO EROSION, FLOODING – NUISANCE OR OTHERWISE, INTERFERENCE ISSUES, ETC.
5. EXISTING STORM SEWER AND DRAINAGE DITCHES ADJACENT TO THE WORKS SHALL BE PROTECTED AT ALL TIMES FROM THE ENTRY OF SEDIMENT/SILT THAT MAY MIGRATE FROM THE SITE. FOR STORM SEWERS: ALL DISBURTS (DEAR LOT CATCHBASINS, ROAD CATCHBASINS, PIPE INLETS, ETC.) MUST BE SECURED/FITTED WITH SILTATION CONTROL MEASURES. FOR DRAINAGE DITCHES: THE INSTALLATION OF ROCK CHECK DAMS, SILTATION FENCE, SEDIMENT CONTAINMENT DEVICES MUST BE INSTALLED TO TRAP AND CONTAIN SEDIMENT. THESE SILTATION CONTROL DEVICES SHALL BE INSPECTED AND MAINTAINED PER ITEMS B AND C ABOVE.
6. IN THE EVENT OF A SPILL (RELEASE OF DELETERIOUS MATERIAL) ON OR EMANATING FROM THE SITE, THE OWNER OR OWNERS AGENT SHALL IMMEDIATELY NOTIFY THE MOECC AND FOLLOW ANY PRESCRIBED CLEAN UP PROCEDURE. THE OWNER OF OWNERS AGENT WILL ADDITIONALLY IMMEDIATELY NOTIFY THE TOWN.

