STORMWATER MANAGEMENT AND FUNCTIONAL SERVICING REPORT

FOR

772 WINSTON CHURCHILL BLVD
ONE PROPERTIES

TOWN OF OAKVILLE

Revision 2: December 15, 2021
Revision 1: April 9, 2021

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Project No. 2060

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1. INTRODUCTION

This report presents the site servicing and stormwater management analysis for the One Properties industrial development located at 772 Winston Churchill Boulevard, south of Beryl Road in the Town of Oakville, as shown on Figure 1. The total site area is 15.59 ha, in which 11.92 ha will be developed with two Industrial warehouse buildings and associated paved and landscaped areas. The subject property is located in the Clearview Creek subwatershed, in which a portion of the existing watercourse is located within a 40.0m easement block along the west and south property limits.

A Subwatershed Study was completed by McCormick Rankin Corporation (MRC) for the Clearview Creek in May 2007 which established pre-development flow rates. In the 2007 Clearview Creek Subwatershed Study the site area was identified as being part of Subcatchment 5, which had a total area of 24.2 ha. The drainage limits of Subcatchment 5, as delineated in the 2007 Clearview Creek Subwatershed Study, is referenced in Figure 2, with further details of Subcatchment 5 and the related pre-development flow rates provided in Appendix A.

Stormwater management will be provided by a combination of surface stormwater storage and a below ground stormwater storage facility providing quantity control, located within the loading dock areas between Building A and Building B, as shown on Plan G-1. Ad dry pond area will also provide stormwater storage, located at the southeast corner of the site. The site area will be controlled to the allowable flows protata from the sub-watershed study for the total development area of 11.92 ha and will drain to the southeast and discharge to the realigned channel on the west side of Winston Churchill Boulevard. Quality control will be provided by a series of JellyFish OGS units. Due to various grading constraints, including the floodline elevation in the watercourse and architectural requirements for the building height, the stormwater outlet will be pumped.

The sanitary and water services will connect to municipal connection which are simultaneously being submitted as external works. The sanitary connection will be made through the rear of the site, ultimately discharging to the sanitary sewer on Acacia Court. The watermain connection will be made to the proposed watermain on Winston Churchill Blvd.

LOCATION PLAN

FIGURE 1

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PROJECT:	772 WINSTON CHURCHILL TOWN OF OAKVILLE
SCALE :	N.T.S
DATE:	DECEMBER 2021
PROJ No.	2060

MODIFIED: 07/03/15 16:07:54 DRAWING NAME: K5470-EXISTING LANDUSE.DWG

MRC	EXISTING LAND USE	EXHIBIT 2
	CLEARVIEW CREEK SUBWATERSHED STUDY	

2. DESIGN CRITERIA

1. Maximum allowable stormwater discharge to be limited to pre-development flows.

2. On-site detention must be provided to attenuate post development peak flows to the pre-development rates for storms up to and including the 100-year storm.

3. Stormwater quality controls to be based on Type 1 Enhanced Level (80% TSS Removal).

3. SITE DEVELOPMENT STATISTICS

The site will consist of two industrial warehouse buildings and associated paved and landscaped areas. The existing watercourse area and road widening will be excluded from the stormwater management calculations, as the drainage from these areas will not be directed within the site. The site statistics are provided below:

Building A	=	30,905.87m^2	
Building B	=	29,202.56m^2	
Paved	=	45,400.97m^2	
Landscaped:	=	12,641.39m^2	
Development Area:	=		119,150.78m^2
Widening:	=	3,703.27m^2	
Watercourse Easement:	=	33,090.99m^2	
Site Area	=		155,945.04m^2

4. PRE-DEVELOPMENT STORMWATER FLOWS

The site is located in the Clearview Creek watershed, in which pre-development stormwater flow rates for the sub-catchment areas were determined in the 2007 Clearview Creek Subwatershed Study, refer to Appendix A for excerpts.

The development area is located in Catchment 5, as indicated on Figure 2. The pre-development rates for the site area of 11.92ha have been pro-rated based on the total subcatchment area (24.2 ha) discharging to the Clearview Creek realignment. The allowable discharge rates for the development are summarized in Table 1, based on the Chicago Storm (Bloor St. Data).

Table 1 – Calculated Pre-Development Flow Rates Based On Total Area

Storm Event	Pre-Development Pro-Rated Target Rate [m^3/s]	
	Area (24.2 ha)(1)	Site Development Area (11.92 ha)(2)
25mm Storm 3	-	0.014
2 Year	0.155	0.076
5 Year	0.300	0.148
10 Year	0.413	0.203
25 Year	0.540	0.266
50 Year	0.706	0.348
100 Year	0.869	0.428

1. Pre-development flow rates from Clearview Creek sub-watershed Catchment 5, SWMHYMO model updated by a.m. Candaras & associates, refer to Appendix A.
2. Target flow rates for 772 Winston Churchill Site, prorated based on development area of 11.92 ha.
3. The target discharge rate for the 25mm storm event is based on the average discharge of the 25mm rainfall volume, for the tributary area, over a 48 hour period.

5. STORMWATER MANAGEMENT

Stormwater management for the development will be provided by a combination of below ground storage chambers and surface stormwater ponding, to address quantity control requirements. Extended detention will be provided by detaining the 25mm stormwater volume and releasing this volume over a 48 hour period. Quality control will be provided through the specification of JellyFish units. The stormwater outlet is subject to the floodwater elevations in the adjacent Clearview Creek, and other constraints, which require a pumped stormwater outlet for all storm events. Refer to Plans G-1 to G-4 for the design layout and details of the storage chambers and surface ponding, quality control structures and pumped outlet. The stormwater design is further detailed in the following sections.

5.1. QUANTITY CONTROLS

In order to achieve the required target flow rates, stormwater storage will be provided below ground in StormTech Chambers MC-4500 (1,837m^3), through surface ponding in the loading dock area (820m^3) and through surface storage in a dry pond area (3,405m^3). The proposed stage storage relationship for this facility is shown in Table 2. An extended detention volume of 2,496.0m^3 will be provided between the 90.00m and 91.80m elevations, satisfying the required volume of 2,479.7m^3. The calculations for the required extended detention volume and release rate are provided below in Section 5.2. Refer to Appendix B for StormTech chamber volume details and Plan G-1 and G-2 for the surface ponding details.

Outlet controls will be provided in MH#4 OCS and will consist of a 63mm orifice at an elevation of 89.15, in order to provide extended/erosion control discharge to satisfy the 25mm storm event. There will also be a 260mm orifice at the elevation 91.80, controlling the remaining storm events to their respective storm target flow rate, up to a maximum discharge of 221l/s. Refer to Table 3 for the Stormwater Management System performance. As demonstrated in Table 3, all storm events satisfy the target flow rates, controlling all storms up to the 100year to the established target flow rate for each respective storm, to a maximum discharge rate of 212 l/s. The surface ponding levels do not exceed 93.64, occurring during the 100year 24h SCS storm event, resulting in a maximum ponding depth of 0.14m in the loading dock area.

Based on the SWMHYMO output results, the erosion control volume of 2,069m^3 will be released over a period of 44.2 hours, at a peak release rate not exceeding 0.014m^3/s. The time period exceeds 48 hours due to the orifice size required to satisfy the 25mm storm target flow rate.

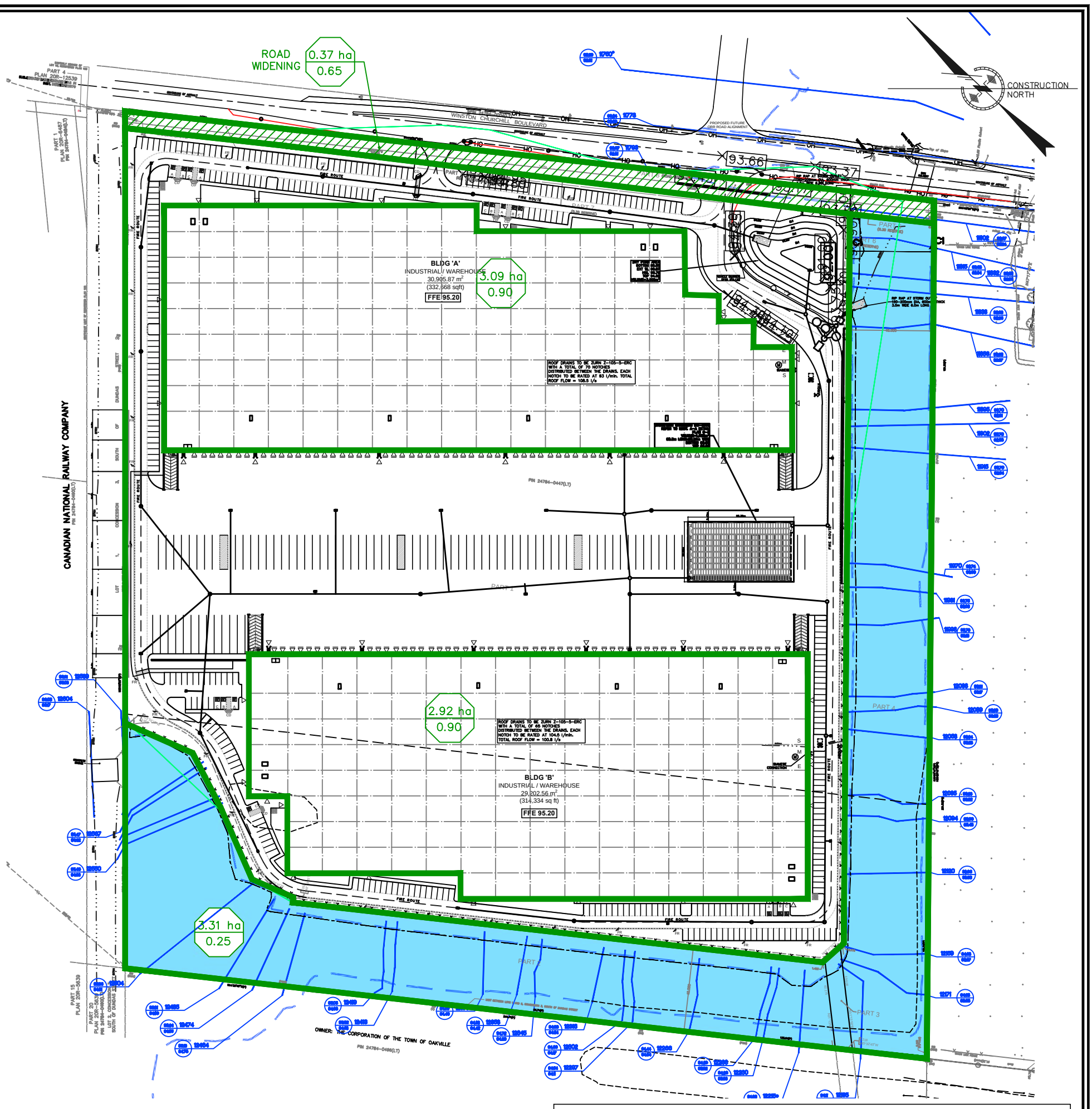

FIGURE 3
POST DEVELOPMENT STORM DRAINAGE AREA PLAN

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SCALE	1:2000
DATE:	DECEMBER 2021
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Table 2 – Below Ground and Surface Stormwater Stage Storage Discharge Relationship

	VOLUME (m^3)					DISCHARGE (m^3/s) AND HEAD (m)				SWMHYMO INPUT	
Elevation	Dry Pond Area m^2	Dry Pond Volume	MC-4500 Chambers	Surface Ponding	Total	Orifice 1 (1)	Orifice 2 (2)	Emergency Overflow (3)	Total Flows	Discharge (m^3/s)	Storage (ha*m)
90.00	110.00	0.00	0.0	0.0	0.0	0.0000			0.0000	0.0000	0.0000
90.10	149.00	12.95	56.8	0.0	69.8	0.0083			0.0083	0.0083	0.0070
90.20	188.00	29.80	113.7	0.0	143.5	0.0088			0.0088	0.0088	0.0143
90.30	227.00	50.55	219.3	0.0	269.9	0.0092			0.0092	0.0092	0.0270
90.40	266.00	75.20	340.3	0.0	415.5	0.0096			0.0096	0.0096	0.0416
90.50	305.00	103.75	460.2	0.0	564.0	0.0100			0.0100	0.0100	0.0564
90.60	344.00	136.20	578.6	0.0	714.8	0.0104			0.0104	0.0104	0.0715
90.70	383.00	172.55	695.3	0.0	867.9	0.0107			0.0107	0.0107	0.0868
90.80	422.00	212.80	809.9	0.0	1,022.7	0.0111			0.0111	0.0111	0.1023
90.90	461.00	256.95	922.1	0.0	1,179.1	0.0114			0.0114	0.0114	0.1179
91.00	500.00	305.00	1,004.5	0.0	1,309.5	0.0117			0.0117	0.0117	0.1309
91.10	530.00	356.50	1,111.5	0.0	1,468.0	0.0120	0.0000		0.0120	0.0120	0.1468
91.20	560.00	411.00	1,214.8	0.0	1,625.8	0.0124	0.0000		0.0124	0.0124	0.1626
91.30	590.00	468.50	1,313.8	0.0	1,782.3	0.0127	0.0000		0.0127	0.0127	0.1782
91.40	620.00	529.00	1,407.7	0.0	1,936.7	0.0130	0.0000		0.0130	0.0130	0.1937
91.50	650.00	592.50	1,495.2	0.0	2,087.7	0.0132	0.0000		0.0132	0.0132	0.2088
91.60	680.00	659.00	1,573.6	0.0	2,232.6	0.0135	0.0000		0.0135	0.0135	0.2233
91.70	710.00	728.50	1,637.4	0.0	2,365.9	0.0138	0.0000		0.0138	0.0138	0.2366
91.80 (4)	740.00	801.00	1,695.3	0.0	2,496.3	0.0141	0.0000		0.0141	0.0141	0.2496
91.90	770.00	876.50	1,752.1	0.0	2,628.6	0.0143	0.0000		0.0143	0.0143	0.2629
92.00	800.00	955.00	1,808.9	0.0	2,763.9	0.0146	0.0392		0.0538	0.0538	0.2764
92.06	824.00	1,003.72	1,837.3	0.0	2,841.1	0.0148	0.0534		0.0682	0.0682	0.2841
92.20	880.00	1,123.00	1,837.3	0.0	2,960.3	0.0151	0.0770		0.0921	0.0921	0.2960
92.40	960.00	1,307.00	1,837.3	0.0	3,144.3	0.0156	0.1016		0.1172	0.1172	0.3144
92.50	1,000.00	1,405.00	1,837.3	0.0	3,242.3	0.0158	0.1119		0.1277	0.1277	0.3242
92.80	1,120.00	1,723.00	1,837.3	0.0	3,560.3	0.0165	0.1382		0.1547	0.1547	0.3560
93.00	1200.00	1,955.00	1,837.3	0.0	3,792.3	0.0170	0.1533		0.1703	0.1703	0.3792
93.50	1,450.00	2,617.50	1,837.3	0.0	4,454.8	0.0181	0.1856		0.2037	0.2037	0.4455
93.75	1,575.00	2,995.63	1,837.3	820.0	5,653.0	0.0186	0.1999	0.00	0.2185	0.2185	0.5653
94.00	1700.00	3,405.00	1,837.3	5,074.3	10,316.7	0.0191	0.2132	3.20	0.2323	0.2323	1.0317

1. Based on an 63mm orifice set at = 89.15, $Q=CA\sqrt{2gh}$
2. Based on a 260mm orifice set at = 91.80, $Q=CA\sqrt{2gh}$
3. Emergency overflow based on 21.0m wide weir spillway from dry pond to watercourse, at elevation 93.80, $Q=CLH^{3/2}$.
4. Extended detention volume 2,512m^3 provided between elevations 90.00 and 91.80.

Table 3 –Below and Above Ground Stormwater Storage Performance

Storm	Pre-Development Flow Rates (m^3/s)	Inflow (m^3/s)	Outflow (m^3/s)	Storage Volume (m^3)	HWL
25mm Storm	0.014	0.923	0.013	2,069	91.49
Chicago Storm 4 hour					
2 Year	0.076	1.297	0.052	2,759	92.00
5 Year	0.148	1.800	0.123	3,209	92.47
10 Year	0.203	2.162	0.150	3,535	92.78
25 Year	0.266	2.544	0.173	3,848	93.04
50 Year	0.348	2.929	0.189	4,171	93.29
100 Year	0.428	3.277	0.204	4,515	93.51
SCS Distribution 24 hour					
2 Year	0.135	0.971	0.095	3,022	92.27
5 Year	0.209	1.220	0.139	3,390	92.64
10 Year	0.269	1.384	0.165	3,728	92.94
25 Year	0.358	1.609	0.192	4,232	93.33
50 Year	0.415	1.748	0.205	4,552	93.52
100 Year	0.500	1.944	0.212	5,127	93.64
Regional [1]	-	1.744	1.592	7,802	93.87

1. Regional storm does not incorporate rooftop storage and control flow. The routing of the Regional storm is based on the outlet pumps being inoperable and the overland spillway occurring at 93.80.

5.2. EXTENDED DETENTION

The proposed below ground stormwater storage system has been designed to provided extended detention for the 25mm storm event, in accordance with MOE stormwater management facility requirements. The target discharge rate has been calculated based on the 25mm runoff volume for the tributary area over a 48 hour period. The 25mm storage volume and target flow calculations are provided below.

<u>25mm Storm Target Flow Rate Calculation</u>

Unit Area	=	1.0 ha
Runoff Coeff	=	0.83
Rainfall Depth	=	25mm
Drain Time	=	48 hours
Volume	=	1.0ha x 0.025m x 0.83 x 10,000 m^2/ha
	=	210 m^3/ha
Average Discharge	=	210 m^3/ha / 48 hrs x 60 min/hr x 60 sec/min
Avg Unit Discharge	=	0.0012 m^3/sec/ha
Site Area	=	11.92 ha
Q_{25mm} Allow	=	11.92 ha x 0.0012 m^3/sec/ha
	=	0.014 m^3/s

<u>25mm Storm Extended Detention Volume Calculation</u>

Site Area	=	11.915ha
Runoff Coeff	=	0.83
Rainfall Depth	=	0.025m
Ext. Detention Vol	=	11.915 ha x 0.84 x 0.025m x 10,000m^2/ha
	=	2,4797 m^3

5.3. QUALITY CONTROLS

Stormwater quality controls are required to provide Type 1 Enhanced Level (80% TSS Removal), as indicated in The Clearview Creek subwatershed study prepared by MRC. Quality control for the site area will be provided by three Jellyfish JF12-20-5 units, in parallel, in order to provide 80% TSS removal in accordance with the ETV certification. The design brief for the proposed structures has been included in Appendix C, including the ETV certification. The Jellyfish units will provide 80% TSS removal, sized based on the total development area of 11.92ha at an imperviousness of 85%. Refer to plan G-3 for the JellyFish configuration located immediately upstream of the storm outlet.

5.4. STORMWATER MANAGEMENT METHODOLOGY

The Clearview Creek sub--watershed study, prepared by MRC, proposed a SWM facility be provided for Catchment 5. In order to provide the most efficient use of the site area, a below ground stormwater storage chamber system and quality control unit have been proposed. The alternative SWM strategy was presented to the CVC prior to the SPA submission. The CVC has reviewed to alternative proposal and provide approval to replace a conventional open pond design with a below ground storage system and quality control structures in the form of parallel JellyFish units. Refer to the email correspondence from the CVC planner dated April 22, 2020, provided in Appendix A.

The below ground storage systems, with the design calculations provided in Section 5.1, are intended to function in the same manner as an open pond. Extended detention will be provided by releasing the 25mm storm event over an extend period of time, with a target of 48hours. Quality control will be provided in three parallel Jellyfish units to achieved he required 80% TSS removal.

The below ground storage chambers will not provide an additional risk to the private or public, as the storm water will be stored below ground and will only be accessible through manholes and access chambers, located on private property. An emergency overflow route is provided to the adjacent channel. Should the outlet become completely inoperable, the stormwater will backup within the site up to the overflow elevation of 94.00, which is far below the proposed building finished first floor elevations of 95.20. The proposed buildings will have no basements and will have no openings below the FFE.

6. ROOF DRAIN

The two proposed industrial buildings, Building A and Building B, will be equipped with roof drains as outlined below:

Building A will be equipped with of Zurn (Z-105-5-ERC) control flow drains with a total of 70 notches, as follows:

Table 4 - Building A Rooftop Controls

Area	No. of Notches	Notch Area	Flow per Notch (1)	Total Flows
30,905.9m^2	70	441.5	1.55 l/s	108.5 l/s

Q_R = 108.5 l/s

(1) Based on manufacturer's design tables at a 102mm depth, 1 notch/drain, 465m^2/notch, 93lpm.

The resulting required total roof top 100-year volume is 1,233.1m^3, as indicated in **Appendix B**. The available roof top storage is 1,545.3m^3, based on a maximum ponding depth of 100mm, as indicated in the Rooftop Available Storage calculations located in **Appendix B.**

Building B will be equipped with Zurn (Z-105-5-ERC) control flow drains with a total of 65 notches, as follows:

Table 5 - Building B Rooftop Controls

Area	No. of Notches	Notch Area	Flow per Notch (1)	Total Flows
29,202.6m^2	65	449.3	1.55 l/s	100.8 l/s

Q_R = 100.8l/s

(1) Based on manufacturer's design tables at a 102mm depth, 1 notch/drain, 465m^2/notch, 93lpm.

The resulting required total roof top 100-year volume is 1,171.5m^3, as indicated in **Appendix B**. The available roof top storage is 1,460.1m^3, based on a maximum ponding depth of 100mm, as indicated in the Rooftop Available Storage calculations located in **Appendix B.**

7. STORM OUTLET AND PUMPING

The site area includes a portion of the Clearview Creek Watercouse, which was previously re-aligned along the west and south perimeter of the property. The realignment design was completed to contain the Regional and 100year flows within the 40m wide channel corridor, as shown on Drawing 10, based on the realignment design prepared by MRC and MMM Group. Refer to Appendix A for a reduced scale plan of Drawing 10.

The Clearview Creek Watershed floodline elevations have been further analysed and updated by the Credit Valley Conservation Authority. The updated Regional and 100 year floodline elevations of the realigned watercourse are provided based on the CVC Flood Hazard Map for the Clearview Creek Watershed, Sheets 2 and 3, refer to plans in Appendix A. The updated Regional and 100year floodline elevations of the watercourse have been shown on the grading plans G-1 and G-2, with the 100year water levels indicated on cross sections along the perimeter of the adjacent development area.

The stormwater outlet for the site will be at the southeast limit of the watercourse, near Winston Churchill Blvd. Due to various constraints on the site, further detailed below, it is proposed that the stormwater outlet be pumped.

The proposed outlet to the watercourse is located in the vicinity of Cross Section 11838, which has a Region highwater elevation of 93.68 and a 100yr water level of 92.86. The finished floor elevation of the proposed buildings is subject to Planning requirements from the Town of Oakville, that the maximum building height of 11.0m be established based on the elevation at the mid-point of the property frontage. The proposed elevation at the midpoint frontage is 95.20, based on the centreline of Winston Churchill Blvd of 94.45 as indicated on Cross Section 1, plan G-1. Therefore, this establishes the building FFE of 95.20, with resulting loading dock elevations of 94.00. In order to accommodate gravity storm sewers within the site area, the resulting storm sewer outlet elevation would be below the regional and 100year water elevations. Based on the grade differential between the proposed storm site sewer system and available outfall elevations, it is proposed that the stormwater outlet be pumped under normal operating conditions.

The proposed storm outlet and pump configuration has been detailed on plan G-3, including the orifice controls (under gravity conditions), the quality controls provided by the off-line parallel JellyFish units, and the stormwater pump chamber discharging to the watercourse. The proposed pump configuration will provide variable discharge rates, in order to achieve a traditional SWM Facility storage-discharge condition. The 25mm storm discharge of 14 l/s will function until the extended detention water level of 91.80 is reached. The total combined pump flow rate is designed to provide a maximum discharge rate of 221 l/s, which will occur

for the greater storm events up to the 100year storm. The maximum flow rate of 221 l/s is slightly greater than the target flow rate for the 10 year storm, based on the 4 hour Chicago storm distribution and the 5year storm based on the 24 hour SCS Distribution.

There will be a total of five (5) pumps provided in the storm pump chamber. Four pumps will operate under normal conditions, working alone or in tandem subject to floats being activated based on the water level in the upstream portion of Outlet Control Structure MH 4. The fifth pump will act as a back pump, should any of the four normal operation pumps become inoperable. A gas generator will also be provided, in the event of a power failure the generator will engage and allow the storm pumps to continue operate. The pumps and generator designs are being completed by John Brooks with preliminary design details provided in Appendix E.

Emergency Overland Spillway

An emergency overland spillway will be provided at southeast corner of the site, within the proposed dry pond area and will be directed to the Clearview Creek channel. In the event that the storm outlet becomes inoperable, stormwater will pond up to the elevation 94.00 and will spill to the south through the 21m spillway into the adjacent channel. The spillway has been designed to convey the uncontrolled 100 year storm and regional flows. Calculations for the flows and the spillway capacity are provided below. A secondary 5.0m wide emergency overflow has also been provided in the loading dock area, to provide an additional relief point. Refer to Plan G-1 for the overflow spillway details.

$Q_{100yr\ Uncont.}$ = 3.16 m^3/s
$Q_{Regional}$ = 1.91 m^3/s

Dry Pond - Emergency Overflow Weir Calculation:

Width = 21.0m
Max. Depth = 93.95 – 93.75 = 0.20m
Q_{CAP} = $CLH^{3/2}$
= $1.705 \times (21.0m) \times (0.20m)^{3/2}$
= 3.20 m^3/s

Loading Area - Emergency Overflow Weir Calculation:

Width = 5.0m
Max. Depth = 94.15 – 94.00 = 0.15m
Q_{CAP} = $CLH^{3/2}$
= $1.705 \times (5.0m) \times (0.15m)^{3/2}$
= 0.50 m^3/s

8. SANITARY DESIGN

8.1. SANITARY DESIGN FLOWS

The combined sanitary flow from Building A and B will discharge to the southwest corner of the site and will drain to the sanitary lift station at MH 10A. The sanitary pumps have been designed by John Brooks, with design details provided in Appendix F. A forcemain will be installed through the existing 400mm dia sleeve previously constructed below the existing watercourse, from MH10A to convey the sanitary flows to MH 1A. The forcemain will discharge into to a proposed 250mm sanitary sewer which will be located in an easement to the west of the site and extended through the open space block, ultimately connecting to the existing 750mm trunk sewer at Acacia Court and Deer Run Avenue. For the external sanitary works downstream of this site a separate FSR for the Industrial Developments located at 772, 560, 568 and 824 Winston Churchill Boulevard dated August 31, 2020 has been completed and submitted to the Town of Oakville and Halton Region for approval.

The population for Building A and Building B is based on the Region of Halton population density for commercial/industrial developments. The total sanitary sewage flows from the site area 17.3 l/s, refer calculations below:

Site Development Area = 11.92 ha

Population Density = 125 persons/ha

Total Population = 1,490 people

Sanitary Flow Rate = 34.375 m^3/ha/day

Peaking Factor M = $0.8 \cdot \left(1 + \frac{14}{4+P^{0.5}}\right)$ where P = Populations in thousands

= $0.8 \cdot \left(1 + \frac{14}{4+(1.490)^{0.5}}\right)$ = 2.95

Peak Sewage Flow Q = $\frac{A \times q \times m}{86400}$ + IA

Q = $\frac{11.92 \times 34.375\ m^3/ha/day \times 2.95}{86400}$

= 14.0 l/s + IA

Infiltration = 11.92 ha x 0.00028 m^3/sec/ha

= 0.0033 m^3/sec

Total Peak Flow = 14.0 l/s + 3.3 l/s

= 17.3 l/s

9. WATERMAIN DESIGN

The proposed development will connect to a proposed 300mm watermain along Winston Churchill Boulevard. On site there will be a 100mm domestic and 200mm fireline that will service both buildings, as shown on Plan G-3 and G-4. The watermain connection for Building A and Building B will be on the south side of each building.

9.1. DOMESTIC AND FIREFLOW DEMAND

The domestic demands were based on the Water and Wastewater Linear Design Manual (October 2019) by Halton Region. The water demand for this site is outlined below:

Site Area	=	11.92 ha
Population Density	=	125 persons/ha (Light Industrial Area)
Total Population	=	1,490 people
Consumption	=	275 l/person/day
Max Day Factor	=	2.25
Peak Hour Factor	=	2.25

<u>Water Demands</u>

Average Daily Demand

= 275 l/capita/day x 1,490 people
= 409,750 l/day
= 4.74 l/s

Maximum Daily Demand

= 275 l/capita/day x 1,490 people x 2.25 (Max day factor)
= 921,937.5 l/day
= 10.7 l/s

Peak Hour Demand

= 275 l/capita/day x 1,490 people x 2.25 (Peak Hour factor)
= 921,937.5 l/day
= 10.7 l/s

Fire Flow Calculation

Building A

1. An estimate of the fire flow required for a given area is determined by the formula:

$$F = 220C\sqrt{A}$$

Where, F = the required fire flow in litres per minute l/m
C = Construction type coefficient= 0.8 (Non-combustible construction)
A = Total area (based on construction type and protected openings)

Building Area = 32,490 m^2

$F = 220(0.80)\sqrt{32{,}490\ m^2}$
$F = 23{,}793\ l/m$ (397 l/s)

Therefore use: $F = 24{,}000\ l/m$ (400 l/s)

2. Occupancy Reduction

Office Area = 0% Increase based on Commercial buildings

∴ Total Reduction = 0%

F_2 = 24,000 *l/m* - (24,000 l/m × 0%)
F_2 = 24,000 *l/m (400 l/s)*

3. Sprinkler Reduction

30% Reduction for NFPA 13 System

4. Separation Charge

East Side (30.1 - 45m) = 0%
West Side (20.1 - 30m) = 0%
North Side (> 45m) = 0%
South Side (> 45m) = 0%
Total Separation Charge = 0%

F_{final} = F_2 – (F_2 × 30%) + (F_2 × 0%) + (F_2 x 0%)
F_{final} = 24,000 l/m – (7,200 l/min) + (0 l/min) + (0 l/min)
F_{final} = 16,800 l/min (280 l/s)

Therefore use: F_{final} = 17,000 l/min (283 l/s)
F_{final} = 4,491 US gpm

The water supply system will be designed to convey the greater of the fire flow plus maximum day demand or the peak hour demand. The greater flow results from the fire flow plus max day, as calculated below.

Fire Flow + Max Day= 283 l/s + 10.7 l/s
= 393.7 l/s
= 23,622 l/min (6,240 US gpm)

Building B:

Fire Flow Calculation (Based on Fire Underwriters Survey 1999)

1. An estimate of the fire flow required for a given area is determined by the formula:

$$F = 220C\sqrt{A}$$

Where, F = the required fire flow in litres per minute l/m
C = Construction type coefficient= 0.8 (Fire resistive construction)
A = Total area (based on construction type and protected openings)

Building Area = 28,972 m^2

$F = 220(0.80)\sqrt{28{,}972\ m^2}$
$F = 22{,}468\ l/m$ (374.5 l/s)

Therefore use: $F = 22{,}000\ l/m$ (367 l/s)

2. Occupancy Reduction
Office Area = 0% Increase based on Commercial buildings

∴ Total Reduction = 0%

F_2 = 22,000 *l/m* - (22,000 l/m × 0%)
F_2 = 22,000 *l/m (367 l/s)*

3. Sprinkler Reduction
30% Reduction for NFPA 13 System

4. Separation Charge
East Side (20.1 - 30m) = 0%
West Side (> 45m) = 0%
North Side (> 45m) = 0%
South Side (> 45m) = 0%
Total Separation Charge = 0%

$F_{final} = F_2 - (F_2 \times 30\%) + (F_2 \times 0\%)$
$F_{final} = 22{,}000$ l/m – (6,600 l/min) + (0 l/min)
$F_{final} = 15{,}400$ l/min (257 l/s)

Therefore use: F_{final} = 15,000 l/min (250 l/s)
F_{final} = 3,963 US gpm

The water supply system will be designed to convey the greater of the fire flow plus maximum day demand or the peak hour demand. The greater flow results from the fire flow plus max day, as calculated below.

Fire Flow + Max Day = 250 l/s + 10.7 l/s
= 260.7 l/s
= 15,642 l/min (4,132 US gpm)

A fire flow hydrant test will be undertaken once the proposed 300mm watermain is constructed on Winston Churchill Boulevard.

10. EROSION AND SEDIMENT CONTROLS

During construction, temporary erosion and sediment controls are to be provided in accordance with the "Erosion and Sediment Control Guidelines for Urban Construction" (2006), prepared by the Greater Golden Horseshoe Conservation Authorities. Erosion control measures will be provided through the use of silt fences, diversion swales, inlet protection devices, sediment traps and temporary sediment pond. The sediment basin and interceptor swales previously completed during the watercourse realignment works are still in place and will be maintained during the initial earthworks and construction as part of the Stage 1 erosion and sediment controls. Refer to Plans ESC-1 and ESC-2 for the stage 1 and stage 2 erosion and sediment control plans.

10.1. EROSION CONTROL AND SEDIMENT CONTROL REQUIREMENTS

The erosion and sediment control requirements for the proposed development are as follows:

1. The Contractor will provide temporary excavated sediment traps for sediment control. The sediment traps should be located at points of discharge from the area.
2. The Contractor will monitor the quality of stormwater discharging from the temporary ESC basin and sediment traps during the construction period.
3. The Contractor will construct temporary drainage systems, such as ditching, temporary culverts to facilitate drainage from exposed soils to the temporary ESC basin and sediment traps.
4. Silt fences will be installed around the exposed area of the temporary ESC basin.
5. The exposed soils will be vegetated as soon as possible. Erosion control blankets should be placed where applicable.
6. Straw bales and/or rock protection will be placed in temporary drainage conveyance channels on steep grades.
7. Rock protection will be placed at points of concentrated discharge, which includes the outlet of the sediment basin.
8. Stockpiled excavated material, and topsoil will be protected from wind and rain erosion.
9. The sediment basin will be cleaned of sediment upon completion of construction and decommissioned.

10.2. TEMPORARY ESC BASIN DESIGN

The temporary sediment basin sizing calculations have been provided below. Refer to the Erosion and Sediment Control Plan - Stage 1 Plan ESC-1 for additional details of the proposed ESC measures and staging notes.

Temporary Sediment Basin Calculations:

Tributary Site Area:	11.92 ha
Required Wet Volume:	125 m^3/ha x 11.92 ha = 1,490 m^3
Required Dry Volume:	125 m^3/ha x 11.92 ha = 1,490 m^3
Bottom Pond Elevation:	92.30 m
Bottom Pond Area:	1,915 m^2
Wet/Perm Water Elevation:	93.00 m
Wet/Perm Pond Area:	2,510 m^2
Permanent Volume Provided:	[(1,915 +2,510)/2] x (93.00 – 92.30) = 1,548.75m^3
Dry Water Elevation:	93.60 m
Dry Pond Area:	3,070 m^2
Dry Volume Provided:	[(3,070m^2 +2,510m^2)/2] x (93.60 – 93.00) = 1,674m^3
Emergency Overflow Elevation:	93.70 m
Top of Pond:	94.00 m

Orifice Sizing Calculations

The dry storage volume is to drain over a 24 to 48 hour period. The orifice was sized to provide the required drain time, based on the MOE Drawdown time (Equation 4.10)

$$t = \frac{2Ap}{(CA_o)\sqrt{2g}}\left(\sqrt{h_1} - \sqrt{h_2}\right)$$

t = draw down time in seconds
A_p = surface area of the pond (m^2)
C = discharge coefficient (0.63)
A_o = cross-sectional area of the orifice
g = gravitational acceleration constant ($9.81 m/s^2$)
h_1 = starting water elevation above the orifice
h_2 = ending water elevation above the orifice

$$t = \frac{2 \times 2{,}790.0}{(0.63 \times 0.0095)\sqrt{2 \times 9.81}}\left(\sqrt{0.60}\right)$$

$t = 171{,}133\ sec$

$t = 47.5\ hr$

t = draw down time in seconds
A_p = 2,790.0 m^2 (average at elevations 93.60 m and 93.00 m)
C = discharge coefficient (0.63)
A_o = ((π x (0.110 m^2) ÷ 4) x 3 = 0.0095 m^2
g = gravitational acceleration constant ($9.81 m/s^2$)
h_1 = 93.60 m
h_2 = 93.00 m

Temporary ESC Basin Emergency Overflow Calculations

Q	=	CAIN	
A_{SITE}	=	11.92 ha	
C_{SITE}	=	0.25	
I_{100yr}	=	160 mm/hr	(based on Oakville IDF, Tc = 10.0min)
Q_{100yr}	=	[(0.25 x 11.92ha)] x 160 mm/hr x 2.778	
	=	1.325 m^3/s	

Emergency overflow capacity has been calculated based on flow through a weir:

Q_{WEIR}	=	$CLH^{3/2}$
C	=	1.705
L	=	5.0 m
H	=	94.00 – 93.70 = 0.30m
Q_{WEIR}	=	1.705 x 5.0m x $(0.30)^{3/2}$
	=	1.40 m^3/s

<u>Southwest Forebay Inlet:</u>

Equation 4.5: Forebay Settling Length

$$Dist = \sqrt{\frac{rQ_p}{V_s}}$$

$$Dist = \sqrt{\frac{2(0.020)}{0.0003}}$$

$$= 11.40\ m$$

where: Dist = sediment forebay length (m)

Q_p = peak flow rate from the pond during design quality storm (0.020m^3/s @ 93.60)

V_s = settling velocity (0.0003m/s)

r = length-to-width ratio of forebay (2:1 min)

Equation 4.6: Dispersion Length

$$Dist = \frac{8Q}{dV_f}$$

$$Dist = \frac{8 \times 0.372}{0.70 \times 0.5}$$

$$= 8.5\ m$$

where: Dist = sediment forebay length (m)

Q = inlet flow rate (0.372 m^3/s, based on the 5year storm event, 5.35ha area)

V_f = desired velocity in the forebay (0.5m/s)

d = depth of permanent pool (0.70m)

Equation 4.7: Minimum Forebay Deep Zone Bottom Width

$$Width = \frac{Dist}{8} = \frac{11.42}{8}$$

= 1.40m

North Forebay Inlet:

Equation 4.5: Forebay Settling Length

$$Dist = \sqrt{\frac{rQ_p}{V_s}}$$

$$Dist = \sqrt{\frac{2(0.020)}{0.0003}}$$

$$= 11.42\ m$$

where: Dist = sediment forebay length (m)

Q_p = peak flow rate from the pond during design quality storm (0.020m³/s @ 93.60)

V_s = settling velocity (0.0003m/s)

r = length-to-width ratio of forebay (2:1 min)

Equation 4.6: Dispersion Length

$$Dist = \frac{8Q}{dV_f}$$

$$Dist = \frac{8 \times 0.456}{0.70 \times 0.5}$$

$$= 10.4\ m$$

where: Dist = sediment forebay length (m)

Q = inlet flow rate (0.456 m³/s, based on the 5year storm event, 6.57 ha area)

V_f = desired velocity in the forebay (0.5m/s)

d = depth of permanent pool (0.70m)

Equation 4.7: Minimum Forebay Deep Zone Bottom Width

$$Width = \frac{Dist}{8} = \frac{11.42}{8}$$

= 1.4m

The south sediment forebay inlet will have a total flow length of 11.5 m and width of 11.5m. The north sediment forebay inlet will have a minimum flow length of 11.5m and a width of 13.8m. Therefore, the sediment forebay will promote localized settling of particulate matter during earthwork activities.

10.3. MONITORING PLAN

The monitoring plan for the development site will be implemented for three stages of development: pre-development, construction, and post-construction. The monitoring plan will be as recommended by the Clearview Creek subwatershed study. Excerpts of the recommended monitoring plan is provided in Appendix A.

As described in the subwatershed study:

The development / activity driven monitoring should follow three stages: the pre-development phase, the construction phase, and the post-construction phase. During the pre-development phase, monitoring should be undertaken to generate any additional baseline data that may be required to compile a more detailed understanding of existing conditions. In the construction phase, the purpose of monitoring will be to ensure that the environmental measures implemented during construction are performing as expected (i.e. sediment control by provision of silt fences and temporary sediment traps/basins). Monitoring during the post-construction phase will be conducted to confirm that the performance targets are being achieved and to ensure that no negative environmental changes are occurring because of development.

<u>During Construction Monitoring Program:</u>

During construction, the monitoring program of the SWM facilities, including the temporary sediment control facilities such as excavated sediment traps, should include the following:

- Weekly inspections of the facilities
- Inspections of the control facilities and the receiving water course (Clearview Creek), after rainfall events with at least 10mm of precipitation
- Measurement of suspended solids downstream of the control works

Weekly inspection reports should be submitted by the developer's engineer to the satisfaction of the Town of Oakville. The reports should summarize the state of the control works, their performance during rainfall events, any presence of downstream erosion or sediment accumulation, and any actions necessary to modify the works.

Post-Construction Monitoring Program:

A monitoring response and maintenance program (MRM Program) will be initiated upon completion of the 'During Construction Monitoring Program' and will extend for a 2-year period following substantial completion. Refer to Section 5.2 of the subwatershed study (also provided in Appendix A of this report) for details and requirements of the post-construction monitoring program.

Prepared by,
a.m. candaras associates inc.

A.M. Candaras, P. Eng.
Consulting Engineer

Fanche Petkovski, P.Eng
December 15, 2021

APPENDIX A
BACKGROUND REFERENCE DOCUMENTS

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FLOOD HAZARD MAP

CLEARVIEW CREEK WATERSHED

LEGEND

Bridges	Municipal Boundary	Wall
Building	Overhead Walkway	Watershed Boundary
Building Ruin	Parcel Fabric	Waterbody Elevation *97.5
Building Under Construction UC	Parking Lot P/A	Wooded Area
Contour Index 172	Pile	
Contour Intermediate 172.5	Pipe P	Regulatory Floodline
Culvert Symbol	Pit	Regulatory Floodplain (2D Model)
Culvert to Scale	Playground PLAY	1D-2D Model Limits 1D 2D
Dam	Pole	Two-Zone Policy Area
Ditch	Pool	Section
Dock,Wharf,Pier	Railway	Overflow Section
Driveway	Railway Abandoned	Structure ID 10
Falls,Rapids Rapid Falls	River,Creek,Shoreline	Spill
Flow Direction	Road	Regional Flood Elevation Section Number 15426 98.75 98.25
Footbridge	Road Understruction (UC) UC	100 Year Flood Elevation
Guiderail	Sidewalk	
Headwall	Silo	Note: The Regulatory flood elevation and floodline is the greater of the Regional and 100 Year storms. See General Note 6 concerning Section Numbers marked with an *.
Hedge H	Spot Height *123.45	
Marsh	Trail	

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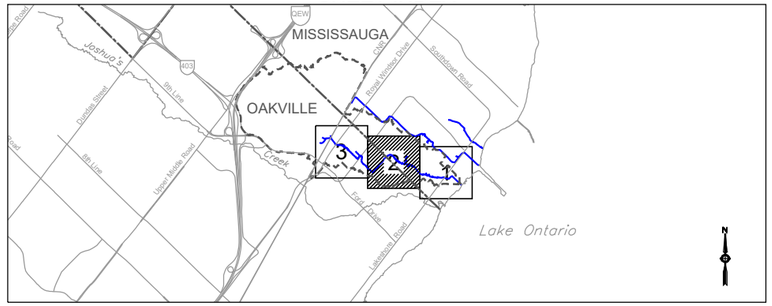

SCALE 1:4000

Metres 100 0 100 200 METRES

CONTOUR INTERVAL 0.5 METRE

General Notes:

1. Contourlines on this map were generated by Airborne Imaging using the Spring of 2015 LiDAR point cloud, breaklines and hydrologic enforcement at bridges. The vertical accuracy of the original points is 0.10 metres RMSE.
2. The planimetric data was obtained from the City of Mississauga in 2017.
3. The vertical datum is mean sea level established by the CGVD 28, 1978 Southern Ontario adjustment.
4. The horizontal datum is North American Datum 1983 CSRS (Epoch 2010) UTM Zone 17.
5. To obtain City of Mississauga datum, add 0.121 metres to elevation data.
6. Where section numbers are marked with an * the Regulatory flood elevations drop moving upstream. The flood elevation for Regulatory purposes shall be calculated by linearly interpolating between the upstream and downstream sections that are adjacent to the sections marked with an *. In no case shall interpolation extend through a structure. For additional clarification please contact Credit Valley Conservation.

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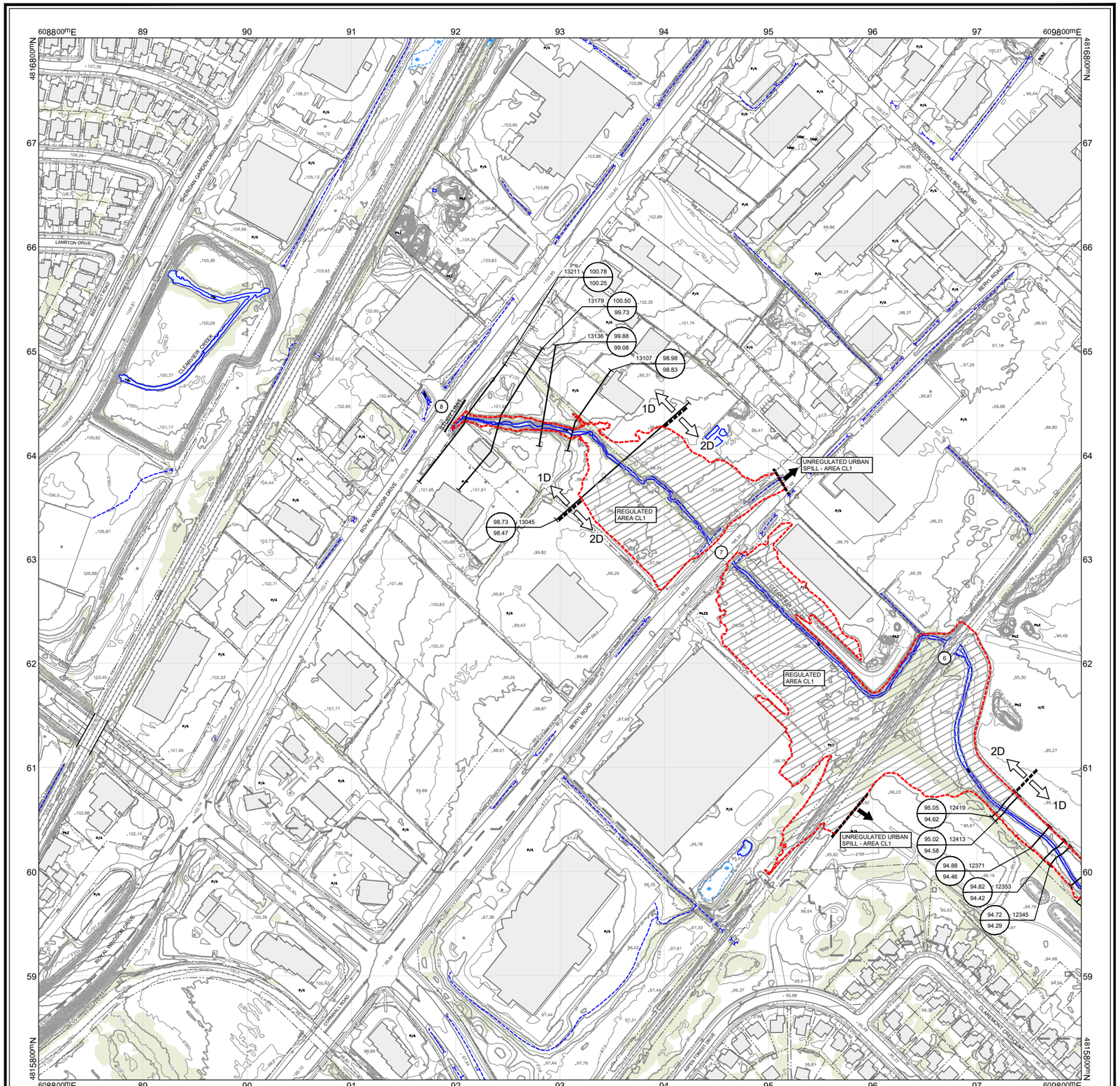
No	Amendment/Revision	By	Date



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FLOOD HAZARD MAP

CLEARVIEW CREEK WATERSHED

LEGEND

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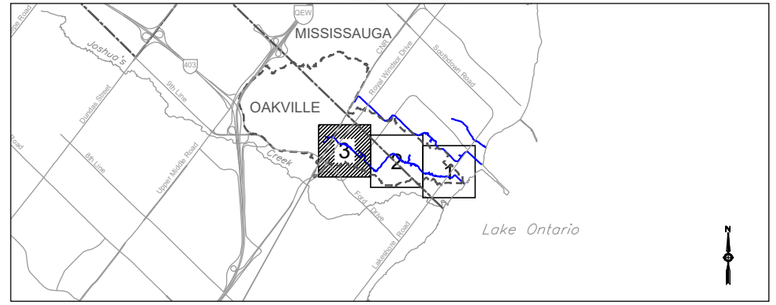
Contour Intermediate 172.5	Pipe (P)	Regulatory Floodplain (2D Model)
Culvert Symbol	Pit	1D-2D Model Limits (1D, 2D)
Culvert to Scale	Playground (PLAY)	Two-Zone Policy Area
Dam	Pole	Section
Ditch	Pool	Overflow Section
Dock,Wharf,Pier	Railway	Structure ID (10)
Driveway	Railway Abandoned	Spill
Falls,Rapids (Rapid, Falls)	River,Creek,Shoreline	Regional Flood Elevation Section Number 15426 (98.75, 98.25)
Flow Direction	Road	100 Year Flood Elevation
Footbridge	Road Understruction (UC)	
Guiderail	Sidewalk	
Headwall	Silo	
Hedge (H)	Spot Height *123.45	
Marsh	Trail	

Note: The Regulatory flood elevation and floodline is the greater of the Regional and 100 Year storms. See General Note 6 concerning Section Numbers marked with an *.

SHEET INDEX



SCALE 1:4000

Metres 100 0 100 200 METRES

CONTOUR INTERVAL 0.5 METRE

General Notes:

1. Contourlines on this map were generated by Airborne Imaging using the Spring of 2015 LiDAR point cloud, breaklines and hydrologic enforcement at bridges. The vertical accuracy of the original points is 0.10 metres RMSE.
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SHEET No 3 of 3

4.3 Stormwater Management for the Park Mount Development

4.3.1. Existing and Future Flows

Existing conditions and post-development flows, with and without a stormwater management pond were calculated for the study subcatchment containing the Park Mount Development. All flows were calculated using the 4-hour Chicago Storm distribution. The NASII Hydrograph method was used to calculate the existing conditions flows and the StandHyd method was used to calculate the future conditions flows.

Table 13 presents the pre-development and post-development flows and runoff volumes for Subcatchment 5 (total area 24.2 ha) that includes the Park Mount Property (approximately 14.5 ha development area not including the creek realignment corridor). Numbers in brackets show the flow contribution from the Park Mount Development area of 14.5 ha.

Table 13 Post-development and Pre-development Flows for Park Mount Development Subcatchment

Storm Recurrence (Years)	Pre-development Runoff		Uncontrolled Post-development Runoff		Post-development Runoff with Stormwater Management Pond in Park Mount Development	
	Flow (m^3/s)	Volume (m^3)	Flow (m^3/s)	Volume (m)	Flow (m^3/s)	Volume (m^3)
2	0.15 (0.10)	1300 (780)	1.74 (1.73)	3840 (3470)	0.08 (0.04)	3840 (3470)
5	0.30 (0.19)	2390 (1430)	2.57 (2.56)	5540 (4830)	0.24 (0.17)	5540 (4830)
10	0.42 (0.27)	3250 (1950)	3.16 (3.15)	6740 (5780)	0.40 (0.31)	6740 (5780)
25	0.58 (0.37)	4460 (2680)	3.99 (3.99)	8360 (7010)	0.55 (0.37)	8360 (7010)
50	0.71 (0.45)	5350 (3200)	4.58 (4.57)	9480 (7850)	0.56 (0.45)	9480 (7850)
100	0.84 (0.54)	6320 (3790)	5.17 (5.16)	10680 (8730)	0.74 (0.54)	10680 (8730)

4.3.2. Stormwater Management Pond

The proposed extended detention SWM wet pond for the Park Mount Development will provide an Enhanced (Level 1) level of treatment, which exceeds the specified Normal (Level 2) target for water quality treatment in the study watershed. The Enhanced level of treatment will provide an added benefit to upstream and downstream users by releasing cleaner post-development flows to the creek thus enhancing the overall water quality in the creek.

The estimated preliminary parameters for the required stormwater pond are summarized in Table 14. The volumes of the permanent pool, the extended detention, and flood attenuation zones were calculated using the criteria discussed in Section 4.2.1, with the exception for water quality, where a higher standard was used. As summarized in Table 14, 202 m^3/ha was used for water quality control, which is based on 80 % impervious area and the Enhanced level of protection, according to criteria in MOE guidelines. The extended detention volume of 210 m^3/ha was calculated based on the volume of runoff generated by 25mm of precipitation and the weighted runoff coefficient of 0.84 for the development area. The combined extended detention and flood attenuation volume is the required detention storage to reduce the 2 year to 100-year post-

6.0 IMPLEMENTATION AND MONITORING PLAN

The implementation and monitoring plan encompasses two different components, specifically, the more detailed and intensive but shorter term monitoring associated with a development proposal or specific construction activity that will change the land use or landscape in one area of the watershed, and the more general long term monitoring undertaken across the watershed as a whole. The development or activity specific monitoring would be undertaken by the developer/proponent, with reporting and review requirements to the Town and CVC. The long term overall monitoring program would be undertaken by the Town and / or CVC.

6.1 Development / Activity Monitoring

The development / activity driven monitoring should follow three stages: the pre-development phase, the construction phase, and the post-construction phase. During the pre-development phase, monitoring should be undertaken to generate any additional baseline data that may be required to compile a more detailed understanding of existing conditions. In the construction phase the purpose of monitoring will be to ensure that the environmental measures implemented during construction are performing as expected (i.e. sediment control by provision of silt fences and temporary sediment traps/basins). Monitoring during the post-construction phase will be conducted to confirm that the performance targets are being achieved and to ensure that no negative environmental changes are occurring because of development.

For the study watershed, the areas of critical importance include impacts of development on water quality and peak flows, potential point soil contamination (on-going issue) and monitoring of the proposed channel re-location and associated stream and riparian corridor habitat elements. Soil contamination is an issue due to the industrial nature of the existing and proposed developments within the subwatershed.

6.2 Stormwater Management Implementation and Monitoring Plan

The preferred option for treatment of stormwater in the study subwatershed is based on the use of 'wet detention ponds'. Where ponds cannot be provided due to existing space/land purchase negotiations the use of flat bottom grassed swales is recommended. The approximate capital cost of construction of the three SWM extended detention wet ponds is approximately $1,050,000. The cost of construction of grassed swales by modification of existing ditches and provision of sediment control BMPs would be in the order of $400,000.

During Construction Monitoring Program

During construction, the monitoring program of the SWM facilities, including the temporary sediment control facilities such as excavated sediment traps, should include the following:

- Weekly inspections of the facilities.
- Inspections of the control facilities and the receiving watercourse, i.e. Clearview Creek, after rainfall events with at least 10 m of precipitation.
- Measurement of suspended solids downstream of the control works.

Weekly inspection reports should be submitted by the developer's engineer to the satisfaction of the Town of Oakville. The reports should summarize the state of the control works, their performance during rainfall events, any presence of downstream erosion or sediment accumulation, and any actions necessary to modify the works.

Post-Construction Monitoring Program

The proponent will submit a Monitoring Response and Maintenance Program (MRM Program), which will be initiated upon completion of the 'During Construction Monitoring Program', and will extend for a 2 year period following substantial completion. A typical monitoring season should extend from mid-April to end of October, with specific monitoring during the off-construction season following major runoff events to ensure long term or over-wintering measures remain stable. The substantial completion requires that for a given development all roads and open spaces be completed and 90% of lots sodded. The program should focus on compliance with watershed targets as well as ecological health immediately downstream of the development. The program should identify the following:

- **Performance Targets**. The following specifies allowable targets for flood control, allowable sediment levels, temperature and other targets relating to water quality:
    - Flood Control Target - SWM pond outflows to be controlled to pre-development levels up to the 100 year event.
    - Sediment Control Target: Background Annual Average.
    - Temperature of SWM pond discharge to Clearview Creek: Background Maximum - Conditional on Air Temperature.
    - Dissolved Oxygen: Background Annual Average.
    - Other water quality parameters: Background Annual Average Levels
        - Total Phosphorous, Nitrate, Chlorides, E.coli, Aluminum, Copper, Ttotal ammonia (unionized NH3)

The exceedance of any of the identified target levels will represent triggers, which will immediately initiate the Response Plan.

- **Mitigation Measures.** If targets are not met mitigation measures should be implemented. Possible mitigation measures will be identified in the MRM Program, along with approximate costs and expected benefits.
- **Response Plan,** which will be implemented where the monitoring identifies that Performance Targets are not being met. The Response Plan may include more comprehensive monitoring program to determine the consequence of exceedance.
- **Maintenance Requirements.** Routine and occasional maintenance requirements will be identified for the SWM facilities.
- **Monitoring Program,** which at the minimum should include the items listed below. Recommendations for remediation should be made where required.

a. Collect water level from SWM facilities during the monitoring season.
b. Collect water quality data (suspended solids, dissolved oxygen, phosphorous) as per Section 6.2 during the same five significant rainfall events specified in Section 6.2.1.
c. During the spring and fall, inspect all SWM facilities shortly after a rainfall event to determine whether the outlet works operate as designed. Make recommendations
d. Groundwater elevation and quality monitoring
e. Twice annually inspect the health of the vegetation at existing SWM facilities
f. Inspect annually the boundary between developed areas and natural areas/buffers.
g. Cleanup litter and notify the Town of Oakville of illicit dumping.

The Monitoring Reports should be submitted twice per year to the Town of Oakville and CVC. The reports will present the results of monitoring of the SWM facilities, note trends, exceedance of performance targets, comment on the effectiveness of the SWM facilities and recommend mitigation measures where required.

- **Erosion Control**. Two or more erosion monitoring stations should be established on Clearview Creek downstream of the proposed development to monitor the amount of erosion during construction and in the post-construction period. The selected sites should contain a section where erosion is evident as well as a section which does not show erosion but is prone to erosion (i.e. creek bend). Each station should be inspected annually and any changes in bed or banks should be noted. A photographic inventory should be maintained at selected sites, which should be updated after each inspection.

6.2.1. Water Quality Testing Frequency and Locations

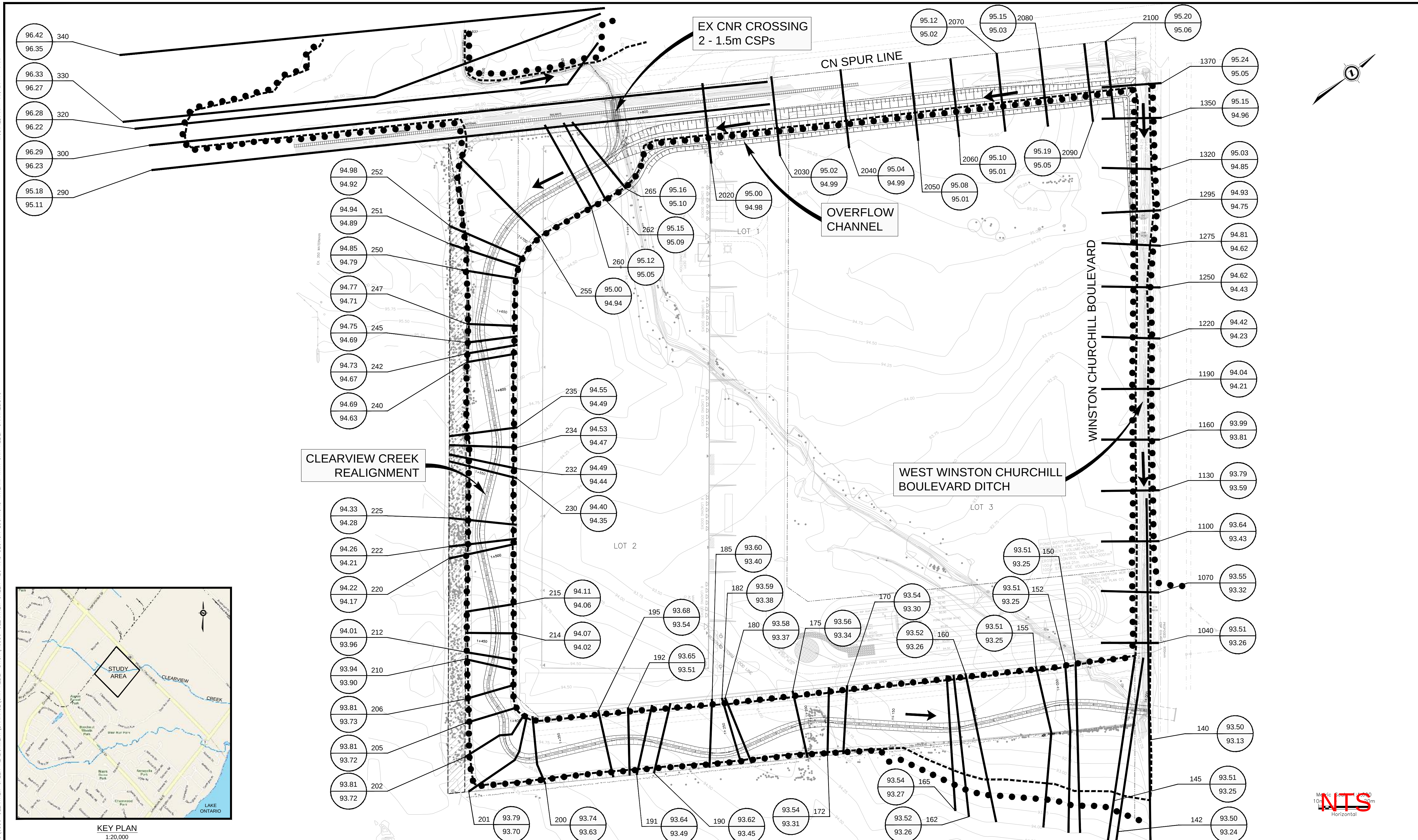
A total of eight water quality sampling runs per year will be conducted at two locations over a three-year period. Five of these sampling runs will be conducted during significant rain events and three sampling runs will be conducted during dry weather conditions (negligible precipitation in the previous five days). The sampling frequency should be evenly distributed throughout the open water season from April to October. The recommended water chemistry sampling locations are:

1. Downstream of Royal Windsor Road
2. Upstream of Winston Churchill Blvd at the property boundary at the downstream end of stream re-alignment

The recommended water sampling program is as follows:

Year 1 - Baseline monitoring, prior to site development. Eight samples are to be taken at the two locations and the samples will be tested for the above-identified parameters.

Years 2 and 3 - Post-construction monitoring, to be conducted after completion of site development. Eight samples are to be taken during each year at the two locations and the samples will be tested for the above-identified parameters.



LEGEND
INTERIM REGIONAL FLOODLINE
INTERIM 100 YEAR FLOODLINE
INTERIM REGIONAL STORM ELEVATION (93.51)
SECTION NUMBER (150)
100 YEAR FLOOD ELEVATION (93.25)

INTERIM CONDITIONS SECTION LOCATIONS AND REGIONAL STORM FLOODLINES

CLEARVIEW CREEK REALIGNMENT AND SITE WORK

772 WINSTON CHURCHILL BOULEVARD
OAKVILLE, ONTARIO

IGRI Advisors Inc.

MMM GROUP

No.	Revision/Issue	Date
8.	CN FLOOD RELIEF (OVERFLOW) CHANNEL	JUNE 14
7.	FOR CVC PERMIT	JUNE 12
6.	ADDRESSED CVC COMMENTS	APR. 12
5.	ADDRESSED CVC COMMENTS	NOV. 11
4.	ADDRESSED CVC COMMENTS	MAY 11
3.	ADDRESSED CVC COMMENTS	FEB. 11
2.	ADDRESSED CVC COMMENTS	APR. 09
1.	L.O.I.	JULY 08

LICENSED PROFESSIONAL ENGINEER
J. CZUJ
PROVINCE OF ONTARIO

Project No.:	6556-0100
Scale:	AS SHOWN
Dwn. By.:	J.J./J.S.
Dsgn. By.:	J.B.
Chkd. By.:	J.C.

Date: JUNE 2014

Revision: 8

Drawing: 10

DRAWING NAME: K:\DRAWINGS\6400-6599\6556-CLEARVIEW CREEK REALIGNMENT\DRAINAGE\CNR RELIEF DITCH\6556-CLEARVIEW CREEK HEC-RAS SECTION LOCATIONS-INTERIM WITH CNR RELIEF CHANNEL.DWG

MODIFIED: Jun. 03, 2014 9:08 AM

```
================================================================================

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9 =========
                                                      9   9  9   9 # 3813174
      StormWater Management HYdrologic Model           999    999  =========

 ********************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 ***************************
 *******  A single event and continuous hydrologic simulation model  ********
 *******     based on the principles of HYMO and its successors      ********
 *******                 OTTHYMO-83 and OTTHYMO-89.                  ********
 ********************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          ********
 *******                   Ottawa,  Ontario: (613) 727-5199          ********
 *******                   Gatineau, Quebec: (819) 243-6858          ********
 *******                   E-Mail: swmhymo@jfsa.com                  ********
 ********************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: A.M. Candaras Associates Inc.                +++++++
 +++++++               Woodbridge           SERIAL#:3813174         +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             ********
 *******           Maximum value for ID numbers  :     10            ********
 *******           Max. number of rainfall points:  15000            ********
 *******           Max. number of flow points    :  15000            ********
 ********************************************************************************


 ********************   D E T A I L E D   O U T P U T   ********************
 ********************************************************************************
 *       DATE: 2021-01-22     TIME: 14:27:53     RUN COUNTER: 000203       *
 ********************************************************************************
 * Input   filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\2060Pre.dat          *
 * Output  filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\2060Pre.out          *
 * Summary filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\2060Pre.sum          *
 * User comments:                                                           *
 * 1:_______________________________________________________________________*
 * 2:_______________________________________________________________________*
 * 3:_______________________________________________________________________*
 ********************************************************************************

--------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-01-22
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#*****************************************************************************
-------------------
| START           |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
```



```
-------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
           #  1=CHIC2YR.STM
--------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
*
-------------------
| READ STORM      |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\CHIC2Y
| Ptotal=  34.80 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
-------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .08   2.260 |   1.08  17.100 |   2.08   5.270 |   3.08   2.700
              .17   2.260 |   1.17  17.100 |   2.17   5.270 |   3.17   2.700
              .25   2.580 |   1.25  81.810 |   2.25   4.500 |   3.25   2.510
              .33   2.580 |   1.33  81.810 |   2.33   4.500 |   3.33   2.510
              .42   3.020 |   1.42  22.530 |   2.42   3.950 |   3.42   2.350
              .50   3.020 |   1.50  22.530 |   2.50   3.950 |   3.50   2.350
              .58   3.690 |   1.58  11.900 |   2.58   3.520 |   3.58   2.210
              .67   3.690 |   1.67  11.900 |   2.67   3.520 |   3.67   2.210
              .75   4.830 |   1.75   8.250 |   2.75   3.190 |   3.75   2.090
              .83   4.830 |   1.83   8.250 |   2.83   3.190 |   3.83   2.090
              .92   7.240 |   1.92   6.400 |   2.92   2.920 |   3.92   1.980
             1.00   7.240 |   2.00   6.400 |   3.00   2.920 |   4.00   1.980

--------------------------------------------------------------------------------
001:0003----------------------------------------------------------------------
*********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .155 (i)
     TIME TO PEAK    (hrs)=    2.417
     RUNOFF VOLUME    (mm)=    5.655
     TOTAL RAINFALL   (mm)=   34.800
     RUNOFF COEFFICIENT   =     .163

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

--------------------------------------------------------------------------------
001:0004----------------------------------------------------------------------
*********************************************
  ** END OF RUN :   1

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

```
--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
           #  1=CHIC5YR.STM
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date         : 2021-01-22
*#  Modeller     : F. Petkovski, P.Eng.
*#  Company      : a.m. candaras associates inc.
*#  License #    : 3813174
*#**************************************************************************
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\CHIC5Y
| Ptotal=  46.25 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	2.820	1.08	22.680	2.08	6.740	3.08	3.400
.17	2.820	1.17	22.680	2.17	6.740	3.17	3.400
.25	3.240	1.25	113.160	2.25	5.730	3.25	3.150
.33	3.240	1.33	113.160	2.33	5.730	3.33	3.150
.42	3.810	1.42	30.090	2.42	5.010	3.42	2.950
.50	3.810	1.50	30.090	2.50	5.010	3.50	2.950
.58	4.680	1.58	15.580	2.58	4.460	3.58	2.770
.67	4.680	1.67	15.580	2.67	4.460	3.67	2.770
.75	6.160	1.75	10.690	2.75	4.030	3.75	2.610
.83	6.160	1.83	10.690	2.83	4.030	3.83	2.610
.92	9.350	1.92	8.230	2.92	3.680	3.92	2.480
1.00	9.350	2.00	8.230	3.00	3.680	4.00	2.480

```
--------------------------------------------------------------------------------
002:0003----------------------------------------------------------------------
*****************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*****************************************
---------------------
| CALIB NASHYD      |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .300 (i)
     TIME TO PEAK    (hrs)=    2.417
     RUNOFF VOLUME    (mm)=   10.402
     TOTAL RAINFALL   (mm)=   46.250
     RUNOFF COEFFICIENT   =     .225

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



```
--------------------------------------------------------------------------------
002:0004----------------------------------------------------------------------
*****************************************
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
  ** END OF RUN :   2

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 003
    NSTORM=   1
           #  1=CHIC10YR.STM
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date         : 2021-01-22
*#  Modeller     : F. Petkovski, P.Eng.
*#  Company      : a.m. candaras associates inc.
*#  License #    : 3813174
*#**************************************************************************
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\CHIC10
| Ptotal=  54.14 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	3.410	1.08	25.220	2.08	7.880	3.08	4.080
.17	3.410	1.17	25.220	2.17	7.880	3.17	4.080
.25	3.890	1.25	135.630	2.25	6.750	3.25	3.800
.33	3.890	1.33	135.630	2.33	6.750	3.33	3.800
.42	4.560	1.42	33.220	2.42	5.930	3.42	3.560
.50	4.560	1.50	33.220	2.50	5.930	3.50	3.560
.58	5.550	1.58	17.550	2.58	5.300	3.58	3.350
.67	5.550	1.67	17.550	2.67	5.300	3.67	3.350
.75	7.230	1.75	12.240	2.75	4.810	3.75	3.160
.83	7.230	1.83	12.240	2.83	4.810	3.83	3.160
.92	10.770	1.92	9.540	2.92	4.410	3.92	3.000
1.00	10.770	2.00	9.540	3.00	4.410	4.00	3.000

```
--------------------------------------------------------------------------------
003:0003----------------------------------------------------------------------
*****************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*****************************************
```

```
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .413 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   14.245
     TOTAL RAINFALL   (mm)=   54.140
     RUNOFF COEFFICIENT   =     .263

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

--------------------------------------------------------------------------------
003:0004----------------------------------------------------------------------
********************************************
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
  ** END OF RUN :   3

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 004
    NSTORM=   1
           #  1=CHIC25YR.STM
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-01-22
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#****************************************************************************
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\CHIC25
| Ptotal=  62.16 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   4.040 |   1.08  27.240 |   2.08   9.030 |   3.08   4.800
               .17   4.040 |   1.17  27.240 |   2.17   9.030 |   3.17   4.800
               .25   4.590 |   1.25 159.940 |   2.25   7.790 |   3.25   4.480
```



```
               .33   4.590 |   1.33 159.940 |   2.33   7.790 |   3.33   4.480
               .42   5.340 |   1.42  35.500 |   2.42   6.880 |   3.42   4.200
               .50   5.340 |   1.50  35.500 |   2.50   6.880 |   3.50   4.200
               .58   6.460 |   1.58  19.320 |   2.58   6.190 |   3.58   3.960
               .67   6.460 |   1.67  19.320 |   2.67   6.190 |   3.67   3.960
               .75   8.320 |   1.75  13.740 |   2.75   5.630 |   3.75   3.750
               .83   8.320 |   1.83  13.740 |   2.83   5.630 |   3.83   3.750
               .92  12.160 |   1.92  10.840 |   2.92   5.180 |   3.92   3.570
              1.00  12.160 |   2.00  10.840 |   3.00   5.180 |   4.00   3.570

--------------------------------------------------------------------------------
004:0003----------------------------------------------------------------------
********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .540 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   18.550
     TOTAL RAINFALL   (mm)=   62.158
     RUNOFF COEFFICIENT   =     .298

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

--------------------------------------------------------------------------------
004:0004----------------------------------------------------------------------
********************************************
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
  ** END OF RUN :   4

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
           #  1=CHIC50YR.STM
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
```

```
*#  Project Number: 2060
*#  Date        : 2021-01-22
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#*****************************************************************************
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\CHIC50
| Ptotal=  70.32 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	4.162	1.08	32.657	2.08	9.717	3.08	4.937
.17	4.162	1.17	32.657	2.17	9.717	3.17	4.937
.25	4.763	1.25	184.617	2.25	8.288	3.25	4.589
.33	4.763	1.33	184.617	2.33	8.288	3.33	4.589
.42	5.601	1.42	43.091	2.42	7.254	3.42	4.291
.50	5.601	1.50	43.091	2.50	7.254	3.50	4.291
.58	6.862	1.58	22.223	2.58	6.469	3.58	4.033
.67	6.862	1.67	22.223	2.67	6.469	3.67	4.033
.75	9.002	1.75	15.316	2.75	5.851	3.75	3.807
.83	9.002	1.83	15.316	2.83	5.851	3.83	3.807
.92	13.574	1.92	11.832	2.92	5.351	3.92	3.608
1.00	13.574	2.00	11.832	3.00	5.351	4.00	3.608

```
--------------------------------------------------------------------------------
005:0003----------------------------------------------------------------------
*********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .706 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   23.284
     TOTAL RAINFALL   (mm)=   70.316
     RUNOFF COEFFICIENT   =     .331

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

--------------------------------------------------------------------------------
005:0004----------------------------------------------------------------------
*********************************************
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
```



```
  ** END OF RUN :   5

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 006
    NSTORM=   1
           #  1=CH100YR.STM
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-01-22
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#*****************************************************************************
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\CH100Y
| Ptotal=  78.03 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	4.310	1.08	38.040	2.08	10.640	3.08	5.210
.17	4.310	1.17	38.040	2.17	10.640	3.17	5.210
.25	4.960	1.25	203.310	2.25	8.990	3.25	4.830
.33	4.960	1.33	203.310	2.33	8.990	3.33	4.830
.42	5.880	1.42	51.040	2.42	7.810	3.42	4.500
.50	5.880	1.50	51.040	2.50	7.810	3.50	4.500
.58	7.270	1.58	25.590	2.58	6.920	3.58	4.220
.67	7.270	1.67	25.590	2.67	6.920	3.67	4.220
.75	9.690	1.75	17.240	2.75	6.230	3.75	3.970
.83	9.690	1.83	17.240	2.83	6.230	3.83	3.970
.92	15.000	1.92	13.110	2.92	5.670	3.92	3.760
1.00	15.000	2.00	13.110	3.00	5.670	4.00	3.760

```
--------------------------------------------------------------------------------
006:0003----------------------------------------------------------------------
*********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127
```

```
     PEAK FLOW      (cms)=     .869 (i)
     TIME TO PEAK   (hrs)=    2.333
     RUNOFF VOLUME   (mm)=   28.048
     TOTAL RAINFALL  (mm)=   78.032
     RUNOFF COEFFICIENT  =     .359

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

--------------------------------------------------------------------------------
006:0004----------------------------------------------------------------------
*****************************************
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
  ** END OF RUN :   6

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 007
    NSTORM=   1
           #  1=CHIC25MM.STM
--------------------------------------------------------------------------------
007:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-01-22
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#*****************************************************************************
--------------------------------------------------------------------------------
007:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\2060\CHIC25
| Ptotal=  25.00 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   1.624 |   1.08  12.284 |   2.08   3.786 |   3.08   1.940
               .17   1.624 |   1.17  12.284 |   2.17   3.786 |   3.17   1.940
               .25   1.853 |   1.25  58.772 |   2.25   3.233 |   3.25   1.803
```



```
               .33   1.853 |   1.33  58.772 |   2.33   3.233 |   3.33   1.803
               .42   2.170 |   1.42  16.185 |   2.42   2.838 |   3.42   1.688
               .50   2.170 |   1.50  16.185 |   2.50   2.838 |   3.50   1.688
               .58   2.651 |   1.58   8.549 |   2.58   2.529 |   3.58   1.588
               .67   2.651 |   1.67   8.549 |   2.67   2.529 |   3.67   1.588
               .75   3.470 |   1.75   5.927 |   2.75   2.292 |   3.75   1.501
               .83   3.470 |   1.83   5.927 |   2.83   2.292 |   3.83   1.501
               .92   5.201 |   1.92   4.598 |   2.92   2.098 |   3.92   1.422
              1.00   5.201 |   2.00   4.598 |   3.00   2.098 |   4.00   1.422

--------------------------------------------------------------------------------
007:0003----------------------------------------------------------------------
*********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW      (cms)=     .067 (i)
     TIME TO PEAK   (hrs)=    2.583
     RUNOFF VOLUME   (mm)=    2.554
     TOTAL RAINFALL  (mm)=   25.000
     RUNOFF COEFFICIENT  =     .102

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

--------------------------------------------------------------------------------
007:0004----------------------------------------------------------------------
*****************************************
--------------------------------------------------------------------------------
007:0002----------------------------------------------------------------------
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007:0002----------------------------------------------------------------------
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007:0002----------------------------------------------------------------------
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007:0002----------------------------------------------------------------------
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007:0002----------------------------------------------------------------------
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007:0002----------------------------------------------------------------------
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007:0002----------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2021-01-22     at 14:27:53
================================================================================
```

APPENDIX B
STORMWATER DESIGN CALCULATIONS

ROOFTOP STORAGE AVAILABLE CALCULATIONS

Table 1A – Building A Roof Storage Required for 100-Year Storm Event

TIME PERIOD (min)	INTENSITY (mm/hr)	RUNOFF (l/s)	STORAGE (m^3)
20-30	4.96	38.3	0.0
30-40	5.88	45.4	0.0
40-50	7.27	56.2	0.0
50-60	9.69	74.9	0.0
60-70	15.00	115.9	4.4
70-80	38.04	293.9	111.3
80-90	203.31	1571.0	877.5
90-100	51.04	394.4	171.5
100-110	25.59	197.7	53.5
110-120	17.24	133.2	14.8
120-130	13.11	101.3	0.0
130-140	10.64	82.2	0.0
140-150	8.99	69.5	0.0
150-160	7.81	60.3	0.0
160-170	6.92	53.5	0.0
			1,233.1

Building A Roof: = 30,906 m^2 @ C = 0.90

CAN = $\frac{[(30{,}906 \times 0.90) \times 2.778}{10{,}000}$

= 7.727

Runoff = CAIN

Storage (m^3): = $\frac{\text{(Runoff - Roof Outflow) x 5 min x 60 sec}}{1{,}000}$

Allowable Outflow = 108.5 l/s

Table 1B – Building B Roof Storage Required for 100-Year Storm Event

TIME PERIOD (min)	INTENSITY (mm/hr)	RUNOFF (l/s)	STORAGE (m^3)
30-40	5.88	42.9	0.0
40-50	7.27	53.1	0.0
50-60	9.69	70.7	0.0
60-70	15.00	109.5	5.3
70-80	38.04	277.7	106.2
80-90	203.31	1484.4	830.2
90-100	51.04	372.7	163.1
100-110	25.59	186.8	51.7
110-120	17.24	125.9	15.1
120-130	13.11	95.7	0.0
130-140	10.64	77.7	0.0
140-150	8.99	65.6	0.0
150-160	7.81	57.0	0.0
160-170	6.92	50.5	0.0
			1,171.5

Building B Roof: = 29,203 m^2 @ C = 0.90

CAN = $\frac{[(29{,}203 \times 0.90) \times 2.778}{10{,}000}$

= 7.301

Runoff = CAIN

Storage (m^3): = $\frac{\text{(Runoff - Roof Outflow) x 5 min x 60 sec}}{1{,}000}$

Allowable Outflow = 100.8 l/s

ROOF PONDING DETAILS: BUILDINGS A & B

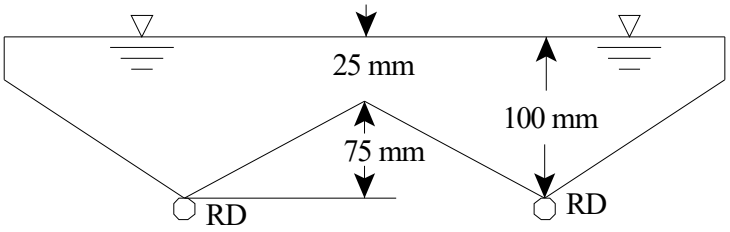
Criteria:

Building A: Roof Area = 30,906 m^2 Total No. of Drains = 70

Building B: Roof Area = 29,203 m^2 Total No. of Drains = 65

100 mm Ponding Depth

75 mm Rise between Drains



Building A Rooftop Ponding:

Area per Drain $= 30{,}906\text{m}^2 / 70\text{ drain} = 441.5\ \text{m}^2/\text{drain}$

Available Ponding Volume per Drain $= \frac{\text{l}\cdot\text{w}\cdot\text{h}}{3} + \text{l}\cdot\text{w}\cdot\text{h}$

Ponding Volume Per Drain $= \frac{(441.5\text{m}^2)\cdot(0.075\text{m})}{3} + (441.5\text{m}^2)\cdot(0.025\text{m}) = 22.1\text{m}^3/\text{drain}$

Rooftop Volume Provided $= 22.1\text{m}^3 \cdot 70\text{ drains} = 1{,}545.3\text{m}^3$

Required Rooftop Volume = 1,233.1m^3

Building B Rooftop Ponding:

Area per Drain $= 29{,}203\text{m}^2 / 65\text{ drain} = 449.3\ \text{m}^2/\text{drain}$

Available Ponding Volume per Drain $= \frac{\text{l}\cdot\text{w}\cdot\text{h}}{3} + \text{l}\cdot\text{w}\cdot\text{h}$

Ponding Volume Per Drain $= \frac{(449.3\text{m}^2)\cdot(0.075\text{m})}{3} + (449.3\text{m}^2)\cdot(0.025\text{m}) = 22.5\text{m}^3/\text{drain}$

Rooftop Volume Provided $= 22.5\text{m}^3 \cdot 65\text{ drains} = 1{,}460.1\text{m}^3$

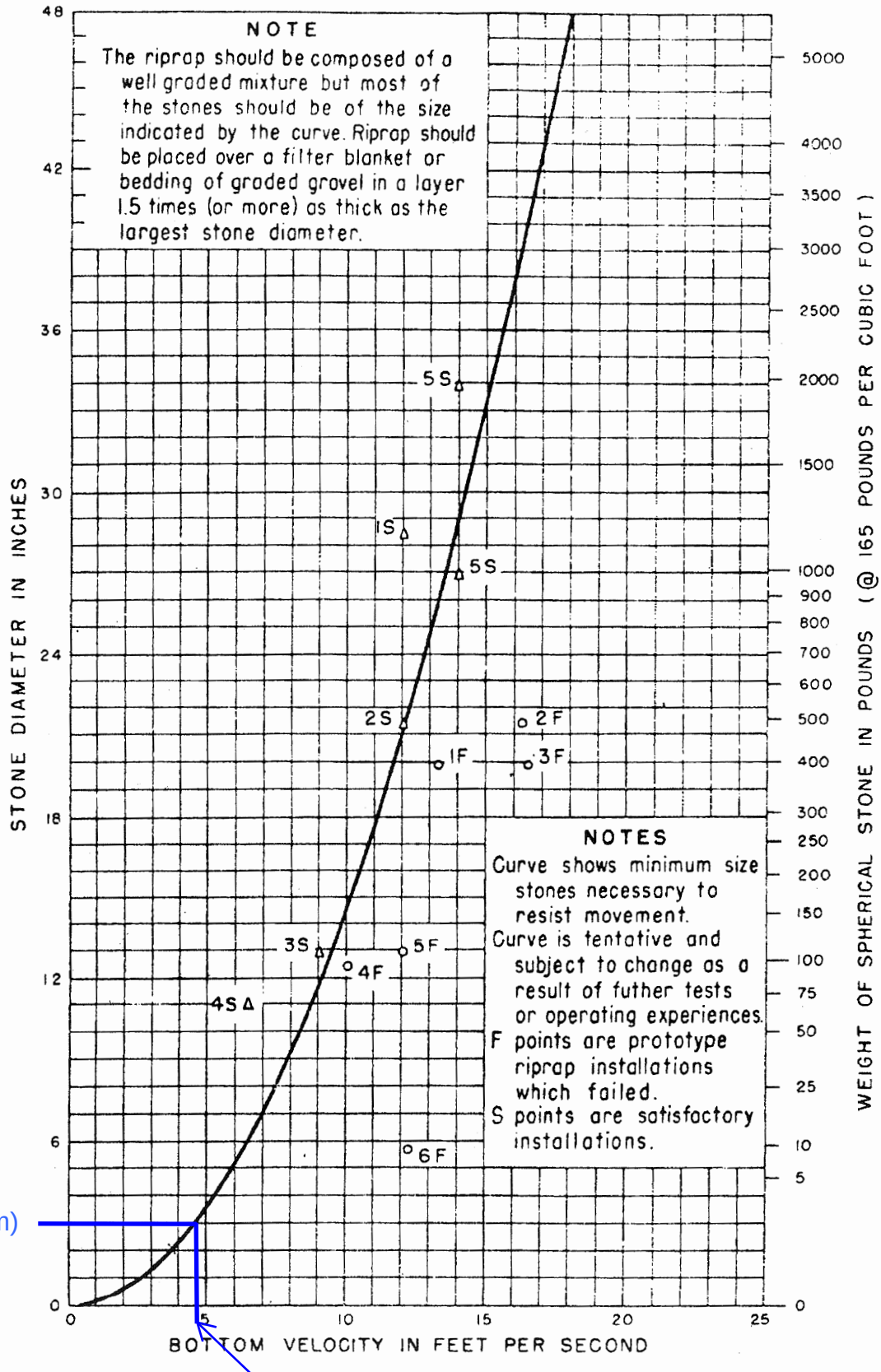
Required Rooftop Volume = 1,171.5m^3

ROOF DRAIN MANUFACTURERS DESIGN TABLE

LOCATION	SQUARE METRE (SQUARE FOOT) NOTCH AREA RATING	ROOF LOAD FACTOR KGS (LBS.)	TOTAL ROOF SLOPE											
			DEAD-LEVEL			51mm (2") RISE			102mm (4") RISE			152mm (6") RISE		
			L.P.M. (G.P.M.) Discharge	Draindown Time Hrs.	mm (In.) Water Depth	L.P.M. (G.P.M.) Discharge	Draindown Time Hrs.	mm (In.) Water Depth	L.P.M. (G.P.M.) Discharge	Draindown Time Hrs.	mm (In.) Water Depth	L.P.M. (G.P.M.) Discharge	Draindown Time Hrs.	mm (In.) Water Depth
St. Thomas, Ontario	232 (2,500)	5.7 (12.5)	54.5 (12)	8	61 (2.4)	68 (15)	7	76 (3.0)	86.5 (19)	5	96.5 (3.8)	104.5 (23)	4	117 (4.6)
	465 (5,000)	6.6 (14.6)	63.5 (14)	19	71 (2.8)	77.5 (17)	16	88.5 (3.4)	97.5 (21.5)	11	109 (4.3)	118 (26)	9	132 (5.2)
	697 (7,500)	7.1 (15.6)	68 (15)	29	76 (3.0)	82 (18)	26	91.5 (3.6)	102.5 (22.5)	18	114.5 (4.5)	125 (27.5)	15	139.5 (5.5)
	929 (10,000)	7.5 (16.6)	72.5 (16)	40	81.5 (3.2)	86.5 (19)	34	96.5 (3.8)	107 (23.5)	24	119.5 (4.7)	132 (29)	20	147.5 (5.8)
Timmins, Ontario	232 (2,500)	4.3 (9.4)	41 (9)	7	45.5 (1.8)	57 (12.5)	6	63.5 (2.5)	72.5 (16)	4	81.5 (3.2)	86.5 (19)	3.3	96.5 (3.8)
	465 (5,000)	5.7 (12.5)	54.5 (12)	16	61 (2.4)	63.5 (14)	14	71 (2.8)	82 (18)	9	91.5 (3.6)	97.5 (21.5)	7.5	109 (4.3)
	697 (7,500)	6.4 (14)	61.5 (13.5)	27	68.5 (2.7)	70.5 (15.5)	22	78.5 (3.1)	86.5 (19)	15	96.5 (3.8)	104.5 (23)	12	117 (4.6)
	929 (10,000)	6.6 (14.6)	63.5 (14)	36	71 (2.8)	72.5 (16)	30	81.5 (3.2)	91 (20)	21	101.5 (4.0)	109 (24)	17	122 (4.8)
Toronto, Ontario	232 (2,500)	5.7 (12.5)	54.5 (12)	8	61 (2.4)	66 (14.5)	7	73.5 (2.9)	82 (18)	4.5	91.5 (3.6)	97.5 (21.5)	3.5	109 (4.3)
	465 (5,000)	6.8 (15.1)	66 (14.5)	19	73.5 (2.9)	77.5 (17)	16	86.5 (3.4)	93 (20.5)	11	104 (4.1)	111.5 (24.5)	9	124.5 (4.9)
	697 (7,500)	8.0 (17.7)	77.5 (17)	30	86.5 (3.4)	84 (18.5)	26	94 (3.7)	100 (22)	18	112 (4.4)	120.5 (26.5)	14	134.5 (5.3)
	929 (10,000)	8.7 (19.2)	82 (18)	42	91.5 (3.6)	86.5 (19)	34	96.5 (3.8)	104.5 (23)	24	117 (4.6)	127.5 (28)	20	142 (5.6)
Windsor, Ontario	232 (2,500)	6.1 (13.5)	59 (13)	8.5	66 (2.6)	70.5 (15.5)	7.5	78.5 (3.1)	84 (18.5)	4.5	94 (3.7)	107 (23.5)	4	119.5 (4.7)
	465 (5,000)	7.1 (15.6)	68 (15)	20	76 (3.0)	79.5 (17.5)	18	89 (3.5)	97.5 (21.5)	11	109 (4.3)	118 (26)	9	132 (5.2)
	697 (7,500)	8.0 (17.7)	77.5 (17)	30	86.5 (3.4)	86.5 (19)	26	96.5 (3.8)	107 (23.5)	18	119.5 (4.7)	125 (27.5)	15	139.5 (5.5)
	929 (10,000)	8.7 (19.2)	82 (18)	42	91.5 (3.6)	91 (20)	36	101.5 (4.0)	113.5 (25)	26	127 (5.0)	129.5 (28.5)	20	145 (5.7)
Charlottetown, P.E.I.	232 (2,500)	4.9 (10.9)	47.5 (10.5)	7.5	53.5 (2.1)	57 (12.5)	6	63.5 (2.5)	68 (15)	3.8	76 (3.0)	79.5 (17.5)	3	89 (3.5)
	465 (5,000)	6.6 (14.6)	63.5 (14)	19	71 (2.8)	75 (16.5)	15.5	84 (3.3)	88.5 (19.5)	10	99 (3.9)	100 (22)	7.5	112 (4.4)
	697 (7,500)	7.8 (17.2)	75 (16.5)	31	84 (3.3)	86.5 (19)	26	96.5 (3.8)	102.5 (22.5)	18	114.5 (4.5)	113.5 (25)	13	127 (5.0)
	929 (10,000)	8.7 (19.2)	84 (18.5)	42	94 (3.7)	97.5 (21.5)	37	106.5 (4.2)	111.5 (24.5)	26	124.5 (4.9)	125 (27.5)	20	139.5 (5.5)
Montreal, Quebec	232 (2,500)	5.2 (11.4)	50 (11)	7.5	56 (2.2)	61.5 (13.5)	7	68.5 (2.7)	79.5 (17.5)	4.5	89 (3.5)	97.5 (21.5)	3.5	109 (4.3)
	465 (5,000)	5.9 (13)	57 (12.5)	17	63.5 (2.5)	70.5 (15.5)	15	78.5 (3.1)	88.5 (19.5)	10	99 (3.9)	109 (24)	8	122 (4.8)
	697 (7,500)	6.1 (13.5)	59 (13)	27	66 (2.6)	72.5 (16)	23	81.5 (3.2)	93 (20.5)	16	104 (4.1)	113.5 (25)	13	127 (5.0)
	929 (10,000)	6.4 (14)	61.5 (13.5)	36	68.5 (2.7)	77.5 (17)	31	86.5 (3.4)	95.5 (21)	22	106.5 (4.2)	120.5 (26.5)	19	134.5 (5.3)
Quebec City, Quebec	232 (2,500)	5.4 (12)	52.5 (11.5)	8	58.5 (2.3)	63.5 (14)	7	71 (2.8)	79.5 (17.5)	4.5	89 (3.5)	97.5 (21.5)	3.5	109 (4.3)
	465 (5,000)	6.4 (14)	61.5 (13.5)	18	68.5 (2.7)	70.5 (15.5)	15	78.5 (3.1)	84 (18.5)	10	94 (3.7)	104.5 (23)	8	117 (4.6)
	697 (7,500)	6.6 (14.6)	63.5 (14)	28	71 (2.8)	72.5 (16)	23	81.5 (3.2)	86.5 (19)	15	96.5 (3.8)	107 (23.5)	12	119.5 (4.7)
	929 (10,000)	7.1 (15.6)	68 (15)	37	76 (3.0)	77.5 (17)	31	86.5 (3.4)	88.5 (19.5)	20	99 (3.9)	109 (24)	17	122 (4.8)
Regina, Saskatchewan	232 (2,500)	4.5 (9.9)	43 (9.5)	7	48.5 (1.9)	54.5 (12)	6	61 (2.4)	72.5 (16)	4	81.5 (3.2)	79.5 (17.5)	3	89 (3.5)
	465 (5,000)	6.4 (14)	61.5 (13.5)	18	68.5 (2.7)	68 (15)	14	76 (3.0)	86.5 (19)	10	96.5 (3.8)	97.5 (21.5)	7.5	109 (4.3)
	697 (7,500)	7.3 (16.1)	70.5 (15.5)	29	78.5 (3.1)	77.5 (17)	24	86.5 (3.4)	100 (22)	17	112 (4.4)	109 (24)	12	122 (4.8)
	929 (10,000)	8.3 (18.2)	79.5 (17.5)	40	89 (3.5)	82 (18)	32	91.5 (3.6)	104.5 (23)	24	117 (4.6)	118 (26)	18	132 (5.2)
Saskatoon, Saskatchewan	232 (2,500)	4.0 (8.8)	38.5 (8.5)	6	43 (1.7)	57 (12.5)	6	63.5 (2.5)	66 (14.5)	3.8	73.5 (2.9)	77.5 (17)	2.8	86.5 (3.4)
	465 (5,000)	5.7 (12.5)	54.5 (12)	16	61 (2.4)	68 (15)	14.5	76 (3.0)	82 (18)	9	91.5 (3.6)	95.5 (21)	7	106.5 (4.2)
	697 (7,500)	6.6 (14.6)	63.5 (14)	28	71 (2.8)	75 (16.5)	24	84 (3.3)	91 (20)	16	101.5 (4.0)	104.5 (23)	12	117 (4.6)
	929 (10,000)	7.1 (15.6)	68 (15)	38	76 (3.0)	82 (18)	32	91.5 (3.6)	97.5 (21.5)	22	109 (4.3)	113.5 (25)	18	127 (5.0)

772 WINSTON CHURCHILL BLVD
PROJECT: 2060 1 - 136
RIP RAP SIZING

SIZE OF RIPRAP



Curve to determine maximum stone size in riprap mixture.

3" (75mm)

4.6 ft/s (1.42 m/s)
525mm DIA. @ 0.50%
HEADWALL#1
Q_{FULL} = 0.317m³/s

FIGURE 1.67

Project:

Chamber Model -	MC-4500	
Units -	**Metric**	Click Here for Imperial
Number of Chambers -	372	
Number of End Caps -	20	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	90.00	m
Amount of Stone Above Chambers -	305	mm
Amount of Stone Below Chambers -	229	mm

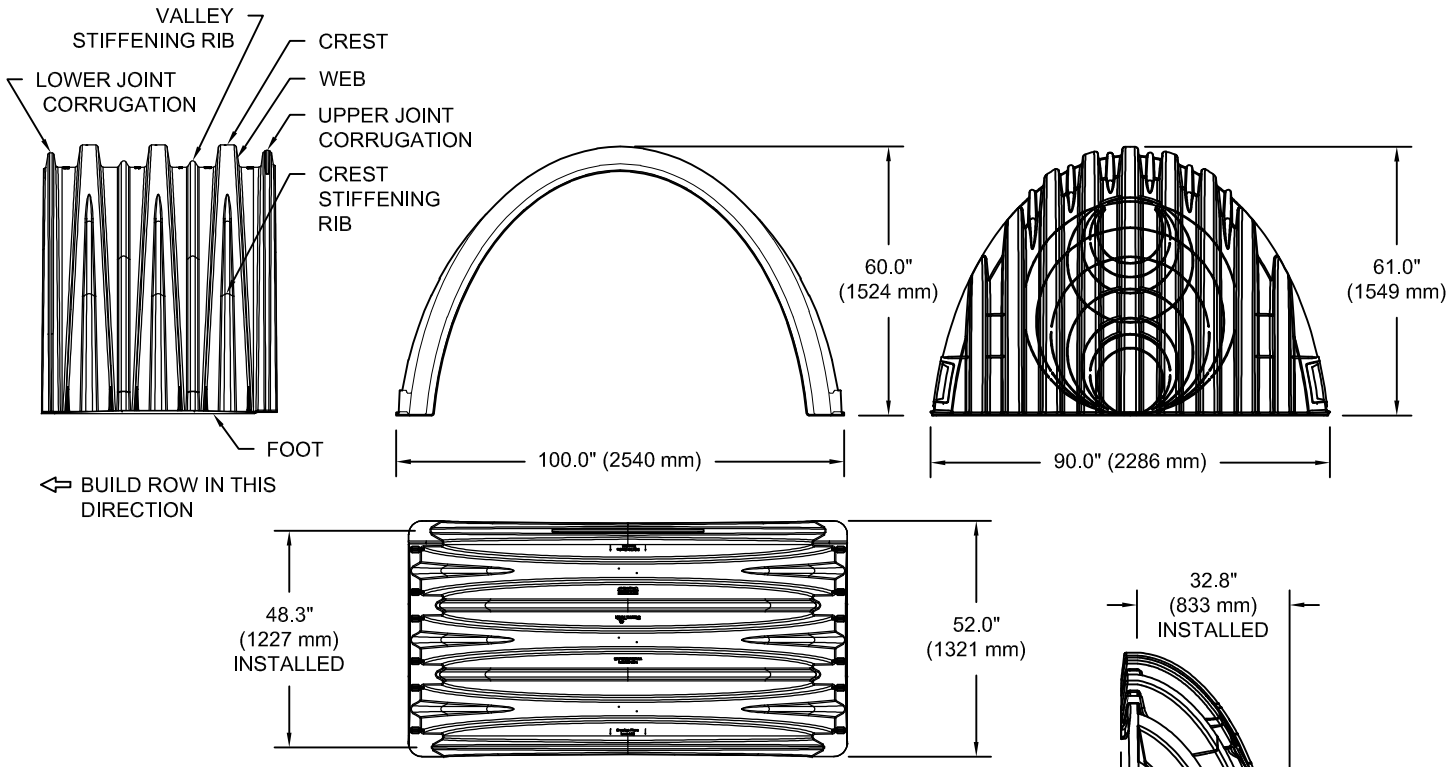
Include Perimeter Stone in Calculations

1399 sq.meters Min. Area - 1326.916 sq.meters

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Single End Cap *(cubic meters)*	Incremental Chambers *(cubic meters)*	Incremental End Cap *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Chamber, End Cap and Stone *(cubic meters)*	Cumulative System *(cubic meters)*	Elevation *(meters)*
2057	0.00	0.00	0.00	0.00	14.207	14.21	1837.34	92.06
2032	0.00	0.00	0.00	0.00	14.207	14.21	1823.13	92.03
2007	0.00	0.00	0.00	0.00	14.207	14.21	1808.93	92.01
1981	0.00	0.00	0.00	0.00	14.207	14.21	1794.72	91.98
1956	0.00	0.00	0.00	0.00	14.207	14.21	1780.51	91.96
1930	0.00	0.00	0.00	0.00	14.207	14.21	1766.31	91.93
1905	0.00	0.00	0.00	0.00	14.207	14.21	1752.10	91.91
1880	0.00	0.00	0.00	0.00	14.207	14.21	1737.89	91.88
1854	0.00	0.00	0.00	0.00	14.207	14.21	1723.69	91.85
1829	0.00	0.00	0.00	0.00	14.207	14.21	1709.48	91.83
1803	0.00	0.00	0.00	0.00	14.207	14.21	1695.27	91.80
1778	0.00	0.00	0.00	0.00	14.207	14.21	1681.07	91.78
1753	0.00	0.00	0.43	0.01	14.031	14.47	1666.86	91.75
1727	0.00	0.00	1.22	0.02	13.710	14.95	1652.39	91.73
1702	0.00	0.00	1.74	0.03	13.501	15.27	1637.44	91.70
1676	0.01	0.00	2.20	0.04	13.312	15.55	1622.17	91.68
1651	0.01	0.00	2.83	0.05	13.057	15.93	1606.63	91.65
1626	0.01	0.00	4.77	0.06	12.275	17.10	1590.69	91.63
1600	0.02	0.00	7.01	0.07	11.374	18.46	1573.59	91.60
1575	0.02	0.00	8.42	0.09	10.804	19.31	1555.13	91.57
1549	0.03	0.01	9.57	0.11	10.337	20.01	1535.82	91.55
1524	0.03	0.01	10.56	0.12	9.931	20.62	1515.81	91.52
1499	0.03	0.01	11.45	0.14	9.569	21.16	1495.19	91.50
1473	0.03	0.01	12.26	0.16	9.242	21.65	1474.03	91.47
1448	0.03	0.01	13.00	0.17	8.939	22.11	1452.38	91.45
1422	0.04	0.01	13.69	0.19	8.656	22.53	1430.27	91.42
1397	0.04	0.01	14.34	0.20	8.392	22.93	1407.73	91.40
1372	0.04	0.01	14.94	0.22	8.142	23.30	1384.80	91.37
1346	0.04	0.01	15.52	0.23	7.906	23.66	1361.50	91.35
1321	0.04	0.01	16.07	0.25	7.680	24.00	1337.84	91.32
1295	0.04	0.01	16.59	0.27	7.466	24.32	1313.85	91.30
1270	0.05	0.01	17.08	0.28	7.263	24.62	1289.53	91.27
1245	0.05	0.01	17.55	0.29	7.068	24.91	1264.91	91.24
1219	0.05	0.02	18.00	0.31	6.882	25.19	1239.99	91.22
1194	0.05	0.02	18.44	0.32	6.704	25.46	1214.80	91.19
1168	0.05	0.02	18.85	0.33	6.534	25.72	1189.34	91.17
1143	0.05	0.02	19.25	0.35	6.369	25.96	1163.62	91.14
1118	0.05	0.02	19.63	0.36	6.212	26.20	1137.66	91.12
1092	0.05	0.02	20.00	0.36	6.062	26.42	1111.46	91.09
1067	0.05	0.02	20.35	0.38	5.913	26.65	1085.04	91.07
1041	0.06	0.02	20.69	0.40	5.772	26.86	1058.39	91.04
1016	0.06	0.02	21.02	0.41	5.636	27.06	1031.53	91.02
991	0.06	0.02	21.33	0.42	5.506	27.26	1004.47	90.99
965	0.06	0.02	21.63	0.43	5.380	27.45	977.21	90.97
940	0.06	0.02	21.93	0.44	5.258	27.63	949.76	90.94
914	0.06	0.02	22.21	0.45	5.142	27.80	922.13	90.91
889	0.06	0.02	22.48	0.46	5.030	27.97	894.33	90.89
864	0.06	0.02	22.74	0.47	4.921	28.14	866.36	90.86
838	0.06	0.02	22.99	0.48	4.818	28.29	838.22	90.84
813	0.06	0.02	23.23	0.49	4.719	28.44	809.93	90.81
787	0.06	0.03	23.47	0.50	4.619	28.59	781.50	90.79
762	0.06	0.03	23.69	0.51	4.526	28.73	752.91	90.76
737	0.06	0.03	23.91	0.52	4.437	28.86	724.18	90.74
711	0.06	0.03	24.11	0.52	4.353	28.99	695.32	90.71
686	0.07	0.03	24.31	0.53	4.269	29.11	666.33	90.69
660	0.07	0.03	24.50	0.54	4.189	29.23	637.22	90.66
635	0.07	0.03	24.68	0.55	4.114	29.35	607.98	90.64
610	0.07	0.03	24.86	0.56	4.041	29.46	578.64	90.61
584	0.07	0.03	25.03	0.55	3.976	29.55	549.18	90.58
559	0.07	0.03	25.19	0.57	3.905	29.66	519.63	90.56
533	0.07	0.03	25.34	0.57	3.842	29.75	489.97	90.53
508	0.07	0.03	25.48	0.58	3.782	29.84	460.22	90.51
483	0.07	0.03	25.62	0.58	3.724	29.93	430.37	90.48
457	0.07	0.03	25.75	0.59	3.670	30.01	400.44	90.46
432	0.07	0.03	25.88	0.59	3.618	30.09	370.43	90.43
406	0.07	0.03	26.00	0.60	3.570	30.16	340.34	90.41
381	0.07	0.03	26.11	0.59	3.526	30.23	310.18	90.38
356	0.07	0.03	26.21	0.60	3.483	30.29	279.95	90.36
330	0.07	0.03	26.31	0.61	3.439	30.36	249.66	90.33
305	0.07	0.03	26.40	0.61	3.400	30.42	219.30	90.30
279	0.07	0.03	26.49	0.62	3.364	30.47	188.88	90.28
254	0.07	0.03	26.62	0.63	3.309	30.55	158.41	90.25
229	0.00	0.00	0.00	0.00	14.207	14.21	127.86	90.23
203	0.00	0.00	0.00	0.00	14.207	14.21	113.65	90.20
178	0.00	0.00	0.00	0.00	14.207	14.21	99.45	90.18
152	0.00	0.00	0.00	0.00	14.207	14.21	85.24	90.15
127	0.00	0.00	0.00	0.00	14.207	14.21	71.03	90.13
102	0.00	0.00	0.00	0.00	14.207	14.21	56.83	90.10
76	0.00	0.00	0.00	0.00	14.207	14.21	42.62	90.08
51	0.00	0.00	0.00	0.00	14.207	14.21	28.41	90.05
25	0.00	0.00	0.00	0.00	14.207	14.21	14.21	90.03

MC-4500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

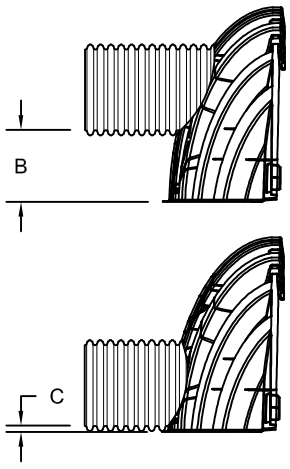
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

User Inputs

Chamber Model:	MC-4500
Outlet Control Structure:	Yes
Project Name:	772 WCB Dec 2021
Engineer:	Fanche Petkovski
Project Location:	New York
Measurement Type:	Metric
Required Storage Volume:	1800.00 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	229 mm.
Stone Above Chambers:	305 mm.
Average Cover Over Chambers:	610 mm.
Design Constraint Dimensions:	(30.00 m. x 52.00 m.)

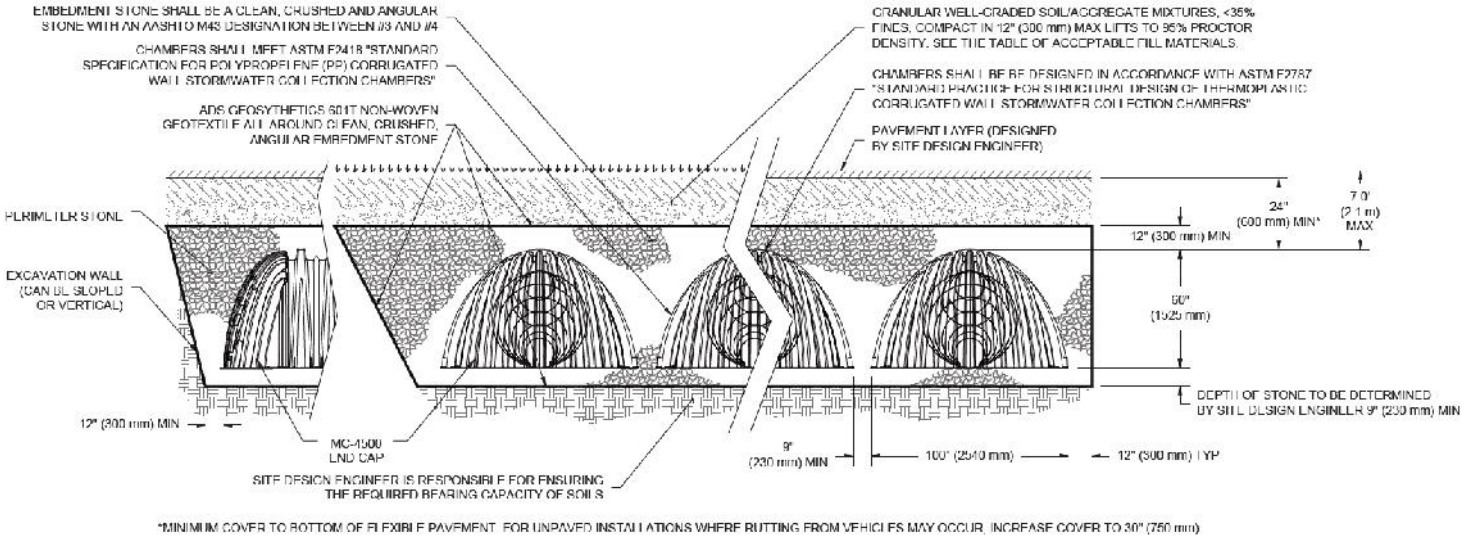
Results

System Volume and Bed Size

Installed Storage Volume:	1837.71 cubic meters.
Storage Volume Per Chamber:	3.02 cubic meters.
Number Of Chambers Required:	372
Number Of End Caps Required:	20
Chamber Rows:	10
Maximum Length:	50.30 m.
Maximum Width:	28.25 m.
Approx. Bed Size Required:	1398.83 square meters.

System Components

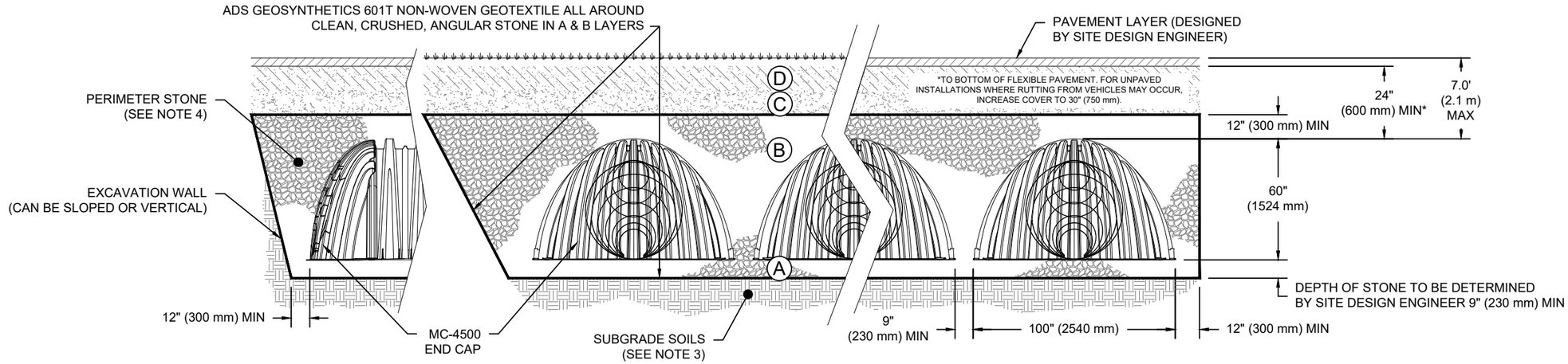
Amount Of Stone Required:	1733.69 cubic meters
Volume Of Excavation (Not Including Fill):	2877.87 cubic meters
Total Non-woven Geotextile Required:	4486.3 square meters
Woven Geotextile Required (excluding Isolator Row):	191.1 square meters
Woven Geotextile Required (Isolator Row):	369.64 square meters
Total Woven Geotextile Required:	560.74 square meters



ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



*FOR COVER DEPTHS GREATER THAN 7.0' (2.1 m) PLEASE CONTACT STORMTECH

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

MC-4500
STANDARD CROSS SECTION
DATE: 05-10-19 | DRAWN: KR | CHECKED: KR | PROJECT #:

DATE	DRWN	CHKD	DESCRIPTION

StormTech
Detention • Retention • Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

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772 WINSTON CHURCHILL
OAKVILLE, CANADA, ONTARIO

MC-4500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 230 mm (9") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm).
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 300 mm (12") BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

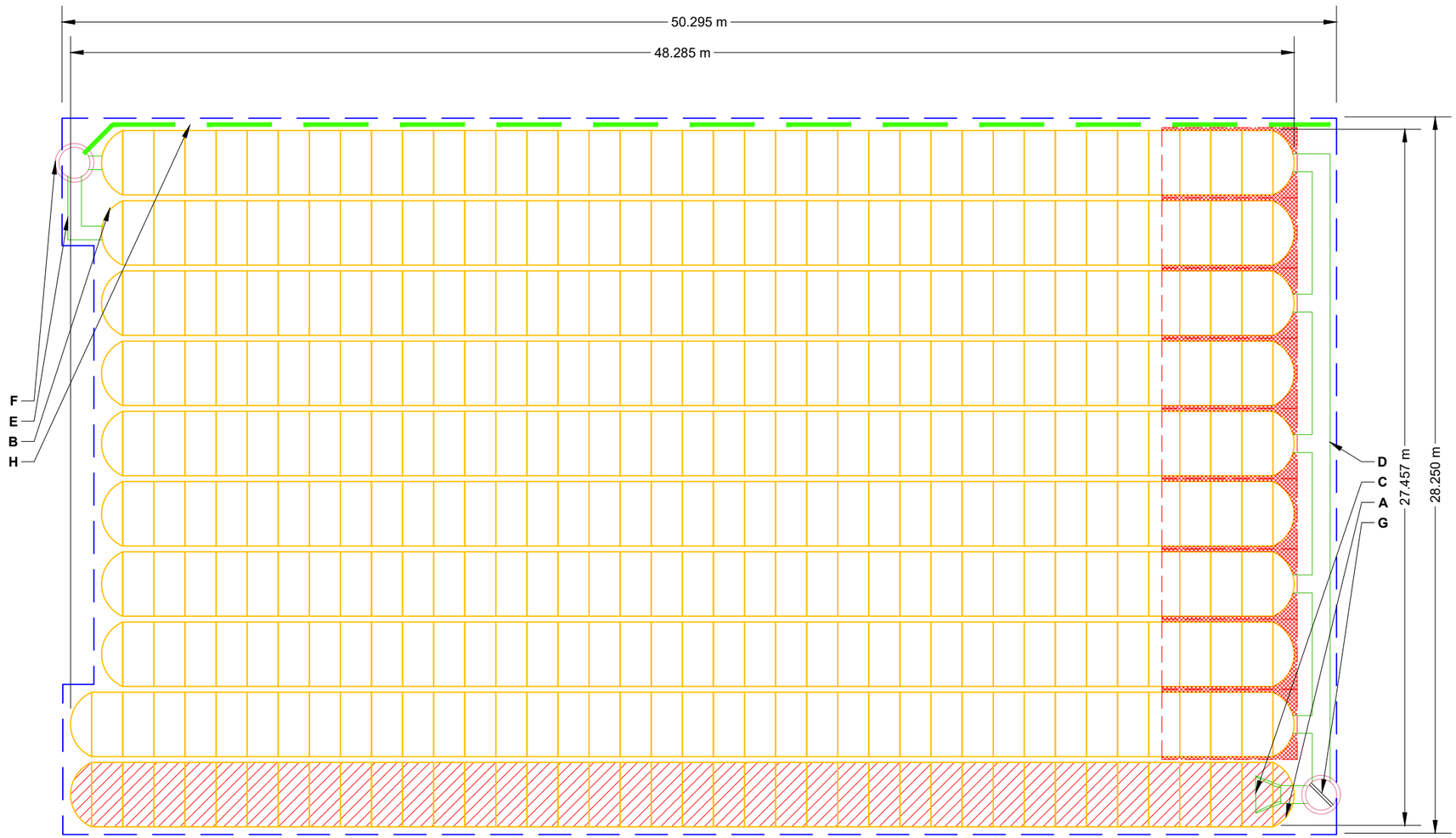
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		PROPOSED ELEVATIONS	
372	STORMTECH MC-4500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	93.886
20	STORMTECH MC-4500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	92.515
305	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	92.362
229	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	92.362
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	92.362
1837.8	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	92.058
		TOP OF MC-4500 CHAMBER:	91.753
		600 mm x 600 mm BOTTOM MANIFOLD INVERT:	90.286
		600 mm ISOLATOR ROW PLUS INVERT:	90.286
1398.8	SYSTEM AREA (m^2)	450 mm x 450 mm BOTTOM MANIFOLD INVERT:	90.279
159.5	SYSTEM PERIMETER (m)	450 mm BOTTOM CONNECTION INVERT:	90.279
		BOTTOM OF MC-4500 CHAMBER:	90.229
		UNDERDRAIN INVERT:	90.000
		BOTTOM OF STONE:	90.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	600 mm BOTTOM PARTIAL CUT END CAP, PART#: MC4500IEPP24B / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	57 mm	
PREFABRICATED END CAP	B	450 mm BOTTOM PARTIAL CUT END CAP, PART#: MC4500IEPP18B / TYP OF ALL 450 mm BOTTOM CONNECTIONS	50 mm	
FLAMP	C	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: MC450024RAMP (TYP 2 PLACES)		
MANIFOLD	D	600 mm x 600 mm BOTTOM MANIFOLD, ADS N-12	57 mm	
MANIFOLD	E	450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12	50 mm	
CONCRETE STRUCTURE	F	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		227 L/s OUT
CONCRETE STRUCTURE W/WEIR	G	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		1174 L/s IN
UNDERDRAIN	H	150 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 5.334 m OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

772 WINSTON CHURCHILL
OAKVILLE, CANADA, ONTARIO
DRAWN: FP
CHECKED: N/A
DATE:
PROJECT #:

DESCRIPTION	CHK	DRW	DATE

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

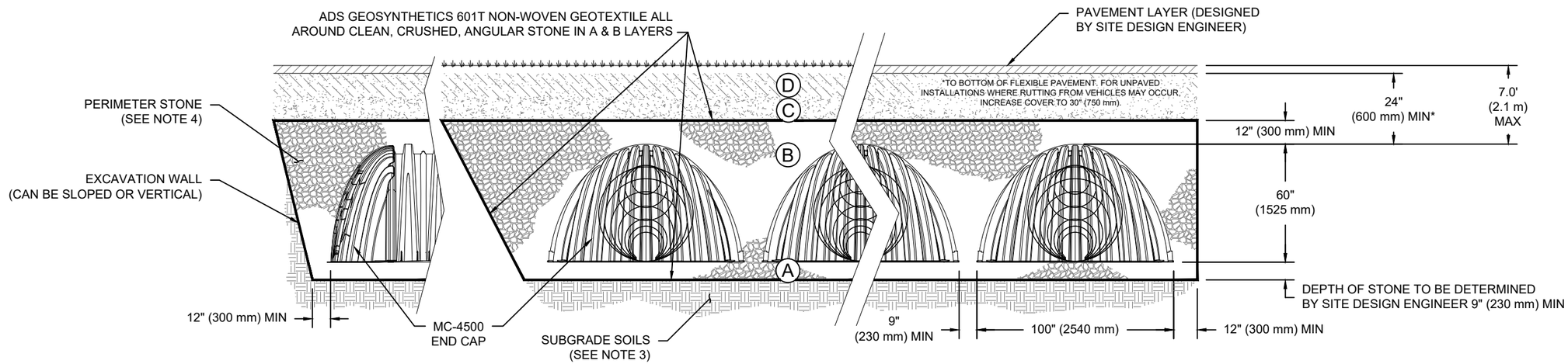
SCALE = 1 : 200

SHEET
2 OF 5

ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

772 WINSTON CHURCHILL
OAKVILLE, CANADA, ONTARIO
DATE:
DRAWN: FP
PROJECT #:
CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

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HILLIARD, OH 43026
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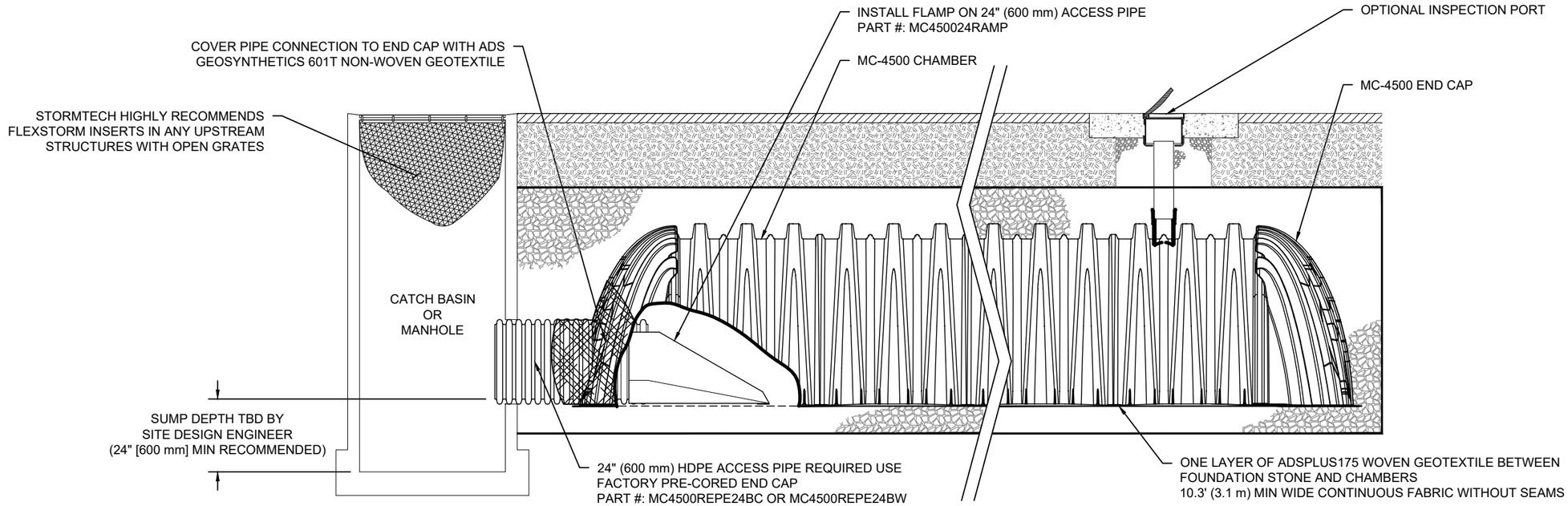


MC-4500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

772 WINSTON CHURCHILL
OAKVILLE, CANADA, ONTARIO
DATE:
DRAWN: FP
PROJECT #:
CHECKED: N/A

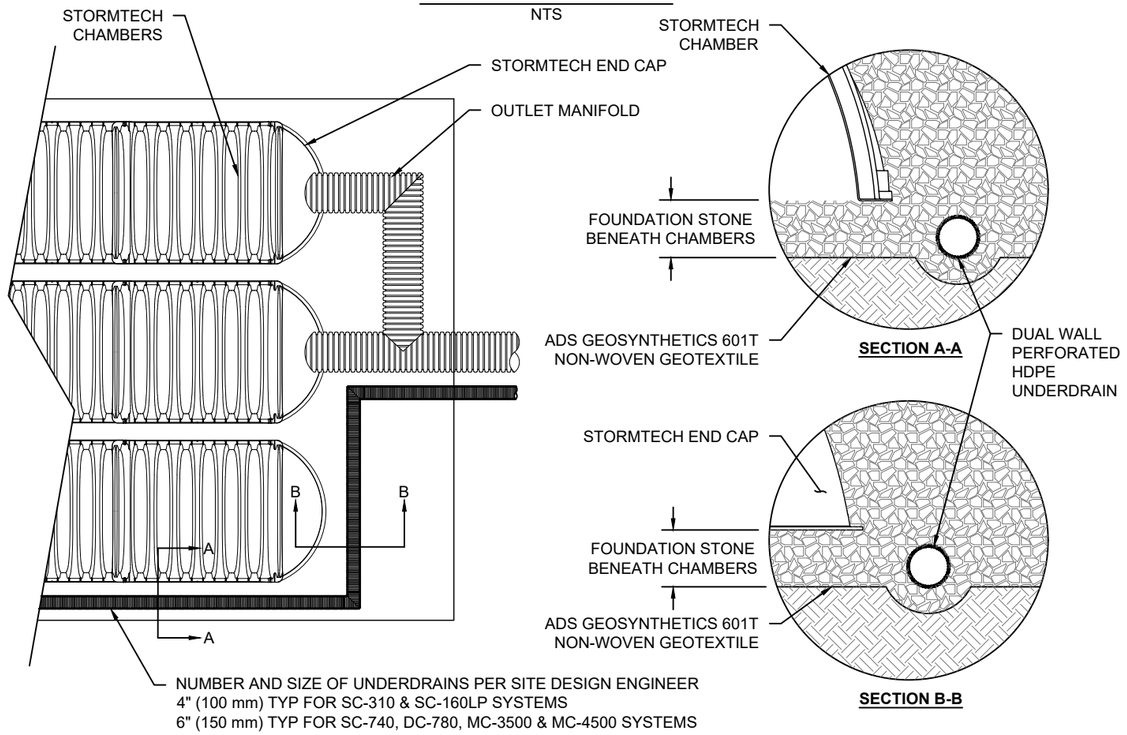
DESCRIPTION	CHK	DRW	DATE

StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

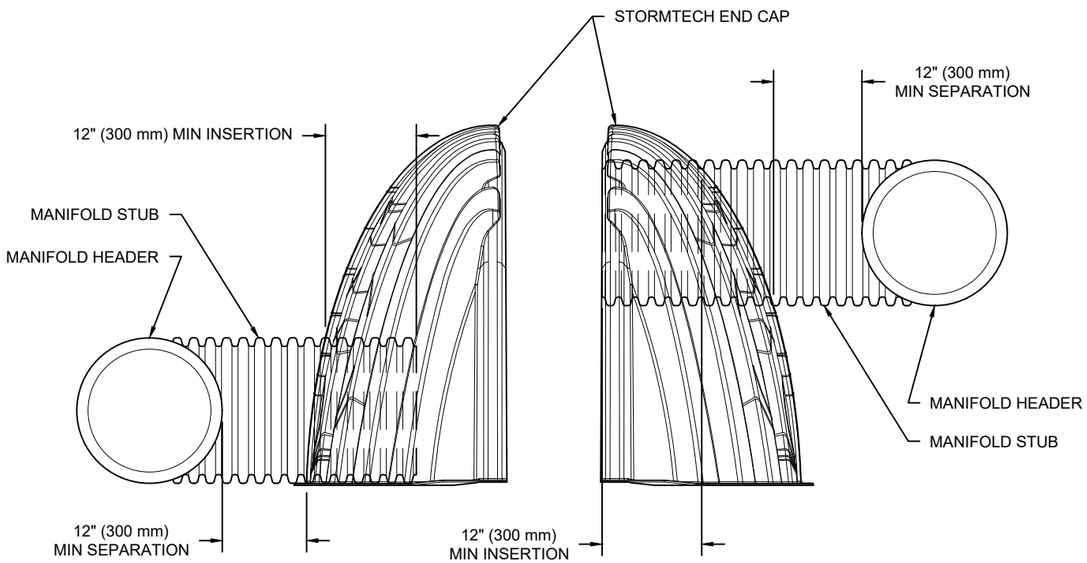
UNDERDRAIN DETAIL

NTS



MC-SERIES END CAP INSERTION DETAIL

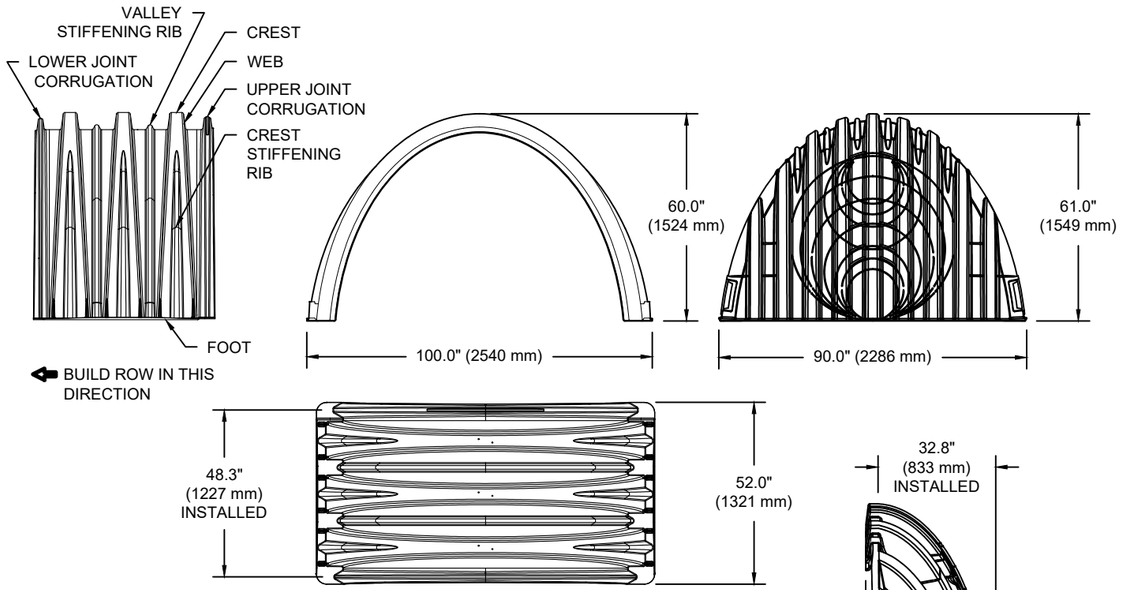
NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

MC-4500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

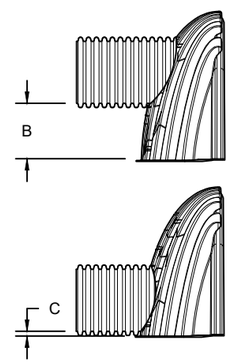
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL

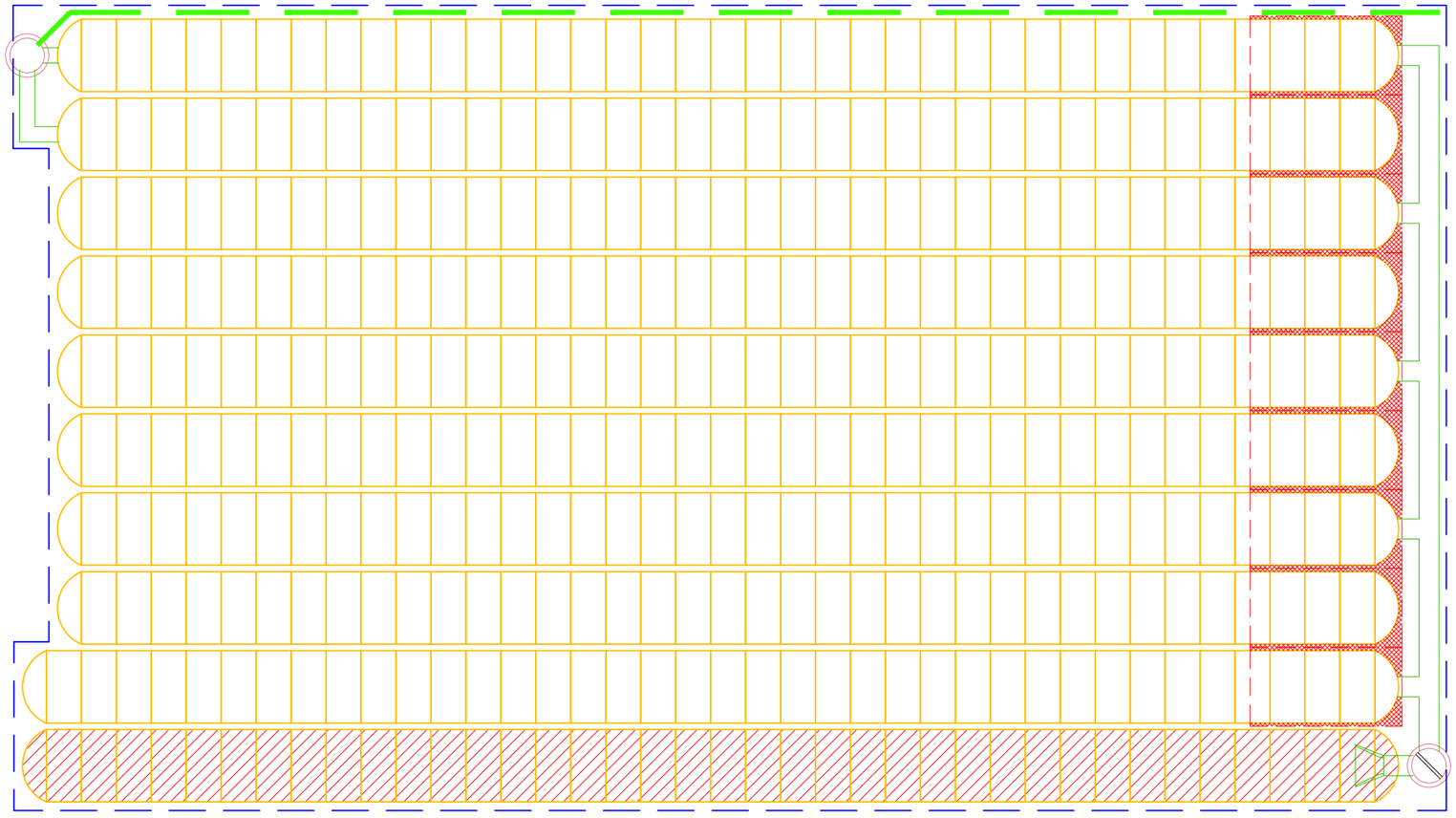


CUSTOM PARTIAL CUT INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

772 WINSTON CHURCHILL
OAKVILLE, CANADA, ONTARIO
DATE:
DRAWN: FP
PROJECT #:
CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473
ADS



APPENDIX C
SWMHYMO OUTPUT

PRE-DEVELOPMENT
TARGET FLOW
SWMHYMO OUTPUT

```
================================================================================

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9 =========
                                                     9   9  9   9 # 3813174
      StormWater Management HYdrologic Model          999    999  =========

 ********************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 *************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                  *******
 ********************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          *******
 *******                   Ottawa,  Ontario: (613) 727-5199          *******
 *******                   Gatineau, Quebec: (819) 243-6858          *******
 *******                   E-Mail: swmhymo@jfsa.com                  *******
 ********************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: A.M. Candaras Associates Inc.                +++++++
 +++++++               Woodbridge            SERIAL#:3813174       +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *******
 *******           Maximum value for ID numbers  :     10            *******
 *******           Max. number of rainfall points:  15000            *******
 *******           Max. number of flow points    :  15000            *******
 ********************************************************************************


 *******************   D E T A I L E D   O U T P U T   *******************
 ********************************************************************************
 *       DATE: 2021-09-13     TIME: 14:29:16     RUN COUNTER: 000270       *
 ********************************************************************************
 * Input   filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060PreB.dat        *
 * Output  filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060PreB.out        *
 * Summary filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060PreB.sum        *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ********************************************************************************

--------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#*****************************************************************************
--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
```



```
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
           #  1=CHIC25MM.STM
--------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC25
| Ptotal=  25.00 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   1.624 |   1.08  12.284 |   2.08   3.786 |   3.08   1.940
               .17   1.624 |   1.17  12.284 |   2.17   3.786 |   3.17   1.940
               .25   1.853 |   1.25  58.772 |   2.25   3.233 |   3.25   1.803
               .33   1.853 |   1.33  58.772 |   2.33   3.233 |   3.33   1.803
               .42   2.170 |   1.42  16.185 |   2.42   2.838 |   3.42   1.688
               .50   2.170 |   1.50  16.185 |   2.50   2.838 |   3.50   1.688
               .58   2.651 |   1.58   8.549 |   2.58   2.529 |   3.58   1.588
               .67   2.651 |   1.67   8.549 |   2.67   2.529 |   3.67   1.588
               .75   3.470 |   1.75   5.927 |   2.75   2.292 |   3.75   1.501
               .83   3.470 |   1.83   5.927 |   2.83   2.292 |   3.83   1.501
               .92   5.201 |   1.92   4.598 |   2.92   2.098 |   3.92   1.422
              1.00   5.201 |   2.00   4.598 |   3.00   2.098 |   4.00   1.422

--------------------------------------------------------------------------------
001:0003----------------------------------------------------------------------
********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .067 (i)
     TIME TO PEAK    (hrs)=    2.583
     RUNOFF VOLUME    (mm)=    2.554
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .102

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

--------------------------------------------------------------------------------
001:0004----------------------------------------------------------------------
*****************************************
  ** END OF RUN :   1

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

```
--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
           #  1=CHIC2YR.STM
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date         : 2021-09-10
*#  Modeller     : F. Petkovski, P.Eng.
*#  Company      : a.m. candaras associates inc.
*#  License #    : 3813174
*#**************************************************************************
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC2Y
| Ptotal=  34.80 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .08   2.260 |   1.08  17.100 |   2.08   5.270 |   3.08   2.700
              .17   2.260 |   1.17  17.100 |   2.17   5.270 |   3.17   2.700
              .25   2.580 |   1.25  81.810 |   2.25   4.500 |   3.25   2.510
              .33   2.580 |   1.33  81.810 |   2.33   4.500 |   3.33   2.510
              .42   3.020 |   1.42  22.530 |   2.42   3.950 |   3.42   2.350
              .50   3.020 |   1.50  22.530 |   2.50   3.950 |   3.50   2.350
              .58   3.690 |   1.58  11.900 |   2.58   3.520 |   3.58   2.210
              .67   3.690 |   1.67  11.900 |   2.67   3.520 |   3.67   2.210
              .75   4.830 |   1.75   8.250 |   2.75   3.190 |   3.75   2.090
              .83   4.830 |   1.83   8.250 |   2.83   3.190 |   3.83   2.090
              .92   7.240 |   1.92   6.400 |   2.92   2.920 |   3.92   1.980
             1.00   7.240 |   2.00   6.400 |   3.00   2.920 |   4.00   1.980

--------------------------------------------------------------------------------
002:0003----------------------------------------------------------------------
*****************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*****************************************
---------------------
| CALIB NASHYD      |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .155 (i)
     TIME TO PEAK    (hrs)=    2.417
     RUNOFF VOLUME    (mm)=    5.655
     TOTAL RAINFALL   (mm)=   34.800
     RUNOFF COEFFICIENT   =     .163

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



```
--------------------------------------------------------------------------------
002:0004----------------------------------------------------------------------
*****************************************
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
  ** END OF RUN :   2

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 003
    NSTORM=   1
           #  1=CHIC5YR.STM
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date         : 2021-09-10
*#  Modeller     : F. Petkovski, P.Eng.
*#  Company      : a.m. candaras associates inc.
*#  License #    : 3813174
*#**************************************************************************
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC5Y
| Ptotal=  46.25 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .08   2.820 |   1.08  22.680 |   2.08   6.740 |   3.08   3.400
              .17   2.820 |   1.17  22.680 |   2.17   6.740 |   3.17   3.400
              .25   3.240 |   1.25 113.160 |   2.25   5.730 |   3.25   3.150
              .33   3.240 |   1.33 113.160 |   2.33   5.730 |   3.33   3.150
              .42   3.810 |   1.42  30.090 |   2.42   5.010 |   3.42   2.950
              .50   3.810 |   1.50  30.090 |   2.50   5.010 |   3.50   2.950
              .58   4.680 |   1.58  15.580 |   2.58   4.460 |   3.58   2.770
              .67   4.680 |   1.67  15.580 |   2.67   4.460 |   3.67   2.770
              .75   6.160 |   1.75  10.690 |   2.75   4.030 |   3.75   2.610
              .83   6.160 |   1.83  10.690 |   2.83   4.030 |   3.83   2.610
              .92   9.350 |   1.92   8.230 |   2.92   3.680 |   3.92   2.480
             1.00   9.350 |   2.00   8.230 |   3.00   3.680 |   4.00   2.480

--------------------------------------------------------------------------------
003:0003----------------------------------------------------------------------
*****************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*****************************************
```

```
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .300 (i)
     TIME TO PEAK    (hrs)=    2.417
     RUNOFF VOLUME    (mm)=   10.402
     TOTAL RAINFALL   (mm)=   46.250
     RUNOFF COEFFICIENT   =     .225

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

--------------------------------------------------------------------------------
003:0004--------------------------------------------------------------------------
********************************************
--------------------------------------------------------------------------------
003:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
003:0002--------------------------------------------------------------------------
  ** END OF RUN :   3

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 004
    NSTORM=   1
           #  1=CHIC10YR.STM
--------------------------------------------------------------------------------
004:0002--------------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#****************************************************************************
--------------------------------------------------------------------------------
004:0002--------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC10
| Ptotal=  54.14 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   3.410 |   1.08  25.220 |   2.08   7.880 |   3.08   4.080
               .17   3.410 |   1.17  25.220 |   2.17   7.880 |   3.17   4.080
               .25   3.890 |   1.25 135.630 |   2.25   6.750 |   3.25   3.800
```



```
               .33   3.890 |   1.33 135.630 |   2.33   6.750 |   3.33   3.800
               .42   4.560 |   1.42  33.220 |   2.42   5.930 |   3.42   3.560
               .50   4.560 |   1.50  33.220 |   2.50   5.930 |   3.50   3.560
               .58   5.550 |   1.58  17.550 |   2.58   5.300 |   3.58   3.350
               .67   5.550 |   1.67  17.550 |   2.67   5.300 |   3.67   3.350
               .75   7.230 |   1.75  12.240 |   2.75   4.810 |   3.75   3.160
               .83   7.230 |   1.83  12.240 |   2.83   4.810 |   3.83   3.160
               .92  10.770 |   1.92   9.540 |   2.92   4.410 |   3.92   3.000
              1.00  10.770 |   2.00   9.540 |   3.00   4.410 |   4.00   3.000

--------------------------------------------------------------------------------
004:0003--------------------------------------------------------------------------
********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .413 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   14.245
     TOTAL RAINFALL   (mm)=   54.140
     RUNOFF COEFFICIENT   =     .263

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

--------------------------------------------------------------------------------
004:0004--------------------------------------------------------------------------
********************************************
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004:0002--------------------------------------------------------------------------
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004:0002--------------------------------------------------------------------------
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004:0002--------------------------------------------------------------------------
  ** END OF RUN :   4

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--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
           #  1=CHIC25YR.STM
--------------------------------------------------------------------------------
005:0002--------------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
```

```
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#*************************************************************************
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC25
| Ptotal=  62.16 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	4.040	1.08	27.240	2.08	9.030	3.08	4.800
.17	4.040	1.17	27.240	2.17	9.030	3.17	4.800
.25	4.590	1.25	159.940	2.25	7.790	3.25	4.480
.33	4.590	1.33	159.940	2.33	7.790	3.33	4.480
.42	5.340	1.42	35.500	2.42	6.880	3.42	4.200
.50	5.340	1.50	35.500	2.50	6.880	3.50	4.200
.58	6.460	1.58	19.320	2.58	6.190	3.58	3.960
.67	6.460	1.67	19.320	2.67	6.190	3.67	3.960
.75	8.320	1.75	13.740	2.75	5.630	3.75	3.750
.83	8.320	1.83	13.740	2.83	5.630	3.83	3.750
.92	12.160	1.92	10.840	2.92	5.180	3.92	3.570
1.00	12.160	2.00	10.840	3.00	5.180	4.00	3.570

```
--------------------------------------------------------------------------------
005:0003----------------------------------------------------------------------
*********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .540 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   18.550
     TOTAL RAINFALL   (mm)=   62.158
     RUNOFF COEFFICIENT   =     .298

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

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005:0004----------------------------------------------------------------------
*********************************************
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005:0002----------------------------------------------------------------------
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005:0002----------------------------------------------------------------------
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005:0002----------------------------------------------------------------------
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005:0002----------------------------------------------------------------------
```



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  ** END OF RUN :   5

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--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 006
    NSTORM=   1
           #  1=CHIC50YR.STM
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
*#*************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#*************************************************************************
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC50
| Ptotal=  70.32 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	4.162	1.08	32.657	2.08	9.717	3.08	4.937
.17	4.162	1.17	32.657	2.17	9.717	3.17	4.937
.25	4.763	1.25	184.617	2.25	8.288	3.25	4.589
.33	4.763	1.33	184.617	2.33	8.288	3.33	4.589
.42	5.601	1.42	43.091	2.42	7.254	3.42	4.291
.50	5.601	1.50	43.091	2.50	7.254	3.50	4.291
.58	6.862	1.58	22.223	2.58	6.469	3.58	4.033
.67	6.862	1.67	22.223	2.67	6.469	3.67	4.033
.75	9.002	1.75	15.316	2.75	5.851	3.75	3.807
.83	9.002	1.83	15.316	2.83	5.851	3.83	3.807
.92	13.574	1.92	11.832	2.92	5.351	3.92	3.608
1.00	13.574	2.00	11.832	3.00	5.351	4.00	3.608

```
--------------------------------------------------------------------------------
006:0003----------------------------------------------------------------------
*********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127
```

```
     PEAK FLOW       (cms)=     .706 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   23.284
     TOTAL RAINFALL   (mm)=   70.316
     RUNOFF COEFFICIENT   =     .331

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

--------------------------------------------------------------------------------
006:0004--------------------------------------------------------------------------
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006:0002--------------------------------------------------------------------------
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006:0002--------------------------------------------------------------------------
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006:0002--------------------------------------------------------------------------
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006:0002--------------------------------------------------------------------------
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006:0002--------------------------------------------------------------------------
  ** END OF RUN :   6

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--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 007
    NSTORM=   1
           #  1=CH100YR.STM
--------------------------------------------------------------------------------
007:0002--------------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#****************************************************************************
--------------------------------------------------------------------------------
007:0002--------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CH100Y
| Ptotal=  78.03 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   4.310 |   1.08  38.040 |   2.08  10.640 |   3.08   5.210
               .17   4.310 |   1.17  38.040 |   2.17  10.640 |   3.17   5.210
               .25   4.960 |   1.25 203.310 |   2.25   8.990 |   3.25   4.830
```



```
               .33   4.960 |   1.33 203.310 |   2.33   8.990 |   3.33   4.830
               .42   5.880 |   1.42  51.040 |   2.42   7.810 |   3.42   4.500
               .50   5.880 |   1.50  51.040 |   2.50   7.810 |   3.50   4.500
               .58   7.270 |   1.58  25.590 |   2.58   6.920 |   3.58   4.220
               .67   7.270 |   1.67  25.590 |   2.67   6.920 |   3.67   4.220
               .75   9.690 |   1.75  17.240 |   2.75   6.230 |   3.75   3.970
               .83   9.690 |   1.83  17.240 |   2.83   6.230 |   3.83   3.970
               .92  15.000 |   1.92  13.110 |   2.92   5.670 |   3.92   3.760
              1.00  15.000 |   2.00  13.110 |   3.00   5.670 |   4.00   3.760

--------------------------------------------------------------------------------
007:0003--------------------------------------------------------------------------
*********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
*********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .869 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   28.048
     TOTAL RAINFALL   (mm)=   78.032
     RUNOFF COEFFICIENT   =     .359

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

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007:0004--------------------------------------------------------------------------
*****************************************
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007:0002--------------------------------------------------------------------------
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007:0002--------------------------------------------------------------------------
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007:0002--------------------------------------------------------------------------
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007:0002--------------------------------------------------------------------------
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007:0002--------------------------------------------------------------------------
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007:0002--------------------------------------------------------------------------
  ** END OF RUN :   7

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--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 008
```

```
    NSTORM=   1
           #  1=2Y24HS.STM
--------------------------------------------------------------------------------
008:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#**************************************************************************
--------------------------------------------------------------------------------
008:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2Y24HS
| Ptotal=  51.39 mm|    Comments: * 2YR SCS 24hr STORM, 15min TIME STEPS,M
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.570	6.25	1.030	12.25	7.400	18.25	.920
.50	.570	6.50	1.030	12.50	7.400	18.50	.920
.75	.570	6.75	1.030	12.75	3.800	18.75	.920
1.00	.570	7.00	1.030	13.00	3.800	19.00	.920
1.25	.570	7.25	1.030	13.25	.720	19.25	.920
1.50	.570	7.50	1.030	13.50	.720	19.50	.920
1.75	.570	7.75	1.030	13.75	4.210	19.75	.920
2.00	.570	8.00	1.030	14.00	4.210	20.00	.920
2.25	.670	8.25	1.390	14.25	1.540	20.25	.620
2.50	.670	8.50	1.390	14.50	1.540	20.50	.620
2.75	.670	8.75	1.390	14.75	1.540	20.75	.620
3.00	.670	9.00	1.390	15.00	1.540	21.00	.620
3.25	.670	9.25	1.640	15.25	1.540	21.25	.620
3.50	.670	9.50	1.640	15.50	1.540	21.50	.620
3.75	.670	9.75	1.850	15.75	1.540	21.75	.620
4.00	.670	10.00	1.850	16.00	1.540	22.00	.620
4.25	.820	10.25	2.360	16.25	.920	22.25	.620
4.50	.820	10.50	2.360	16.50	.920	22.50	.620
4.75	.820	10.75	3.190	16.75	.920	22.75	.620
5.00	.820	11.00	3.190	17.00	.920	23.00	.620
5.25	.820	11.25	4.930	17.25	.920	23.25	.620
5.50	.820	11.50	4.930	17.50	.920	23.50	.620
5.75	.820	11.75	21.380	17.75	.920	23.75	.620
6.00	.820	12.00	56.730	18.00	.920	24.00	.620

```
--------------------------------------------------------------------------------
008:0003----------------------------------------------------------------------
**********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
**********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .274 (i)
```



```
     TIME TO PEAK    (hrs)=   12.833
     RUNOFF VOLUME    (mm)=   12.857
     TOTAL RAINFALL   (mm)=   51.387
     RUNOFF COEFFICIENT   =     .250

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

--------------------------------------------------------------------------------
008:0004----------------------------------------------------------------------
**********************************************
--------------------------------------------------------------------------------
008:0002----------------------------------------------------------------------
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008:0002----------------------------------------------------------------------
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008:0002----------------------------------------------------------------------
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008:0002----------------------------------------------------------------------
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008:0002----------------------------------------------------------------------
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008:0002----------------------------------------------------------------------
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008:0002----------------------------------------------------------------------
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008:0002----------------------------------------------------------------------
  ** END OF RUN :   8

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 009
    NSTORM=   1
           #  1=5Y24HS.STM
--------------------------------------------------------------------------------
009:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#**************************************************************************
--------------------------------------------------------------------------------
009:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\5Y24HS
| Ptotal=  63.89 mm|    Comments: * 5 YEAR SCS 24hr STORM, 15 min TIME STE
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.700	6.25	1.280	12.25	9.200	18.25	1.150

.50	.700	6.50	1.280	12.50	9.200	18.50	1.150
.75	.700	6.75	1.280	12.75	4.730	18.75	1.150
1.00	.700	7.00	1.280	13.00	4.730	19.00	1.150
1.25	.700	7.25	1.280	13.25	.890	19.25	1.150
1.50	.700	7.50	1.280	13.50	.890	19.50	1.150
1.75	.700	7.75	1.280	13.75	5.240	19.75	1.150
2.00	.700	8.00	1.280	14.00	5.240	20.00	1.150
2.25	.830	8.25	1.720	14.25	1.920	20.25	.770
2.50	.830	8.50	1.720	14.50	1.920	20.50	.770
2.75	.830	8.75	1.720	14.75	1.920	20.75	.770
3.00	.830	9.00	1.720	15.00	1.920	21.00	.770
3.25	.830	9.25	2.040	15.25	1.920	21.25	.770
3.50	.830	9.50	2.040	15.50	1.920	21.50	.770
3.75	.830	9.75	2.300	15.75	1.920	21.75	.770
4.00	.830	10.00	2.300	16.00	1.920	22.00	.770
4.25	1.020	10.25	2.940	16.25	1.150	22.25	.770
4.50	1.020	10.50	2.940	16.50	1.150	22.50	.770
4.75	1.020	10.75	3.960	16.75	1.150	22.75	.770
5.00	1.020	11.00	3.960	17.00	1.150	23.00	.770
5.25	1.020	11.25	6.130	17.25	1.150	23.25	.770
5.50	1.020	11.50	6.130	17.50	1.150	23.50	.770
5.75	1.020	11.75	26.580	17.75	1.150	23.75	.770
6.00	1.020	12.00	70.530	18.00	1.150	24.00	.770

```
--------------------------------------------------------------------------------
009:0003--------------------------------------------------------------------------
**********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
**********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .424 (i)
     TIME TO PEAK    (hrs)=   12.750
     RUNOFF VOLUME    (mm)=   19.528
     TOTAL RAINFALL   (mm)=   63.893
     RUNOFF COEFFICIENT   =     .306

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

--------------------------------------------------------------------------------
009:0004--------------------------------------------------------------------------
**********************************************
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009:0002--------------------------------------------------------------------------
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009:0002--------------------------------------------------------------------------
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009:0002--------------------------------------------------------------------------
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009:0002--------------------------------------------------------------------------
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009:0002--------------------------------------------------------------------------
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009:0002--------------------------------------------------------------------------
```



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--------------------------------------------------------------------------------
009:0002--------------------------------------------------------------------------
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009:0002--------------------------------------------------------------------------
  ** END OF RUN :   9

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 010
    NSTORM=   1
           #  1=10Y24HS.STM
--------------------------------------------------------------------------------
010:0002--------------------------------------------------------------------------
*#***************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#***************************************************************************
--------------------------------------------------------------------------------
010:0002--------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\10Y24H
| Ptotal=  72.94 mm|    Comments: * 10 YEAR SCS 24hr STORM, 15 min TIME ST
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.800	6.25	1.460	12.25	10.500	18.25	1.310
.50	.800	6.50	1.460	12.50	10.500	18.50	1.310
.75	.800	6.75	1.460	12.75	5.400	18.75	1.310
1.00	.800	7.00	1.460	13.00	5.400	19.00	1.310
1.25	.800	7.25	1.460	13.25	1.020	19.25	1.310
1.50	.800	7.50	1.460	13.50	1.020	19.50	1.310
1.75	.800	7.75	1.460	13.75	5.980	19.75	1.310
2.00	.800	8.00	1.460	14.00	5.980	20.00	1.310
2.25	.950	8.25	1.970	14.25	2.190	20.25	.880
2.50	.950	8.50	1.970	14.50	2.190	20.50	.880
2.75	.950	8.75	1.970	14.75	2.190	20.75	.880
3.00	.950	9.00	1.970	15.00	2.190	21.00	.880
3.25	.950	9.25	2.330	15.25	2.190	21.25	.880
3.50	.950	9.50	2.330	15.50	2.190	21.50	.880
3.75	.950	9.75	2.630	15.75	2.190	21.75	.880
4.00	.950	10.00	2.630	16.00	2.190	22.00	.880
4.25	1.170	10.25	3.350	16.25	1.310	22.25	.880
4.50	1.170	10.50	3.350	16.50	1.310	22.50	.880
4.75	1.170	10.75	4.520	16.75	1.310	22.75	.880
5.00	1.170	11.00	4.520	17.00	1.310	23.00	.880
5.25	1.170	11.25	7.000	17.25	1.310	23.25	.880

```
              5.50   1.170 |  11.50   7.000 |  17.50   1.310 |  23.50    .880
              5.75   1.170 |  11.75  30.330 |  17.75   1.310 |  23.75    .880
              6.00   1.170 |  12.00  80.500 |  18.00   1.310 |  24.00    .880

--------------------------------------------------------------------------------
010:0003------------------------------------------------------------------------
***********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
***********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .546 (i)
     TIME TO PEAK    (hrs)=   12.750
     RUNOFF VOLUME    (mm)=   24.877
     TOTAL RAINFALL   (mm)=   72.943
     RUNOFF COEFFICIENT   =     .341

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

--------------------------------------------------------------------------------
010:0004------------------------------------------------------------------------
***********************************************
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010:0002------------------------------------------------------------------------
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010:0002------------------------------------------------------------------------
  ** END OF RUN :  10

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--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 011
```

```
    NSTORM=   1
           #  1=25Y24HS.STM
--------------------------------------------------------------------------------
011:0002------------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#******************************************************************************
--------------------------------------------------------------------------------
011:0002------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\25Y24H
| Ptotal=  85.25 mm|    Comments: * 25 YEAR SCS 24hr STORM, 15 min TIME ST
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25    .940 |   6.25   1.710 |  12.25  12.280 |  18.25   1.530
               .50    .940 |   6.50   1.710 |  12.50  12.280 |  18.50   1.530
               .75    .940 |   6.75   1.710 |  12.75   6.310 |  18.75   1.530
              1.00    .940 |   7.00   1.710 |  13.00   6.310 |  19.00   1.530
              1.25    .940 |   7.25   1.710 |  13.25   1.190 |  19.25   1.530
              1.50    .940 |   7.50   1.710 |  13.50   1.190 |  19.50   1.530
              1.75    .940 |   7.75   1.710 |  13.75   6.990 |  19.75   1.530
              2.00    .940 |   8.00   1.710 |  14.00   6.990 |  20.00   1.530
              2.25   1.110 |   8.25   2.300 |  14.25   2.560 |  20.25   1.020
              2.50   1.110 |   8.50   2.300 |  14.50   2.560 |  20.50   1.020
              2.75   1.110 |   8.75   2.300 |  14.75   2.560 |  20.75   1.020
              3.00   1.110 |   9.00   2.300 |  15.00   2.560 |  21.00   1.020
              3.25   1.110 |   9.25   2.730 |  15.25   2.560 |  21.25   1.020
              3.50   1.110 |   9.50   2.730 |  15.50   2.560 |  21.50   1.020
              3.75   1.110 |   9.75   3.070 |  15.75   2.560 |  21.75   1.020
              4.00   1.110 |  10.00   3.070 |  16.00   2.560 |  22.00   1.020
              4.25   1.360 |  10.25   3.920 |  16.25   1.530 |  22.25   1.020
              4.50   1.360 |  10.50   3.920 |  16.50   1.530 |  22.50   1.020
              4.75   1.360 |  10.75   5.290 |  16.75   1.530 |  22.75   1.020
              5.00   1.360 |  11.00   5.290 |  17.00   1.530 |  23.00   1.020
              5.25   1.360 |  11.25   8.190 |  17.25   1.530 |  23.25   1.020
              5.50   1.360 |  11.50   8.190 |  17.50   1.530 |  23.50   1.020
              5.75   1.360 |  11.75  35.470 |  17.75   1.530 |  23.75   1.020
              6.00   1.360 |  12.00  94.140 |  18.00   1.530 |  24.00   1.020

--------------------------------------------------------------------------------
011:0003------------------------------------------------------------------------
***********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
***********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .727 (i)
```

```
     TIME TO PEAK    (hrs)=   12.750
     RUNOFF VOLUME    (mm)=   32.723
     TOTAL RAINFALL   (mm)=   85.247
     RUNOFF COEFFICIENT   =     .384

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

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011:0004-----------------------------------------------------------------------
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011:0002-----------------------------------------------------------------------
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011:0002-----------------------------------------------------------------------
  ** END OF RUN :  11

*******************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 012
    NSTORM=   1
           #  1=50Y24HS.STM
-------------------------------------------------------------------------------
012:0002-----------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#******************************************************************************
-------------------------------------------------------------------------------
012:0002-----------------------------------------------------------------------
*
--------------------
```

```
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\50Y24H
| Ptotal=  92.76 mm|    Comments: * 100 YEAR SCS 24hr STORM, 15 min TIME S
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25   1.020 |   6.25   1.860 |  12.25  13.360 |  18.25   1.670
               .50   1.020 |   6.50   1.860 |  12.50  13.360 |  18.50   1.670
               .75   1.020 |   6.75   1.860 |  12.75   6.860 |  18.75   1.670
              1.00   1.020 |   7.00   1.860 |  13.00   6.860 |  19.00   1.670
              1.25   1.020 |   7.25   1.860 |  13.25   1.300 |  19.25   1.670
              1.50   1.020 |   7.50   1.860 |  13.50   1.300 |  19.50   1.670
              1.75   1.020 |   7.75   1.860 |  13.75   7.610 |  19.75   1.670
              2.00   1.020 |   8.00   1.860 |  14.00   7.610 |  20.00   1.670
              2.25   1.210 |   8.25   2.500 |  14.25   2.780 |  20.25   1.110
              2.50   1.210 |   8.50   2.500 |  14.50   2.780 |  20.50   1.110
              2.75   1.210 |   8.75   2.500 |  14.75   2.780 |  20.75   1.110
              3.00   1.210 |   9.00   2.500 |  15.00   2.780 |  21.00   1.110
              3.25   1.210 |   9.25   2.970 |  15.25   2.780 |  21.25   1.110
              3.50   1.210 |   9.50   2.970 |  15.50   2.780 |  21.50   1.110
              3.75   1.210 |   9.75   3.340 |  15.75   2.780 |  21.75   1.110
              4.00   1.210 |  10.00   3.340 |  16.00   2.780 |  22.00   1.110
              4.25   1.480 |  10.25   4.270 |  16.25   1.670 |  22.25   1.110
              4.50   1.480 |  10.50   4.270 |  16.50   1.670 |  22.50   1.110
              4.75   1.480 |  10.75   5.750 |  16.75   1.670 |  22.75   1.110
              5.00   1.480 |  11.00   5.750 |  17.00   1.670 |  23.00   1.110
              5.25   1.480 |  11.25   8.910 |  17.25   1.670 |  23.25   1.110
              5.50   1.480 |  11.50   8.910 |  17.50   1.670 |  23.50   1.110
              5.75   1.480 |  11.75  38.590 |  17.75   1.670 |  23.75   1.110
              6.00   1.480 |  12.00 102.410 |  18.00   1.670 |  24.00   1.110

-------------------------------------------------------------------------------
012:0003-----------------------------------------------------------------------
***********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
***********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=     .843 (i)
     TIME TO PEAK    (hrs)=   12.750
     RUNOFF VOLUME    (mm)=   37.788
     TOTAL RAINFALL   (mm)=   92.755
     RUNOFF COEFFICIENT   =     .407

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

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012:0004-----------------------------------------------------------------------
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012:0002-----------------------------------------------------------------------
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012:0002-----------------------------------------------------------------------
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012:0002--------------------------------------------------------------------------
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012:0002--------------------------------------------------------------------------
  ** END OF RUN :  12

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--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 013
    NSTORM=   1
           #  1=100Y24HS.STM
--------------------------------------------------------------------------------
013:0002--------------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : 2021-09-10
*#  Modeller    : F. Petkovski, P.Eng.
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#******************************************************************************
--------------------------------------------------------------------------------
013:0002--------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\100Y24
| Ptotal= 103.37 mm|    Comments: * 100 YEAR SCS 24hr STORM, 15 min TIME S
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .25   1.140 |   6.25   2.070 |  12.25  14.890 |  18.25   1.860
               .50   1.140 |   6.50   2.070 |  12.50  14.890 |  18.50   1.860
               .75   1.140 |   6.75   2.070 |  12.75   7.650 |  18.75   1.860
              1.00   1.140 |   7.00   2.070 |  13.00   7.650 |  19.00   1.860
              1.25   1.140 |   7.25   2.070 |  13.25   1.450 |  19.25   1.860
              1.50   1.140 |   7.50   2.070 |  13.50   1.450 |  19.50   1.860
              1.75   1.140 |   7.75   2.070 |  13.75   8.480 |  19.75   1.860
              2.00   1.140 |   8.00   2.070 |  14.00   8.480 |  20.00   1.860
              2.25   1.340 |   8.25   2.790 |  14.25   3.100 |  20.25   1.240
```



```
              2.50   1.340 |   8.50   2.790 |  14.50   3.100 |  20.50   1.240
              2.75   1.340 |   8.75   2.790 |  14.75   3.100 |  20.75   1.240
              3.00   1.340 |   9.00   2.790 |  15.00   3.100 |  21.00   1.240
              3.25   1.340 |   9.25   3.310 |  15.25   3.100 |  21.25   1.240
              3.50   1.340 |   9.50   3.310 |  15.50   3.100 |  21.50   1.240
              3.75   1.340 |   9.75   3.720 |  15.75   3.100 |  21.75   1.240
              4.00   1.340 |  10.00   3.720 |  16.00   3.100 |  22.00   1.240
              4.25   1.650 |  10.25   4.760 |  16.25   1.860 |  22.25   1.240
              4.50   1.650 |  10.50   4.760 |  16.50   1.860 |  22.50   1.240
              4.75   1.650 |  10.75   6.410 |  16.75   1.860 |  22.75   1.240
              5.00   1.650 |  11.00   6.410 |  17.00   1.860 |  23.00   1.240
              5.25   1.650 |  11.25   9.920 |  17.25   1.860 |  23.25   1.240
              5.50   1.650 |  11.50   9.920 |  17.50   1.860 |  23.50   1.240
              5.75   1.650 |  11.75  43.010 |  17.75   1.860 |  23.75   1.240
              6.00   1.650 |  12.00 114.144 |  18.00   1.860 |  24.00   1.240

--------------------------------------------------------------------------------
013:0003--------------------------------------------------------------------------
********************************************
* SUB-CATCHMENT 5 - PRE-DEVELOPMENT FLOW RATES
* BASED ON AREA OF 24.2 ha
********************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=   24.20   Curve Number   (CN)=70.00
| 01:000100 DT= 5.00 |   Ia      (mm)=   7.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=    1.127

     PEAK FLOW       (cms)=    1.015 (i)
     TIME TO PEAK    (hrs)=   12.750
     RUNOFF VOLUME    (mm)=   45.256
     TOTAL RAINFALL   (mm)=  103.373
     RUNOFF COEFFICIENT   =     .438

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

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013:0004--------------------------------------------------------------------------
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013:0002--------------------------------------------------------------------------
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013:0002--------------------------------------------------------------------------
      FINISH
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********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2021-09-13     at 14:29:16
================================================================================
```

POST DEVELOPMENT
SWMHYMO OUTPUT

```
2     Metric units
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
START               TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [001]
                     "CHIC25MM.STM"
*
READ STORM          STORM_FILENAME= ["storm.001"]

**************************
*SITE 772 WINSTON CHURCHILL*
**************************
*
* PAVED AREAS AND LANDSCAPED AREAS
CALIB STANDHYD      ID=[1], NHYD=["001"], DT=[1](min), AREA=[5.904](ha),
                    XIMP=[0.90], TIMP=[0.90], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[70.0],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[2.0](%),
                                         LGP=[40.0](m), MNP=[0.25], SCP=[0.0](mi
                    Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
                                         LGI=[30](m), MNI=[0.013], SCI=[0.0](min
                    RAINFALL=[ , , , , ](mm/hr) ,  END=-1

*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
CALIB STANDHYD      ID=[2], NHYD=["002"], DT=[1](min), AREA=[6.0108](ha),
                    XIMP=[0.90], TIMP=[0.90], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[70.0],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[2.0](%),
                                         LGP=[40.0](m), MNP=[0.25], SCP=[0.0](mi
                    Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
                                         LGI=[30](m), MNI=[0.013], SCI=[0.0](min
                    RAINFALL=[ , , , , ](mm/hr) ,  END=-1

* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
ROUTE RESERVOIR     IDout= 3 ,   NHYD= 200 ,  IDin= 2 ,
                    RDT=[1](min),
                    TABLE of ( OUTFLOW-STORAGE ) values
                    (cms) - (ha-m)
                    0        0
                    0.1568   0.150
                    0.2080   0.3000
                    0.2094   0.3073
                    IDovf=[   ], NHYDovf=[   ]

ADD HYD             IDsum=4, NHYD=503, IDs to add=[1+3]

*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
```



```
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*********************************************

ROUTE RESERVOIR     IDout= 5 ,   NHYD= 201 ,  IDin= 4 ,
                    RDT=[1](min),
                    TABLE of ( OUTFLOW-STORAGE ) values
                    (cms) - (ha-m)
                    0.0000   0.0000
                    0.0083   0.0070
                    0.0088   0.0143
                    0.0096   0.0416
                    0.0104   0.0715
                    0.0111   0.1023
                    0.0117   0.1309
                    0.0120   0.1468
                    0.0124   0.1626
                    0.0130   0.1937
                    0.0135   0.2233
                    0.0138   0.2366
                    0.0141   0.2496
                    0.0143   0.2629
                    0.0538   0.2764
                    0.0682   0.2841
                    0.1277   0.3242
                    0.1703   0.3792
                    0.2037   0.4455
                    0.2185   0.5653
                    IDovf=[   ], NHYDovf=[   ]

*PRINT HYD         ID = 5 # OF PCYCLES=1

* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
ROUTE RESERVOIR     IDout= 6 ,   NHYD= 200 ,  IDin= 4 ,
                    RDT=[1](min),
                    TABLE of ( OUTFLOW-STORAGE ) values
                    (cms) - (ha-m)
                    0        0
                    0.012    0.0010
                    0.014    0.2496
                    0.075    0.2600
                    0.076    0.4277
                    0.211    0.4287
                    0.221    0.5653
                    IDovf=[   ], NHYDovf=[   ]

*****************************************************************
START               TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [002]
                     "CHIC2YR.STM"

START               TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [003]
                     "CHIC5YR.STM"

START               TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [004]
                     "CHIC10YR.STM"

START               TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [005]
```

```
                     "CHIC25YR.STM"

START                TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [006]
                     "CHIC50YR.STM"

START                TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [007]
                     "CH100YR.STM"

START                TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [008]
                     "2Y24HS.STM"

START                TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [009]
                     "5Y24HS.STM"

START                TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [010]
                     "10Y24HS.STM"

START                TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [011]
                     "25Y24HS.STM"

START                TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [012]
                     "50Y24HS.STM"

START                TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [013]
                     "100Y24HS.STM"

FINISH
```

```
================================================================================

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999    9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9       9 =========
                                                      9   9  9   9 # 3813174
      StormWater Management HYdrologic Model           999    999  =========

 ********************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 *************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                  *******
 ********************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          *******
 *******                   Ottawa,  Ontario: (613) 727-5199          *******
 *******                   Gatineau, Quebec: (819) 243-6858          *******
 *******                   E-Mail: swmhymo@jfsa.Com                  *******
 ********************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: A.M. Candaras Associates Inc.                 +++++++++
 +++++++               Woodbridge            SERIAL#:3813174         +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++              *******
 *******           Maximum value for ID numbers  :     10             *******
 *******           Max. number of rainfall points:  15000             *******
 *******           Max. number of flow points    :  15000             *******
 ********************************************************************************


 ********************   D E T A I L E D   O U T P U T   ********************
 ********************************************************************************
 *       DATE: 2021-12-16     TIME: 16:46:28     RUN COUNTER: 000395       *
 ********************************************************************************
 * Input   filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060PstB.dat         *
 * Output  filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060PstB.out         *
 * Summary filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060PstB.sum         *
 * User comments:                                                           *
 * 1:_______________________________________________________________________*
 * 2:_______________________________________________________________________*
 * 3:_______________________________________________________________________*
 ********************************************************************************

--------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
--------------------
```



```
| START           |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
-------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
           #  1=CHIC25MM.STM
--------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC25
| Ptotal=  25.00 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   1.624 |   1.08  12.284 |   2.08   3.786 |   3.08   1.940
               .17   1.624 |   1.17  12.284 |   2.17   3.786 |   3.17   1.940
               .25   1.853 |   1.25  58.772 |   2.25   3.233 |   3.25   1.803
               .33   1.853 |   1.33  58.772 |   2.33   3.233 |   3.33   1.803
               .42   2.170 |   1.42  16.185 |   2.42   2.838 |   3.42   1.688
               .50   2.170 |   1.50  16.185 |   2.50   2.838 |   3.50   1.688
               .58   2.651 |   1.58   8.549 |   2.58   2.529 |   3.58   1.588
               .67   2.651 |   1.67   8.549 |   2.67   2.529 |   3.67   1.588
               .75   3.470 |   1.75   5.927 |   2.75   2.292 |   3.75   1.501
               .83   3.470 |   1.83   5.927 |   2.83   2.292 |   3.83   1.501
               .92   5.201 |   1.92   4.598 |   2.92   2.098 |   3.92   1.422
              1.00   5.201 |   2.00   4.598 |   3.00   2.098 |   4.00   1.422

--------------------------------------------------------------------------------
001:0003----------------------------------------------------------------------
**************************
*SITE 772 WINSTON CHURCHILL*
**************************
*
* PAVED AREAS AND LANDSCAPED AREAS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          5.31          .59
     Dep. Storage     (mm)=          2.00         5.00
     Average Slope     (%)=          1.00         2.00
     Length            (m)=         30.00        40.00
     Mannings n           =          .013         .250

     Max.eff.Inten.(mm/hr)=         58.77         3.13
               over (min)           2.00        30.00
     Storage Coeff.  (min)=          1.53 (ii)   29.74 (ii)
     Unit Hyd. Tpeak (min)=          2.00        30.00
     Unit Hyd. peak  (cms)=           .66          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=           .87          .00          .866 (iii)
     TIME TO PEAK    (hrs)=          1.33         1.92         1.333
     RUNOFF VOLUME    (mm)=         23.00         3.10        21.010
     TOTAL RAINFALL   (mm)=         25.00        25.00        25.000
     RUNOFF COEFFICIENT   =           .92          .12          .840

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
          CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0004--------------------------------------------------------------------------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.41          .60
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      58.77         3.13
               over (min)        2.00        30.00
     Storage Coeff.  (min)=       1.53 (ii)   29.74 (ii)
     Unit Hyd. Tpeak (min)=       2.00        30.00
     Unit Hyd. peak  (cms)=        .66          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .88          .00          .882 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.92         1.333
     RUNOFF VOLUME    (mm)=      23.00         3.10        21.010
     TOTAL RAINFALL   (mm)=      25.00        25.00        25.000
     RUNOFF COEFFICIENT   =        .92          .12          .840

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0005--------------------------------------------------------------------------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>02:(002   )   |
| OUT<03:(000200)   |    =========  OUTFLOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .208  .3000E+00
                           .157  .1500E+00   |     .209  .3073E+00

     ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
     -------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )      6.01      .882     1.333     21.010
     OUTFLOW<03: (000200)      6.01      .083     1.867     21.010

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.364
                  TIME SHIFT OF PEAK FLOW         (min)=    32.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.7900E-01

--------------------------------------------------------------------------------
```



```
001:0006--------------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:001        5.90     .866    1.33  21.01    .000
                 +ID2 03:000200     6.01     .083    1.87  21.01    .000
                  ================================================
                  SUM 04:000503    11.91     .923    1.33  21.01    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0007--------------------------------------------------------------------------
*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*********************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .014  .2233E+00
                            .008  .7000E-02   |     .014  .2366E+00
                            .009  .1430E-01   |     .014  .2496E+00
                            .010  .4160E-01   |     .014  .2629E+00
                            .010  .7150E-01   |     .054  .2764E+00
                            .011  .1023E+00   |     .068  .2841E+00
                            .012  .1309E+00   |     .128  .3242E+00
                            .012  .1468E+00   |     .170  .3792E+00
                            .012  .1626E+00   |     .204  .4455E+00
                            .013  .1937E+00   |     .219  .5653E+00

     ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
     -------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)     11.91      .923     1.333     21.010
     OUTFLOW<05: (000201)     11.91      .013     7.883     21.010

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.432
                  TIME SHIFT OF PEAK FLOW         (min)=   393.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2069E+00

--------------------------------------------------------------------------------
001:0008--------------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTFLOW STORAGE TABLE  =========
```

	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	.000	.0000E+00	.076	.4277E+00
	.012	.1000E-02	.211	.4287E+00
	.014	.2496E+00	.221	.5653E+00
	.075	.2600E+00	.000	.0000E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >04: (000503)	11.91	.923	1.333	21.010
OUTFLOW<06: (000200)	11.91	.014	7.800	21.010

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.477
TIME SHIFT OF PEAK FLOW (min)= 388.00
MAXIMUM STORAGE USED (ha.m.)=.2042E+00

001:0009
** END OF RUN : 1

START | Project dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
TZERO = .00 hrs on 0
METOUT= 2 (output = METRIC)
NRUN = 002
NSTORM= 1
# 1=CHIC2YR.STM

002:0002
*# Project Name: 772 Winston Churchill Blvd., Oakville
*# Project Number: 2060
*# Date : DECEMBER 2021
*# Modeller : FP
*# Company : a.m. candaras associates inc.
*# License # : 3813174
*# Revision : B

002:0002
*

READ STORM | Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC2Y
Ptotal= 34.80 mm | Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	2.260	1.08	17.100	2.08	5.270	3.08	2.700
.17	2.260	1.17	17.100	2.17	5.270	3.17	2.700
.25	2.580	1.25	81.810	2.25	4.500	3.25	2.510
.33	2.580	1.33	81.810	2.33	4.500	3.33	2.510
.42	3.020	1.42	22.530	2.42	3.950	3.42	2.350

.50	3.020	1.50	22.530	2.50	3.950	3.50	2.350
.58	3.690	1.58	11.900	2.58	3.520	3.58	2.210
.67	3.690	1.67	11.900	2.67	3.520	3.67	2.210
.75	4.830	1.75	8.250	2.75	3.190	3.75	2.090
.83	4.830	1.83	8.250	2.83	3.190	3.83	2.090
.92	7.240	1.92	6.400	2.92	2.920	3.92	1.980
1.00	7.240	2.00	6.400	3.00	2.920	4.00	1.980

002:0003
SITE 772 WINSTON CHURCHILL
*
* PAVED AREAS AND LANDSCAPED AREAS

CALIB STANDHYD | Area (ha)= 5.90
01:001 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	5.31	.59	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	30.00	40.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)=		81.81	8.53	
over (min)		1.00	20.00	
Storage Coeff. (min)=		1.34 (ii)	20.24 (ii)	
Unit Hyd. Tpeak (min)=		1.00	20.00	
Unit Hyd. peak (cms)=		.89	.06	
				TOTALS
PEAK FLOW	(cms)=	1.21	.01	1.208 (iii)
TIME TO PEAK	(hrs)=	1.33	1.65	1.333
RUNOFF VOLUME	(mm)=	32.80	6.40	30.161
TOTAL RAINFALL	(mm)=	34.80	34.80	34.800
RUNOFF COEFFICIENT	=	.94	.18	.867

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

002:0004
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS

CALIB STANDHYD | Area (ha)= 6.01
02:002 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	5.41	.60
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	30.00	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		81.81	8.53

```
               over (min)        1.00        20.00
     Storage Coeff.  (min)=      1.34 (ii)   20.24 (ii)
     Unit Hyd. Tpeak (min)=      1.00        20.00
     Unit Hyd. peak  (cms)=       .89          .06
                                                  *TOTALS*
     PEAK FLOW       (cms)=      1.23          .01          1.230 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.65          1.333
     RUNOFF VOLUME    (mm)=     32.80         6.40         30.161
     TOTAL RAINFALL   (mm)=     34.80        34.80         34.800
     RUNOFF COEFFICIENT   =       .94          .18           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0005---------------------------------------------------------------------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>02:(002   )   |
| OUT<03:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .208  .3000E+00
                            .157  .1500E+00   |     .209  .3073E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )       6.01     1.230     1.333     30.161
     OUTFLOW<03: (000200)       6.01      .119     1.850     30.160

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.643
                  TIME SHIFT OF PEAK FLOW         (min)=    31.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1135E+00

-------------------------------------------------------------------------------
002:0006---------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 01:001        5.90    1.208    1.33  30.16    .000
               +ID2 03:000200     6.01     .119    1.85  30.16    .000
                ==========================================================
                SUM 04:000503    11.91    1.297    1.33  30.16    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0007---------------------------------------------------------------------
*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
```



```
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*********************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .014  .2233E+00
                            .008  .7000E-02   |     .014  .2366E+00
                            .009  .1430E-01   |     .014  .2496E+00
                            .010  .4160E-01   |     .014  .2629E+00
                            .010  .7150E-01   |     .054  .2764E+00
                            .011  .1023E+00   |     .068  .2841E+00
                            .012  .1309E+00   |     .128  .3242E+00
                            .012  .1468E+00   |     .170  .3792E+00
                            .012  .1626E+00   |     .204  .4455E+00
                            .013  .1937E+00   |     .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.297     1.333     30.160
     OUTFLOW<05: (000201)      11.91      .052     5.150     30.160

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.046
                  TIME SHIFT OF PEAK FLOW         (min)=   229.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2759E+00

-------------------------------------------------------------------------------
002:0008---------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .076  .4277E+00
                            .012  .1000E-02   |     .211  .4287E+00
                            .014  .2496E+00   |     .221  .5653E+00
                            .075  .2600E+00   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.297     1.333     30.160
     OUTFLOW<06: (000200)      11.91      .075     4.233     30.160

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.783
                  TIME SHIFT OF PEAK FLOW         (min)=   174.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2606E+00

-------------------------------------------------------------------------------
002:0009---------------------------------------------------------------------
************************************************************
-------------------------------------------------------------------------------
002:0002---------------------------------------------------------------------
```

```
  ** END OF RUN :   2

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 003
    NSTORM=   1
           #  1=CHIC5YR.STM
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC5Y
| Ptotal=  46.25 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .08   2.820 |   1.08  22.680 |   2.08   6.740 |   3.08   3.400
              .17   2.820 |   1.17  22.680 |   2.17   6.740 |   3.17   3.400
              .25   3.240 |   1.25 113.160 |   2.25   5.730 |   3.25   3.150
              .33   3.240 |   1.33 113.160 |   2.33   5.730 |   3.33   3.150
              .42   3.810 |   1.42  30.090 |   2.42   5.010 |   3.42   2.950
              .50   3.810 |   1.50  30.090 |   2.50   5.010 |   3.50   2.950
              .58   4.680 |   1.58  15.580 |   2.58   4.460 |   3.58   2.770
              .67   4.680 |   1.67  15.580 |   2.67   4.460 |   3.67   2.770
              .75   6.160 |   1.75  10.690 |   2.75   4.030 |   3.75   2.610
              .83   6.160 |   1.83  10.690 |   2.83   4.030 |   3.83   2.610
              .92   9.350 |   1.92   8.230 |   2.92   3.680 |   3.92   2.480
             1.00   9.350 |   2.00   8.230 |   3.00   3.680 |   4.00   2.480

--------------------------------------------------------------------------------
003:0003----------------------------------------------------------------------
**************************
*SITE 772 WINSTON CHURCHILL*
**************************
*
* PAVED AREAS AND LANDSCAPED AREAS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
```



```
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.31          .59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     113.16        18.45
               over (min)        1.00        15.00
     Storage Coeff.  (min)=       1.18 (ii)   15.06 (ii)
     Unit Hyd. Tpeak (min)=       1.00        15.00
     Unit Hyd. peak  (cms)=        .97          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.67          .02          1.675 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.57          1.333
     RUNOFF VOLUME    (mm)=      44.25        11.34         40.959
     TOTAL RAINFALL   (mm)=      46.25        46.25         46.250
     RUNOFF COEFFICIENT   =        .96          .25           .886

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0004----------------------------------------------------------------------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.41          .60
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     113.16        18.45
               over (min)        1.00        15.00
     Storage Coeff.  (min)=       1.18 (ii)   15.06 (ii)
     Unit Hyd. Tpeak (min)=       1.00        15.00
     Unit Hyd. peak  (cms)=        .97          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.70          .02          1.706 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.57          1.333
     RUNOFF VOLUME    (mm)=      44.25        11.34         40.959
     TOTAL RAINFALL   (mm)=      46.25        46.25         46.250
     RUNOFF COEFFICIENT   =        .96          .25           .886

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
003:0005----------------------------------------------------------------------
```

```
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>02:(002   )   |
| OUT<03:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .208  .3000E+00
                           .157  .1500E+00   |     .209  .3073E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )       6.01     1.706     1.333     40.959
     OUTFLOW<03: (000200)       6.01      .159     1.850     40.958

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.328
                  TIME SHIFT OF PEAK FLOW         (min)=    31.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1568E+00

--------------------------------------------------------------------------------
003:0006----------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 01:001         5.90    1.675    1.33  40.96    .000
               +ID2 03:000200      6.01     .159    1.85  40.96    .000
                ======================================================
                SUM 04:000503     11.91    1.800    1.33  40.96    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
003:0007----------------------------------------------------------------------
*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*********************************************
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .014  .2233E+00
                           .008  .7000E-02   |     .014  .2366E+00
                           .009  .1430E-01   |     .014  .2496E+00
                           .010  .4160E-01   |     .014  .2629E+00
                           .010  .7150E-01   |     .054  .2764E+00
                           .011  .1023E+00   |     .068  .2841E+00
                           .012  .1309E+00   |     .128  .3242E+00
                           .012  .1468E+00   |     .170  .3792E+00
                           .012  .1626E+00   |     .204  .4455E+00
```



```
                           .013  .1937E+00   |     .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.800     1.333     40.958
     OUTFLOW<05: (000201)      11.91      .123     4.017     40.958

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.821
                  TIME SHIFT OF PEAK FLOW         (min)=   161.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3209E+00

--------------------------------------------------------------------------------
003:0008----------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .076  .4277E+00
                           .012  .1000E-02   |     .211  .4287E+00
                           .014  .2496E+00   |     .221  .5653E+00
                           .075  .2600E+00   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.800     1.333     40.958
     OUTFLOW<06: (000200)      11.91      .075     4.983     40.958

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.191
                  TIME SHIFT OF PEAK FLOW         (min)=   219.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3341E+00

--------------------------------------------------------------------------------
003:0009----------------------------------------------------------------------
************************************************************
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
  ** END OF RUN :   3

********************************************************************************




--------------------
| START             |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 004
    NSTORM=   1
           #  1=CHIC10YR.STM
--------------------------------------------------------------------------------
```

```
004:0002-------------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
-------------------------------------------------------------------------------
004:0002-------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC10
| Ptotal=  54.14 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   3.410 |   1.08  25.220 |   2.08   7.880 |   3.08   4.080
               .17   3.410 |   1.17  25.220 |   2.17   7.880 |   3.17   4.080
               .25   3.890 |   1.25 135.630 |   2.25   6.750 |   3.25   3.800
               .33   3.890 |   1.33 135.630 |   2.33   6.750 |   3.33   3.800
               .42   4.560 |   1.42  33.220 |   2.42   5.930 |   3.42   3.560
               .50   4.560 |   1.50  33.220 |   2.50   5.930 |   3.50   3.560
               .58   5.550 |   1.58  17.550 |   2.58   5.300 |   3.58   3.350
               .67   5.550 |   1.67  17.550 |   2.67   5.300 |   3.67   3.350
               .75   7.230 |   1.75  12.240 |   2.75   4.810 |   3.75   3.160
               .83   7.230 |   1.83  12.240 |   2.83   4.810 |   3.83   3.160
               .92  10.770 |   1.92   9.540 |   2.92   4.410 |   3.92   3.000
              1.00  10.770 |   2.00   9.540 |   3.00   4.410 |   4.00   3.000

-------------------------------------------------------------------------------
004:0003-------------------------------------------------------------------------
**************************
*SITE 772 WINSTON CHURCHILL*
**************************
*
* PAVED AREAS AND LANDSCAPED AREAS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.31          .59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n             =     .013         .250

     Max.eff.Inten.(mm/hr)=     135.63        27.75
               over (min)        1.00        13.00
     Storage Coeff.  (min)=       1.10 (ii)   12.88 (ii)
     Unit Hyd. Tpeak (min)=       1.00        13.00
     Unit Hyd. peak  (cms)=       1.02          .09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.00          .03       2.012 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.52       1.333
     RUNOFF VOLUME    (mm)=      52.14        15.28      48.454
     TOTAL RAINFALL   (mm)=      54.14        54.14      54.140
```



```
     RUNOFF COEFFICIENT   =        .96          .28           .895

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
004:0004-------------------------------------------------------------------------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.41          .60
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n             =     .013         .250

     Max.eff.Inten.(mm/hr)=     135.63        27.75
               over (min)        1.00        13.00
     Storage Coeff.  (min)=       1.10 (ii)   12.88 (ii)
     Unit Hyd. Tpeak (min)=       1.00        13.00
     Unit Hyd. peak  (cms)=       1.02          .09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.04          .03       2.049 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.52       1.333
     RUNOFF VOLUME    (mm)=      52.14        15.28      48.454
     TOTAL RAINFALL   (mm)=      54.14        54.14      54.140
     RUNOFF COEFFICIENT   =        .96          .28           .895

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
004:0005-------------------------------------------------------------------------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>02:(002   )   |
| OUT<03:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .208  .3000E+00
                            .157  .1500E+00   |     .209  .3073E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )       6.01     2.049     1.333     48.454
     OUTFLOW<03: (000200)       6.01      .170     1.867     48.454

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    8.279
                  TIME SHIFT OF PEAK FLOW         (min)=    32.00
```

```
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1876E+00

--------------------------------------------------------------------------------
004:0006----------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 01:001         5.90    2.012    1.33  48.45    .000
               +ID2 03:000200      6.01     .170    1.87  48.45    .000
                ==================================================
                SUM 04:000503    11.91    2.162    1.33  48.45    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
004:0007----------------------------------------------------------------------
**********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
**********************************************
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .014  .2233E+00
                           .008  .7000E-02   |     .014  .2366E+00
                           .009  .1430E-01   |     .014  .2496E+00
                           .010  .4160E-01   |     .014  .2629E+00
                           .010  .7150E-01   |     .054  .2764E+00
                           .011  .1023E+00   |     .068  .2841E+00
                           .012  .1309E+00   |     .128  .3242E+00
                           .012  .1468E+00   |     .170  .3792E+00
                           .012  .1626E+00   |     .204  .4455E+00
                           .013  .1937E+00   |     .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     2.162     1.333     48.454
     OUTFLOW<05: (000201)      11.91      .150     4.017     48.454

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.954
                  TIME SHIFT OF PEAK FLOW         (min)=   161.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3535E+00

--------------------------------------------------------------------------------
004:0008----------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
--------------------
```



```
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .076  .4277E+00
                           .012  .1000E-02   |     .211  .4287E+00
                           .014  .2496E+00   |     .221  .5653E+00
                           .075  .2600E+00   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     2.162     1.333     48.454
     OUTFLOW<06: (000200)      11.91      .076     5.517     48.454

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.507
                  TIME SHIFT OF PEAK FLOW         (min)=   251.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3984E+00

--------------------------------------------------------------------------------
004:0009----------------------------------------------------------------------
************************************************************
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
004:0002----------------------------------------------------------------------
  ** END OF RUN :   4

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
           #  1=CHIC25YR.STM
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#****************************************************************************
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC25
```

| Ptotal= 62.16 mm| Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	4.040	1.08	27.240	2.08	9.030	3.08	4.800
.17	4.040	1.17	27.240	2.17	9.030	3.17	4.800
.25	4.590	1.25	159.940	2.25	7.790	3.25	4.480
.33	4.590	1.33	159.940	2.33	7.790	3.33	4.480
.42	5.340	1.42	35.500	2.42	6.880	3.42	4.200
.50	5.340	1.50	35.500	2.50	6.880	3.50	4.200
.58	6.460	1.58	19.320	2.58	6.190	3.58	3.960
.67	6.460	1.67	19.320	2.67	6.190	3.67	3.960
.75	8.320	1.75	13.740	2.75	5.630	3.75	3.750
.83	8.320	1.83	13.740	2.83	5.630	3.83	3.750
.92	12.160	1.92	10.840	2.92	5.180	3.92	3.570
1.00	12.160	2.00	10.840	3.00	5.180	4.00	3.570

005:0003

SITE 772 WINSTON CHURCHILL

*

* PAVED AREAS AND LANDSCAPED AREAS

| CALIB STANDHYD | Area (ha)= 5.90
| 01:001 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	5.31	.59
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	30.00	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		159.94	41.33
over (min)		1.00	11.00
Storage Coeff. (min)=		1.03 (ii)	11.08 (ii)
Unit Hyd. Tpeak (min)=		1.00	11.00
Unit Hyd. peak (cms)=		1.06	.10

		TOTALS
PEAK FLOW	(cms)=	2.36	.04	2.380 (iii)
TIME TO PEAK	(hrs)=	1.33	1.48	1.333
RUNOFF VOLUME	(mm)=	60.16	19.68	56.110
TOTAL RAINFALL	(mm)=	62.16	62.16	62.158
RUNOFF COEFFICIENT	=	.97	.32	.903

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0004

*

* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS

| CALIB STANDHYD | Area (ha)= 6.01
| 02:002 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	5.41	.60
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	30.00	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		159.94	41.33
over (min)		1.00	11.00
Storage Coeff. (min)=		1.03 (ii)	11.08 (ii)
Unit Hyd. Tpeak (min)=		1.00	11.00
Unit Hyd. peak (cms)=		1.06	.10

		TOTALS
PEAK FLOW	(cms)=	2.40	.04	2.423 (iii)
TIME TO PEAK	(hrs)=	1.33	1.48	1.333
RUNOFF VOLUME	(mm)=	60.16	19.68	56.110
TOTAL RAINFALL	(mm)=	62.16	62.16	62.158
RUNOFF COEFFICIENT	=	.97	.32	.903

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0005

* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S

| ROUTE RESERVOIR | Requested routing time step = 1.0 min.
| IN>02:(002) |
| OUT<03:(000200) |

========= OUTLFOW STORAGE TABLE =========			
OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.208	.3000E+00
.157	.1500E+00	.209	.3073E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >02: (002)	6.01	2.423	1.333	56.110
OUTFLOW<03: (000200)	6.01	.181	1.900	56.110

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.450
TIME SHIFT OF PEAK FLOW (min)= 34.00
MAXIMUM STORAGE USED (ha.m.)=.2195E+00

005:0006

ADD HYD (000503)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
ID1	01:001	5.90	2.380	1.33	56.11	.000
+ID2	03:000200	6.01	.181	1.90	56.11	.000
SUM	04:000503	11.91	2.544	1.33	56.11	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
005:0007-----------------------------------------------------------------------------
*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*********************************************
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .014  .2233E+00
                           .008  .7000E-02   |     .014  .2366E+00
                           .009  .1430E-01   |     .014  .2496E+00
                           .010  .4160E-01   |     .014  .2629E+00
                           .010  .7150E-01   |     .054  .2764E+00
                           .011  .1023E+00   |     .068  .2841E+00
                           .012  .1309E+00   |     .128  .3242E+00
                           .012  .1468E+00   |     .170  .3792E+00
                           .012  .1626E+00   |     .204  .4455E+00
                           .013  .1937E+00   |     .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     2.544     1.333     56.110
     OUTFLOW<05: (000201)      11.91      .173     4.033     56.110

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.806
                  TIME SHIFT OF PEAK FLOW         (min)=   162.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3848E+00

-----------------------------------------------------------------------------
005:0008-----------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .076  .4277E+00
                           .012  .1000E-02   |     .211  .4287E+00
                           .014  .2496E+00   |     .221  .5653E+00
                           .075  .2600E+00   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     2.544     1.333     56.110
     OUTFLOW<06: (000200)      11.91      .211     4.000     56.110
```



```
                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    8.296
                  TIME SHIFT OF PEAK FLOW         (min)=   160.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.4290E+00

-----------------------------------------------------------------------------
005:0009-----------------------------------------------------------------------
*************************************************************
-----------------------------------------------------------------------------
005:0002-----------------------------------------------------------------------
-----------------------------------------------------------------------------
005:0002-----------------------------------------------------------------------
-----------------------------------------------------------------------------
005:0002-----------------------------------------------------------------------
-----------------------------------------------------------------------------
005:0002-----------------------------------------------------------------------
  ** END OF RUN :   5

*****************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 006
    NSTORM=   1
           #  1=CHIC50YR.STM
-----------------------------------------------------------------------------
006:0002-----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#**************************************************************************
-----------------------------------------------------------------------------
006:0002-----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CHIC50
| Ptotal=  70.32 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .08   4.162 |   1.08  32.657 |   2.08   9.717 |   3.08   4.937
              .17   4.162 |   1.17  32.657 |   2.17   9.717 |   3.17   4.937
              .25   4.763 |   1.25 184.617 |   2.25   8.288 |   3.25   4.589
              .33   4.763 |   1.33 184.617 |   2.33   8.288 |   3.33   4.589
              .42   5.601 |   1.42  43.091 |   2.42   7.254 |   3.42   4.291
              .50   5.601 |   1.50  43.091 |   2.50   7.254 |   3.50   4.291
              .58   6.862 |   1.58  22.223 |   2.58   6.469 |   3.58   4.033
              .67   6.862 |   1.67  22.223 |   2.67   6.469 |   3.67   4.033
              .75   9.002 |   1.75  15.316 |   2.75   5.851 |   3.75   3.807
```

```
              .83   9.002 |   1.83  15.316 |   2.83   5.851 |   3.83   3.807
              .92  13.574 |   1.92  11.832 |   2.92   5.351 |   3.92   3.608
             1.00  13.574 |   2.00  11.832 |   3.00   5.351 |   4.00   3.608

--------------------------------------------------------------------------------
006:0003--------------------------------------------------------------------------
*************************
*SITE 772 WINSTON CHURCHILL*
*************************
*
* PAVED AREAS AND LANDSCAPED AREAS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.31          .59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     184.62        57.36
               over (min)        1.00        10.00
     Storage Coeff.  (min)=       .97 (ii)    9.79 (ii)
     Unit Hyd. Tpeak (min)=       1.00        10.00
     Unit Hyd. peak  (cms)=       1.09          .11
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.72          .06         2.757 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.47          1.333
     RUNOFF VOLUME    (mm)=      68.32        24.49         63.934
     TOTAL RAINFALL   (mm)=      70.32        70.32         70.316
     RUNOFF COEFFICIENT   =        .97          .35           .909

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0004--------------------------------------------------------------------------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.41          .60
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     184.62        57.36
               over (min)        1.00        10.00
     Storage Coeff.  (min)=       .97 (ii)    9.79 (ii)
     Unit Hyd. Tpeak (min)=       1.00        10.00
     Unit Hyd. peak  (cms)=       1.09          .11
```



```
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.77          .06         2.806 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.47          1.333
     RUNOFF VOLUME    (mm)=      68.32        24.49         63.934
     TOTAL RAINFALL   (mm)=      70.32        70.32         70.316
     RUNOFF COEFFICIENT   =        .97          .35           .909

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0005--------------------------------------------------------------------------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>02:(002    )   |
| OUT<03:(000200)    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
                             .000  .0000E+00   |     .208  .3000E+00
                             .157  .1500E+00   |     .209  .3073E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )       6.01     2.806     1.333     63.934
     OUTFLOW<03: (000200)       6.01      .194     2.000     63.933

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.915
                  TIME SHIFT OF PEAK FLOW         (min)=    40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2591E+00

--------------------------------------------------------------------------------
006:0006--------------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:001        5.90    2.757    1.33  63.93    .000
                 +ID2 03:000200     6.01     .194    2.00  63.93    .000
                  ==========================================================
                  SUM 04:000503    11.91    2.929    1.33  63.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
006:0007--------------------------------------------------------------------------
*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*********************************************
```

```
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .014  .2233E+00
                            .008  .7000E-02   |     .014  .2366E+00
                            .009  .1430E-01   |     .014  .2496E+00
                            .010  .4160E-01   |     .014  .2629E+00
                            .010  .7150E-01   |     .054  .2764E+00
                            .011  .1023E+00   |     .068  .2841E+00
                            .012  .1309E+00   |     .128  .3242E+00
                            .012  .1468E+00   |     .170  .3792E+00
                            .012  .1626E+00   |     .204  .4455E+00
                            .013  .1937E+00   |     .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     2.929     1.333     63.933
     OUTFLOW<05: (000201)      11.91      .189     4.017     63.933

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.465
                  TIME SHIFT OF PEAK FLOW         (min)=   161.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.4171E+00

--------------------------------------------------------------------------------
006:0008----------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .076  .4277E+00
                            .012  .1000E-02   |     .211  .4287E+00
                            .014  .2496E+00   |     .221  .5653E+00
                            .075  .2600E+00   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     2.929     1.333     63.933
     OUTFLOW<06: (000200)      11.91      .212     4.000     63.933

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.236
                  TIME SHIFT OF PEAK FLOW         (min)=   160.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.4417E+00

--------------------------------------------------------------------------------
006:0009----------------------------------------------------------------------
************************************************************
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
```



```
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
  ** END OF RUN :   6

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 007
    NSTORM=   1
           #  1=CH100YR.STM
--------------------------------------------------------------------------------
007:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
--------------------------------------------------------------------------------
007:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\CH100Y
| Ptotal=  78.03 mm|    Comments: *BLOOR ST STAT DATA 10 MIN DISCRITIZATIO
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .08   4.310 |   1.08  38.040 |   2.08  10.640 |   3.08   5.210
              .17   4.310 |   1.17  38.040 |   2.17  10.640 |   3.17   5.210
              .25   4.960 |   1.25 203.310 |   2.25   8.990 |   3.25   4.830
              .33   4.960 |   1.33 203.310 |   2.33   8.990 |   3.33   4.830
              .42   5.880 |   1.42  51.040 |   2.42   7.810 |   3.42   4.500
              .50   5.880 |   1.50  51.040 |   2.50   7.810 |   3.50   4.500
              .58   7.270 |   1.58  25.590 |   2.58   6.920 |   3.58   4.220
              .67   7.270 |   1.67  25.590 |   2.67   6.920 |   3.67   4.220
              .75   9.690 |   1.75  17.240 |   2.75   6.230 |   3.75   3.970
              .83   9.690 |   1.83  17.240 |   2.83   6.230 |   3.83   3.970
              .92  15.000 |   1.92  13.110 |   2.92   5.670 |   3.92   3.760
             1.00  15.000 |   2.00  13.110 |   3.00   5.670 |   4.00   3.760

--------------------------------------------------------------------------------
007:0003----------------------------------------------------------------------
**************************
*SITE 772 WINSTON CHURCHILL*
**************************
*
* PAVED AREAS AND LANDSCAPED AREAS
```

```
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.31          .59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     203.31        72.73
               over (min)        1.00         9.00
     Storage Coeff.  (min)=        .93 (ii)    8.95 (ii)
     Unit Hyd. Tpeak (min)=       1.00         9.00
     Unit Hyd. peak  (cms)=       1.12          .13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       3.00          .07         3.046 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.45         1.333
     RUNOFF VOLUME    (mm)=      76.03        29.32        71.361
     TOTAL RAINFALL   (mm)=      78.03        78.03        78.032
     RUNOFF COEFFICIENT   =        .97          .38          .915

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
007:0004----------------------------------------------------------------------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.41          .60
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     203.31        72.73
               over (min)        1.00         9.00
     Storage Coeff.  (min)=        .93 (ii)    8.95 (ii)
     Unit Hyd. Tpeak (min)=       1.00         9.00
     Unit Hyd. peak  (cms)=       1.12          .13
                                                      *TOTALS*
     PEAK FLOW       (cms)=       3.06          .07         3.102 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.45         1.333
     RUNOFF VOLUME    (mm)=      76.03        29.32        71.361
     TOTAL RAINFALL   (mm)=      78.03        78.03        78.032
     RUNOFF COEFFICIENT   =        .97          .38          .915

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```



```
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
007:0005----------------------------------------------------------------------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>02:(002   )   |
| OUT<03:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .208  .3000E+00
                            .157  .1500E+00   |     .209  .3073E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )       6.01     3.102     1.333     71.361
     OUTFLOW<03: (000200)       6.01      .206     2.000     71.360

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.654
                  TIME SHIFT OF PEAK FLOW        (min)=    40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2953E+00

--------------------------------------------------------------------------------
007:0006----------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 01:001         5.90     3.046    1.33  71.36    .000
               +ID2 03:000200      6.01      .206    2.00  71.36    .000
                ==========================================================
                SUM 04:000503     11.91     3.227    1.33  71.36    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
007:0007----------------------------------------------------------------------
**********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
**********************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .014  .2233E+00
                            .008  .7000E-02   |     .014  .2366E+00
                            .009  .1430E-01   |     .014  .2496E+00
                            .010  .4160E-01   |     .014  .2629E+00
                            .010  .7150E-01   |     .054  .2764E+00
```

.011	.1023E+00	.068	.2841E+00
.012	.1309E+00	.128	.3242E+00
.012	.1468E+00	.170	.3792E+00
.012	.1626E+00	.204	.4455E+00
.013	.1937E+00	.219	.5653E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >04: (000503)	11.91	3.227	1.333	71.360
OUTFLOW<05: (000201)	11.91	.204	4.017	71.360

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.336
TIME SHIFT OF PEAK FLOW (min)= 161.00
MAXIMUM STORAGE USED (ha.m.)=.4515E+00

```
-------------------------------------------------------------------------------
007:0008---------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTFLOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .076  .4277E+00
                           .012  .1000E-02   |     .211  .4287E+00
                           .014  .2496E+00   |     .221  .5653E+00
                           .075  .2600E+00   |     .000  .0000E+00
```

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >04: (000503)	11.91	3.227	1.333	71.360
OUTFLOW<06: (000200)	11.91	.214	4.017	71.361

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.626
TIME SHIFT OF PEAK FLOW (min)= 161.00
MAXIMUM STORAGE USED (ha.m.)=.4670E+00

```
-------------------------------------------------------------------------------
007:0009---------------------------------------------------------------------
************************************************************
-------------------------------------------------------------------------------
007:0002---------------------------------------------------------------------
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007:0002---------------------------------------------------------------------
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007:0002---------------------------------------------------------------------
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007:0002---------------------------------------------------------------------
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007:0002---------------------------------------------------------------------
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007:0002---------------------------------------------------------------------
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007:0002---------------------------------------------------------------------
  ** END OF RUN :   7

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



```
--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 008
    NSTORM=   1
           #  1=2Y24HS.STM
-------------------------------------------------------------------------------
008:0002---------------------------------------------------------------------
*#***************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#***************************************************************************
-------------------------------------------------------------------------------
008:0002---------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2Y24HS
| Ptotal=  51.39 mm|    Comments: * 2YR SCS 24hr STORM, 15min TIME STEPS,M
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.570	6.25	1.030	12.25	7.400	18.25	.920
.50	.570	6.50	1.030	12.50	7.400	18.50	.920
.75	.570	6.75	1.030	12.75	3.800	18.75	.920
1.00	.570	7.00	1.030	13.00	3.800	19.00	.920
1.25	.570	7.25	1.030	13.25	.720	19.25	.920
1.50	.570	7.50	1.030	13.50	.720	19.50	.920
1.75	.570	7.75	1.030	13.75	4.210	19.75	.920
2.00	.570	8.00	1.030	14.00	4.210	20.00	.920
2.25	.670	8.25	1.390	14.25	1.540	20.25	.620
2.50	.670	8.50	1.390	14.50	1.540	20.50	.620
2.75	.670	8.75	1.390	14.75	1.540	20.75	.620
3.00	.670	9.00	1.390	15.00	1.540	21.00	.620
3.25	.670	9.25	1.640	15.25	1.540	21.25	.620
3.50	.670	9.50	1.640	15.50	1.540	21.50	.620
3.75	.670	9.75	1.850	15.75	1.540	21.75	.620
4.00	.670	10.00	1.850	16.00	1.540	22.00	.620
4.25	.820	10.25	2.360	16.25	.920	22.25	.620
4.50	.820	10.50	2.360	16.50	.920	22.50	.620
4.75	.820	10.75	3.190	16.75	.920	22.75	.620
5.00	.820	11.00	3.190	17.00	.920	23.00	.620
5.25	.820	11.25	4.930	17.25	.920	23.25	.620
5.50	.820	11.50	4.930	17.50	.920	23.50	.620
5.75	.820	11.75	21.380	17.75	.920	23.75	.620
6.00	.820	12.00	56.730	18.00	.920	24.00	.620

```
-------------------------------------------------------------------------------
008:0003---------------------------------------------------------------------
*************************
*SITE 772 WINSTON CHURCHILL*
```

```
**************************
*
* PAVED AREAS AND LANDSCAPED AREAS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.31          .59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      56.73        16.57
               over (min)        2.00        16.00
     Storage Coeff.  (min)=       1.56 (ii)   16.04 (ii)
     Unit Hyd. Tpeak (min)=       2.00        16.00
     Unit Hyd. peak  (cms)=        .65          .07
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .84          .02          .849 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.17        12.000
     RUNOFF VOLUME    (mm)=      49.39        13.86        45.835
     TOTAL RAINFALL   (mm)=      51.39        51.39        51.388
     RUNOFF COEFFICIENT   =        .96          .27          .892

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
008:0004----------------------------------------------------------------------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.41          .60
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      56.73        16.57
               over (min)        2.00        16.00
     Storage Coeff.  (min)=       1.56 (ii)   16.04 (ii)
     Unit Hyd. Tpeak (min)=       2.00        16.00
     Unit Hyd. peak  (cms)=        .65          .07
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .85          .02          .864 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.17        12.000
     RUNOFF VOLUME    (mm)=      49.38        13.86        45.835
     TOTAL RAINFALL   (mm)=      51.39        51.39        51.388
     RUNOFF COEFFICIENT   =        .96          .27          .892

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



```
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
008:0005----------------------------------------------------------------------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>02:(002   )   |
| OUT<03:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .208  .3000E+00
                            .157  .1500E+00   |     .209  .3073E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )       6.01      .864    12.000     45.835
     OUTFLOW<03: (000200)       6.01      .132    12.150     45.835

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   15.261
                  TIME SHIFT OF PEAK FLOW         (min)=     9.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1261E+00

--------------------------------------------------------------------------------
008:0006----------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 01:001         5.90      .849   12.00  45.83    .000
               +ID2 03:000200      6.01      .132   12.15  45.83    .000
                ==========================================================
                SUM 04:000503     11.91      .971   12.00  45.83    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
008:0007----------------------------------------------------------------------
*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*********************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .014  .2233E+00
                            .008  .7000E-02   |     .014  .2366E+00
```

.009	.1430E-01	.014	.2496E+00
.010	.4160E-01	.014	.2629E+00
.010	.7150E-01	.054	.2764E+00
.011	.1023E+00	.068	.2841E+00
.012	.1309E+00	.128	.3242E+00
.012	.1468E+00	.170	.3792E+00
.012	.1626E+00	.204	.4455E+00
.013	.1937E+00	.219	.5653E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >04: (000503)	11.91	.971	12.000	45.835
OUTFLOW<05: (000201)	11.91	.095	15.133	45.835

PEAK FLOW REDUCTION [Qout/Qin](%)= 9.795
TIME SHIFT OF PEAK FLOW (min)= 188.00
MAXIMUM STORAGE USED (ha.m.)=.3022E+00

008:0008
*PRINT HYD ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s

ROUTE RESERVOIR IN>04:(000503) OUT<06:(000200)

Requested routing time step = 1.0 min.

========= OUTLFOW STORAGE TABLE =========

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.076	.4277E+00
.012	.1000E-02	.211	.4287E+00
.014	.2496E+00	.221	.5653E+00
.075	.2600E+00	.000	.0000E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >04: (000503)	11.91	.971	12.000	45.835
OUTFLOW<06: (000200)	11.91	.075	16.033	45.835

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.751
TIME SHIFT OF PEAK FLOW (min)= 242.00
MAXIMUM STORAGE USED (ha.m.)=.2975E+00

008:0009
****

008:0002

008:0002

008:0002

008:0002

008:0002

008:0002

008:0002

008:0002

008:0002

008:0002

** END OF RUN : 8

****

START	Project dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\ Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\

TZERO = .00 hrs on 0
METOUT= 2 (output = METRIC)
NRUN = 009
NSTORM= 1
# 1=5Y24HS.STM

009:0002
*#**********
*# Project Name: 772 Winston Churchill Blvd., Oakville
*# Project Number: 2060
*# Date : DECEMBER 2021
*# Modeller : FP
*# Company : a.m. candaras associates inc.
*# License # : 3813174
*# Revision : B
*#**********

009:0002
*

READ STORM Ptotal= 63.89 mm	Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\5Y24HS Comments: * 5 YEAR SCS 24hr STORM, 15 min TIME STE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	.700	6.25	1.280	12.25	9.200	18.25	1.150
.50	.700	6.50	1.280	12.50	9.200	18.50	1.150
.75	.700	6.75	1.280	12.75	4.730	18.75	1.150
1.00	.700	7.00	1.280	13.00	4.730	19.00	1.150
1.25	.700	7.25	1.280	13.25	.890	19.25	1.150
1.50	.700	7.50	1.280	13.50	.890	19.50	1.150
1.75	.700	7.75	1.280	13.75	5.240	19.75	1.150
2.00	.700	8.00	1.280	14.00	5.240	20.00	1.150
2.25	.830	8.25	1.720	14.25	1.920	20.25	.770
2.50	.830	8.50	1.720	14.50	1.920	20.50	.770
2.75	.830	8.75	1.720	14.75	1.920	20.75	.770
3.00	.830	9.00	1.720	15.00	1.920	21.00	.770
3.25	.830	9.25	2.040	15.25	1.920	21.25	.770
3.50	.830	9.50	2.040	15.50	1.920	21.50	.770
3.75	.830	9.75	2.300	15.75	1.920	21.75	.770
4.00	.830	10.00	2.300	16.00	1.920	22.00	.770
4.25	1.020	10.25	2.940	16.25	1.150	22.25	.770
4.50	1.020	10.50	2.940	16.50	1.150	22.50	.770
4.75	1.020	10.75	3.960	16.75	1.150	22.75	.770
5.00	1.020	11.00	3.960	17.00	1.150	23.00	.770
5.25	1.020	11.25	6.130	17.25	1.150	23.25	.770
5.50	1.020	11.50	6.130	17.50	1.150	23.50	.770
5.75	1.020	11.75	26.580	17.75	1.150	23.75	.770
6.00	1.020	12.00	70.530	18.00	1.150	24.00	.770

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--------------------------------------------------------------------------------
009:0003--------------------------------------------------------------------------
*************************
*SITE 772 WINSTON CHURCHILL*
*************************
*
* PAVED AREAS AND LANDSCAPED AREAS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.31          .59
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     30.00        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     70.53        26.86
               over (min)       1.00        13.00
     Storage Coeff.  (min)=     1.43 (ii)   13.37 (ii)
     Unit Hyd. Tpeak (min)=     1.00        13.00
     Unit Hyd. peak  (cms)=      .86          .09
                                                    *TOTALS*
     PEAK FLOW       (cms)=     1.04          .03      1.063 (iii)
     TIME TO PEAK    (hrs)=    12.00        12.12     12.000
     RUNOFF VOLUME    (mm)=    61.89        20.67     57.770
     TOTAL RAINFALL   (mm)=    63.89        63.89     63.892
     RUNOFF COEFFICIENT   =      .97          .32       .904

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
009:0004--------------------------------------------------------------------------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.41          .60
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     30.00        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     70.53        26.86
               over (min)       1.00        13.00
     Storage Coeff.  (min)=     1.43 (ii)   13.37 (ii)
     Unit Hyd. Tpeak (min)=     1.00        13.00
     Unit Hyd. peak  (cms)=      .86          .09
                                                    *TOTALS*
     PEAK FLOW       (cms)=     1.06          .03      1.082 (iii)
     TIME TO PEAK    (hrs)=    12.00        12.12     12.000
```



```
     RUNOFF VOLUME    (mm)=    61.89        20.67     57.770
     TOTAL RAINFALL   (mm)=    63.89        63.89     63.892
     RUNOFF COEFFICIENT   =      .97          .32       .904

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
009:0005--------------------------------------------------------------------------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>02:(002   )   |
| OUT<03:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
-------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .208  .3000E+00
                           .157  .1500E+00   |     .209  .3073E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )       6.01     1.082    12.000     57.770
     OUTFLOW<03: (000200)       6.01      .160    12.250     57.770

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   14.745
                  TIME SHIFT OF PEAK FLOW         (min)=    15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1582E+00

--------------------------------------------------------------------------------
009:0006--------------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 01:001         5.90     1.063   12.00  57.77    .000
               +ID2 03:000200      6.01      .160   12.25  57.77    .000
                ==========================================================
                SUM 04:000503     11.91     1.220   12.00  57.77    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0007--------------------------------------------------------------------------
*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*********************************************
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
```

| OUT<05:(000201) | ========= OUTLFOW STORAGE TABLE =========
|---|---|---|---|---|
| | OUTFLOW | STORAGE | OUTFLOW | STORAGE |
| | (cms) | (ha.m.) | (cms) | (ha.m.) |
| | .000 | .0000E+00 | .014 | .2233E+00 |
| | .008 | .7000E-02 | .014 | .2366E+00 |
| | .009 | .1430E-01 | .014 | .2496E+00 |
| | .010 | .4160E-01 | .014 | .2629E+00 |
| | .010 | .7150E-01 | .054 | .2764E+00 |
| | .011 | .1023E+00 | .068 | .2841E+00 |
| | .012 | .1309E+00 | .128 | .3242E+00 |
| | .012 | .1468E+00 | .170 | .3792E+00 |
| | .012 | .1626E+00 | .204 | .4455E+00 |
| | .013 | .1937E+00 | .219 | .5653E+00 |

ROUTING RESULTS	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW >04: (000503)	11.91	1.220	12.000	57.770
OUTFLOW<05: (000201)	11.91	.139	14.383	57.770

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.413
TIME SHIFT OF PEAK FLOW (min)= 143.00
MAXIMUM STORAGE USED (ha.m.)=.3390E+00

009:0008
*PRINT HYD ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s

ROUTE RESERVOIR	Requested routing time step = 1.0 min.
IN>04:(000503)	
OUT<06:(000200)	

| ========= OUTLFOW STORAGE TABLE =========
|---|---|---|---|---|
| | OUTFLOW | STORAGE | OUTFLOW | STORAGE |
| | (cms) | (ha.m.) | (cms) | (ha.m.) |
| | .000 | .0000E+00 | .076 | .4277E+00 |
| | .012 | .1000E-02 | .211 | .4287E+00 |
| | .014 | .2496E+00 | .221 | .5653E+00 |
| | .075 | .2600E+00 | .000 | .0000E+00 |

ROUTING RESULTS	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW >04: (000503)	11.91	1.220	12.000	57.770
OUTFLOW<06: (000200)	11.91	.076	16.867	57.770

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.212
TIME SHIFT OF PEAK FLOW (min)= 292.00
MAXIMUM STORAGE USED (ha.m.)=.3877E+00

009:0009
****

009:0002
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009:0002
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009:0002
009:0002
** END OF RUN : 9

****

START	Project dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
	Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\

TZERO = .00 hrs on 0
METOUT= 2 (output = METRIC)
NRUN = 010
NSTORM= 1
# 1=10Y24HS.STM

010:0002
*#**********
*# Project Name: 772 Winston Churchill Blvd., Oakville
*# Project Number: 2060
*# Date : DECEMBER 2021
*# Modeller : FP
*# Company : a.m. candaras associates inc.
*# License # : 3813174
*# Revision : B
*#**********
010:0002
*

READ STORM	Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\10Y24H
Ptotal= 72.94 mm	Comments: * 10 YEAR SCS 24hr STORM, 15 min TIME ST

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
.25	.800	6.25	1.460	12.25	10.500	18.25	1.310
.50	.800	6.50	1.460	12.50	10.500	18.50	1.310
.75	.800	6.75	1.460	12.75	5.400	18.75	1.310
1.00	.800	7.00	1.460	13.00	5.400	19.00	1.310
1.25	.800	7.25	1.460	13.25	1.020	19.25	1.310
1.50	.800	7.50	1.460	13.50	1.020	19.50	1.310
1.75	.800	7.75	1.460	13.75	5.980	19.75	1.310
2.00	.800	8.00	1.460	14.00	5.980	20.00	1.310
2.25	.950	8.25	1.970	14.25	2.190	20.25	.880
2.50	.950	8.50	1.970	14.50	2.190	20.50	.880
2.75	.950	8.75	1.970	14.75	2.190	20.75	.880
3.00	.950	9.00	1.970	15.00	2.190	21.00	.880
3.25	.950	9.25	2.330	15.25	2.190	21.25	.880
3.50	.950	9.50	2.330	15.50	2.190	21.50	.880
3.75	.950	9.75	2.630	15.75	2.190	21.75	.880
4.00	.950	10.00	2.630	16.00	2.190	22.00	.880
4.25	1.170	10.25	3.350	16.25	1.310	22.25	.880

4.50	1.170	10.50	3.350	16.50	1.310	22.50	.880
4.75	1.170	10.75	4.520	16.75	1.310	22.75	.880
5.00	1.170	11.00	4.520	17.00	1.310	23.00	.880
5.25	1.170	11.25	7.000	17.25	1.310	23.25	.880
5.50	1.170	11.50	7.000	17.50	1.310	23.50	.880
5.75	1.170	11.75	30.330	17.75	1.310	23.75	.880
6.00	1.170	12.00	80.500	18.00	1.310	24.00	.880

010:0003----------
****
SITE 772 WINSTON CHURCHILL
****
*
* PAVED AREAS AND LANDSCAPED AREAS

CALIB STANDHYD	Area (ha)= 5.90
01:001 DT= 1.00	Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	5.31	.59	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	30.00	40.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)=		80.50	34.46	
over (min)		1.00	12.00	
Storage Coeff. (min)=		1.35 (ii)	12.16 (ii)	
Unit Hyd. Tpeak (min)=		1.00	12.00	
Unit Hyd. peak (cms)=		.89	.09	
				TOTALS
PEAK FLOW	(cms)=	1.19	.04	1.219 (iii)
TIME TO PEAK	(hrs)=	12.00	12.10	12.000
RUNOFF VOLUME	(mm)=	70.94	26.10	66.459
TOTAL RAINFALL	(mm)=	72.94	72.94	72.942
RUNOFF COEFFICIENT	=	.97	.36	.911

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

010:0004----------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS

CALIB STANDHYD	Area (ha)= 6.01
02:002 DT= 1.00	Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	5.41	.60
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	30.00	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		80.50	34.46

over (min)		1.00	12.00	
Storage Coeff. (min)=		1.35 (ii)	12.16 (ii)	
Unit Hyd. Tpeak (min)=		1.00	12.00	
Unit Hyd. peak (cms)=		.89	.09	
				TOTALS
PEAK FLOW	(cms)=	1.21	.04	1.241 (iii)
TIME TO PEAK	(hrs)=	12.00	12.10	12.000
RUNOFF VOLUME	(mm)=	70.94	26.10	66.459
TOTAL RAINFALL	(mm)=	72.94	72.94	72.942
RUNOFF COEFFICIENT	=	.97	.36	.911

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

010:0005----------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S

ROUTE RESERVOIR	Requested routing time step = 1.0 min.
IN>02:(002)	
OUT<03:(000200)	========= OUTLFOW STORAGE TABLE =========

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.208	.3000E+00
.157	.1500E+00	.209	.3073E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >02: (002)	6.01	1.241	12.000	66.459
OUTFLOW<03: (000200)	6.01	.168	12.500	66.458

PEAK FLOW REDUCTION [Qout/Qin](%)= 13.559
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)=.1837E+00

010:0006----------

ADD HYD (000503)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01:001	5.90	1.219	12.00	66.46	.000
	+ID2 03:000200	6.01	.168	12.50	66.46	.000
	SUM 04:000503	11.91	1.384	12.00	66.46	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

010:0007----------
****
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3

```
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
**********************************************
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .014  .2233E+00
                           .008  .7000E-02   |     .014  .2366E+00
                           .009  .1430E-01   |     .014  .2496E+00
                           .010  .4160E-01   |     .014  .2629E+00
                           .010  .7150E-01   |     .054  .2764E+00
                           .011  .1023E+00   |     .068  .2841E+00
                           .012  .1309E+00   |     .128  .3242E+00
                           .012  .1468E+00   |     .170  .3792E+00
                           .012  .1626E+00   |     .204  .4455E+00
                           .013  .1937E+00   |     .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.384    12.000     66.458
     OUTFLOW<05: (000201)      11.91      .165    14.333     66.458

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.950
                  TIME SHIFT OF PEAK FLOW         (min)=   140.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3728E+00

--------------------------------------------------------------------------------
010:0008----------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .076  .4277E+00
                           .012  .1000E-02   |     .211  .4287E+00
                           .014  .2496E+00   |     .221  .5653E+00
                           .075  .2600E+00   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.384    12.000     66.458
     OUTFLOW<06: (000200)      11.91      .151    14.733     66.459

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   10.945
                  TIME SHIFT OF PEAK FLOW         (min)=   164.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.4283E+00

--------------------------------------------------------------------------------
010:0009----------------------------------------------------------------------
************************************************************
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010:0002----------------------------------------------------------------------
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--------------------------------------------------------------------------------
010:0002----------------------------------------------------------------------
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010:0002----------------------------------------------------------------------
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010:0002----------------------------------------------------------------------
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010:0002----------------------------------------------------------------------
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010:0002----------------------------------------------------------------------
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010:0002----------------------------------------------------------------------
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010:0002----------------------------------------------------------------------
  ** END OF RUN :  10

********************************************************************************




--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 011
    NSTORM=   1
           #  1=25Y24HS.STM
--------------------------------------------------------------------------------
011:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
--------------------------------------------------------------------------------
011:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\25Y24H
| Ptotal=  85.25 mm|    Comments: * 25 YEAR SCS 24hr STORM, 15 min TIME ST
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .25    .940 |   6.25   1.710 |  12.25  12.280 |  18.25   1.530
              .50    .940 |   6.50   1.710 |  12.50  12.280 |  18.50   1.530
              .75    .940 |   6.75   1.710 |  12.75   6.310 |  18.75   1.530
             1.00    .940 |   7.00   1.710 |  13.00   6.310 |  19.00   1.530
             1.25    .940 |   7.25   1.710 |  13.25   1.190 |  19.25   1.530
             1.50    .940 |   7.50   1.710 |  13.50   1.190 |  19.50   1.530
             1.75    .940 |   7.75   1.710 |  13.75   6.990 |  19.75   1.530
             2.00    .940 |   8.00   1.710 |  14.00   6.990 |  20.00   1.530
```

2.25	1.110	8.25	2.300	14.25	2.560	20.25	1.020
2.50	1.110	8.50	2.300	14.50	2.560	20.50	1.020
2.75	1.110	8.75	2.300	14.75	2.560	20.75	1.020
3.00	1.110	9.00	2.300	15.00	2.560	21.00	1.020
3.25	1.110	9.25	2.730	15.25	2.560	21.25	1.020
3.50	1.110	9.50	2.730	15.50	2.560	21.50	1.020
3.75	1.110	9.75	3.070	15.75	2.560	21.75	1.020
4.00	1.110	10.00	3.070	16.00	2.560	22.00	1.020
4.25	1.360	10.25	3.920	16.25	1.530	22.25	1.020
4.50	1.360	10.50	3.920	16.50	1.530	22.50	1.020
4.75	1.360	10.75	5.290	16.75	1.530	22.75	1.020
5.00	1.360	11.00	5.290	17.00	1.530	23.00	1.020
5.25	1.360	11.25	8.190	17.25	1.530	23.25	1.020
5.50	1.360	11.50	8.190	17.50	1.530	23.50	1.020
5.75	1.360	11.75	35.470	17.75	1.530	23.75	1.020
6.00	1.360	12.00	94.140	18.00	1.530	24.00	1.020

011:0003---
****
SITE 772 WINSTON CHURCHILL
****
*
* PAVED AREAS AND LANDSCAPED AREAS

| CALIB STANDHYD | Area (ha)= 5.90
| 01:001 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	5.31	.59	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	30.00	40.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)	=	94.14	45.55	
over (min)		1.00	11.00	
Storage Coeff. (min)	=	1.27 (ii)	10.94 (ii)	
Unit Hyd. Tpeak (min)	=	1.00	11.00	
Unit Hyd. peak (cms)	=	.93	.10	
				TOTALS
PEAK FLOW	(cms)=	1.39	.05	1.434 (iii)
TIME TO PEAK	(hrs)=	12.00	12.08	12.000
RUNOFF VOLUME	(mm)=	83.24	34.05	78.329
TOTAL RAINFALL	(mm)=	85.25	85.25	85.248
RUNOFF COEFFICIENT	=	.98	.40	.919

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

011:0004---
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS

| CALIB STANDHYD | Area (ha)= 6.01
| 02:002 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	5.41	.60	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	30.00	40.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)	=	94.14	45.55	
over (min)		1.00	11.00	
Storage Coeff. (min)	=	1.27 (ii)	10.94 (ii)	
Unit Hyd. Tpeak (min)	=	1.00	11.00	
Unit Hyd. peak (cms)	=	.93	.10	
				TOTALS
PEAK FLOW	(cms)=	1.41	.05	1.460 (iii)
TIME TO PEAK	(hrs)=	12.00	12.08	12.000
RUNOFF VOLUME	(mm)=	83.25	34.05	78.329
TOTAL RAINFALL	(mm)=	85.25	85.25	85.248
RUNOFF COEFFICIENT	=	.98	.40	.919

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

011:0005---
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S

| ROUTE RESERVOIR | Requested routing time step = 1.0 min.
| IN>02:(002) |
| OUT<03:(000200) | ========= OUTLFOW STORAGE TABLE =========

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.208	.3000E+00
.157	.1500E+00	.209	.3073E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >02: (002)	6.01	1.460	12.000	78.329
OUTFLOW<03: (000200)	6.01	.181	12.500	78.328

PEAK FLOW REDUCTION [Qout/Qin](%)= 12.370
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)=.2199E+00

011:0006---

ADD HYD (000503) | ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
ID1 01:001	5.90	1.434	12.00	78.33	.000
+ID2 02:000200	6.01	.181	12.50	78.33	.000
SUM 04:000503	11.91	1.609	12.00	78.33	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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011:0007------------------------------------------------------------------------------
***********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
***********************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |      .014  .2233E+00
                            .008  .7000E-02   |      .014  .2366E+00
                            .009  .1430E-01   |      .014  .2496E+00
                            .010  .4160E-01   |      .014  .2629E+00
                            .010  .7150E-01   |      .054  .2764E+00
                            .011  .1023E+00   |      .068  .2841E+00
                            .012  .1309E+00   |      .128  .3242E+00
                            .012  .1468E+00   |      .170  .3792E+00
                            .012  .1626E+00   |      .204  .4455E+00
                            .013  .1937E+00   |      .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.609    12.000     78.328
     OUTFLOW<05: (000201)      11.91      .192    14.617     78.328

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.958
                   TIME SHIFT OF PEAK FLOW         (min)=   157.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.4232E+00

------------------------------------------------------------------------------
011:0008------------------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |      .076  .4277E+00
                            .012  .1000E-02   |      .211  .4287E+00
                            .014  .2496E+00   |      .221  .5653E+00
                            .075  .2600E+00   |      .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.609    12.000     78.328
     OUTFLOW<06: (000200)      11.91      .212    14.050     78.328
```

```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   13.160
                   TIME SHIFT OF PEAK FLOW         (min)=   123.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.4394E+00

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011:0009------------------------------------------------------------------------------
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011:0002------------------------------------------------------------------------------
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011:0002------------------------------------------------------------------------------
  ** END OF RUN :  11

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| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 012
    NSTORM=   1
           #  1=50Y24HS.STM
------------------------------------------------------------------------------
012:0002------------------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#****************************************************************************
------------------------------------------------------------------------------
012:0002------------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\50Y24H
| Ptotal=  92.76 mm|    Comments: * 100 YEAR SCS 24hr STORM, 15 min TIME S
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	1.020	6.25	1.860	12.25	13.360	18.25	1.670
.50	1.020	6.50	1.860	12.50	13.360	18.50	1.670
.75	1.020	6.75	1.860	12.75	6.860	18.75	1.670
1.00	1.020	7.00	1.860	13.00	6.860	19.00	1.670
1.25	1.020	7.25	1.860	13.25	1.300	19.25	1.670
1.50	1.020	7.50	1.860	13.50	1.300	19.50	1.670
1.75	1.020	7.75	1.860	13.75	7.610	19.75	1.670
2.00	1.020	8.00	1.860	14.00	7.610	20.00	1.670
2.25	1.210	8.25	2.500	14.25	2.780	20.25	1.110
2.50	1.210	8.50	2.500	14.50	2.780	20.50	1.110
2.75	1.210	8.75	2.500	14.75	2.780	20.75	1.110
3.00	1.210	9.00	2.500	15.00	2.780	21.00	1.110
3.25	1.210	9.25	2.970	15.25	2.780	21.25	1.110
3.50	1.210	9.50	2.970	15.50	2.780	21.50	1.110
3.75	1.210	9.75	3.340	15.75	2.780	21.75	1.110
4.00	1.210	10.00	3.340	16.00	2.780	22.00	1.110
4.25	1.480	10.25	4.270	16.25	1.670	22.25	1.110
4.50	1.480	10.50	4.270	16.50	1.670	22.50	1.110
4.75	1.480	10.75	5.750	16.75	1.670	22.75	1.110
5.00	1.480	11.00	5.750	17.00	1.670	23.00	1.110
5.25	1.480	11.25	8.910	17.25	1.670	23.25	1.110
5.50	1.480	11.50	8.910	17.50	1.670	23.50	1.110
5.75	1.480	11.75	38.590	17.75	1.670	23.75	1.110
6.00	1.480	12.00	102.410	18.00	1.670	24.00	1.110

012:0003

****
SITE 772 WINSTON CHURCHILL
****

*

* PAVED AREAS AND LANDSCAPED AREAS

CALIB STANDHYD	Area (ha)= 5.90
01:001 DT= 1.00	Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	5.31	.59	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	30.00	40.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)=		102.41	52.93	
over (min)		1.00	10.00	
Storage Coeff. (min)=		1.23 (ii)	10.33 (ii)	
Unit Hyd. Tpeak (min)=		1.00	10.00	
Unit Hyd. peak (cms)=		.95	.11	
				TOTALS
PEAK FLOW	(cms)=	1.51	.06	1.567 (iii)
TIME TO PEAK	(hrs)=	12.00	12.07	12.000
RUNOFF VOLUME	(mm)=	90.75	39.16	85.596
TOTAL RAINFALL	(mm)=	92.76	92.76	92.755
RUNOFF COEFFICIENT	=	.98	.42	.923

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

012:0004

*

* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS

CALIB STANDHYD	Area (ha)= 6.01
02:002 DT= 1.00	Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	5.41	.60	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	30.00	40.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)=		102.41	52.93	
over (min)		1.00	10.00	
Storage Coeff. (min)=		1.23 (ii)	10.33 (ii)	
Unit Hyd. Tpeak (min)=		1.00	10.00	
Unit Hyd. peak (cms)=		.95	.11	
				TOTALS
PEAK FLOW	(cms)=	1.54	.06	1.595 (iii)
TIME TO PEAK	(hrs)=	12.00	12.07	12.000
RUNOFF VOLUME	(mm)=	90.75	39.16	85.596
TOTAL RAINFALL	(mm)=	92.76	92.76	92.755
RUNOFF COEFFICIENT	=	.98	.42	.923

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

012:0005

* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S

ROUTE RESERVOIR	Requested routing time step = 1.0 min.
IN>02:(002)	
OUT<03:(000200)	========= OUTLFOW STORAGE TABLE =========

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.208	.3000E+00
.157	.1500E+00	.209	.3073E+00

ROUTING RESULTS	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >02: (002)	6.01	1.595	12.000	85.596
OUTFLOW<03: (000200)	6.01	.188	12.517	85.596

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.799
TIME SHIFT OF PEAK FLOW (min)= 31.00
MAXIMUM STORAGE USED (ha.m.)=.2421E+00

012:0006

```
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.     DWF
--------------------              (ha)     (cms)    (hrs)   (mm)   (cms)
                 ID1 01:001        5.90    1.567    12.00  85.60    .000
                +ID2 03:000200     6.01     .188    12.52  85.60    .000
                 ====================================================
                 SUM 04:000503    11.91    1.748    12.00  85.60    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
012:0007-----------------------------------------------------------------------
************************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |      .014  .2233E+00
                           .008  .7000E-02   |      .014  .2366E+00
                           .009  .1430E-01   |      .014  .2496E+00
                           .010  .4160E-01   |      .014  .2629E+00
                           .010  .7150E-01   |      .054  .2764E+00
                           .011  .1023E+00   |      .068  .2841E+00
                           .012  .1309E+00   |      .128  .3242E+00
                           .012  .1468E+00   |      .170  .3792E+00
                           .012  .1626E+00   |      .204  .4455E+00
                           .013  .1937E+00   |      .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.748    12.000     85.596
     OUTFLOW<05: (000201)      11.91      .205    14.717     85.596

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.721
                   TIME SHIFT OF PEAK FLOW         (min)=   163.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.4552E+00

-------------------------------------------------------------------------------
012:0008-----------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
```

```
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |      .076  .4277E+00
                           .012  .1000E-02   |      .211  .4287E+00
                           .014  .2496E+00   |      .221  .5653E+00
                           .075  .2600E+00   |      .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.748    12.000     85.596
     OUTFLOW<06: (000200)      11.91      .213    14.267     85.596

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   12.190
                   TIME SHIFT OF PEAK FLOW         (min)=   136.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.4575E+00

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012:0009-----------------------------------------------------------------------
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012:0002-----------------------------------------------------------------------
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012:0002-----------------------------------------------------------------------
  ** END OF RUN :  12

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--------------------
| START            |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
--------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 013
    NSTORM=   1
           #  1=100Y24HS.STM
-------------------------------------------------------------------------------
013:0002-----------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
```

```
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
```

013:0002

```
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\100Y24
| Ptotal= 103.37 mm|    Comments: * 100 YEAR SCS 24hr STORM, 15 min TIME S
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.25	1.140	6.25	2.070	12.25	14.890	18.25	1.860
.50	1.140	6.50	2.070	12.50	14.890	18.50	1.860
.75	1.140	6.75	2.070	12.75	7.650	18.75	1.860
1.00	1.140	7.00	2.070	13.00	7.650	19.00	1.860
1.25	1.140	7.25	2.070	13.25	1.450	19.25	1.860
1.50	1.140	7.50	2.070	13.50	1.450	19.50	1.860
1.75	1.140	7.75	2.070	13.75	8.480	19.75	1.860
2.00	1.140	8.00	2.070	14.00	8.480	20.00	1.860
2.25	1.340	8.25	2.790	14.25	3.100	20.25	1.240
2.50	1.340	8.50	2.790	14.50	3.100	20.50	1.240
2.75	1.340	8.75	2.790	14.75	3.100	20.75	1.240
3.00	1.340	9.00	2.790	15.00	3.100	21.00	1.240
3.25	1.340	9.25	3.310	15.25	3.100	21.25	1.240
3.50	1.340	9.50	3.310	15.50	3.100	21.50	1.240
3.75	1.340	9.75	3.720	15.75	3.100	21.75	1.240
4.00	1.340	10.00	3.720	16.00	3.100	22.00	1.240
4.25	1.650	10.25	4.760	16.25	1.860	22.25	1.240
4.50	1.650	10.50	4.760	16.50	1.860	22.50	1.240
4.75	1.650	10.75	6.410	16.75	1.860	22.75	1.240
5.00	1.650	11.00	6.410	17.00	1.860	23.00	1.240
5.25	1.650	11.25	9.920	17.25	1.860	23.25	1.240
5.50	1.650	11.50	9.920	17.50	1.860	23.50	1.240
5.75	1.650	11.75	43.010	17.75	1.860	23.75	1.240
6.00	1.650	12.00	114.144	18.00	1.860	24.00	1.240

013:0003

```
**************************
*SITE 772 WINSTON CHURCHILL*
**************************
*
* PAVED AREAS AND LANDSCAPED AREAS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	5.31	.59
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	30.00	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		114.14	62.99
over (min)		1.00	10.00
Storage Coeff. (min)=		1.18 (ii)	9.67 (ii)
Unit Hyd. Tpeak (min)=		1.00	10.00
Unit Hyd. peak (cms)=		.97	.12

				TOTALS
PEAK FLOW	(cms)=	1.68	.07	1.753 (iii)
TIME TO PEAK	(hrs)=	12.00	12.07	12.000
RUNOFF VOLUME	(mm)=	101.37	46.69	95.907
TOTAL RAINFALL	(mm)=	103.37	103.37	103.374
RUNOFF COEFFICIENT	=	.98	.45	.928

```
  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
      CN* =  70.0    Ia = Dep. Storage  (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

013:0004

```
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	5.41	.60
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	30.00	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		114.14	62.99
over (min)		1.00	10.00
Storage Coeff. (min)=		1.18 (ii)	9.67 (ii)
Unit Hyd. Tpeak (min)=		1.00	10.00
Unit Hyd. peak (cms)=		.97	.12

				TOTALS
PEAK FLOW	(cms)=	1.72	.08	1.785 (iii)
TIME TO PEAK	(hrs)=	12.00	12.07	12.000
RUNOFF VOLUME	(mm)=	101.37	46.69	95.907
TOTAL RAINFALL	(mm)=	103.37	103.37	103.374
RUNOFF COEFFICIENT	=	.98	.45	.928

```
  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
      CN* =  70.0    Ia = Dep. Storage  (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

013:0005

```
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>02:(002   )   |
| OUT<03:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .208  .3000E+00
```


File: N:\otthymo\2060\2060PstB.out 12/16/2021, 4:46:30 PM

```
                            .157  .1500E+00   |      .209  .3073E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >02: (002   )       6.01     1.785    12.000     95.907
     OUTFLOW<03: (000200)       6.01      .199    12.517     95.906

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.152
                   TIME SHIFT OF PEAK FLOW         (min)=    31.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.2738E+00

--------------------------------------------------------------------------------
013:0006------------------------------------------------------------------------
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                 ID1 01:001        5.90    1.753   12.00  95.91    .000
                +ID2 03:000200     6.01     .199   12.52  95.91    .000
                 ==================================================
                 SUM 04:000503    11.91    1.944   12.00  95.91    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
013:0007------------------------------------------------------------------------
************************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
*ORIFICE 2: ELEV 91.80, 260mm DIA.
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
************************************************
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |      .014  .2233E+00
                           .008  .7000E-02   |      .014  .2366E+00
                           .009  .1430E-01   |      .014  .2496E+00
                           .010  .4160E-01   |      .014  .2629E+00
                           .010  .7150E-01   |      .054  .2764E+00
                           .011  .1023E+00   |      .068  .2841E+00
                           .012  .1309E+00   |      .128  .3242E+00
                           .012  .1468E+00   |      .170  .3792E+00
                           .012  .1626E+00   |      .204  .4455E+00
                           .013  .1937E+00   |      .219  .5653E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.944    12.000     95.906
     OUTFLOW<05: (000201)      11.91      .212    15.300     95.906

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   10.907
```

```
                   TIME SHIFT OF PEAK FLOW         (min)=   198.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.5127E+00

--------------------------------------------------------------------------------
013:0008------------------------------------------------------------------------
*PRINT HYD         ID = 5 # OF PCYCLES=1
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |      .076  .4277E+00
                           .012  .1000E-02   |      .211  .4287E+00
                           .014  .2496E+00   |      .221  .5653E+00
                           .075  .2600E+00   |      .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.944    12.000     95.906
     OUTFLOW<06: (000200)      11.91      .217    14.967     95.906

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.143
                   TIME SHIFT OF PEAK FLOW         (min)=   178.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.5049E+00

--------------------------------------------------------------------------------
013:0009------------------------------------------------------------------------
*****************************************************************
--------------------------------------------------------------------------------
013:0002------------------------------------------------------------------------
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013:0002------------------------------------------------------------------------
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013:0002------------------------------------------------------------------------
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013:0002------------------------------------------------------------------------
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013:0002------------------------------------------------------------------------
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013:0002------------------------------------------------------------------------
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013:0002------------------------------------------------------------------------
      FINISH
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********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
```

Simulation ended on 2021-12-16 at 16:46:30

```
2     Metric units
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
START               TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN= [001]
                     "HAZEL.STM"
*
READ STORM          STORM_FILENAME= ["storm.001"]

*************************
*SITE 772 WINSTON CHURCHILL*
*************************
*
* PAVED AREAS AND LANDSCAPED AREAS
CALIB STANDHYD      ID=[1], NHYD=["001"], DT=[1](min), AREA=[5.904](ha),
                    XIMP=[0.90], TIMP=[0.90], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[86.0],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[2.0](%),
                                         LGP=[40.0](m), MNP=[0.25], SCP=[0.0](mi
                    Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
                                         LGI=[30](m), MNI=[0.013], SCI=[0.0](min
                    RAINFALL=[ , , , , ](mm/hr) ,  END=-1

*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
CALIB STANDHYD      ID=[2], NHYD=["002"], DT=[1](min), AREA=[6.0108](ha),
                    XIMP=[0.90], TIMP=[0.90], DWF=[0.0](cms), LOSS=[2],
                    SCS curve number CN=[86.0],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[2.0](%),
                                         LGP=[40.0](m), MNP=[0.25], SCP=[0.0](mi
                    Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
                                         LGI=[30](m), MNI=[0.013], SCI=[0.0](min
                    RAINFALL=[ , , , , ](mm/hr) ,  END=-1

* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
* ROOF DRAIN CONTROLLS NOT MODELLED FOR REGIONAL EVENT **
*ROUTE RESERVOIR     IDout= 3 ,   NHYD= 200 ,  IDin= 2 ,
*                    RDT=[1](min),
*                    TABLE of ( OUTFLOW-STORAGE ) values
*                    (cms) - (ha-m)
*                    0        0
*                    0.1568   0.150
*                    0.2080   0.3000
*                    0.2094   0.3073
*                    IDovf=[   ], NHYDovf=[   ]

ADD HYD             IDsum=4, NHYD=503, IDs to add=[1+2]

*********************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
```



```
*ORIFICE 2: ELEV 91.80, 260mm DIA. AFTER WEIR WALL AT 91.10
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*EMERGENCY OVERFLOW AT 93.80 - 21.0m WIDE SPILLWAY
*********************************************

ROUTE RESERVOIR     IDout= 5 ,   NHYD= 201 ,  IDin= 4 ,
                    RDT=[1](min),
                    TABLE of ( OUTFLOW-STORAGE ) values
                    (cms) - (ha-m)
                    0.0000   0.0000
                    0.0083   0.0070
                    0.0088   0.0143
                    0.0096   0.0416
                    0.0104   0.0715
                    0.0111   0.1023
                    0.0124   0.1626
                    0.0130   0.1937
                    0.0135   0.2233
                    0.0138   0.2366
                    0.0141   0.2496
                    0.0143   0.2629
                    0.0538   0.2764
                    0.0682   0.2841
                    0.1277   0.3242
                    0.1703   0.3792
                    0.2037   0.4455
                    0.2185   0.5653
                    3.2025   1.0317
                    10.8084  1.3215
                    IDovf=[   ], NHYDovf=[   ]

* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
* EMERGENCY OVERFLOW AT 93.80 - 21.0m WIDE SPILLWAY
ROUTE RESERVOIR     IDout= 6 ,   NHYD= 200 ,  IDin= 4 ,
                    RDT=[1](min),
                    TABLE of ( OUTFLOW-STORAGE ) values
                    (cms) - (ha-m)
                    0        0
                    0.012    0.0010
                    0.014    0.2496
                    0.075    0.2600
                    0.076    0.4277
                    0.211    0.4287
                    0.221    0.5653
                    3.205    0.9331
                    10.808   1.2230
                    IDovf=[   ], NHYDovf=[   ]

* PUMPS INOPERABLE - OVERLAND SPILLWAY ONLY
* EMERGENCY OVERFLOW AT 93.80 - 21.0m WIDE SPILLWAY
ROUTE RESERVOIR     IDout= 6 ,   NHYD= 200 ,  IDin= 4 ,
                    RDT=[1](min),
                    TABLE of ( OUTFLOW-STORAGE ) values
                    (cms) - (ha-m)
                    0        0
                    0.002    0.5077
```

```
                    3.205    0.9331
                    10.808   1.2230
                    IDovf=[   ], NHYDovf=[   ]

FINISH
```

```
================================================================================

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S  W W W  M   M  H   H    Y    M   M  O   O       9999    9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9       9 =========
                                                      9   9  9   9 # 3813174
      StormWater Management HYdrologic Model           999    999  =========

 ********************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 ***************************
 *******  A single event and continuous hydrologic simulation model  ********
 *******     based on the principles of HYMO and its successors      ********
 *******                 OTTHYMO-83 and OTTHYMO-89.                  ********
 ********************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          ********
 *******                   Ottawa,  Ontario: (613) 727-5199          ********
 *******                   Gatineau, Quebec: (819) 243-6858          ********
 *******                   E-Mail: swmhymo@jfsa.Com                  ********
 ********************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: A.M. Candaras Associates Inc.                 +++++++
 +++++++                Woodbridge           SERIAL#:3813174         +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             ********
 *******           Maximum value for ID numbers  :     10            ********
 *******           Max. number of rainfall points:  15000            ********
 *******           Max. number of flow points    :  15000            ********
 ********************************************************************************


 ******************   D E T A I L E D   O U T P U T   ******************
 ********************************************************************************
 *       DATE: 2021-12-16     TIME: 16:46:36     RUN COUNTER: 000396       *
 ********************************************************************************
 * Input   filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060RegB.dat         *
 * Output  filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060RegB.out         *
 * Summary filename: C:\PROGRA~1\SWMHYMO\Projects\2060\2060RegB.sum         *
 * User comments:                                                          *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ********************************************************************************

--------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: 772 Winston Churchill Blvd., Oakville
*#  Project Number: 2060
*#  Date        : DECEMBER 2021
*#  Modeller    : FP
*#  Company     : a.m. candaras associates inc.
*#  License #   : 3813174
*#  Revision    : B
*#*****************************************************************************
--------------------
```



```
| START           |  Project  dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
-------------------  Rainfall dir.: C:\PROGRA~1\SWMHYMO\Projects\2060\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
           #  1=HAZEL.STM
--------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: C:\PROGRA~1\SWMHYMO\Projects\2060\HAZEL.
| Ptotal= 212.00 mm|    Comments: HURRICANE HAZEL STORM
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              1.00   6.000 |   4.00  13.000 |   7.00  23.000 |  10.00  53.000
              2.00   4.000 |   5.00  17.000 |   8.00  13.000 |  11.00  38.000
              3.00   6.000 |   6.00  13.000 |   9.00  13.000 |  12.00  13.000

--------------------------------------------------------------------------------
001:0003----------------------------------------------------------------------
**************************
*SITE 772 WINSTON CHURCHILL*
**************************
*
* PAVED AREAS AND LANDSCAPED AREAS
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.90
| 01:001    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.31          .59
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.00        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        50.55
               over (min)        2.00        11.00
     Storage Coeff.  (min)=       1.60 (ii)   10.87 (ii)
     Unit Hyd. Tpeak (min)=       2.00        11.00
     Unit Hyd. peak  (cms)=        .64          .10
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .78          .08          .864 (iii)
     TIME TO PEAK    (hrs)=       9.47        10.00        10.000
     RUNOFF VOLUME    (mm)=     210.00       172.52       206.253
     TOTAL RAINFALL   (mm)=     212.00       212.00       212.000
     RUNOFF COEFFICIENT   =        .99          .81          .973

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  86.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0004----------------------------------------------------------------------
*
* BUILDING AREAS WITH CONTROLLED FLOW ROOF DRAINS
```

```
----------------------
| CALIB STANDHYD     |   Area    (ha)=    6.01
| 02:002    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.41         .60
     Dep. Storage     (mm)=      2.00        5.00
     Average Slope     (%)=      1.00        2.00
     Length            (m)=     30.00       40.00
     Mannings n           =      .013        .250

     Max.eff.Inten.(mm/hr)=     53.00       50.55
               over (min)       2.00       11.00
     Storage Coeff.  (min)=     1.60 (ii)  10.87 (ii)
     Unit Hyd. Tpeak (min)=     2.00       11.00
     Unit Hyd. peak  (cms)=      .64         .10
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .80         .08        .880 (iii)
     TIME TO PEAK    (hrs)=     9.45       10.00       10.000
     RUNOFF VOLUME    (mm)=   210.00      172.53      206.253
     TOTAL RAINFALL   (mm)=   212.00      212.00      212.000
     RUNOFF COEFFICIENT   =      .99         .81         .973

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  86.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0005----------------------------------------------------------------------
* CONTROLLED FLOW ROOF DRAINS, 108.5l/s + 100.8l/s = 209.4 L/S
* ROOF DRAIN CONTROLLS NOT MODELLED FOR REGIONAL EVENT **
*ROUTE RESERVOIR     IDout= 3 ,   NHYD= 200 ,  IDin= 2 ,
*                    RDT=[1](min),
*                    TABLE of ( OUTFLOW-STORAGE ) values
*                    (cms) - (ha-m)
*                    0        0
*                    0.1568   0.150
*                    0.2080   0.3000
*                    0.2094   0.3073
*                    IDovf=[   ], NHYDovf=[   ]
--------------------
| ADD HYD (000503) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.     DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
                ID1 01:001         5.90     .864   10.00 206.25    .000
               +ID2 02:002         6.01     .880   10.00 206.25    .000
                ====================================================
                SUM 04:000503    11.91    1.744   10.00 206.25    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0006----------------------------------------------------------------------
*****************************************
*STORMWATER MANAGEMENT
*BELOW GROUND STORAGE SYSTEM
*BOTTOM ELEV:90.0m ; TOP ELEV 92.06
*EROS/EXT ELEV 91.10, EROS VOL 2,581m3
*ORIFICE 1: ELEV 89.15, 63mm ORIFICE
```



```
*ORIFICE 2: ELEV 91.80, 260mm DIA. AFTER WEIR WALL AT 91.10
*STORMTECH CHAMBERS MC-4500 - 1,837m3
*SURFACE DRY POND AREA - 3,405m3
*SURFACE STORAGE - 0.25m DEEP - 820m3
*TOTAL VOLUME: 5,077 m3
*EMERGENCY OVERFLOW AT 93.80 - 21.0m WIDE SPILLWAY
*****************************************
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<05:(000201)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .014  .2496E+00
                           .008  .7000E-02   |     .014  .2629E+00
                           .009  .1430E-01   |     .054  .2764E+00
                           .010  .4160E-01   |     .068  .2841E+00
                           .010  .7150E-01   |     .128  .3242E+00
                           .011  .1023E+00   |     .170  .3792E+00
                           .012  .1626E+00   |     .204  .4455E+00
                           .013  .1937E+00   |     .219  .5653E+00
                           .014  .2233E+00   |    3.203  .1032E+01
                           .014  .2366E+00   |   10.808  .1321E+01

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.744    10.000    206.253
     OUTFLOW<05: (000201)      11.91     1.592    10.017    206.253

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   91.262
                  TIME SHIFT OF PEAK FLOW         (min)=     1.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.7802E+00

--------------------------------------------------------------------------------
001:0007----------------------------------------------------------------------
* MODEL SIMULATION OF THE THREE STAGES OF PUMPING
* P1=14 l/s, P1+P2=76l/s, P1+P2+P3=221 l/s
* EMERGENCY OVERFLOW AT 93.80 - 21.0m WIDE SPILLWAY
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .211  .4287E+00
                           .012  .1000E-02   |     .221  .5653E+00
                           .014  .2496E+00   |    3.205  .9331E+00
                           .075  .2600E+00   |   10.808  .1223E+01
                           .076  .4277E+00   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.744    10.000    206.253
     OUTFLOW<06: (000200)      11.91     1.656    10.017    206.253

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   94.946
                  TIME SHIFT OF PEAK FLOW         (min)=     1.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.7422E+00

--------------------------------------------------------------------------------
```

```
001:0008--------------------------------------------------------------------------
* PUMPS INOPERABLE - OVERLAND SPILLWAY ONLY
* EMERGENCY OVERFLOW AT 93.80 - 21.0m WIDE SPILLWAY
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(000503)   |
| OUT<06:(000200)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |    3.205  .9331E+00
                           .002  .5077E+00   |   10.808  .1223E+01

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (000503)      11.91     1.744    10.000    206.253
     OUTFLOW<06: (000200)      11.91     1.638    10.017    175.757

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   93.926
                  TIME SHIFT OF PEAK FLOW         (min)=     1.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.7251E+00

      *** WARNING: Outflow volume is less than inflow volume.
--------------------------------------------------------------------------------
001:0009--------------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0008 ROUTE RESERVOIR
      *** WARNING: Outflow volume is less than inflow volume.
   Simulation ended on 2021-12-16     at 16:46:36
================================================================================
```

APPENDIX D
JELLYFISH DESIGN BRIEF

STANDARD OFFLINE
Jellyfish Filter Sizing Report

Project Information

Date	Wednesday, March 24, 2021
Project Name	772 Winston Churchill Blvd.
Project Number	Split 3
Location	Oakville

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.

Please see ***www.ImbriumSystems.com*** *for more information.*

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF12-20-5 is recommended to meet the water quality objective by treating a flow of 113.6 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 1280 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF12-20-5	20	5	3.6	113.6	1280

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see ***www.ImbriumSystems.com*** *for more information.*

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

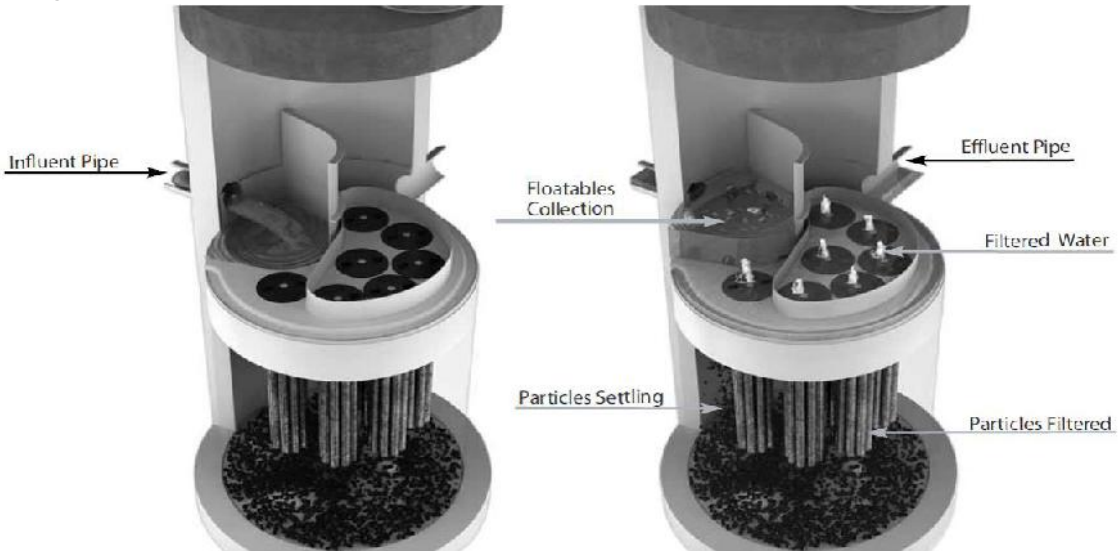
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 59% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

The Jellyfish filter has been field-tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitotred storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 59%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Project Information

Date:	Wednesday, March 24, 2021
Project Name:	772 Winston Churchill Blvd.
Project Number:	Split 3
Location:	Oakville

Designer Information

Company:	A.M. Candaras Associates Inc.
Contact:	Fanche Petkovski
Phone #:	

Notes

Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

Drainage Area

Total Area:	3.98 ha
Imperviousness:	85%

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	**80.4 L/s**
Sediment Loading	Treating 90% of the average annual runoff volume, 19977 m³, with a suspended sediment concentration of 60 mg/L.	**1199 kg**

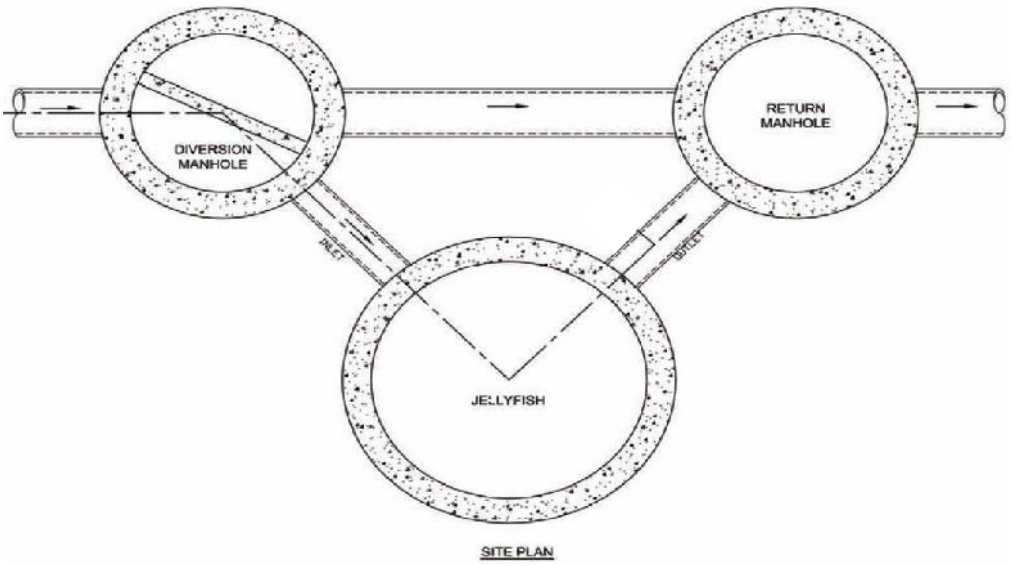
Recommendation

The Jellyfish Filter model JF12-20-5 is recommended to meet the water quality objective by treating a flow of 113.6 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 1280 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	5	1	1.8	5205	0.79	848	27.8	313
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	**20**	**5**	**3.6**	**20820**	**3.2**	**2771**	**113.6**	**1280**
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	62º	150	200
1.8	59º	200	250
2.4	52º	250	300
3.0	48º	300	450
3.6	**40º**	**300**	**450**

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head caclulations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged condtions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

STANDARD SPECIFICATION
STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92
Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92
Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.

2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.

2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft2 / m2)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.

2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.

2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.

2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.

2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.

2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.

2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).

3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.

3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.

3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.

3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.

3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.

3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.

3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.

3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.

3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).

3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.

3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.

4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL
In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after is has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Jellyfish® Filter

Developed by Imbrium Systems, Inc.,
Whitby, Ontario, Canada

Registration: GPS-ETV_VR2020-08-15_Imbrium-JF

In accordance with

ISO 14034:2016

Environmental Management —
Environmental Technology Verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

August 15, 2020
Vancouver, BC, Canada

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

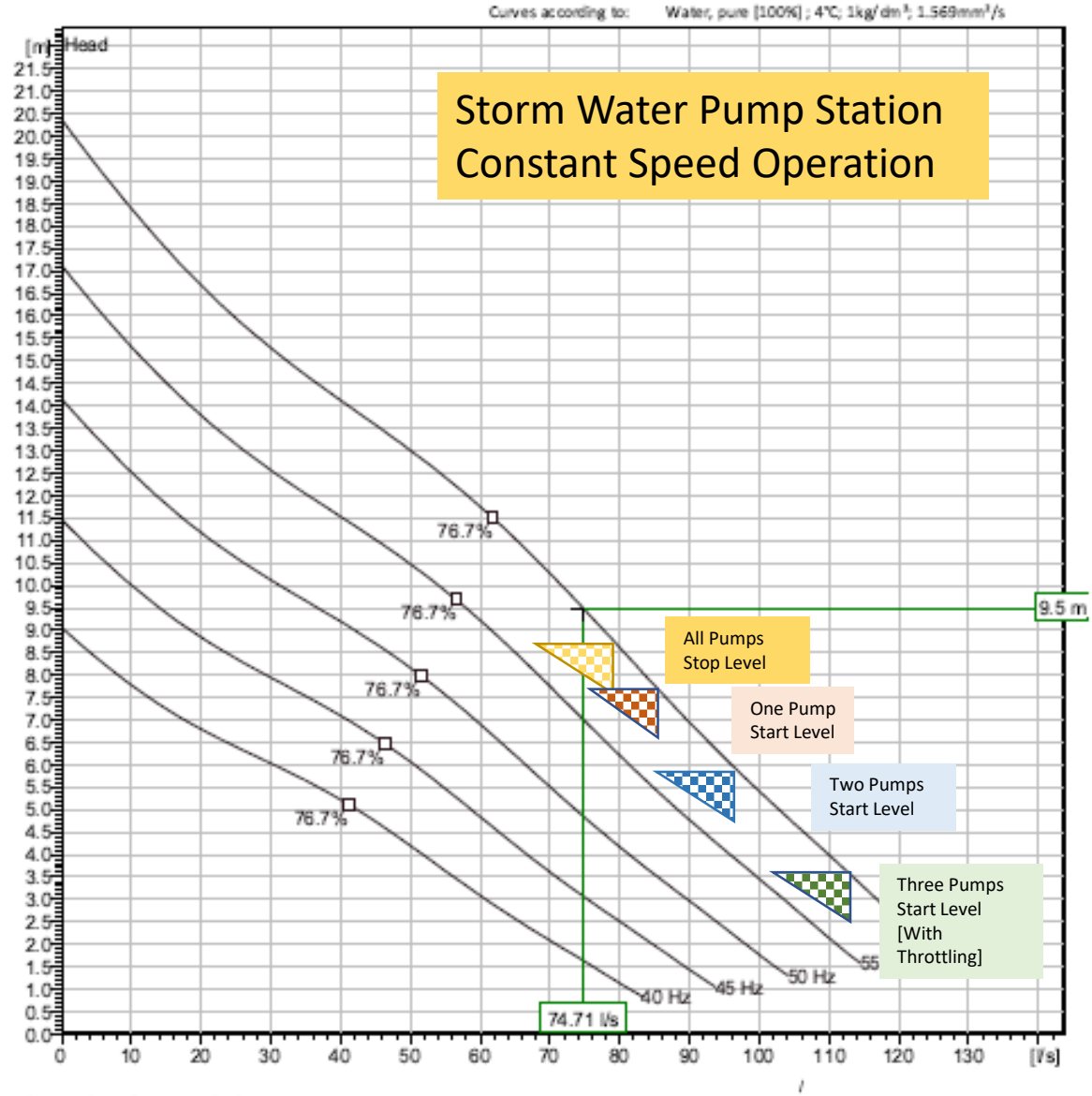
APPENDIX E
STORM PUMP
SPECIFICATIONS

NP 3153 MT 3~ 436

Duty Analysis

FLYGT
a xylem brand

Curves according to: Water, pure [100%] ; 4°C; 1kg/dm³; 1.569mm²/s



Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Spec. Energy	NPSHre
	l/s	m	kW	l/s	m	kW		kWh/l	m
1	74.7	9.5	9.5	74.7	9.5	9.5	73.3 %	3.85E-5	6.97

2.1 — Unit Drawings

2.1.1— Installation Drawings

Installation drawings show weights, dimensions, clearances, exhaust details, connection locations, wiring stub-ups, lifting locations, and other information. Use the unit specific installation drawings when designing a site installation plan. Thoroughly read the NOTES section of each drawing for important details.

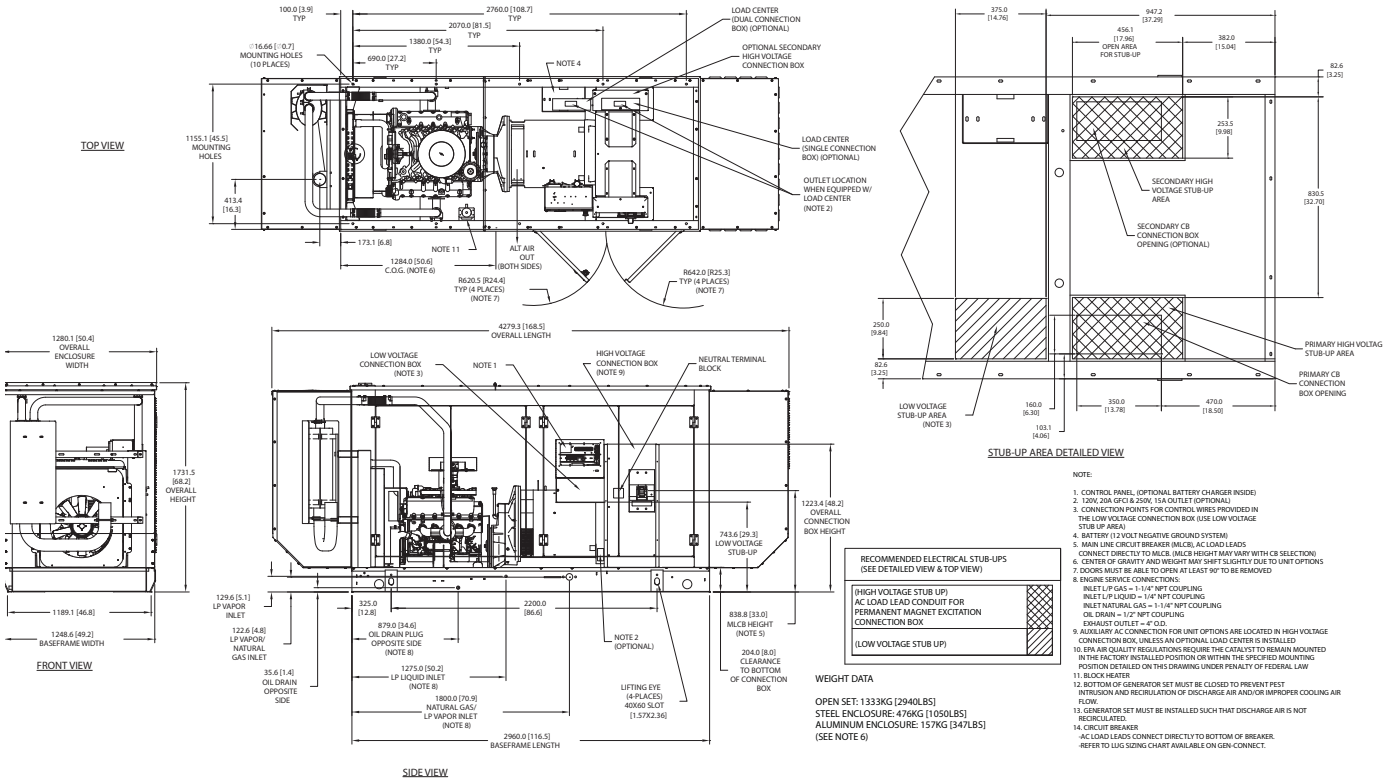


Figure 2-1. Typical Installation Drawing

2.1.2— Wiring Diagrams

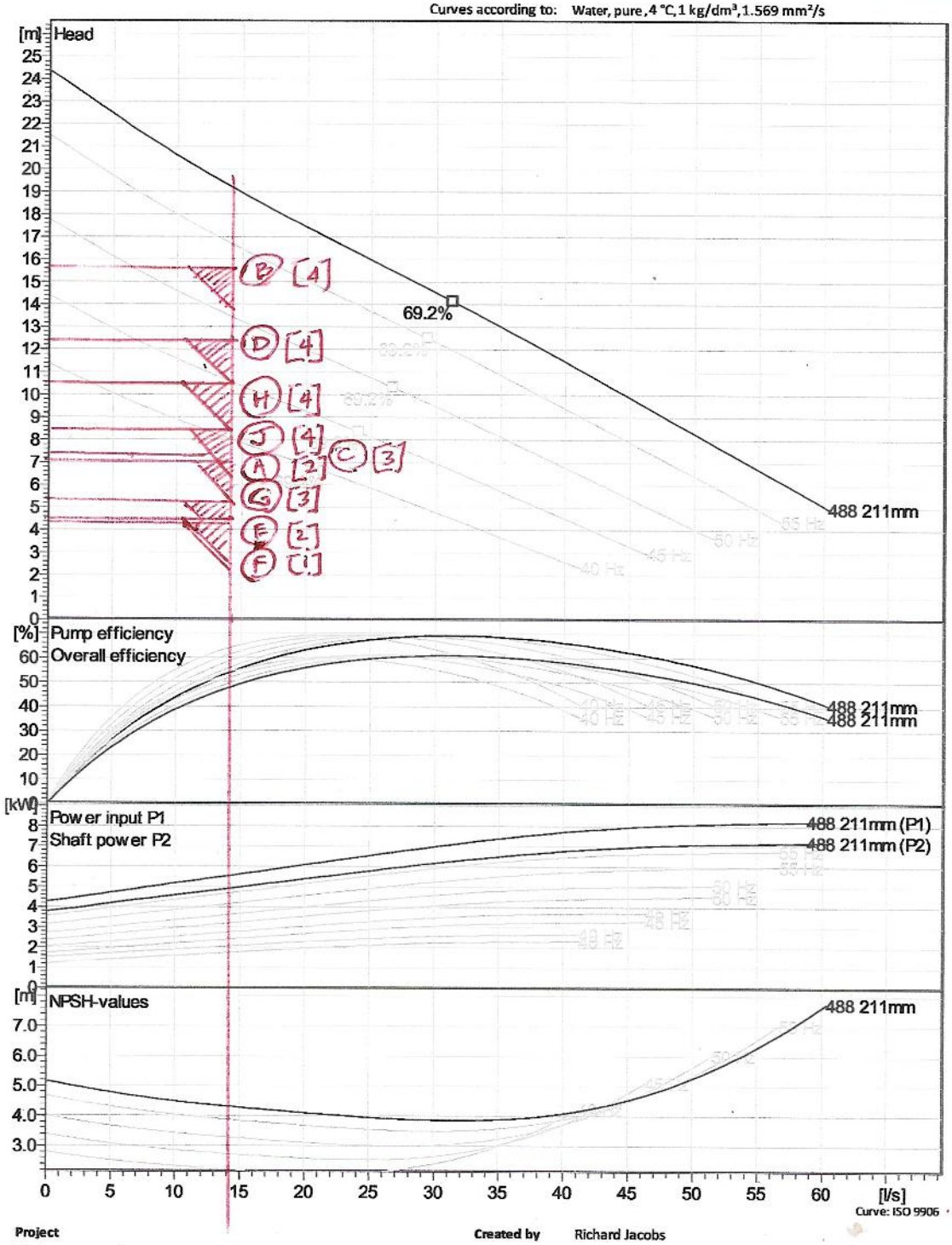
Wiring and schematic diagrams show the connection points for control wiring, load wiring, and any service power supply required for battery chargers, block heaters, etc. Always use the unit specific wiring diagrams during planning and installation.

NP 3127 HT 3~ Adaptive 488 14 lps Pump

VFD Curve

FLYGT
a xylem brand

Curves according to: Water, pure, 4 °C, 1 kg/dm³, 1.569 mm²/s



Project		**Created by**	Richard Jacobs
Block	0	**Created on**	11/27/2021 **Last update** 11/27/2021

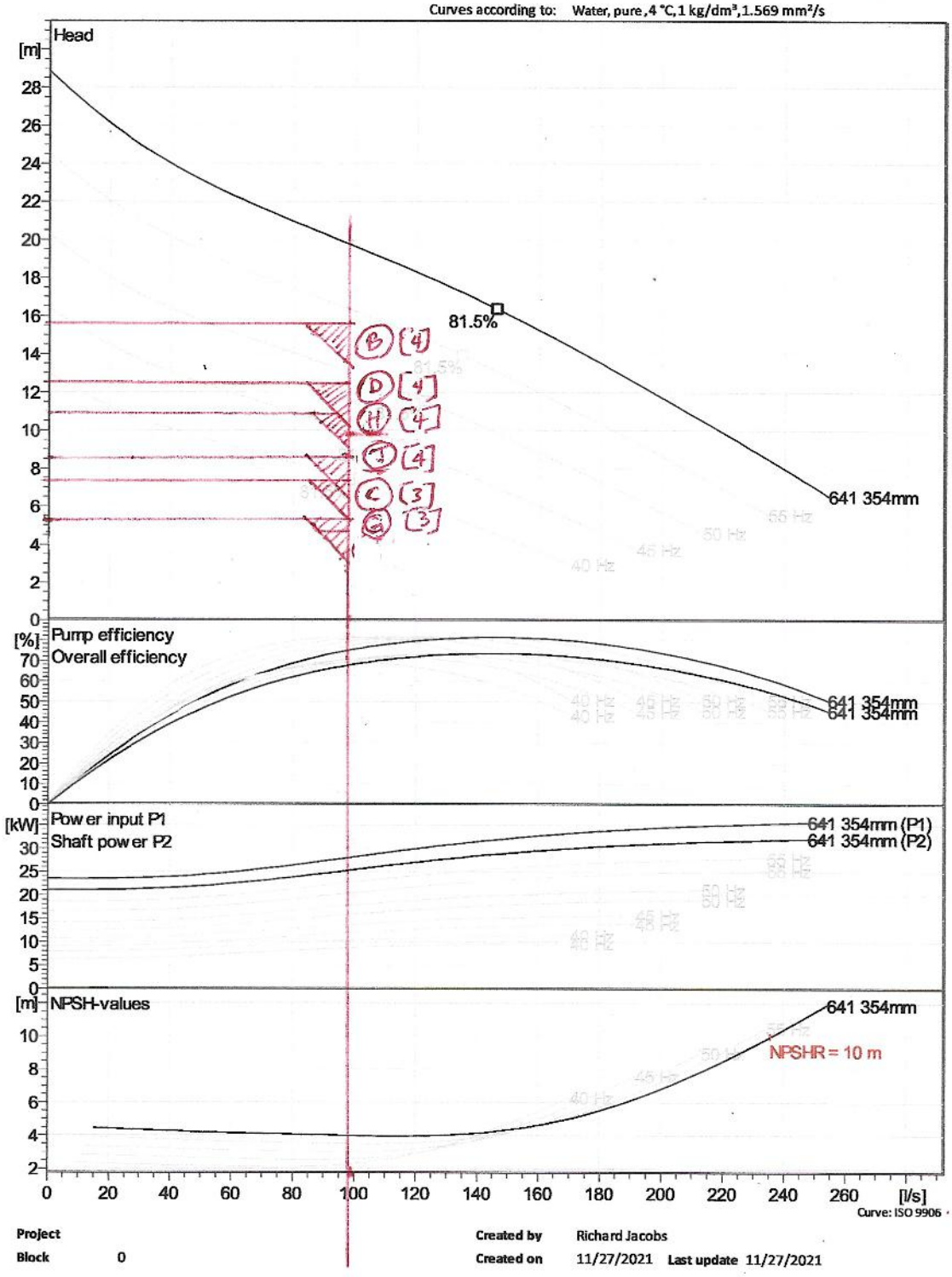
NP 3202 MT 3~ 641 97 Lps Pump

No (A) SMALL PUMPS ONLY
No (E) " "
No (F) " "

VFD Curve

FLYGT
a xylem brand

Curves according to: Water, pure, 4 °C, 1 kg/dm³, 1.569 mm²/s



Curve: ISO 9906

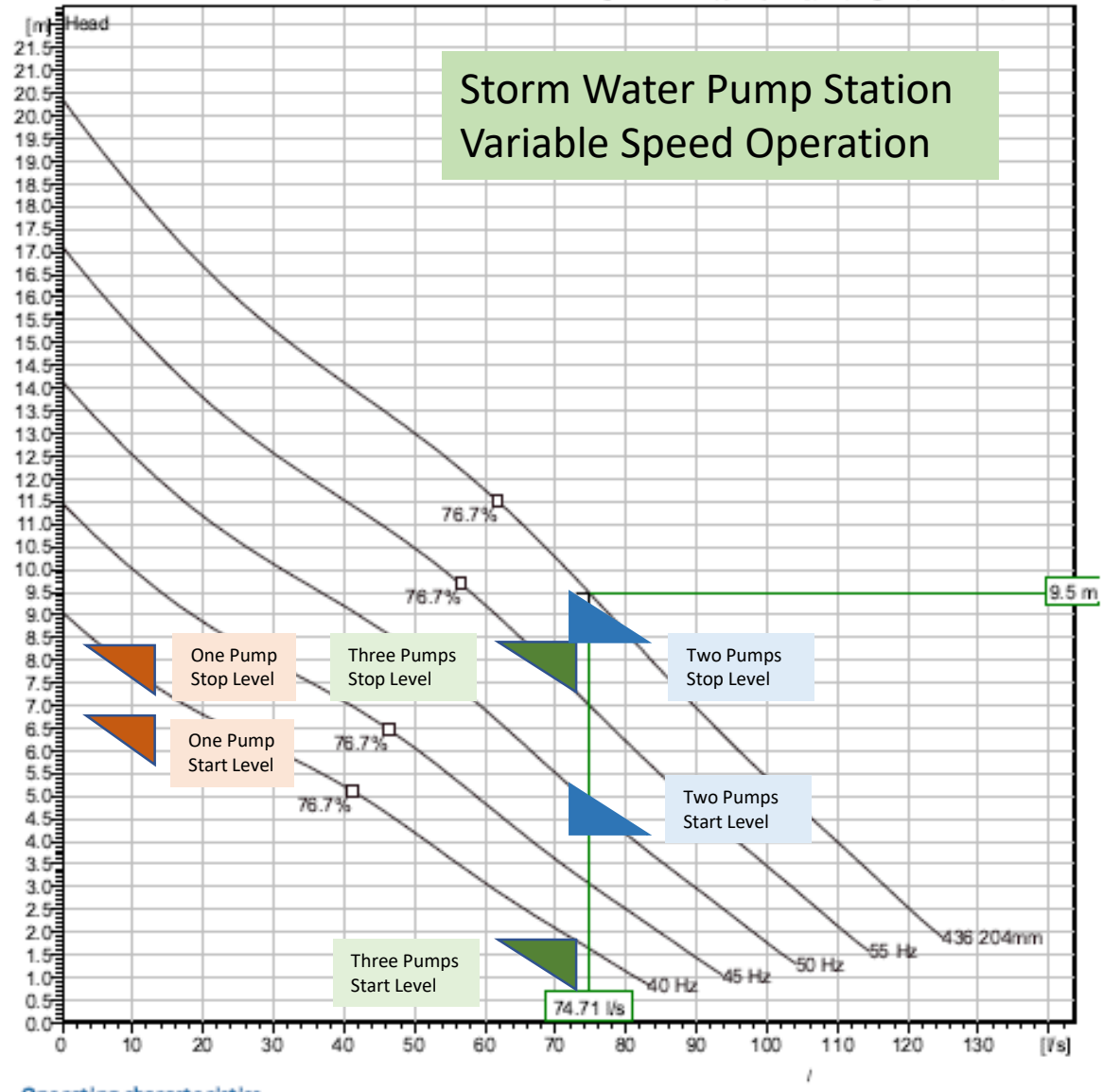
Project		Created by	Richard Jacobs
Block	0	Created on	11/27/2021 Last update 11/27/2021

NP 3153 MT 3~ 436

Duty Analysis

FLYGT
a xylem brand

Curves according to: Water, pure [100%] ; 4°C; 1kg/dm³; 1.569mm²/s



Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Spec. Energy	NPSHre
	l/s	m	kW	l/s	m	kW		kWh/l	m
1	74.7	9.5	9.5	74.7	9.5	9.5	73.3 %	3.85E-5	6.97

APPENDIX F
SANITARY PUMP
SPECIFICATIONS

Submersible Pumps

SF Series®

VARIOUS PATENTS APPLY

Models SFV4C SFEV4C SFV4C-X SFEV4C-X

Size 4”

C/US

FM APPROVED
X-PROOF MOTORS FOR CLASS I, DIV. 1, GROUPS C&D LOCATIONS
(X-Proof Version Only)

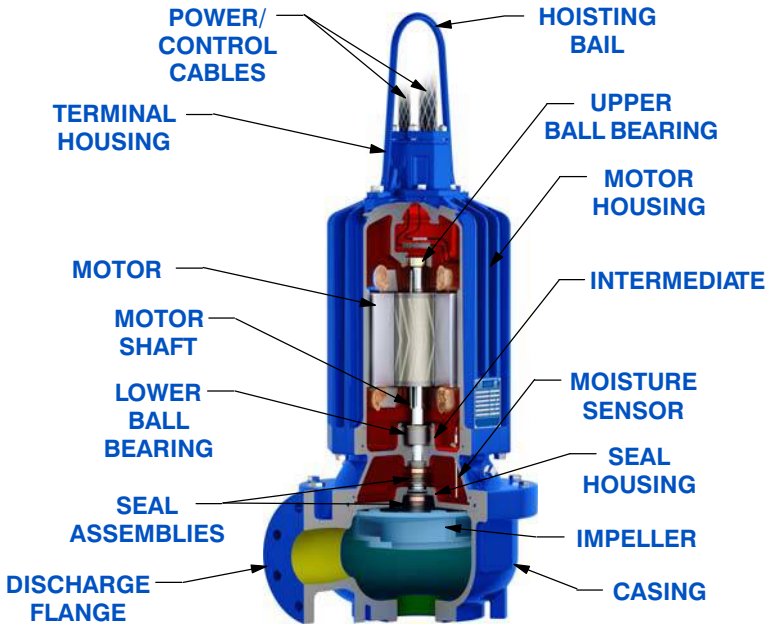
The Gorman-Rupp SF Series® vortex pumps provide superior pumping efficiency while maintaining a 3-inch (76,2 mm) spherical solids passage.

Key Features:

- NEMA premium efficiency motors
- Vortex pump technology
- Press-fit motor with finned motor housing provides superior motor cooling, even in a submersed state, resulting in increased motor life
- NEMA Class H motor insulation
- Easy, in-the-field cable changes
- Standard moisture detection in both the seal and motor chambers
- CSA-C/US and Factory Mutual (FM) Approved for Class I, Division I, Group C and D Haz Loc Applications (X-Proof Model)

Optional Accessories:

- G-R Hard Iron Impeller
- Control Panel (Consult SF Series Motor Data Reference for Customer-Supplied Control Panel)
- Submersible Transducer or Ball Type Float Switches
- Slide Rail Installation Components
  - Guide shoe w/Rubber Seal
  - Base Elbow and Rail Brackets
- Trash Stand Installation Components
  - Trash Stand
  - Discharge Elbow



TYPICAL VORTEX CROSS-SECTION

PUMP DETAILS

Pump Models		SFV4C SFEV4C SFV4C-X SFEV4C-X
Agency Approvals		FM/CSA-C/US
Discharge Flange		4" ANSI w/ Flat Face
Impeller Type		Vortex
Impeller Material		Ductile Iron
Spherical Solids Handling		3" (76 mm) Non-Deformable Diameter
Motor Housing (Including Seal Plate and Intermediate)		Gray Iron 30
Pump Casing		Gray Iron 30
Motor Shaft		17–4 PH Stainless Steel
O-Rings		Buna-N and Fluorocarbon (DuPont Viton® or Equivalent)
Bearings: Type/Lubrication	Upper	Single Row Ball/Permanent Lubrication
	Lower	Double Row Ball/Permanent Lubrication
External Hardware		303/304 Stainless Steel
External Surface Protection		Epoxy Paint
Seal Type		Tandem, Mechanical, Oil Lubricated Upper, Self-Lubricated Lower
Sealing Faces: Rotating/Stationary	Upper	Carbon/Ni-Resist
	Lower	Silicon Carbide/Silicon Carbide
Seal Elastomers		Buna-N Upper, Fluorocarbon (DuPont Viton® or Equivalent) Lower
Max. Liquid Temperature		104°F (40°C)

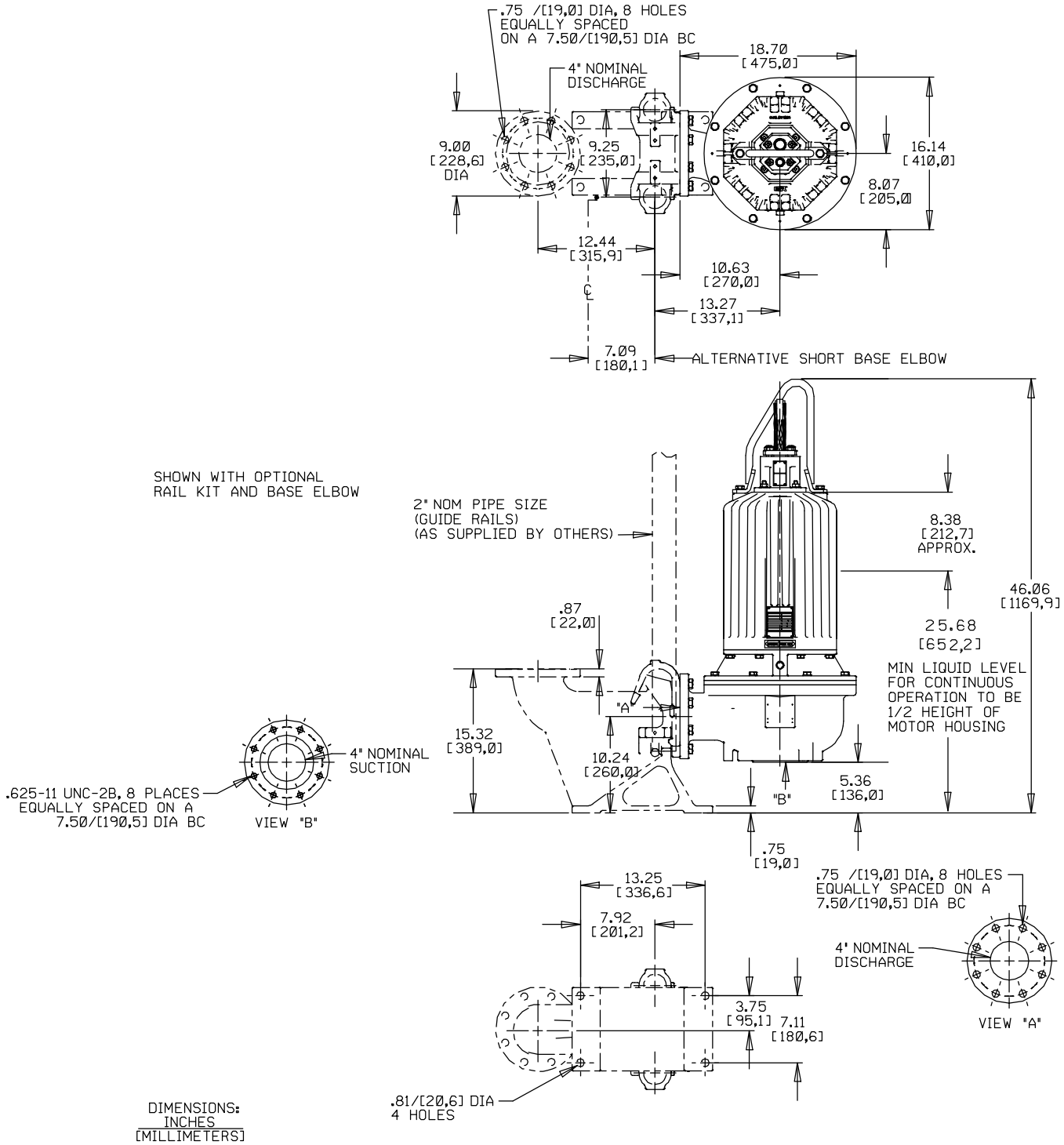
MOTOR DETAILS

Speed		60 Hz, 1750 RPM	
Motor Design		Inverter-Duty Rated, Air-Filled Enclosure, Squirrel Cage, Induction Start	
Motor Efficiency Rating		NEMA Premium Efficiency (IEC IE3)	
Insulation		Class H, Rated 356°F (180°C)	
Max. Submergence		65 Feet (20 Meters)	
Min. Submergence		1/2 Motor Covered	
Max. Starts per Hour		10	
Max. Rated Output Power		12.5 HP (9,3 kW)	14.0 HP (10,4 kW)
Amp Draw @ Max. Rated Power: Full Load/ Locked Rotor			
	208V/3P	36.6/184.7	
	230V/3P		37.6/167.0
	460V/3P		18.8/83.5
	575V/3P		15.0/66.8
NEMA Motor Code		F	E
Service Factor		1.0	1.15
Efficiency: 100%/75%/50% Load		86%/87%/86%	86%/87%/87%
Power Factor: 100%/75%/50% Load		0.82/0.80/0.71	0.82/0.81/0.74
Field Connection		Across-the-Line	
Moisture Sensor		Single Probe Monitoring Both Seal and Motor Chambers	
Thermal Overload		One Thermostat per Phase, Self-Resetting	

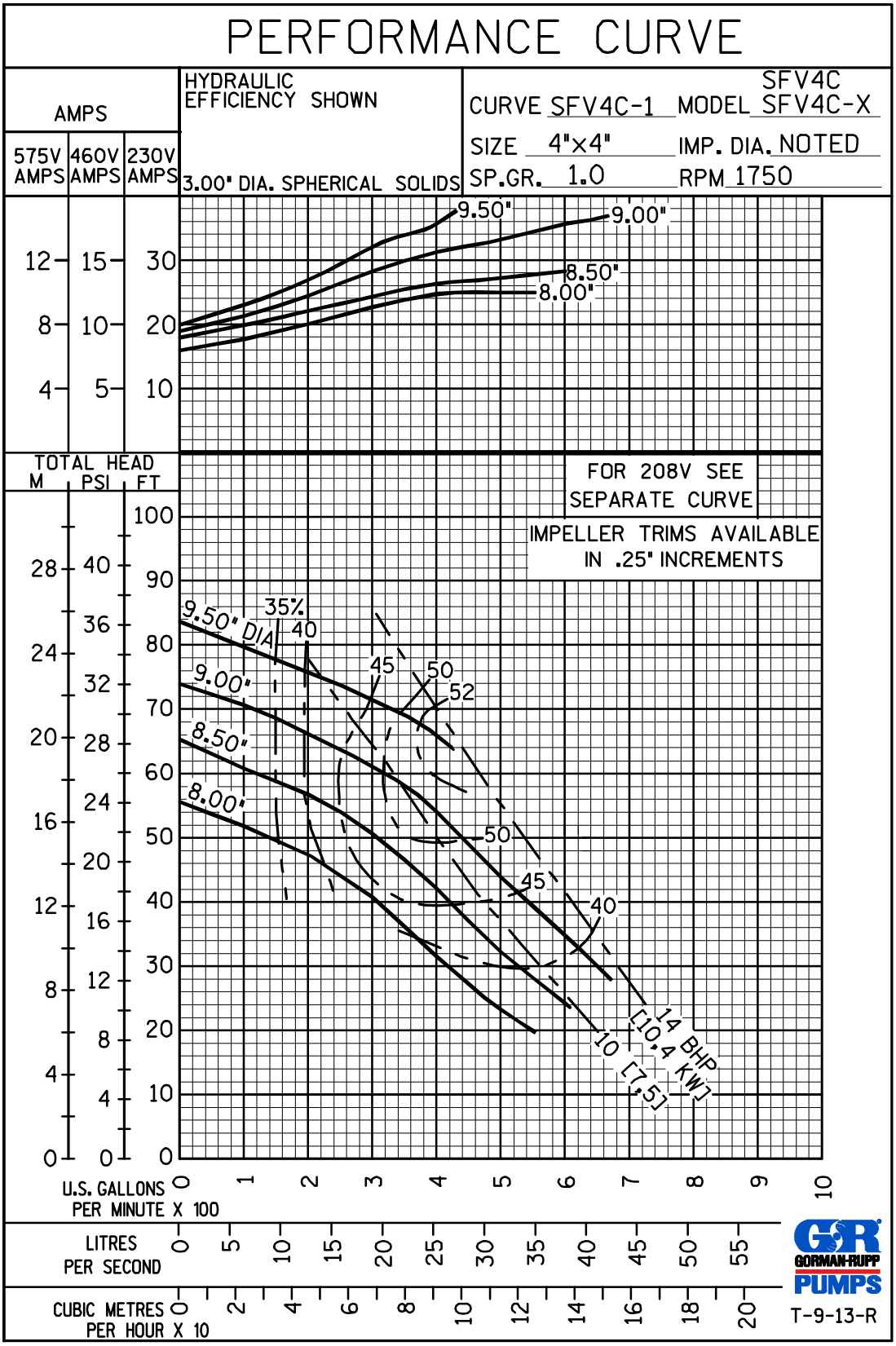
CABLE DETAILS

Voltage		208-230/460V	575V
Power Cable	No. Cables/Conductors per	1/6	1/4
	Gauge	(3) 8 AWG PWR & (3) 10 AWG GND/GC	10 AWG
	Type/Material	GGC/CPE	SOOW/EPDM
	Nominal Cable O.D.	0.91" (23,1 mm)	0.75" (19,0 mm)
Control Cable	No. Cables/Conductors per	1/4	
	Gauge	14 AWG	
	Type/Material	SOOW/CPE	
	Nominal Cable O.D.	0.61" (15,5 mm)	
Length		32 Feet (10 Meters) Standard, 164 Feet (50 Meters) Maximum	

Specification Data	MODELS SFV4C SFEV4C SFV4C-X SFEV4C-X SLIDE RAIL VERSION APPROXIMATE DIMENSIONS and WEIGHTS			
SECTION 133, PAGE 140.2		**NET WT:** (pump only)	**507 LBS.**	**[230 KG.]**
		(comb. cable wt. per meter [3.2 ft.])	**2.9 LBS.**	**[1,3 KG.]**
		SHIPPING WT: (pump only)	**537 LBS.**	**[244,0 KG.]**
		CRATE SIZE:	**15.3 CU. FT.**	**[0,43 CU. M.]**



PERFORMANCE CURVE



Pump Data Sheet - Gorman-Rupp SEW 60Hz

Company: JOHN BROOKS COMPANY LTD
Name: TERENCE ALWEYN
Date: 03/14/2021

Oakville Industrial Park- Sanitary Lift Station
Fluid: Sewage
Flow: 17.8 l/s
TDH: 20 m

Pump:

Size:	SFV4C-1	Dimensions:	
Type:	SF-SERIES_STD_3PH	Suction:	---
Synch Speed:	1800 rpm	Discharge:	---
Dia:	9.25 in		
Curve:	SFV4C-1		

Fluid:

Name:	Water		
SG:	1	Vapor Pressure:	1.77 kPa a
Density:	999 kg/m³	Atm Pressure:	101 kPa a
Viscosity:	1.1 cP		
Temperature:	15.6 °C	Margin Ratio:	1

Search Criteria:

Flow:	17.8 l/s	Near Miss:	---
Head:	20 m	Static Head:	0 m

Pump Limits:

Temperature:	---	Sphere Size:	76.2 mm
Wkg Pressure:	---		

Motor:

Standard:	NEMA	Size:	11.2 kW
Enclosure:	TEFC	Speed:	1800 rpm
Frame:	254T		
Sizing Criteria:	Max Power on Design Curve		

Pump Selection Warnings:

None

--- Duty Point ---

Flow:	18 l/s
Head:	20.5 m
Eff:	46.4%
Power:	7.77 kW
NPSHr:	---
Speed:	1750 rpm

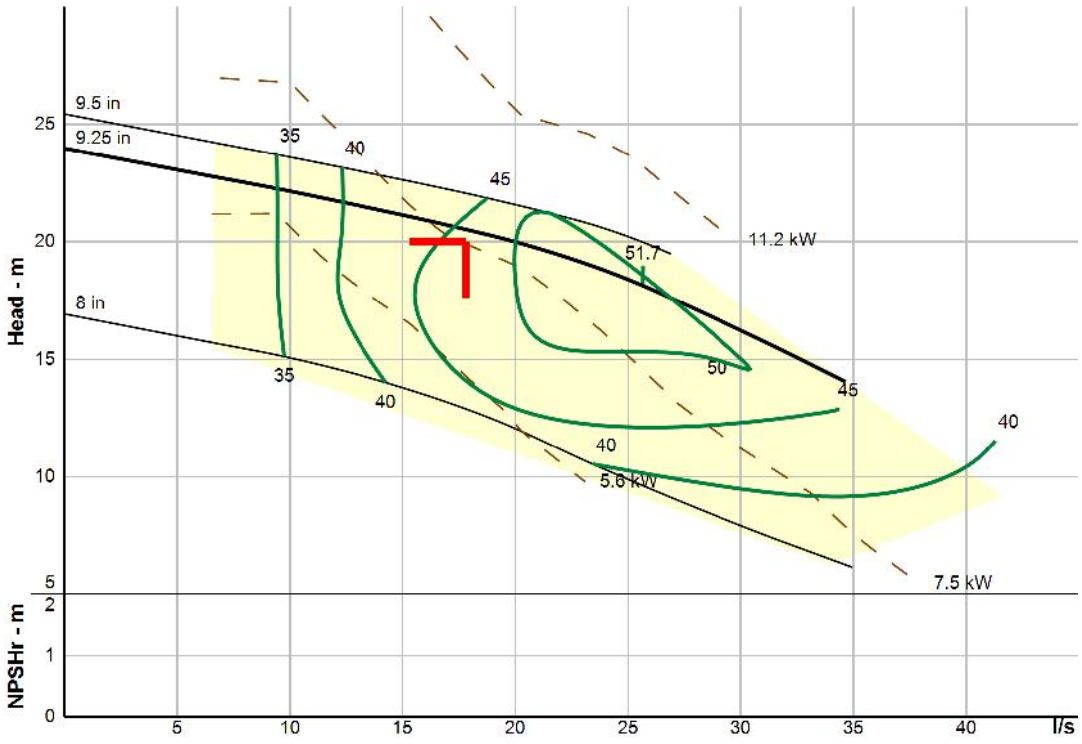
--- Design Curve ---

Shutoff Head:	24 m
Shutoff dP:	235 kPa
Min Flow:	--- l/s

BEP: 51.7% @ 25.6 l/s
NOL Power:
10.8 kW @ 34.7 l/s

--- Max Curve ---

Max Power:
9.81 kW @ 26.9 l/s



This curve is provided for preliminary selection only. Please consult factory before making final pump or motor selections.

Performance Evaluation:

Flow	Speed	Head	Efficiency	Power	NPSHr
l/s	rpm	m	%	kW	
21.4	1750	19.5	50	8.08	---
17.8	1750	20.5	46	7.77	---
14.2	1750	21.3	42	7.01	---
10.7	1750	22	37	6.17	---
7.12	1750	22.7	26	5.99	---

JOHN BROOKS COMPANY LIMITED

2625 Meadowpine Blvd,Mississauga, Ontario, L5N 7K5
Phone:905-624-4200, ext. 159**Cell:**416-455-9042**Toll Free Phone:**877-624-5757
Fax: 905-624-6379
Email: talweyn@johnbrooks.ca

Sunday, March 14, 2021

Attention: Tas Candaras
A.M. CANDARAS ASSOCIATES
8551 Weston Road, Suite 203
Woodbridge, ON, L4L 9R4

T:(905) 850-8020
F: (905) 850-8099
E:tas@amcai.com

RE: Oakville Industrial Park. SANITARY STATION

Quotation Number: WQ-2103-33916191-0-TA-16628 **Revision: 00**

Dear Tas,

With reference to your **Oakville** Industrial Park. SANITARY STATION, we thank you for the opportunity to propose our equipment for your pumping application. Based on the information you have provided, we are pleased to submit the following proposal for a solution suitable for your application.

PERFORMANCE

Fluid: Sewage
Duty : 17.8 l/s @ 12 M
Quantity: 2 (1W+1SB)

Quantity 1 JOHN BROOKS SUBMERSIBLE PUMP PACKAGE consisting of:

1.1 PUMPS Gorman Rupp Solids Handling Vortex Electric Motor Driven Submersible Pump

- Qty 2 GORMAN RUPP FLYGT MODEL SFV4C-X SUBMERSIBLE PUMP
  NEMA premium efficiency motors 14HP, 575/3/60 Inverter-Duty Rated, Air-Filled Enclosure, Squirrel Cage, Induction Start
  NEMA Premium Efficiency (IEC IE3) Class H, Rated 356F (180C)
  Vortex pump technology
  Press-fit motor with finned motor housing provides superior motor cooling, even in a submersed state, resulting in increased motor life
  NEMA Class H motor insulation
  Easy, in-the-field cable changes
  Standard moisture detection in both the seal and motor chambers
  CSA-C/US and Factory Mutual (FM) Approved for Class I, Division I, Group C and D Haz Loc Applications
  Cable length 35 M 575V, ¼ Gauge, 10AWG SOOW/EPDM
  Guide Shoe X-PROOF
  Control Panel Relay Kit 50284
  Wet Pit Elbow Kit for Rails base plate with elbow, 36 ft. lifting cable, upper guide and mounting bracket

1.2 Tank

- Ø8' x 33' FRP Duplex Pump Station Tank to include the following:
- One (1) Ø8’ FRP Dome Bottom with Skirt and flange
- One (1) Ø8’ FRP Filament Wound Shell with ribs reinforcement
- One (1) Ø8’ FRP Flat Top with reinforcement

- Three (3) FRP Shoebox Style Hatches
- One (1) Integral valve chamber section with dividing walls to provide water tight seal between wet well chamber and valve chamber. Valve chamber to extend from tank top to midpoint of tank
- One (1) Narrow Width Aluminum Ladder extending from tank base to the height of the tank attached to tank wall (for wet well chamber)
- One (1) Narrow Width Aluminum Ladder extending from tank top to bottom of internal valve chamber attached to tank wall (for valve chamber)
- One (1) FRP Intermediate full platform in wet well area
- One (1) Ø10" FRP Flange w/ gussets 150 PSI – 150# (Inlet 1)
- One (1) Ø10" FRP Flange w/ gussets 150 PSI – 150# (Inlet 2)
- Two (2) set of Ø4" Double Sided FRP Flange 150 PSI – 150# (wet well to dry well)
- One (1) set of Ø4" Double Sided FRP Flange 150 PSI – 150# (outlet)
- Two (2) Ø6" FRP Vent with Gooseneck & Insect Screen
- Three (3) Ø2" FRP FNPT Couplings (Electrical)
- Polymer concrete pump base (tank internal)
- Two (2) sets of 304 SS guiderail (Ø2" OD) c/w Three FRP C-channel supports
- Internal Ø4" SCH80 PVC piping c/w FRP pipe supports
- Installation of pump base elbows and internal piping with valves
- One (1) FRP Benching Bottom slopped towards pumps
- Three (3) 12" x 12" FRP Brackets for mounting Float Hanger, Junction Box, and Level sensor
- Two (2) steel lifting lugs
- One (1) Bottom Flange around FRP Skirt for bolting to concrete

1.3 Piping 4" PVC SCH80

1.4 Valves

- 4" BALLCENTRIC PLUG VALVE PRATT SERIE 601N1, ANSI 125 FLANGED CAST IRON, PRESSURE 175 PSI
  NICKEL SEAT, BUNA-NITRILE ELASTOMER TRIM
  MANUAL OPERATOR WITH HAND LEVER

- 4" FLEXIBLE DISC CHECK VALVE, PRATT SERIE 851A
  BODY & BONNET IN DUCTILE IRON ASTM A536-64-45-12
  BUNA-N DISC, ENCAPSULATED CARBON STEEL ASTM A-36, 250PSI

1.5 Instruments (4) Float , IS
NOTE: Instruments may be shipped loose for field installation by others

1.6 Electric Control panel

- 1 EEMAC 4X painted steel, 575V/3/60, duplex, heat and seal, 15HP complete with:
- 1 Inner door
- 1 Main disconnect- non fusible
- 2 Co-ordinated motor starters
- 1 Primary and secondary fusing
- 1 Transformer
- 2 Contactors
- 1 Alternator
- 2 Heat sensor cut-outs
- Lot Terminals
- 1 Run lights
- 1 High level light
- 2 Seal leak lights
- Lot H-O-A switches
- 3 Acknowledge and test switches
- 1 Globe with flasher
- 1 Alarm horn

- 2 EHSM basic with door kit - See note #9
- 1 Four float duplex- with intrinsically safe circuitry-manual reset of the alarm
- 1 120V strip heater and thermostat
- Lot 22.5mm industrial grade LED lights
- Lot 22.5mm Operators
- Lot Dry contacts for remote alarm

2. COMMENTS

Please refer to list of exceptions/clarifications
IMPORTANT: grade elevation, inlet pipe invert elevation, top of concrete elevation, soil report to be provided with Purchase Order. JBC made number of assumptions to provide quote in timely manner. Information will be required at time of order. JBC reserves the right to revise price based on latest information provided by customer.
Installation of tanks is not included in JBC scope of work.
Antifloat concrete pedestal to be supplied and installed by others.
Anchor bolts are not included in JBC scope of work.
Electrical wiring is not in JBC scope of work

OPTIONAL ADDER

Electric Control panel with VFD

Quantity 1 EEMAC 4X stainless steel, 575V/3/60, duplex, heat and seal, 15HP complete with:

- 1 Inner door
- 1 Main disconnect- non fusible
- 2 Co-ordinated motor starters
- 1 Primary and secondary fusing
- 1 Transformer
- 2 Altivar 630 series VFDs
- 2 Altivar 630 series HIM mount and cable
- 2 5% Line reactor
- 1 Alternator
- 2 Heat sensor cut-outs
- Lot Terminals
- 2 Run lights
- 1 High level light
- 2 Seal leak lights
- 2 H-O-A switches
- 3 Acknowledge and test switches
- 1 Globe with flasher
- 1 Alarm horn
- 2 EHSM basic with door kit - See note #9
- 1 Four float duplex- with intrinsically safe circuitry-manual reset of the alarm
- 1 120V strip heater and thermostat
- 2 Circulation fans
- Lot 22.5mm industrial grade LED lights
- Lot 22.5mm Operators
- Lot Dry contacts for remote alarm