Site Servicing and Stormwater Management Report
Petrie's Landing I, Phases 3 to 5

Type of Document
Site Plan Submission

Project Name
Petrie's Landing I, Phases 3 to 5

Project Number
OTT-00247308-A0

Site Plan Control File Number
D07-12-18-0143

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1 Introduction

EXP Services Inc. (EXP) was retained by Brigil Homes to complete the site servicing and stormwater management design for Phases 3, 4, and 5 of Petrie's Landing. These three (3) phases will consist of an additional four (4) high-rise condominium buildings for a total of six (6) high-rises within the development. The site is located at 8900 Jeanne D' Arc Boulevard North in the City of Ottawa. Phase 3 (or Tower 3) is located immediately east of the existing 16-storey residential Tower 2 (completed as Phase 2), which is east of the existing 15-storey Tower 1 (completed as Phase 1). Phase 4 will be located east of Tower 3, and Phase 5 will consist of two high-rise residential buildings (*Towers 5 & 6*) located west of Phase 1. The site location is illustrated in Figure A1 of Appendix A.

The total development will serve approximately *2004 persons based on 1,232 residential units* within six (6) high-rise buildings. This report will discuss the adequacy of the existing storm & sanitary sewers and watermains to convey the storm runoff, sewage flows, and water demands that will result from the proposed development.

1.1 Site Description and Proposed Development

Currently the site is occupied by existing residential Towers 1, 2 and 3.

The total property area of original parcel at 8900 Jeanne D' Arc Boulevard North was 5.77 hectares, of which approximately 0.89 hectares was developed as Phase 1, and 0.69 hectares as Phase 2. Currently the remaining 4.19 hectares is undeveloped and consists of brush, woods and meadows. Of this remaining 4.19-hectare property area, Phases 3, 4 and 5 will combine for an additional developed area of 2.34 hectares and the final 1.85 hectares will remain undeveloped. Phases 1 through 5 of Petrie's Landing abuts the Ottawa River to the north, Highway 174 to the south, vacant land to the east and an existing City of Ottawa public works yard to the west. The site location is shown on Figure A1 in Appendix A. The following Table 1-1 below summarizes the breakdown of the existing and proposed phases of Petrie's Landing development by Brigil. Figure A2 in Appendix A illustrates all phases of the development.

Table 1-1: Summary of Petrie's Landing Development

Phase	Status	Area (hectares)	No. of Storeys	No. of Units
Phase 1	Ex. Tower 1	0.8895	15	89
Phase 2	Ex. Tower 2	0.6852	16	144
Phase 3	Ex. Tower 3	0.5676	18	162
Phase 4	Future Tower 4	0.6097	22	261
Phase 5	Future Towers 5	0.7769	22	228
	Future Towers 6	0.3899	32	348
	Undeveloped	1.8521		0
Totals =		5.7709		1,232

This report will demonstrate that the existing and proposed infrastructure will support the development. The report will identify the servicing and stormwater management requirements and provide a servicing design brief for submission with the engineering drawings for Site Plan approval.

1.2 Background Documents

The servicing for the entire subject property was completed in 2005 during the design for Tower 1. At that time, Dave McManus Engineering (DME), prepared a Stormwater Management and Servicing Report, which resulted in the site plan being approved by the City of Ottawa in the fall of 2008. The report, which is noted below, was prepared based on the proposed site plan at that time.

During the development of Phase 1, a sanitary sewer extension on North Service Road, now Jean D'Arc Boulevard North, was constructed to the intersection at Trim Road, along with a stormwater management facility (dry pond), and a double watermain feed was installed to service the site. Additional information on each of the existing; stormwater, sewage and water systems will be provided in upcoming sections of this report. The two existing servicing reports that are relevant to the now proposed Phases 3-5 development are as follows:

- Stormwater Management and Servicing Report, Phase I, David McManus Engineering Ltd. Nov 2008.
- Stormwater Management and Servicing Report, Phase II, EXP Services Inc. June 2016.

In addition, the following documents were referred to in preparing the current report:

- City of Ottawa Sewer Design Guidelines, Second Edition, October 2012, (SDG002) including:
  - Technical Bulletin ISDTB-2012-4 (June 20, 2012)
  - Technical Bulletin ISDTB-2014-01 (February 05, 2014)
  - Technical Bulletin PIEDTB-2016-01 (September 06, 2016)
  - Technical Bulletin ISDTB-2018-01 (March 21, 2018)
  - Technical Bulletin ISDTB-2018-04 (June 27, 2018)
  - Technical Bulletin ISDTB-2019-02 (July 08, 2019)
- Ottawa Design Guidelines – Water Distribution, July 2010 (WDG001), including:
  - Technical Bulletin ISDTB-2010-02 (December 15, 2010)
  - Technical Bulletin ISDTB-2014-02 (May 27, 2014)
  - Technical Bulletin ISTB-2018-02 (March 21, 2018)
  - Technical Bulletin ISTB-2021-03 (August 18, 2021)
- Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change, March 2003 (SMPDM)
- Design Guidelines for Drinking-Water Systems, Ontario Ministry of the Environment and Climate Change, 2008 (GDWS)
- Fire Underwriters Survey, Water Supply for Public Fire Protection (FUS), 2020

1.3 Existing Infrastructure

Existing municipal services were designed and constructed during Phases 1 & 2. A 250mm diameter sanitary sewer was installed within the development along with a 300mm diameter sanitary sewer located offsite within Jean D'Arc Boulevard North (formerly North Service Road). Storm sewers 375mm and 600mm in diameter were installed along the north and south portions of the site, with the smaller 375mm storm used for surface drainage within the access roadway, and a 600mm storm sewer used to collect runoff from the building roofs and surrounding surface areas located above the parking structures below.

Two 200mm watermains were stubbed at the limits of Phase 2 of this development in anticipation for Phases 3 and 4. An onsite stormwater management facility consisting of a dry pond and oil/grit separator were provided up-front during the construction of Phase 1 to service the entire development. Additional information on the existing services is provided in the appropriate sections of this report.

The ground topography within Phase 1 through 5 is relative flat sloping from south to north and becomes steeper towards the Ottawa River. Ground elevations within the overall site boundary range from approximately 44.2 metres to 55.4 metres in elevation.

1.4 Consultation and Permits

During the development of Tower 1, Environmental Compliance Approvals (ECA's) were filed through both the City of Ottawa Transfer of Review program for sewers on Jeanne D'Arc Boulevard, and through a direct submission for onsite stormwater management. Copies of the two existing ECA's are provided in Appendix J for reference.

The original stormwater design incorporated the entire Petrie's Landing development. The stormwater ECA included stormwater detention, flow control and water quality treatment. Further discussion on conformance with the original stormwater design is provided in proceeding sections of this report.

Since the proposed site is located within the Rideau Valley Conservation Authority (RVCA) jurisdiction, signoff from the RVCA will be required prior to Site Plan approval.

2 Geotechnical Considerations

A geotechnical investigation was completed by the Paterson Group Inc. dated May 9, 2019, and was prepared to establish the subsurface and groundwater conditions and to provide recommendations related to excavation, foundation design, backfilling requirements, site grading, pipe bedding, pavement structure.

In general, the site consists of topsoil underlain by very stiff brown silty clay. The stiff clay extends down to depths of over 15 metres below existing grade. Practical refusal was encountered at depths of between 22.8 metres and 32 metres below original ground. Groundwater depth is expected to range between 5 metres and 6 metres below grade.

A permissible grade raise of 3.0 metres was established for the site. The recommended pavement structure for access and fire lanes was established at: 40mm + 50mm of asphalt, 150mm granular "A" and 400mm depth of Granular "B". For car parking areas only the recommended pavement structure was established at: 50mm of asphalt, 150mm granular "A" and 300mm depth of Granular "B".

To help reduce long-term lowering of the groundwater table, clay seals were recommended for service trenches. A 1.5m long clay seal, at 60 metre spacing was recommended.

3 Deviations

There are two noted deviations from the City Design Standards (SDG002).

- Four (4) sanitary sewer runs have full-flow velocities just slightly below the permitted minimum of 0.60 m/sec, based on as-built sewer slopes. Refer to Section 5 for additional details.

4 Watermain Servicing

4.1 Design Criteria

A summary of design parameters used in the water distribution model were taken from Section 4.0 of the City's Design Guidelines – Water Distribution (WDG001), and are as follows:

- Population Density (bachelor/1-bedroom/1-bedroom+den apt.) = 1.4 person/unit
- Population Density (2-bedroom/2-bedroom+den apt.) = 2.1 person/unit
- Population Density (3-bedroom/3-bedroom+den apt.) = 3.1 person/unit
- Average daily water consumption (residential) = 280 L/cap/day
- Maximum Day Factor (2.50 x Avg. Day)
- Maximum Hour Factor (5.50 x Avg. Day)
- C factor (150 mm to 300 mm diameter) 100
- C factor (200 mm to 250 mm diameter) 110
- C factor (300 mm to 600 mm diameter) 120

- Minimum Allowable Pressure = 275 kPa (40 psi)
- Maximum Allowable Pressure = 690 kPa (100 psi)
- Minimum Static Pressure (under fire flow conditions) = 140 kPa (20 psi)
- Required Fire flow (most critical building onsite) = 100 L/sec (refer to Section 4.3.3)

4.2 Proposed Servicing and Calculations

4.2.1 Methodology

The water distribution system proposed for this development is designed in accordance with the WDG001 including the latest technical bulletin. The following steps indicate the basic methodology that was used in the hydraulic analysis:

- A water distribution model was created by adding junction nodes at intersections and creating watermains between the junctions.
- For each junction node the water demand was determined based on the number of units and the corresponding population. For ground floor commercial areas, average demands were taken from the SDG002.
- The water consumption rates were calculated for the maximum day and maximum hour conditions.
- Hydraulic boundary conditions were set from the information obtained from the City of Ottawa. The boundary conditions provided from the City were based on the above water demands and required fire flows.
- Estimated the required fire flow (RFF) based on the Fire Underwriters Survey (FUS), and
- Water modelling scenarios were established to determine results under various demand and layout configurations.
- The proposed water distribution model was simulated, and the results compared with the City of Ottawa criteria.

4.2.2 Water Demands

We estimated the total domestic water demands for the entire site is shown below, using parameters from the City of Ottawa Water Distribution Design Guidelines (WDG001).

Number of Units

Studio / Bachelor apartment units	=	132
1-bedroom / 1-bedroom + den apartment units	=	721
2-bedroom / 2-bedroom + den apartment units	=	365
3-bedroom / 3-bedroom + den apartment units	=	14
Total units	=	1232

Population

132 Studio / Bachelor units (@ 1.4 persons per unit)	=	184.8
721 1-bedroom / 1-bedroom + den units (@ 1.4 persons per unit)	=	1009.4
365 2-bedroom / 2-bedroom + den units (@ 2.1 persons per unit)	=	766.5
14 3-bedroom / 3-bedroom + den units (@ 3.1 persons per unit)	=	43.4
Total Population	=	2004.1

Demand Rates

Average Residential Demands (L/person/day)	=	280
Average Commercial Demands (L/gross ha/day)	=	28,000

Peaking Factors

Max Day Residential Peaking Factor	=	2.5 x avg. day
Max Day Commercial Peaking Factor	=	1.5 x avg. day
Peak Hour Residential Peaking Factor	=	5.5 x avg. day
Peak Hour Commercial Peaking Factor	=	1.8 x avg. day

Residential Water Demands

Total Average Day Demands (2004.1 persons x 280 L/person/day x (1/86,400 sec/day)	=	6.495 L/sec

Total Commercial Average Day Water Demands (in Phase 5)

(0.301 ha x 28,000 L/gross ha/day x (1/86,400 sec/day)	=	0.0975 L/sec
Total Maximum Day Demands (6.495 L/sec x 2.5) + (0.0975 L/sec x 1.5)	=	16.38 L/sec
Total Peak Hour Demands (6.495 L/sec x 5.5) + (0.0975 L/sec x 1.8)	=	35.90 L/sec

The average day, maximum day, and peak hourly demands for all phases of Petrie's Landing development are ***6.59 L/sec***, ***16.38 L/sec***, and ***35.90 L/sec*** respectively.

4.2.3 Hydraulic Boundary Conditions

Hydraulic Grade Line (HGL) boundary conditions were obtained from the City of Ottawa for design purposes. A copy of the correspondence received from the City is provided in Appendix M.

The following HGL boundary conditions were provided by City staff:

- Max Day + Fire Flow (with a RFF of 6,000 L/min) = 108.3 m
- Peak Hour HGL = 106.5 m
- High Pressure Check = 114.0 m

Based on a ground elevation of approximately 52.7m at the boundary condition location this results in a system water pressure of 53.8 m or 76.5 psi during peak hour conditions, and 61.3 m or 87.1 psi at a maximum value. This represents a relatively high pressure since the site is located at a low elevation within Pressure Zone 1E.

4.3 Proposed Servicing and Calculations

4.3.1 Modelling Scenarios

A total of four (4) scenarios were analyzed. The performance of the proposed water distribution system within the development was analyzed under each scenario. The following summarizes the modelling scenarios that were analyzed.

Scenario 1A	Max Day Plus FF	(Based on HGL with Fire Flow Requirement of 6,000 L/min)
Scenario 1B	Max Day Plus FF	(Based on HGL with Fire Flow Requirement of 6,000 L/min) P-3 Out of Service (only one feed available)
Scenario 2	Peak Hour	Two Watermains in Service
Scenario 3	High Pressure Check	Two Watermains in Service

Please refer to Figure A3 in Appendix A which illustrates the water distribution layout.

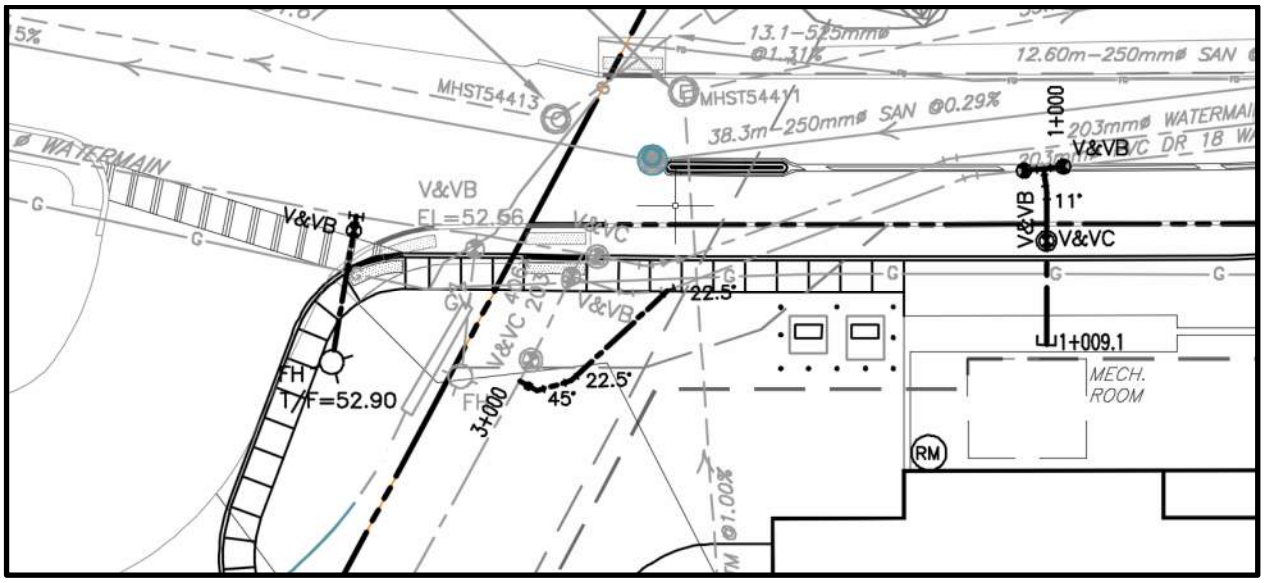
4.3.2 Distribution Layout

Discussions with City of Ottawa staff regarding the layout and distribution of valves at the connection point to the city watermain were held, and as a result, re-configuration of the watermains are proposed for isolation purposes.

Currently there is no isolation valve located between the two existing 200mm diameter watermain feeds into the site. This requirement was established as part of the WDG002 design guidelines in 2010, after the initial installation of these watermain during the development of Phase 1.

In order to support this design requirement, and to provide the ability to isolate either of the 200mm watermains for repair purposes, a portion of the southernmost 200mm watermain entering the subject will be relocated. This work is located within the Phase 5 boundary, just northwest of Tower 5B. The image below illustrates the new watermain layout that is proposed.

Figure 1 – Watermain Updates at Site Entrance



Detailed water model results are included in Appendix C for reference. Based on the modelling results there is sufficient water pressures under peak hour conditions and adequate fire flows under maximum day plus fire flow conditions available under all phases of this development.

4.3.3 Fire Flow Requirements

Water for fire protection will be available utilizing the proposed fire hydrants located along the proposed private roadway. The required fire flows for the proposed site were calculated based on typical values as established by the Fire Underwriters Survey 2020 (FUS) and the City if Ottawa protocol for application of the FUS method (ISTB-2018-02).

The fire flow requirements were calculated for all towers. It was determined the most critical building within the proposed development was Towers 5 and 6 having a fire flow requirement of 100 L/sec, based on the FUS.

The following equation from the Fire Underwriters document "Water Supply for Public Fire Protection", 2020, was used for calculation of the on-site supply rates required to be supplied by the hydrants:

$F = 200 * C * \sqrt{(A)}$

where:

F = Required Fire flow in Litres per minute
C = Coefficient related to type of Construction (0.8 for all residential towers)
A = Total Floor Area in square metres

A reduction for low hazard occupancy of -15% for residential dwellings, and an increase for fire area exposure of +12% (max) was used. Below is a sample calculation of the fire flow requirements for Tower 5 residential building.

Tower 5

F= 220 * 1.5 * √ (4800m^2) = 12,194 L/min rounded to 12,000 L/min
F= 12,000 L/min * (-15% non-combustible) = 10,200 L/min
F= 10,200 L/min * (-50% sprinkler) = 5,100 L/min

F = 5,100 L/min * (+12% exposure factor) = +1,224 L/min

RFF = 5,100 L/min + 1,224 L/min = 6,324 L/min

RFF = 6,324 L/min (rounded to 6,000 L/min or 100 L/sec)

The following summarizes the required fire flows for all buildings, which include the reductions, and/or increases due to occupancy, sprinklers systems and exposures. These fire flows have been calculated based on the FUS method and the City of Ottawa Water Distribution Guidelines (WDG001), and the latest Technical Bulletin.

Table 4-1: Summary of Fire Flow Requirements for All Buildings

Building #	Description	[1]No of Storeys	Fire Flow, F (L/min)	[2]Type of Constr. Coeff, C	[3]Reduction Due to Occupancy (%)	[4]Total Increase due to Exposures (%)	[5,6]Required Fire Flow in	
							(L/min)	(L/sec)
Ex Tower 1	high-rise condo	15	12,000	0.8	-15%	0%	5,000	83
Ex Tower 2	high-rise condo	16	12,000	0.8	-15%	0%	5,000	83
Tower 3	high-rise condo	18	12,000	0.8	-15%	0%	5,000	83
Tower 4	high-rise condo	22	12,000	0.8	-15%	0%	5,000	83
Tower 5	high-rise condo	22	12,000	0.8	-15%	12%	6,000	100
Tower 6	high-rise condo	32	12,000	0.8	-15%	12%	6,000	100

Notes

1 - If basements are included (<50% below grade) then denoted as +.

2 -Types of constructions: 0.8 for non-combustible, 1.0 for ordinary construction,1.5 for wood frame construction

3 - Reductions due to Occupancy are -25% for non-combustible or -15% for limited combustible.

4 – Increase due to exposures were calculated based on FUS and technical bulletin ISTB-2018-02.

5 – Required Fire Flows are rounded to nearest 1,000 L/min.

The fire flow requirement for the proposed site is **6,000 L/min (or 100 L/sec)** based on the most critical building. Please refer to Tables B2 through Table B7 in Appendix B for detailed calculations based on the FUS method.

4.4 Simulation Results

4.4.1 Modelling Results

The results of the WaterCAD modelling under peak hour and maximum day plus fire flow conditions are summarized in Table 4-2 for Scenario 2 and Table 4-3 below for Scenarios 1A, 1B. These results are based on a hydraulic boundary condition at end of Jeanne D'Arc Boulevard where the local watermains connect to the municipal 400mm diameter watermain. The complete results for all scenarios are provided in Appendix C.

Table 4-2: Summary of Results of Scenario 2 for Peak Hour

Junction	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-1	52.70	0.00	106.50	76
J-2	53.53	0.00	106.39	75
J-3	54.30	0.00	106.22	74
J-4	54.80	0.00	106.37	73
J-5	54.80	3.16	106.37	73
J-6	54.30	0.00	106.26	74
J-7	54.30	9.64	106.20	74
J-8	53.30	0.00	106.10	75
J-9	52.62	0.00	106.13	76
J-11	53.30	0.00	106.10	75
J-12	52.15	4.37	106.10	77
J-14	54.18	0.00	106.08	74
J-16	54.70	0.00	106.07	73
J-17	54.80	4.95	106.07	73
J-21	54.70	7.41	106.07	73
J-24	54.30	0.00	106.35	74
J-28	54.03	0.00	106.21	74
J-29	55.00	0.00	106.50	73
J-32	55.00	0.00	106.07	72
J-33	53.86	0.00	106.21	74
J-37	54.60	6.38	106.39	74

The calculated minimum and maximum working pressures anticipated within the development are 72 psi and 77 psi under peak hour conditions for all junctions. This meets the minimum 40 psi as per City of Ottawa Guidelines.

Table 4-3 below provides the results of scenarios 1A and 1B under maximum day plus fire flow conditions.

Table 4-3: Summary Results of Scenario 1A & 1B for Maximum Day Plus Fire Flow

Hydrant Node	Fire Flow Required (L/sec)	Total Flow Available Based on Model Results (L/sec) Based on HGL Using a Fire flow of 6,000 L/min	Satisfies Fire Flow Constraints?
FH-1	100	> 100	True
FH-2	100	> 100	True
FH-3	100	> 100	True
FH-4	100	> 100	True
FH-5	100	> 100	True
FH-6	100	> 100	True
FH-7 (384040H003)	100	> 100	True

Under Maximum Day + Fire Flow conditions the available fire flows are in excess of the required fire flows (RFF) at all junctions, and therefore meeting the City of Ottawa watermain design criteria. Additional information on the available fire flows from each hydrant based on the City's Technical Bulletin 2018-02 is provided in the proceeding section.

Scenario 4 was completed to determine the available fire flows in the event that conduit (P-3) was closed. This would represent only one feed in service and would simulate the fire flows that would be available during a watermain repair. The minimum fire flow available would be 178.8 L/sec at the most easterly fire hydrant (FH-4).

Table 4-4: Summary Results of Scenario 4

Hydrant Node	Available Fire Flow (L/sec)
FH-1	>200
FH-2	184.4
FH-3	190.7
FH-4	178.8
FH-5	>200
FH-6	>200
FH-7 (384040H003)	>200

4.4.2 Review of Hydrant Spacing

A review of the hydrant spacing was completed to ensure compliance with Appendix I of Technical Bulletin ISTB-2018-02. As per Section 3 of Appendix I all hydrants within 150 metres were reviewed to assess the total possible contribution of flow from each contributing hydrant. For each hydrant the distance to the proposed building was determined to arrive at the contribution of fire flow from each. All hydrants are expected to be of Class AA as per Section 5.1 of Appendix I.

The following Table 4-5 below summarizes all fire hydrants within a 150m distance from each of the residential towers. For each hydrant the distance measured along a fire route or roadway was used and its contribution to the required fire flow. A detailed table showing the distances and fire flow from each hydrant to each tower can be found in Table B8 of Appendix B.

Table 4-5: Required Fire Flow Based On Proximity To Asset

Hydrant #	Fire Flow Contribution from Hydrants (L/min)				
	Tower 1	Tower 2	Tower 3	Tower 4	Tower 5/6
#1	5,700	3,800	0	0	5,700
#2	3,800	5,700	3,800	3,800	0
#3	0	3,800	5,700	5,700	0
#4	0	3,800	5,700	5,700	0
#5	3,800	0	0	0	5,700
#6	3,800	3,800	0	0	5,700
#7 (384040H003)	3,800	0	0	0	3,800
Total (L/min)	20,900	20,900	15,200	15,200	20,900
FUS RFF in L/min or (L/sec)	5,000	5,000	5,000	5,000	6,000
	(83)	(83)	(83)	(83)	(100)
Meets Requirement (Yes/No)	Yes	Yes	Yes	Yes	Yes
Notes: *1-Fire Flow Contribution for Class AA Hydrant from Table 1 of Appendix I, ISTB-2018-02*					

From this table the total available contribution of flow from hydrants, which are in proximity to each tower, was estimated at between 15,200 L/min and 20,900 L/min. These values exceed the required fire flows for each residential tower as identified in Appendix I of Technical Bulletin ISTB-2018-02.

4.4.3 High Pressure Check

The estimated pressures within the onsite distribution system based on the high-pressure HGL were estimated between 84 psi and 88 psi. Therefore, the used of pressure reducing valves should be considered by the mechanical consultant during the design of interior water systems of each new proposed tower.

5 Sanitary Sewer Design

5.1 Design Criteria

The criteria established for the design of the sanitary sewer system is in accordance with the latest version of the SDG002 and technical bulletins. The following summarizes the criteria used:

Bachelor units	=	1.4 persons/unit
1-bedroom / 1-bedroom + den units	=	1.4 persons/unit
2-bedroom / 2-bedroom + den units	=	2.1 persons/unit
3-bedroom / 3-bedroom + den units	=	3.1 persons/unit
Residential Peak Factor	=	Harmon Formula
Average Domestic Flow (1874.4 x 280 L/cap/day x (1/86,400 sec/day)	=	280 L/person/day
Permitted velocity	=	0.60 to 6.0 m/sec
Minimum Slope	=	0.24% (250mm)

5.2 Proposed Sanitary Servicing and Calculations

The sanitary sewer system is designed based on a population flow, an allowance for amenity areas within the buildings and an area-based infiltration allowance. The flows were calculated as a summation of all towers using City of Ottawa sewer design guidelines (SDG002) as follows:

Areas

Site area (Phase 1-5)	=	3.92 ha
External areas (1.29 ha + 4.88 ha)	=	6.17 ha

Number of Units

Studio / Bachelor apartment units	=	132
1-bedroom / 1-bedroom + den apartment units	=	721
2-bedroom / 2-bedroom + den apartment units	=	365
3-bedroom / 3-bedroom + den apartment units	=	14

Population

132 Studio / Bachelor units (@ 1.4 persons per unit)	=	184.8
721 1-bedroom / 1-bedroom + den units (@ 1.4 persons per unit)	=	1009.4
365 2-bedroom / 2-bedroom + den units (@ 2.1 persons per unit)	=	766.5
14 3-bedroom / 3-bedroom + den units (@ 3.1 persons per unit)	=	43.4
Equivalent Pop	=	2004.1

Residential Peaking Factor

Peak Factor = $1 + 14 / (4 + (P/1000)^{0.5})^* K$, where K = 0.8

Peak Factor = $1 + 14 / (4 + (2004.1/1000)^{0.5}) \times 0.8$ = 3.07

Domestic Sewage Flow

Average Domestic Flow (2004.1 x 280 L/cap/day x (1/86,400 sec/day)	=	6.49 L/sec
Peak Domestic Flow (3.07 x 6.49)	=	19.94 L/sec

Commercial Area & Amenities

Ground Floor Commercial + amenitites (Ex. Tower 5, 6)	=	1,360 m^2 + 1,650 m^2
External Lands	=	6.171 ha
Commercial / Amenity Peak Factor	=	1.0 (since < 20%)
Commercial / Amenity Average Sewage Flow Allowance	=	28,000 L/gross ha/d
Commercial / Amenity Average Sewage Flow Allowance (6.472 ha x 28,000 L/gross ha/day x 1.5 x (1/86,400 sec/day)	=	3.15 L/sec

Infiltration

Infiltration allowance :	=	0.33 L/ha/sec
Infiltration Flow (10.09 ha x 0.33 L/ha/sec)	=	3.33 L/sec

Total Peak Sewage Flow

Peak Sanitary Flow = 19.94 + 3.15 + 3.33	**=**	**26.41 L/sec**

The estimated peak sanitary flow rate from the proposed property is **26.4 L/sec** based on City of Ottawa Design Guidelines.

The minimum reserve capacity in the sanitary sewer system is estimated at 12.6 L/sec within manhole run MHSA54991 – MHSA54992. This is due to the flat 0.16% slope of this run.

Of the fifteen (15) sanitary sewer runs four (4) have a minimum full-flow velocity less than the required 0.60 m/sec as per the SDG002. The velocities range between 0.53 m/sec and 0.59 m/sec, just below the minimum 0.60 m/sec. Three (3) of these sewer runs are within the Jeanne D'Arc Boulevard downstream of the site, and one run is in Phase2.

It should be noted that the peak sanitary flow calculated is for the ultimate condition with all phases complete and an additional offsite external area of 6.17 hectares being serviced.

It would be recommended that the City elect to schedule regular maintenance on the sanitary sewer runs on Jeanne D'Arc Boulevard east of Trim Road.

6 Stormwater Management

6.1 Background

6.1.1 Existing Conditions

The current stormwater drainage system for the site consists of onsite storm sewers (minor system) and an access roadway (major system). The minor system consists of two onsite storm sewers. One system runs along the rear of the towers parallel to the north property line and discharges westerly into the stormwater pond located in the north/west quadrant of the site. The second storm sewer system runs west and north along the access roadway to the stormwater facility. The stormwater facility (or dry pond) has two inlets and one outlet structure. Stormwater exiting the facility then travels through an oil/grit separator, and then flows easterly along Jeanne D'Arc Boulevard to its outfall location approximately 60 metres west of the property. The outfall consists of a concrete headwall located approximately 10m down the embankment towards the Ottawa River.

The stormwater facility was designed during the development of Phase 1 and was sized to accommodate the entire 3.77-hectare development site. Additional information on the original stormwater design is provided in proceeding sections of this report.

6.1.2 Review of Previous Phase 1 (Tower 1) Design

There are no inlet control devices in catch basins or area drains within Phase 1 to control peak runoff into the minor system. All runoff is directed to the stormwater (SWM) facility. The SWM facility is controlled within the outlet structure using a single orifice to control outflow. The majority of surface runoff is captured by area drains, as the area drains are located on top of the underground parking structure. The building area drains are connected directly into the internal plumbing system and outlet to the storm sewer system north of the buildings. The access road along the south and west portion of the site has a separate storm sewer system connected to the SWM facility.

The following is a summary of the SWM servicing design for the Phase 1, taken from the Original DME Report.

- Total directly connected drainage area = 3.77 ha
- Allowable Runoff Coefficient = 0.25
- Allowable Release rate based on 5-year pre-development = 184.1 L/sec
- 5-year and 100-year storage requirements = 296 m^3 and 680 m^3
- Post-development runoff coefficient (calculated) = 0.58
- Maximum available storage in SWM facility = 708 cubic metres
- Flow Control from Pond = 270mm dia Orifice
- 5-year and 100-year elevation in Pond = 49.47m & 50.07m
- Overflow Elevation of Pond = 50.07m
- Orifice Flow from Pond based on Maximum head = 1.42m

- Quality Control Requirements (RVCA) = 80% TSS
- Vortech Separator. Design Treatment capacity = 240 L/sec
- Vortech Separator. Design TSS removal efficiency = 83% TSS

6.1.3 Review of Previous Phase 2 Design.

The stormwater design for Phase 2 was completed by EXP, which consisted of the review of the existing Phase 1 design and the confirmation that peak flows could still be accommodated based on the design completed during Phase 1.

Phase 2 works consisted of the extension of storm water infrastructure. Approximately 115 metres and three storm sewer manholes were installed to service this phase.

An estimate of the runoff coefficient based on the existing Phase 1, proposed Phase 2, and future Phases 3-5 site plans was completed at the time. An average runoff coefficient of 0.52 for Phase 2 and overall of 0.52 for the entire site, was estimated. This was lower than the original estimate of 0.58 that was established during the design development of Phase 1.

6.1.4 Existing Quality Control

During the design of Phase 1, the Rideau Valley Conservation Authority established that the water quality criteria for the site as "enhanced" protection which is an 80% total suspended solids (TSS) removal.

As part of the construction of Phase 1, a hydro dynamic Vortech separator model 5000 was installed. The separator, manufactured by Contech Stormwater Solutions Inc., was designed for a maximum treatment capacity of 240 L/sec for a drainage area of 3.9 hectares and maximum runoff coefficient of 0.60. The design net annual TSS removal efficiency is 83%. Details on the design of the chamber can be found in the original Phase 1 report.

Therefore, quality control for the entire site is achieved using the existing Vortech separator. It is located downstream of the dry pond prior to outletting into the existing ravine. For Phases 3 to 5 no additional quality control will be required.

6.1.5 Existing Quantity Control

The SWM facility was sized and designed to accommodate the entire 100-year storm within the facility. A review of the stormwater drainage systems in Phase 1 indicates that five (5) flow-controlled roof drains were used, however the 15 area drains did not include flow control. For Phase 2 of the development fifteen (15) roof drains were used. Similarly, the Tower 2 roof drains are flow-control to 30gpm (1.89 L/sec) at 150mm depth as required by the Building Code. The fourteen (14) area drains in Phase 2 are not flow controlled, however ponding will naturally occur as captured flow rate will be dictated by the internal plumbing and is sized based on the Building Code requirements.

None of the area drains require flow controls as the capture rate at each drain is dictated by the internal orifice within the drain. As not all runoff from the 100-year storm will be captured into the storm sewer, flows in excess of the captured rate will be stored onsite and within the existing dry pond. The required 5-year and 100-year storage volumes based on the Modified Rational Method were originally estimated at 296 m^3 and 680 m^3 during the development of Phase 1, and then re-estimated at 302 m^3 and 687 m^3 during the development of Phase 2. These estimates were based on the adjustments to the average runoff

coefficients from site plan updates. The 5-year and 100-year volume requirements were re-calculated based on the average runoff coefficients determined and the permitted release rate. In addition, the 100-year volume requirements were calculated using a runoff coefficient that was increased by 25% as noted in the SDG002. This increased the volume requirements to 360 m^3 and 923 m^3 for the 5-year and 100-year events, respectively.

As indicated in the Phase 1 report, the pond was designed for a maximum capacity of 708 cubic metres. A re-calculation of the 100-year storage volume requirement for the entire site (all phases) was completed based on the Modified Rational Method and the current pond allowable release rate of 176.6 L/sec and the average runoff coefficient of C_{AVG} = 0.55. Using the latest City of Ottawa IDF data, and increasing the runoff coefficient by +25% for the 100-year storm, results in a 100-year volume of 923.2 m^3 for C_{AVG}=0.69.

Therefore, the current pond is slightly short of providing the revised 100-year volume of 923 m^3 to accommodate all phases based on the Modified Rational Method. As previously mentioned, the rooftops of Towers 1 and 2 include flow-controlled drains and this storage volume was not accounted for.

In order to meet the 100-year storage volume requirement, surface ponding and rooftop storage was estimated for all Phases. The rooftop storage for all buildings was estimated using the prism volume formula assuming a maximum 150mm depth. The following table summarizes the estimated volumes available on the roofs based on the roof areas. The actual 100-year ponding volumes on the roofs were calculated using PCSWMM and are presented later in this report.

Table 6-1: Summary of Maximum Ponding Volumes on Rooftop Using Prism Formula

Tower No.	Total Number of Roof Drains	Roof Area (m^2)	Area on Roof Available for Ponding (m^2)	Max. Prism Volume on Roof (m^3)
Tower 1	5	870	870	44
Tower 2	13	906	428	21
Tower 3	13	924	381	19
Tower 4 – High Roof	13	762	640	32
Tower 5 -High Roof	10	583	509	25.5
Tower 6 – High Roof	10	583	509	25.5
Tower 5, 6 Podium	9	1003	754	37.7
Total		5631	4091	204.7

The total ponding volume available on the roofs is estimated at 204.7 m^3. This would supplement the current pond volume of 708 m^3 to yield a total volume of 912.7 m^3. This total available storage volume of 912.7 m^3.

Additional information on the 100-year volumes available in the existing SWM facility, based on full development of the site is provided in upcoming sections of this report, through the development of a dynamic (PCSWMM) hydrologic/hydraulic stormwater model.

6.1.6 Review of Pre-Development Conditions

Although a pre-development peak flow of 184.1 L/sec was calculated during Phase 1 (DME), this rate was based on a developed site area of 3.77 hectares of the total 3.9-hectare site. The remaining 0.13-hectares was to flow offsite rather than to the stormwater facility. What was not calculated in the original report was the contribution of runoff within the site to various outlets.

Although the ultimate discharge point is the Ottawa River, there are two routes that runoff discharges offsite. Therefore 2007 topographic data was obtained from the City and was used to create a 1m x 1m DTM model of 2007 existing conditions. The DTM was loaded in PCSWMM and the watershed delineation tool was used to determine overland subcatchment boundaries and overland flow paths. Figure A5 in Appendix A illustrates the predevelopment subcatchments and identifies the outlets where stormwater runoff discharges offsite.

The following table summarizes the 5-year and 100-year peak flows to each outlet based on same 20-minute time of concentration used during the original phase 1 design.

Table 6-2: Summary of Pre-Development Peak Flows to Various Outlets

Outlet Location	Area (hectares)	5-year Peak Flow (L/sec)	100-year Peak Flow (L/sec)
Northerly to Ottawa River (PRE-1)	3.4530	168.6	359.8
Westerly to Ravine (PRE-2)	0.4659	22.7	48.6
Totals	3.9189	191.3	408.4

Table E1 in Appendix E provides additional detail on the pre-development peak flows. Slight variations in the peak flows can be attributed to the original site area of 3.99 hectares used during Phase 1, and the current area of 3.919 hectares. The original allowable release rate of 184.1 L/sec will be maintained at the outfall from the SWM facility.

6.1.7 Minor System Allowable Capture Rate

The pre-development parameters were taken from the original DME Report and used to determine the allowable release rates from the proposed site using the Rational Formula are re-iterated below:

$Q_{5ALL} = 2.78\ C_{AVG}\ I_T\ A$

where:

Q_{5ALL} = 5-year Peak Allowable Discharge (L/s)
C_{AVG} = Average Runoff Coefficient (0<C<1)
I_T = Average Rainfall Intensity (mm/h) for Return Period
A = Drainage Area (hectares)

Using a time of concentration (T_C) of 20 minutes and a runoff coefficient of 0.25, the allowable release rate (Q_{5ALL}) from the site is determined for the 5-year storm (City of Ottawa Guidelines), I_5, using the IDF Curve as follows:

I_5 = 998.071 / (20 + 6.053)0.814
= 70.3 mm/hr
Q_{5ALL} = 2.78 (0.25) (70.25 mm/hr) (3.77 ha)
= 184.1 L/sec

The allowable release rate from the proposed site is 184.1 L/sec based on a 5-year storm event. The remaining runoff above the 5-year rate, up to the 100-year storm event, will be controlled onsite. This release rate was also based on an area of 3.77 hectares, a runoff coefficient of 0.25 and a 5-year storm intensity of 70.3 mm/hour (Tc = 20 min).

6.2 Proposed Storm Servicing Strategy

6.2.1 Design Methodology

The methodology for the design of the stormwater system is as follows:

- Developed subcatchments for all inlets. This included separate roof areas. The post-development subcatchments are illustrated on Drawing C400.
- Calculated average runoff coefficients for all phases.
- Created new 2-year and 5-year storm design sheets for the entire development based on updated runoff coefficients. The time of concentrations for drainage areas used in the sewer design sheets were updated to 10 minutes. This varies from the 20-minute time of concentrations used in the original design.
- The 2-year storm design sheet was used to establish proposed storm sewer diameters. For existing storm sewer runs, the 2-year and 5-year design sheets were used to determine the system's level of service.
- Recalculated the 5-year and 100-year storage requirements for entire site based on the Modified Rational Method and the allowable release rates.
- Reviewed the existing SWM facility size to accommodate the re-calculated 100-year storage requirements.

New storm sewers will be installed to service Phases 3, 4 and 5 of the development. They will consist of the extension of new 375mm (southern) or 600mm (northern) storm sewers. The storm sewers were sized based on the Rational Method using average runoff coefficients based on computed areas of hard and soft surfaces. Design of the storm sewer system was completed in conformance with the City of Ottawa Design Guidelines Second Edition, 0ct 2012, specifically Section 5 "Storm and Combined Sewer Design". A summary of the design criteria that relates to this design report is listed below in Section 5.2.

Once the storm sewer was sized, a dynamic hydrologic/hydraulic model (PCSWMM) was created that provided peak flow hydrographs and water surface profiles. Additional information on the dynamic model development is included in upcoming sections of this report.

The next section will outline the storm sewer servicing requirements for Phases 3, 4 and 5 of this development and confirm that the previously installed storm sewer infrastructure is appropriate to service these next phases.

6.2.2 Design Criteria

The stormwater system was designed in conformance with the latest version of the City of Ottawa Design Guidelines (October 2012). Section 5 "Storm and Combined Sewer Design", and Section 8 "Stormwater Management" from the design manual were referenced.

A summary of the design criteria that relates to this design report is listed below.

6.2.3 Minor System Design Criteria

- The original storm service was sized based on the rational formula and Manning's Equation under free flow conditions for the 5-year storm using a 20-minute inlet time. The storm sewer system was reviewed based on both the 2-year & 5-year storm design with a 10-minute time of concentration.
- Since a detailed site plan was available for the site, including building footprints, calculations of the average runoff coefficients for each drainage area were completed. Average runoff coefficients were calculated for each inlet drainage area.
- Minimum sewer slopes to be based on minimum velocities for storm sewers of 0.80 m/sec.

6.2.4 Major System Design Criteria

- The major system has been designed to accommodate on-site detention with sufficient capacity to attenuate the 100-year design storm. On-site storage is calculated based on the 100-year design storm with on-site detention storage provided in the SWM facility.
- On site storage is provided and calculated for up to the 100-year design storm with maximum ponding of 150mm depth on the roofs, and either 150mm (over parking structures) or 350mm on the ground surface.
- Calculation of the 100-year storage requirements was completed based on the Modified Rational Method as noted in the City's Design Guidelines. This was compared to the dynamic stormwater model.
- The product of the depth of flow x velocity must be less than 0.6 m/sec under the 100-year storm as per City Guidelines.
- The major system (roadway) has been designed to convey surface runoff to the outlets.
- A minimum of 150mm of vertical clearance must be provided between the spill elevation on the street and the ground elevation at the building.
- Overland flow routes are provided.

6.3 Runoff Coefficients

Imperviousness percentages and average runoff coefficients for all subcatchments were calculated using PCSWMM's area weighting routine. This modelling software has a GIS engine which allows for subcatchment (or polygon) definition including attributes. For all subcatchments these parameters were derived based on based on hard surfaces (concrete or asphalt) having an imperviousness of 100%, and soft surfaces (landscaping surfaces) having a zero percent imperviousness. The conversion from an imperviousness percent to a runoff coefficient was taken as C = (IMP*0.70) / 100 + 0.20, with the imperviousness (IMP) as a percentage.

Individual post-development imperviousness percentages, and runoff coefficients used in the dynamic modelling analysis were based on actual surface cover types. Imperviousness levels of impervious surfaces (roofs, asphalt, and concrete) were taken as 100%, whereas pervious surfaces (grass/landscaping) were taken as 0%.

A background GIS layer was created in PCSWMM and was used in the area weighting routine. This layer included all the ground surface cover types, such as concrete, grass, asphalt, roofs, etc., which contained the percent imperviousness for each polygon. All subcatchment imperviousness attributes were updated based on the weighting routine. Average runoff coefficients for each subcatchment were derived from the above noted formula.

The average runoff coefficients for each phase of development and the overall site area under post-development conditions was calculated. The following table below summarizes the average runoff coefficients for each phase.

Table 6-3: Summary of Post-Development Average Runoff Coefficients

Phase	Area (hectares)	Average Runoff Coefficient
Phase 1	0.8895	0.48
Phase 2	0.6852	0.58
Phase 3	0.5676	0.55
Phase 4	0.6097	0.48
Phase 5	0.3899	0.74
Phase 6	0.7769	0.58
Total =	3.9188	0.55

6.4 Minor System (Storm Sewer) Design

Average runoff coefficients were calculated for all drainage areas for sizing of the storm sewers. Inlet times of 10 minutes were used for the storm sewers. The average post-development runoff coefficient was calculated as 0.55 for the overall site.

The Storm Drainage Plan is illustrated on Drawing C400. A total seventy-six (76) subcatchments (or drainage areas) are shown on this drawing with average runoff coefficients calculated for each drainage area.

Under the 2-year storm event, pipe capacity is adequately provided with no overcapacity within the proposed development. Under the 5-year storm event, 5 of the 19 sewer runs upstream of the SWM facility would surcharge assuming free flow conditions (no inlet restrictions). Design sheets for the 2-year sizing of the storm sewer system, and the 5-year calculations for runoff are included for reference in Appendix E.

6.5 Stormwater Management Modelling

The site is designed using a dual drainage stormwater model. Dual drainage systems consist of two separate and distinct networks, being a) the minor (or storm sewer) system and b) the major (or street) system. Storm sewer inlets intercept runoff from catchments and links are created between the major system and the minor system.

For this analysis all minor and major system components were included in the PCSWMM model, including inlet control devices (ICDs) in catchbasins, inlet control for catchbasins in flow-by conditions, and storage for catch basins in ponding conditions.

Rating curves were developed for ICD's based on manufactures specifications, for surface and curb-inlet type catchbasins, and for surface ponding areas.

6.5.1 Hydrologic/Hydraulic Analysis

PCSWMM was used to create a dual drainage hydrologic/hydraulic model of the storm sewer system. The model accounts for both the minor system (storm sewer) and the major system (roads). Catchbasins were modelled in either a flow-by condition or in a ponding condition. For catchbasins in flow-by conditions inlet capture curves were developed based on the type of curbs used (mountable curb in this case), and the inlet type (either curb inlet catchbasins or surface inlet catchbasins). Ponding areas were modelled as storage nodes with surface ponding represented by area-depth curves above the inlet control devices (ICDs) located at the outlet pipe invert. Calculations of runoff was completed based on the PCSWMM's EPA SWM 5 engine. Catchment parameters were taken from City of Ottawa's SDG002 Design parameters. The following design parameters and assumptions are noted as follows:

- Infiltration losses based on Horton Equation as per City of Ottawa SDG002.
- Impervious and pervious depression storage as per City of Ottawa SDG002.
- 5-year, 3-hour Chicago storm used to review minor system design based on Rational Method.
- 100-year, 3-hour Chicago storm used assess impact of major event and determine peak flows and depth of runoff.
- Runoff coefficient for all subcatchments were determined using area weighting routine and based on actual hard and soft surface areas. Runoff coefficients were calculated from the impervious levels using the relationship C = (IMP x 0.7) + 0.20.
- Subcatchment areas were derived tributary to each surface inlet (catchbasin).
- Subcatchment widths are equal to the subcatchment area divided by the overland flow path length. As per City Guidelines, the subcatchment width is equal to 2 x length or two-sided catchments.
- Inflows from all catchbasins were restricted with inlet control devices (ICDs) necessary to ensure allowable capture rate of not more than 100 L/sec was maintained.
- The volume of surface ponding at low-points were calculated using the prism-formula (V=1/3*A*H).

6.5.2 Parameters

Drawing C400 illustrate the post-development storm drainage system. Flow path lengths for each subcatchment was determined based on the average overland flow path length, with the catchment width being the area/length. Subcatchment slopes were set at 1%. The following summarizes the general subcatchment parameters used:

Table 6-4: General Subcatchment Parameters

Parameter	PCSWMM Parameter	Value
Infiltration Loss Method		Horton
Maximum Infiltration Rate	Max. Infil. Rate	76 mm/hr
Minimum Infiltration Rate	Min. Infil. Rate	13.2 mm/hr
Decay Constant (1/hr)	Decay Constant	4.14
Manning N (Impervious)	N Impev	0.013
Manning N (Pervious)	N Perv	0.40
Depression Storage – Pervious Surfaces	Dstore Imperv	1.57 mm
Depression Storage – Impervious Surfaces	Dstore Perv	4.67 mm
Zero Percent Impervious	Zero Imper	25%
Subcatchment Slopes	Slope	0.5% or 1%

Table 6.5 below presents the individual subcatchment parameters that were developed and used in the PCSWMM model.

Table 6-5: Post-Development Subcatchment Parameters

Name	Outlet	Area (ha)	Width (m)	Flow Path Length (m)	Slope (%)	IMP (%)	*Cavg*
S01	T3-ROOF-5-NOSTORAGE	0.0074	24.7	2.996	1	100	0.9
S02	OUTFALL_174	0.0048	9	5.333	1	22.2	0.36
S04	OUTFALL_174	0.0285	178.1	1.6	1	6.7	0.25
S05	IN138478	0.037	81.2	4.557	0.5	1	0.21
S06	T3-ROOF-2-STORAGE	0.0075	25	3	1	100	0.9
S07	SP35	0.1446	57.6	25.104	1	73.8	0.72
S08	DITCH-OUT	0.0594	35.8	16.592	0.5	36.4	0.45
S09	T3-ROOF-4-NOSTORAGE	0.0294	36.8	7.989	1	100	0.9
S10	T3-ROOF-3-STORAGE	0.0078	26	3	1	100	0.9
S11	T2-ROOF3-STORAGE	0.0092	30.7	2.997	1	99.7	0.9
S12	T2-ROOF-4-NOSTORAGE	0.0293	36.6	8.005	1	99.9	0.9
S13	T2-ROOF2-STORAGE	0.0096	32	3	1	100	0.9
S14	T2-ROOF1-STORAGE	0.0359	44.9	7.996	1	100	0.9
S15	T2-ROOF-5-NOSTORAGE	0.0066	22	3	1	99.9	0.9
S16	CB07	0.028	25.8	10.853	1	13	0.29
S17	SP09	0.0246	17.1	14.386	1	25.8	0.38
S18	SP10	0.0168	16.8	10	1	22.9	0.36
S19	SP11	0.0366	26	14.077	1	23.6	0.37

S20	SP05	0.0411	30.3	13.564	1	18.1	0.33
S21	SP02	0.0849	49.5	17.152	1	100	0.9
S22	TOWER1-CONN	0.0299	33.3	8.979	1	68.9	0.68
S23	SWM-POND	0.1972	143.2	13.771	1	0.4	0.2
S24	202B	0.0602	11	54.727	1	11.6	0.28
S25	MHST54415	0.0338	11.4	29.649	1	0	0.2
S26	SP04	0.0662	33.6	19.702	1	10.5	0.27
S27	SP06	0.0552	38	14.526	1	81	0.77
S28	SP07	0.0328	26.2	12.519	1	71.4	0.7
S29	SP12	0.0376	30	12.533	1	23.1	0.36
S30	CB11	0.1517	46.3	32.765	1	22.5	0.36
S31	SP03	0.0372	56.3	6.607	1	99.9	0.9
S32	TOWER1-CONN	0.0197	9.1	21.648	1	99.8	0.9
S33	SP30	0.0302	47	6.426	1	17.9	0.33
S34	SP08	0.0543	17.5	31.029	1	75.7	0.73
S37	T1-ROOF-STORAGE	0.087	87	10	1	100	0.9
S38	MHST54409	0.0506	59.5	8.504	1	100	0.9
S39	TOWER1-CONN	0.0951	79.3	11.992	1	19.9	0.34
S40	SP01	0.114	47	24.255	1	64.6	0.65
S41	MHST54411	0.213	132.1	16.124	1	84.6	0.79
S42	CB10-MAJ	0.127	38.5	32.987	1	68.4	0.68
S43	TOWER2-CONN-1	0.029	7.9	36.709	1	100	0.9
S44	MHST76834	0.0496	12.2	40.656	1	0.5	0.2
S45	IN141918-MAJ	0.0396	50.1	7.904	1	79.7	0.76
S46	SP28	0.0113	19	5.947	1	18.2	0.33
S47	TOWER4-CONN-2	0.0243	9.3	26.129	1	91	0.84
S48	CB05-MAJ	0.0359	15.9	22.579	1	85	0.8
S49	SP20	0.0801	68.5	11.693	1	59.1	0.61
S50	SP13	0.02	37.3	5.362	1	33.5	0.43
S51	SP14	0.0231	22.4	10.312	1	39	0.47
S52	SP15	0.0224	23.7	9.451	1	29.9	0.41
S53	OUTFALL_OTT_RIVER_2	0.0634	149.3	4.246	0.5	0	0.2
S54	SP19	0.0442	47.3	9.345	1	7.9	0.26
S55	CB04-MAJ	0.0232	13.7	16.934	1	67.2	0.67
S56	SP18	0.0223	38.3	5.822	1	44	0.51
S57	SP36	0.0235	18	13.056	1	32.5	0.43
S58	206	0.0211	16.8	12.56	1	20.8	0.35
S59	SP99	0.2066	256.7	8.048	0.5	2	0.21
S60	SP17	0.0205	25.2	8.135	1	24.2	0.37

S61	SP16	0.0213	21.7	9.816	1	34.7	0.44
S62	SP22	0.0443	37.7	11.751	1	56	0.59
S63	SP21	0.0435	31.8	13.679	1	71.5	0.7
S64	SP27	0.0516	63	8.19	1	27.2	0.39
S65	CB08	0.0253	10	25.3	1	4.5	0.23
S66	CB09	0.0639	28.7	22.265	1	13.9	0.3
S67	T5A5B-ROOF-STORAGE	0.1003	60.8	16.497	1	100	0.9
S67_1	T4-ROOF2-NOSTORAGE	0.0511	102.2	5	1	100	0.9
S67_2	T4-ROOF1-STORAGE	0.0762	152.4	5	1	100	0.9
S68	SP26	0.0279	23.2	12.026	1	28.9	0.4
S69	SP25	0.0366	45.5	8.044	1	18	0.33
S70	SP23	0.0828	92.1	8.99	1	26.7	0.39
S71	SP24	0.023	32.6	7.055	1	9.2	0.26
S72	TOWER2-CONN-1	0.005	5.1	9.804	1	100	0.9
S73	SP31,SP32	0.0048	9.7	4.948	1	99.9	0.9
S74	SP29	0.0147	16	9.188	1	46	0.52
S75	IN141919-MAJ	0.1074	33	32.545	1	69.6	0.69
S76	T3-ROOF-1-STORAGE	0.0403	50.4	7.996	1	100	0.9
S77	T5-ROOF-AMMENITY_1	0.0208	46.2	4.502	1	100	0.9
S78	T5-ROOF_AMMENITY_2	0.021	46.7	4.497	1	100	0.9
S79	T5-ROOF-STORAGE	0.0583	55.5	10.505	1	100	0.9
S80	T6-ROOF_AMMENITY_1	0.0169	37.6	4.495	1	100	0.9
S81	T6-ROOF_AMMENITY_2	0.021	46.7	4.497	1	100	0.9
S82	T5A-ROOF-STORAGE	0.0583	55.5	10.505	1	100	0.9

Storage Node Parameters

None of the catchbasin (CBs) are equipped with inlet control devices (ICDs) as there are only two (2) CBs that are located in ponding conditions. One (1) CB is located at the low point adjacent to the underground parking ramp for Tower 1, and the other CB is located within the parking lot for Tower 2. For both CBs there is minimal ponding depth, and therefore a relatively low capture rate through the lid. It was determined that ICDs were not necessary for these two catchbasins.

There are ten (10) additional catchbasins within the entire development, of which six are located along the access road and are in a flow-by condition. Along the rear of the building three (3) catchbasins are required to pick up drainage at low points in the existing topography.

Catchbasins under ponding and flow-by conditions were modelled as storage nodes. These storage nodes used in the model represent the catchbasins and major system junctions. For storage nodes modeled as catchbasins, the invert of the storage node is representative of the invert of the CB and the rim of the storage node is the top of the CB plus the ponding depth plus an additional allowance of 150mm for overland flow. This allowance permits the model to route any additional overland flow downstream to another junction. Ponding at low points are represented using storage area-depth curves in PCSWMM, with the depth (or head) measured from the invert of the catchbasin. For this project area-depth curves

for surface ponding was used at catchbasins and at area drains. Rating curves at surface ponding locations are provided in Appendix G.

Similarly, ponding on the flat roofs of the towers were modelled as storage nodes. The rating curves for the storage functions for each roof was determined based on the effective roof ponding areas, and the maximum 150mm depth as permitted by the Ontario Building Code (OBC). Like the surface areas ponding is represented using an area-depth curve in PCSWMM, with the depth (or head) measured from the low point of the roof (i.e. roof drain weir elevation). Rating curves at ponding locations of the roofs are provided in Appendix F. Individual rating curves for each roof is provided, with a summary table at the beginning of Appendix F. Please note that these tables also provide the head-outflow curves for each roof, which will be further discussed in the Outlet Node (ICD) Parameters section of this report.

Table 6-6 below summarizes all the storage nodes used in the PCSWMM model, the associated invert and rim elevations, the curves type and name, the type of storage and the number of inlets.

Table 6-6: Storage Node Parameters

Name	Invert Elev. (m)	Rim Elev. (m)	Depth (m)	Storage Curve	Curve Name	TYPE	No of Inlets
SP01	54.45	54.82	0.37	TABULAR	SP01-STORAGE	AREA_DRAINS	4
SP02	54.31	54.82	0.51	TABULAR	SP02-STORAGE	AREA_DRAINS	2
SP03	52.38	52.7	0.32	TABULAR	SP03-STORAGE	PLUG-ICD	1
SP04	54.35	54.8	0.45	TABULAR	SP04-STORAGE	AREA_DRAINS	1
SP05	54.4	54.75	0.35	TABULAR	SP05-STORAGE	AREA_DRAINS	2
SP06	54.4	54.84	0.44	TABULAR	SP06-STORAGE	AREA_DRAINS	1
SP07	54.45	54.84	0.39	TABULAR	SP07-STORAGE	AREA_DRAINS	1
SP08	53.75	54.23	0.48	TABULAR	SP12-STORAGE	PLUG-ICD	1
SP09	54.4	54.85	0.45	TABULAR	SP09-STORAGE	AREA_DRAINS	1
SP10	54.47	54.85	0.38	TABULAR	SP10-STORAGE	AREA_DRAINS	1
SP11	54.4	54.85	0.45	TABULAR	SP11-STORAGE	AREA_DRAINS	1
SP12	54.4	54.85	0.45	TABULAR	SP12-STORAGE	AREA_DRAINS	1
SP13	54.53	54.95	0.42	TABULAR	SP13-STORAGE	AREA_DRAINS	2
SP14	54.51	54.94	0.43	TABULAR	SP14-STORAGE	AREA_DRAINS	1
SP15	54.51	54.93	0.42	TABULAR	SP15-STORAGE	AREA_DRAINS	1
SP16	54.51	54.91	0.4	TABULAR	SP16-STORAGE	AREA_DRAINS	1
SP17	54.51	54.9	0.39	TABULAR	SP17-STORAGE	AREA_DRAINS	1
SP18	54.5	54.85	0.35	TABULAR	SP18-STORAGE	AREA_DRAINS	1
SP19	54.5	54.96	0.46	TABULAR	SP19-STORAGE	AREA_DRAINS	1
SP20	54.5	54.96	0.46	TABULAR	SP20-STORAGE	AREA_DRAINS	2
SP21	54.5	54.9	0.4	TABULAR	SP21-STORAGE	AREA_DRAINS	1
SP22	54.5	54.95	0.45	TABULAR	SP22-STORAGE	AREA_DRAINS	1
SP23	54.6	55	0.4	TABULAR	SP23-STORAGE	AREA_DRAINS	4
SP24	54.65	55.02	0.37	TABULAR	SP24-STORAGE	AREA_DRAINS	2

SP25	54.75	55.1	0.35	TABULAR	SP25-STORAGE	AREA_DRAINS	2
SP26	54.6	55.03	0.43	TABULAR	SP26-STORAGE	AREA_DRAINS	1
SP27	54.75	55.1	0.35	TABULAR	SP27-STORAGE	AREA_DRAINS	3
SP28	54.75	55.1	0.35	TABULAR	SP28-STORAGE	AREA_DRAINS	2
SP29	54.75	55.15	0.4	TABULAR	SP29-STORAGE	AREA_DRAINS	1
SP30	54.85	55.25	0.4	TABULAR	SP30-STORAGE	AREA_DRAINS	3
SP31,SP32	54.76	55.14	0.38	TABULAR	SP31,SP32-STORAGE	AREA_DRAINS	2
SP35	53.35	53.8	0.45	TABULAR	SP35-STORAGE	AREA_DRAINS	3
SP36	54.15	54.55	0.4	TABULAR	SP38-STORAGE	AREA_DRAINS	1
SP99	51.89	52.49	0.6	TABULAR	SP99		0
SWM-POND	48.63	51	2.37	TABULAR	SWM-POND-DME-ADJ	DRY_POND	1
T1-ROOF-STORAGE	60	60.15	0.15	TABULAR	TOWER1-ROOF-STORAGE	ROOF_DRAINS	5
T2-ROOF1-STORAGE	60	60.15	0.15	TABULAR	TOWER2-ROOF1-STORAGE	ROOF_DRAINS	4
T2-ROOF2-STORAGE	60	60.15	0.15	TABULAR	TOWER2-ROOF2-STORAGE	ROOF_DRAINS	4
T2-ROOF3-STORAGE	60	60.15	0.15	TABULAR	TOWER2-ROOF3-STORAGE	ROOF_DRAINS	4
T2-ROOF-4-NOSTORAGE	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	6
T2-ROOF-5-NOSTORAGE	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	2
T3-ROOF-1-STORAGE	60	60.15	0.15	TABULAR	TOWER3-ROOF1-STORAGE	ROOF_DRAINS	5
T3-ROOF-2-STORAGE	60	60.15	0.15	TABULAR	TOWER3-ROOF2-STORAGE	ROOF_DRAINS	5
T3-ROOF-3-STORAGE	60	60.15	0.15	TABULAR	TOWER3-ROOF3-STORAGE	ROOF_DRAINS	0
T3-ROOF-4-NOSTORAGE	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	8
T3-ROOF-5-NOSTORAGE	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	0
T4-ROOF1-STORAGE	60	60.15	0.15	TABULAR	TOWER4-HIGHROOF-STORAGE	ROOF_DRAINS	12
T4-ROOF2-NOSTORAGE	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	9
T5A5B-ROOF-STORAGE	60	60.15	0.15	TABULAR	TOWER5&6-PODIUM-BALLAST-ROOF	ROOF_DRAINS	9
T5A-ROOF-STORAGE	60	60.15	0.15	TABULAR	TOWER5A-ROOF-STORAGE	ROOF_DRAINS	10
T5-ROOF_AMMENITY_2	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	0
T5-ROOF-AMMENITY_1	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	0
T5-ROOF-STORAGE	60	60.15	0.15	TABULAR	TOWER5-ROOF-STORAGE	ROOF_DRAINS	10
T6-ROOF_AMMENITY_1	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	0
T6-ROOF_AMMENITY_2	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	0

6.5.3 Existing SWM Pond Parameters

The existing stormwater facility is located at the north-westerly edge of the site and collects and detains stormwater runoff for large storm events. The pond is a dry detention area, which does not have a permanent pool for water quality treatment. Rather, stormwater treatment is achieved in a downstream oil/grit separator. The size of the retention area is large enough to contain the 100-year event, having a maximum volume of 708 m^3 at its spill elevation. The following summarizes the pond volumes based on the original DME design prepared during Phase 1:

Table 6-7: Existing Stormwater Facility Stage-Storage Data

Depth (m)	Incr. Depth (m)	Elevation (m)	Area (m2)	Incr. Vol (m3)	Cumulative Vol (m3)
1.44	0.60	50.07	667	344	708
0.84	0.84	49.47	478	365	365
0.00	0	48.63	390	0	0

A copy of certificate of Approval for this stormwater facility is provided in Appendix J for reference.

As a result of changes to the City of Ottawa Design Guidelines since 2007, an updated dynamic stormwater management model was prepared for the development. With the requirement to increase runoff coefficient parameters for major events, there is an increased stormwater storage requirement. From the modeling it was determined that the existing pond would discharge through its overflow channel during the 100-year event, without a minor modification to the outflow channel in the pond. An iterative process was used in the PCSWMM model to raise the overflow elevation from 50.07m to 50.31m, which increased the pond volume from 708m^3 to the new proposed storage volume of 897 m^3.

6.5.4 Outlet Node Parameters

In PCSWMM, OUTLETS are flow control devices used to control the outflow from storage units. OUTLETS are defined using rating curves, that relate head versus discharge. OUTLETS are represented by a link connecting two nodes. In this analysis OUTLETS were used to model flow-controlled roof drains, area drains, catchbasins in flow-by condition and the SWM pond outlet. The following summarizes the flow control methods used in this analysis:

Roof Areas:

- Flow Controlled Roof Drains (Tower 1) — Watts ACCUTROL (full position)
- Flow Controlled Roof Drains (Tower 2 – High Roof) — Watts ACCUTROL (full position)
- Flow Controlled Roof Drains (Tower 2 – Amenities Roof) — No Flow Control
- Flow Controlled Roof Drains (Tower 3 – High Roof) — Watts ACCUTROL (50% position)
- Flow Controlled Roof Drains (Tower 3 – Amenities Roof) — No Flow Control
- Flow Controlled Roof Drains (Towers 4 - High Roof) — Watts ACCUTROL (50% position)
- Flow Controlled Roof Drains (Towers 4 – Amenities Roof) — No Flow Control
- Flow Controlled Roof Drains (Towers 5 - High Roof) — Watts ACCUTROL (50% position)
- Flow Controlled Roof Drains (Towers 5 - Amenities Roof) — No Flow Control

- Flow Controlled Roof Drains (Towers 6 - High Roof) — Watts ACCUTROL (50% position)
- Flow Controlled Roof Drains (Towers 6 - Amenities Roof) — NO FLOW CONTROL

Surface Areas

- Surface Areas: Area Drains (Tower 1) — JR Smith Model 1005
- Surface Areas: Area Drains (Tower 2) — WATTS FD-463P (75mm orifice)
- Surface Areas: Area Drains (Towers 3) — WATTS FD-460-AF (75mm orifice)
- Surface Areas: Area Drains (Towers 4,5,6) — WATTS FD-460-AF (75mm orifice)
- Ex. SWM Facility Pond Outlet: — Plug Type ICD (263mm DIA)

Rating curves for the area drains and the SWM pond outlet are presented in Appendix H. whereas the rating curves for individual roofs are presented in Appendix F. Since the same flow-controlled roof drain are used for majority of the towers, and the discharge from each drain is dependent on the depth of flow and the number of drains, rating curves for each roof area was completed based on the number of drains. All rating curves for the roof areas are presented in Appendix F.

As previously mentioned, the seven (7) catchbasins located along the southern access road are not equipped with inlet control devices as only one (1) in a ponding condition, with the other six (6) catchbasins in a flow-by condition. Table 6-8 below summarizes the OUTLETS used in the modelling of the stormwater system. Additional information on the outlet node parameters used for modeling of the inlet capacity at flow-by conditions is presented in proceeded sections of this report. For now, the table below summarizes the rating curves used for all PCSWMM OUTLETS. The outlets (or flow control devices) used in the model consist of 1) area drains, 2) roof drains, and 3) inlet capacity at CBs in flow-by conditions. Within the first column [Name] of Table 6-8 below, T2-P2-Out refers to Tower#2-PondingArea#2-Outet and T4-R1-OUT refers to Tower#4-RoofArea#1-Outlet, etc. Within column 2 [Outlet Node] TOWER2-CONN-1 refers to Tower#2-RoofArea#2-Lateral#2, and so on.

Table 6-8: Outlet (ICD) Node Parameters

Name	Outlet Node	Type	Inlet Elev. (m)	Rating Curve	Curve Name	100-yr Flow (L/s)
SP01-OUTLET	TOWER1-CONN	AREA_DRAINS	54.45	TABULAR/DEPTH	Tower1_AreaDrains_4Drains	38.78
SP02-OUTLET	TOWER1-CONN	AREA_DRAINS	54.31	TABULAR/DEPTH	Tower1_AreaDrains_2Drains	21.28
SP04-OUTLET	TOWER2-CONN-1	AREA_DRAINS	54.35	TABULAR/DEPTH	Tower2_AreaDrains_1Drain	6.12
SP05-OUTLET	TOWER2-CONN-1	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_2Drains	9.81
SP06-OUTLET	TOWER2-CONN-1	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_1Drain	6.08
SP07-OUTLET	TOWER2-CONN-1	AREA_DRAINS	54.45	TABULAR/DEPTH	Tower2_AreaDrains_1Drain	5.47
SP09-OUTLET	TOWER2-CONN-2	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_1Drain	5.35
SP10-OUTLET	TOWER2-CONN-2	AREA_DRAINS	54.47	TABULAR/DEPTH	Tower2_AreaDrains_1Drain	4.93

SP11-OUTLET	TOWER2-CONN-2	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_1Drain	5.47
SP12-OUTLET	TOWER2-CONN-2	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_1Drain	5.6
SP13-OUTLET	TOWER3-CONN-1	AREA_DRAINS	54.53	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains	8.09
SP14-OUTLET	TOWER3-CONN-1	AREA_DRAINS	54.51	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	5.73
SP15-OUTLET	TOWER3-CONN-1	AREA_DRAINS	54.51	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	5.78
SP16-OUTLET	TOWER3-CONN-1	AREA_DRAINS	54.51	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	5.3
SP17-OUTLET	TOWER3-CONN-1	AREA_DRAINS	54.51	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	5.13
SP18-OUTLET	TOWER3-CONN-1	AREA_DRAINS	54.6	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	6.13
SP19-OUTLET	TOWER3-CONN-1	AREA_DRAINS	54.45	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains	9.98
SP20-OUTLET	TOWER3-CONN-2	AREA_DRAINS	54.5	TABULAR/DEPTH	Tower3/4/5_AreaDrains_3Drains	19.17
SP21-OUTLET	TOWER4-CONN-1	AREA_DRAINS	54.5	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	6.71
SP22-OUTLET	TOWER4-CONN-1	AREA_DRAINS	54.5	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains	11.15
SP23-OUTLET	TOWER3-CONN-2	AREA_DRAINS	54.6	TABULAR/DEPTH	Tower3/4/5_AreaDrains_4Drains	21.08
SP24-OUTLET	TOWER3-CONN-2	AREA_DRAINS	54.65	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains	7.26
SP25-OUTLET	TOWER4-CONN-1	AREA_DRAINS	54.75	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains	9.94
SP26-OUTLET	TOWER4-CONN-1	AREA_DRAINS	54.6	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	5.7
SP27-OUTLET	TOWER4-CONN-1	AREA_DRAINS	54.75	TABULAR/DEPTH	Tower3/4/5_AreaDrains_3Drains	15.23
SP28-OUTLET	TOWER4-CONN-2	AREA_DRAINS	54.75	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	3.94
SP29-OUTLET	TOWER4-CONN-2	AREA_DRAINS	54.75	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	5.19
SP30-OUTLET	TOWER4-CONN-2	AREA_DRAINS	54.85	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains	9.75
SP31,SP32-OUTLET	TOWER3-CONN-2	AREA_DRAINS	54.76	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains	2.38
SP35-OUTLET	TOWER5A5B-CONN	AREA_DRAINS	53.35	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains	13.43
SP36-OULTET	TOWER5A5B-CONN	AREA_DRAINS	54.15	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain	5.41
CB4-IC	CB04	CB-INLET_CONTROL	53.97	TABULAR/DEPTH	CB-IC	10.83
CB5-IC	CB05	CB-INLET_CONTROL	54.53	TABULAR/DEPTH	CB-IC	10.53
CB9-IC	CB10	CB-INLET_CONTROL	53.32	TABULAR/DEPTH	CB-IC	22.74
IN141918-IC	IN141918	CB-INLET_CONTROL	52.55	TABULAR/DEPTH	CB-IC	54.87
IN141919-IC	IN141919	CB-INLET_CONTROL	53.32	TABULAR/DEPTH	CB-IC	49.88
T1-ROOF-OUTLET	TOWER1-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower1_RoofDrains_5Drains	8.54

T2-ROOF-1-OUTLET	TOWER2-CONN-1	ROOF_DRAINS	60	TABULAR/DEPTH	Tower2_RoofDrains_5Drains	7.51
T2-ROOF-2-OUTLET	TOWER2-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	Tower2_Roof_Drains_4Drains	4.19
T2-ROOF-3-OUTLET	TOWER2-CONN-1	ROOF_DRAINS	60	TABULAR/DEPTH	Tower2_Roof_Drains_4Drains	4.06
T2-ROOF-4-OUTLET	TOWER2-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	14.51
T2-ROOF-5-OUTLET	TOWER2-CONN-1	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	3.27
T3-ROOF-1-OUTLET	TOWER3-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	Tower3_RoofDrains_5Drains	6.07
T3-ROOF-2-OUTLET	TOWER3-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	Tower3_RoofDrains_4Drains	1.26
T3-ROOF-3-OUTLET	TOWER3-CONN-1	ROOF_DRAINS	60	TABULAR/DEPTH	Tower3_RoofDrains_4Drains	1.26
T3-ROOF-4-OUTLET	TOWER3-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	14.56
T3-ROOF-5-OUTLET	TOWER3-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	3.66
T4-AMENITYROOF-OUTLET	TOWER4-CONN-2	ROOF_DRAINS	60	TABULAR/HEAD	No_Flow_Control	25.31
T4-HIGHROOF-OUTLET	TOWER4-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	Tower4_RoofDrains_13Drains	11.19
T5&6_Podium-ROOF-OUTLET	TOWER5A5B-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_Podium_Roof_9Drains	10.82
T5_AMMENITY_OUTLET_1	TOWER5A5B-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	10.3
T5_AMMENITY_OUTLET_2	TOWER5A5B-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	10.4
T5-ROOF_HIGH_OUTLET	TOWER5A5B-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5_HighRoofDrains_10Drains	10.59
T6_AMMENITY_OUTLET_1	TOWER5A5B-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	0
T6_AMMENITY_OUTLET_2	TOWER5A5B-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	0
T6-ROOF-HIGH-OUTLET	TOWER5A5B-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower6_RoofDrains_10Drains	10.9

6.6 Dual Drainage Modelling Methodology

6.6.1 Model Development

The subcatchment (or storm drainage areas) were developed in Autodesk CIVIL 3D and imported into PCSWMM. PCSWMM was then used to generate impervious levels for each subcatchment with the area-weighting command. Storm sewers and manholes were imported from CIVIL 3D as GIS shape files and the node and conduit elevations and sizes were inputted based on the preliminary sizing completed with the Rational Method analysis. Connections between the catchbasin nodes and the sewer main were converted to OUTLETS to represent the ICDs. Once all the minor system components were inputted, the major system was defined connecting inlets.

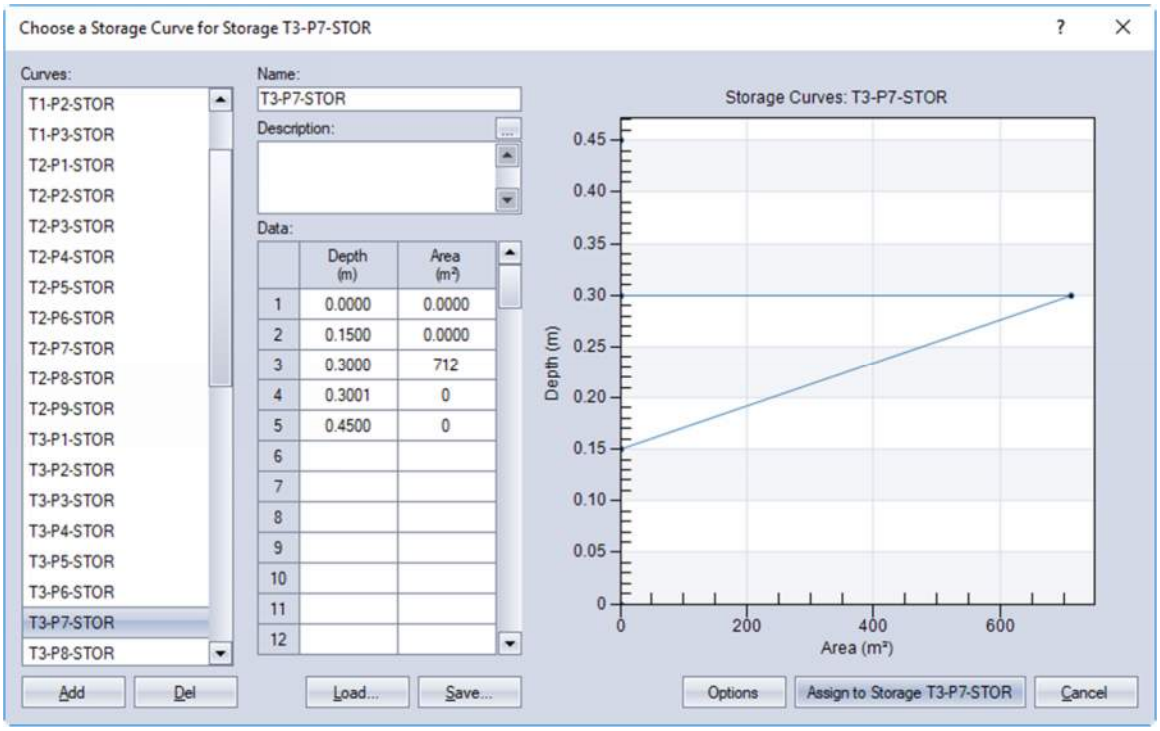
The major system was represented as irregular conduits based on a half-street cross-section. The transect editor in PCSWMM was used to establish this transect, which was applied to the majority of the major system. In addition, swale and roadway spill irregular transects were used to represent the overland flows. In flow-by conditions all subcatchments were linked to major system nodes place just upstream (u/s) of the catchbasin storage nodes. Between the u/s node and the catchbasins were represented by a PCSWMM OUTLET. These outlets were established with rating curves to represent the approach-flow and depth, and the inlet capture rate. Additional information on the rating curves under flow-by and ponding conditions is provided in proceeding sections of this report.

Figure 2 – Model Schematic Showing Minor and Major System Components

Figure 2 above presents a portion of the PCSWMM model which demonstrates the object connectivity. The subcatchment are illustrates as white polygons, with their area number, area in hectares and percent imperviousness labelled. The yellow lines and orange circles represent the storm sewer system and manholes, with purple lines representing the OUTLET links (or ICDs). The dashed red lines represent the major system street conduits. Catch basins are shown as red squares and looking closely you can see two OUTLETS connecting the CBs to the storm sewer and the major system nodes.

For catchbasins in a flow-by condition a rating curve for the inlet capacity of the lid is used, with the CB itself modelled as a STORAG NODE. At ponding locations, the storage nodes were defined based on the depth to the ICD. For catchbasins the depth from the top of grate to the outlet pipe is 1.4m, therefore the storage of stormwater will only occur starting at a 1.4m depth. For area drains the depth from the top of grate to the outlet pipe was set at -150mm. The storage rating curves at an area drain was modeled similar to the illustration in Figure 3 below.

Figure 3 - Representation of Rating Curves for Modelling of Storage at Ponding Locations



6.6.2 Storm Events Modelled

Seven (7) storm events were modelled as follows: 3-hour 2-year Chicago storm (timestep 10 mins)

- 3-hour 5-year Chicago storm (timestep 10 mins)
- 3-hour 100-year Chicago storm (timestep 10 mins)
- 3-hour 100-year + 20% Chicago storm (timestep 10 mins)
- Historical storms occurring July 1, 1979, Aug 4, 1988, August 08, 1996

6.6.3 Inlet Control at Flow-By Conditions

The flow-by capture curves are used when an inlet is not located in a ponding area. In this case only a portion of the overland flow is captured, while the remaining flow continues downstream (bypassed). Although the City of Ottawa does not specifically provide rating curves for catchbasins under flow-by conditions, they do provide gutter flow rate curves for either barrier curbs (SC1.1 or OPSD600.110) or mountable curb and gutter (SC1.3 or OPSD 600.020).

The gutter flow rates are provided at longitudinal road slopes of 2%, 4%, 6%, and 8% for flow spreads ranging between 0m to 3m. Along with the gutter flow rates, the inlet capacities of the surface inlets are provided at various spreads.

The inlet capacities of the curb inlet catchbasins were derived from Appendix 7-A.14 through 7-A.17. These pages provide the capture rates (Qc) of the inlets at various approach flows (Qt). A rating curve for surface type inlets catchbasins was based on a roadway with a 3.0% cross fall and longitudinal slopes of 1%. The following Table 6-9 below summarizes the rating curves used in a flow-by condition.

Table 6-9: Rating Curves for Barrier Curb and Surface Inlet Catchbasin in Flow-By Condition (3% cross fall, 1% slope)

Approach Flow (L/sec)	Total Spread, T (m)	Depth of Flow at Gutter (m)	Inlet Capture Rate (L/sec)
0	0.000	0.000	0
2	0.500	0.015	11
12	1.000	0.030	13
35	1.500	0.045	28
75	2.000	0.060	40
136	2.500	0.075	44
167	2.700	0.081	48
221	3.000	0.090	55
300	3.350	0.101	55

Table H1 in Appendix H provides additional information on the development of the rating curves for the catchbasin in flow-by conditions. This exercise was completed since PCSWMM does not have the ability to provide Approach Flow versus Capture Flow at flow-by conditions. PCSWMM requires a depth versus captured flow rate instead.

6.6.4 Modelling Results

The following summarizes the results of various storm events to ensure the design criteria is met. This includes the following:

1) Peak Flows to the Ottawa River from the SWM Pond shall meet allowable rate of 184.1 L/sec based on a 5-year pre-development rate.

2) Peak flows to ravine (over watermain easement) to meet allowable rate of 48.6 L/sec based on 100-year pre-development flow rate.

Table 6-10: Peak Flows at Outfalls

Storm Event	Max. Flow at Outlets (L/sec)				
	To Ottawa River				To RR 174 Right-of-Way
	Outfall #1 (VIA Ravine)	Outfall #2 (Overland)	Outfall #3 (VIA Storm Sewer Outlet from SWM Facility)	Total Flow to Ottawa River (Outlets #1,#2,#3)	
Chicago_3h_2yr	0.3	0.3	103.9	104.5	1.1
Chicago_3h_5yr	1.0	4.6	126.7	132.3	5.4
Chicago_3h_100yr	30.4	20.1	181.3	231.8	14
Chicago_3h_100yr + 20%	52.5	28.1	196.8	277.4	17.6
Historic_Jul1-79	35.9	14.8	196.6	247.3	8.6
Historic_Aug4-88	49.1	19.4	182.9	251.4	12.6
Historic_Aug8-96	13.1	9.6	144.1	166.8	7.4

From Table 6-10 above the 100-year peak flow under post-development conditions is 181.3 from the SWM facility. This meets the allowable rate of 184.1 L/sec based on a 5-year pre-development flow rate.

From Table E3 and Table 6-10 the 100-year peak flows under post-development conditions is 30.4 L/sec to the existing ravine. This is less than the pre-development rate of 48.6 L/sec. In addition, from Table E1 of Appendix E, the total 100-year pre-development peak runoff rate from the site was 408.4 L/sec. In comparison the total post-development runoff rate during the 100-year event is 231.8 L/sec, as noted in the table above.

The total storage occurring during the 5-year and 100-year storm event is presented in the Table 6-11 below. These results as based on the maximum volumes occurring in each PCSWMM STORAGE node.

Table 6-11: Summary of Storage

Storage Location	5-Year Storage Volumes from PCSWMM (m3)	100-Year Storage Volumes from PCSWMM (m3)
Roof Storage	55.1	93.9
Surface Storage	4	65
SWM Facility Storage	402.7	942.4
Totals	461.8	1101.3

6.7 Hydraulics

6.7.1 Hydraulic Grade Line Analysis

The maximum 100-year HGL was plotted from PCSWMM. A profile through the two storm sewer systems is shown below in Figures 4 & 5. It is shown that during the 100-yr event the maximum water surface elevations are surcharged, and remain within the storm sewer system, and does not surcharge to the surface. The 2-year and 5-year water surface profiles are also shown for refernece.

Figure 4 – 100-year HGL (North Storm Sewer)

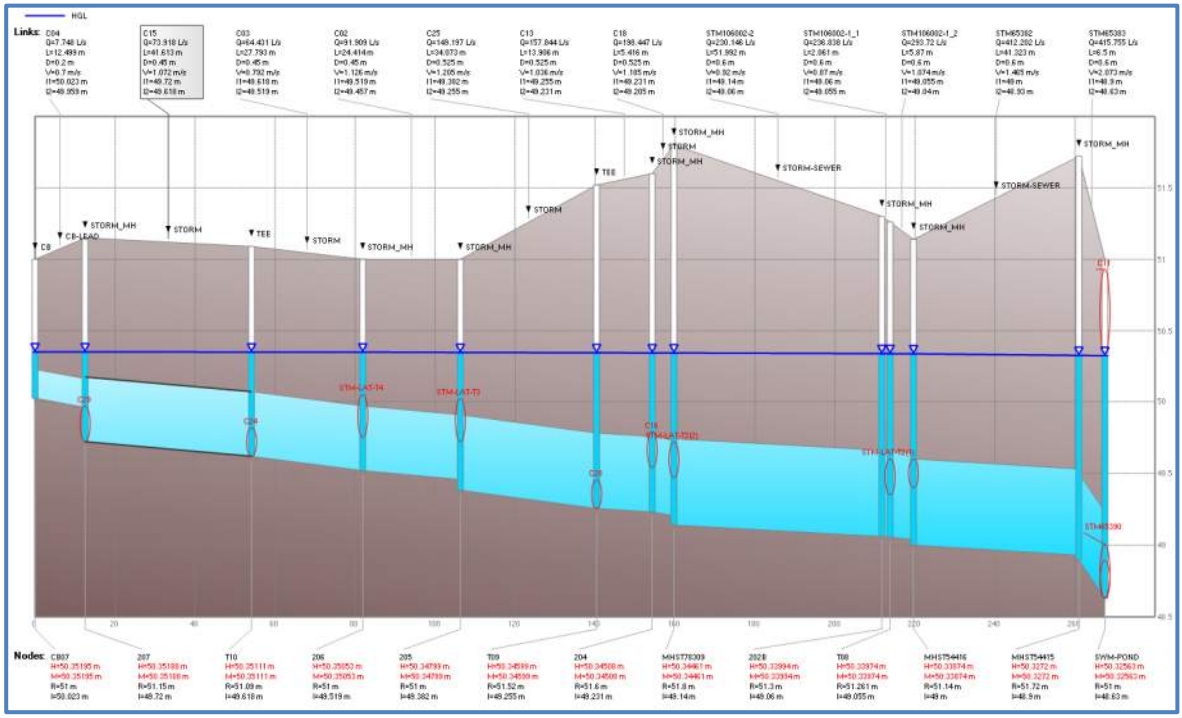
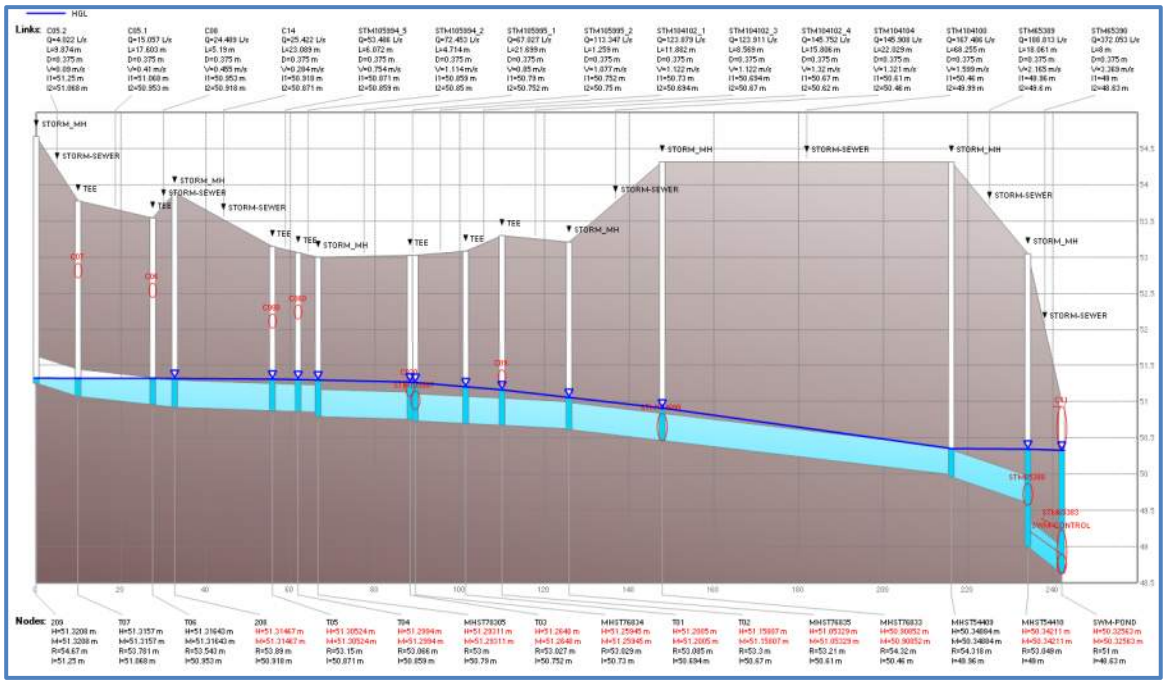


Figure 5 – 100-year HGL (South Storm Sewer)



6.8 Stormwater Management Summary and Conclusions

Based on the results of the PCSWMM model the following summarizes the storm sewer design and the stormwater management requirements of Petrie's Landing I, Phase 3-5, along with information on the previous stormwater design of Phases 1 & 2 (i.e. Towers 1 and 2):

- New storm sewers shall be installed within Phases 3, 4 and 5. These new storm sewers will be extended from the previous sewer stubs provided during Phase 2. The north storm sewer along the rear of the buildings will consist of 450mm and 525mm diameter storm sewers. This northern storm sewer is used to service the building roof drains of Towers 3 and 4, and surface areas above the parking structure via surface area drains.

- A new storm sewer will be extended along the southern access roadway into Phases 3 and 4. This sewer will consist of a 375mm storm sewer and will capture runoff from the access roadway and from the foundation drainage system of the 2 levels of underground parking below Tower 3 and Tower 4.

- The proposed storm sewer was sized based on Rational Method and the 2-year storm event with a starting time of concentration of 10 minutes.

- A PCSWMM dynamic model was prepared to confirm the stormwater system. The model incorporates both minor system (storm sewer) and major system (roadway) components. It includes all ground surface and roof storage areas based on developed area-depth curves. Flow control was modelled using OUTLETS within PCSWMM based on depth-discharge curves. Rating

curves were developed for all roof and area drains. The existing stormwater facility was modelled based on existing design parameters from the Phase 1 design.

- The existing pond has a capacity of 708 m^3 at a spill elevation of 50.07metres. As a result of the PCSWMM modelling, based on current City guidelines, it was determined that during a 100-year storm event that the existing pond would overflow for a short duration and volume, therefore it is proposed to raise the overflow elevation by 0.29m from 50.07m to 50.36m. The 100-year peak rate from the facility, based on the PCSWMM model, is 181.2 L/sec.

- The total 100-year peak flow from the entire Petrie's Landing development is 245.8 L/sec, of which 181.2 L/sec is from the SWM facility, 30.4 L/sec from uncontrolled areas discharging to the ravine west of Towers 5 and 6, 14.0 L/sec overland to Highway 174 right-of-way, and 20.1 L/sec from uncontrolled areas behind Towers 3 and 4. Post-development peak flows meet pre-development peaks flows and allowable discharge rates as established during the original Phase 1 design.

- Existing area drains in Phase 1 were modelled as 76mm orifices. Existing area drains in Phase 2 were modelled as 75mm orifices. Going forward for Phases 3, 4, and 5 and 6, 75mm diameter orifices / mechanical piping will be required for all area drains.

- As a result of the PCSWMM dynamic model it was determined that the proposed 100-year volume that would occur onsite is 1,101.3 m^3. Since the volume available in the existing SWM facility is 708 m^3, the overflow elevation will need to be raised by 0.29m to obtain a maximum spill volume of 942 m^3.

- An elevated hydraulic grade line (HGL) in both the north and south storm sewers require any storm sewer connections from the building towers to have backflow preventers as per City of Ottawa standards.

7 Erosion and Sediment Control

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

- Filter cloth shall be installed between the frame and cover of all adjacent catch basins and catch basin manhole structures.
- Heavy duty silt fencing will be used to control runoff around the construction area. Silt fencing locations are identified on the site grading and erosion control plan.
- Visual inspection shall be completed daily on sediment control barriers and any damage repaired immediately. Care will be taken to prevent damage during construction operations.
- In some cases barriers may be removed temporarily to accommodate the construction operations. The affected barriers will be reinstated at night when construction is completed.
- Sediment control devices will be cleaned of accumulated silt as required. The deposits will be disposed of as per the requirements of the contract.
- During the course of construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer.
- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) OPSS 805 and City of Ottawa specifications.

8 Conclusions

This servicing design brief outlines the rationale which will be used to service the proposed development. The following summarizes the servicing requirements for the site:

- The sizing of the storm sewer for the original Phase I design was based on a 5-year storm and a 20-minute time of concentration for the catchments. A new 2-year design sheet was completed, with 10 minutes time of concentration for the catchments, as required by the SDG002. The storm sewer system is sized to accommodate the 2-year design storm under free flow conditions.
- The allowable capture rate from the entire site was calculated based on a runoff coefficient of 0.25 and a time of concentration of 20 minutes for a 5-year storm event. The allowable release rate was calculated to be 184.1 L/sec. Runoff in excess of this will be detained onsite for up to the 100-year storm. Runoff from the site is controlled to the allowable rate of 184.1 L/sec. This includes the controlled runoff from the SWM facility and the uncontrolled areas.
- On-site storage is utilized to control runoff to allowable rates up to the 100-year storm. Stormwater detention is provided in one centralized SWM facility that was constructed in Phase 1. Some flow-controlled roof drains will be used for Towers 3,4, 5 and 6. Area drains in Phases 1 and 2 are not flow controlled, however will naturally occur, due to the internal plumbing sizing. Other surface inlets (CB's and CBMH's) are not flow controlled.
- The total required 100-year storage was re-estimated based on a revised runoff coefficient calculated for the latest site plan. The 100-year updated volume based on the Modified Rational Method is 923 m^3, with a total of 1,101.3 m^3 occurring based on modelling. This includes 65 m^3 of surface storage, 135 m^3 of roof storage and 942 m^3 of dry pond detention storage.
- The original 100-year storage volume in the SWM pond was presented at 708 m^3. A dynamic stormwater model taking into account upstream flow attenuation and storage on rooftops and on the surface, results in a revised 100-year volume occurring in the facility of 942 m^3. This is based on the requirement to raise the overflow elevation by 0.29m from 50.07m to 50.36m.
- The sanitary sewer from the development will discharge to the existing sanitary sewer which was left at the limits of Phase 2. The total estimated sewage flow is 26.4 L/sec from all five phases combined with an allowance for a 6.17-hectare commercial development adjacent to 8900 Jeanne D'Arc Blvd. All sanitary sewers have additional reserve capacity, however four (4) have full-flow velocities just slightly below the permitted minimum of 0.60 m/sec, based on as-built sewer slopes.
- The maximum estimated fire flow requirements for all towers is 100 L/sec, calculated in accordance with the Fire Underwriters Survey, 2020. Adequate flows are available within the entire development under maximum day plus fire flow conditions.
- The site is serviced by two 200mm diameter PVC watermain's. W3 chambers will be provided on the watermain connection to each new tower. A total of four new fire hydrants will be necessary to meet the required fire flows. One hydrant in each of Phase 3 and 4, and two within Phase 5. The locations of the new hydrants are illustrated on the site servicing plans.
- The calculated minimum and maximum working pressures anticipated within the development range between 72 psi and 77 psi under peak hourly conditions. This meet the City's WDG001 requirements.
- Erosion and sediment control methods will be used during construction to limit erosion potential.

Appendix A – Figures

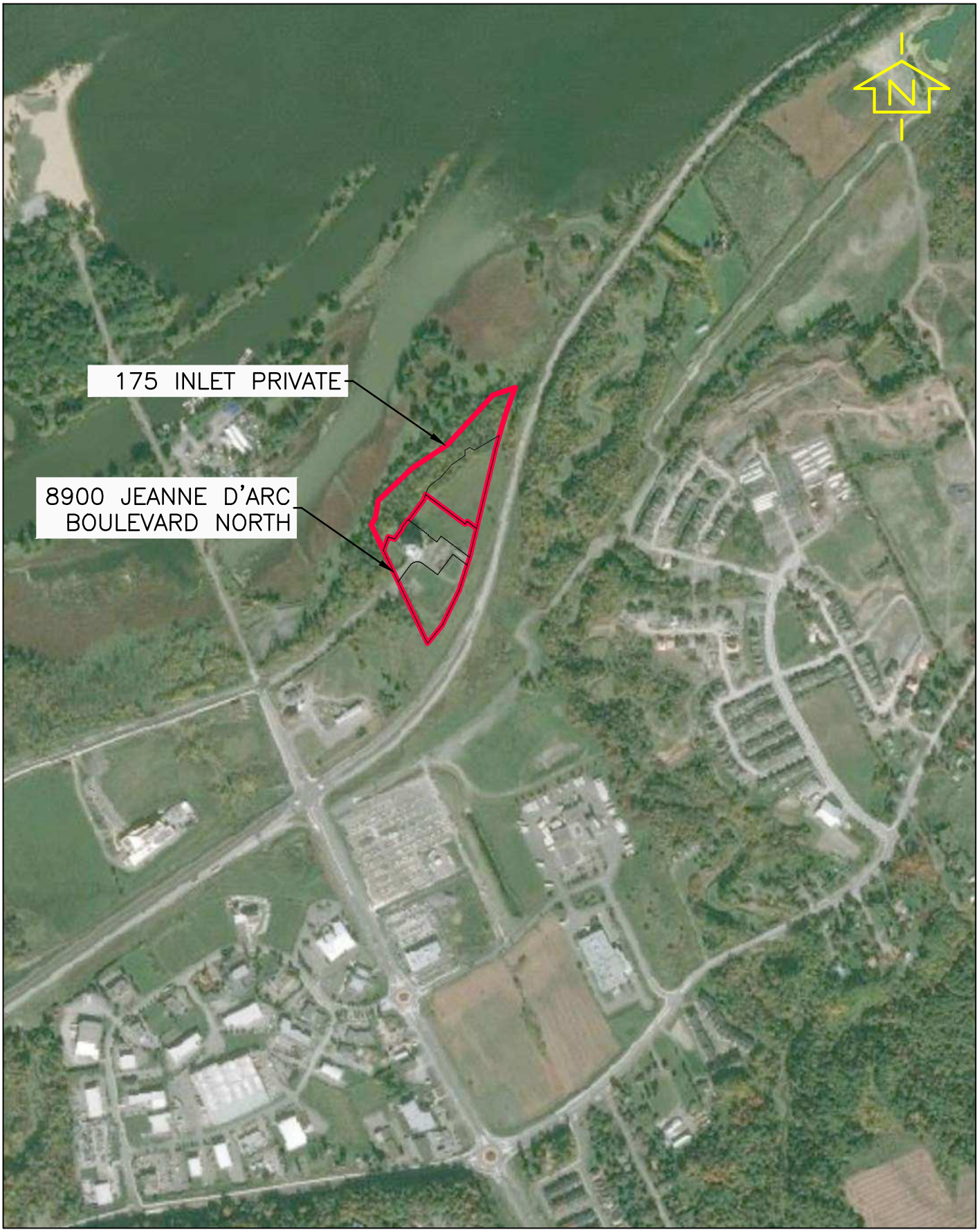
Figure A1: Site Location Plan

Figure A2: Phasing Plan

Figure A3: Water Distribution Plan

Figure A4: Sanitary Drainage Plan

Figure A5: Pre-Development Storm Drainage Plan



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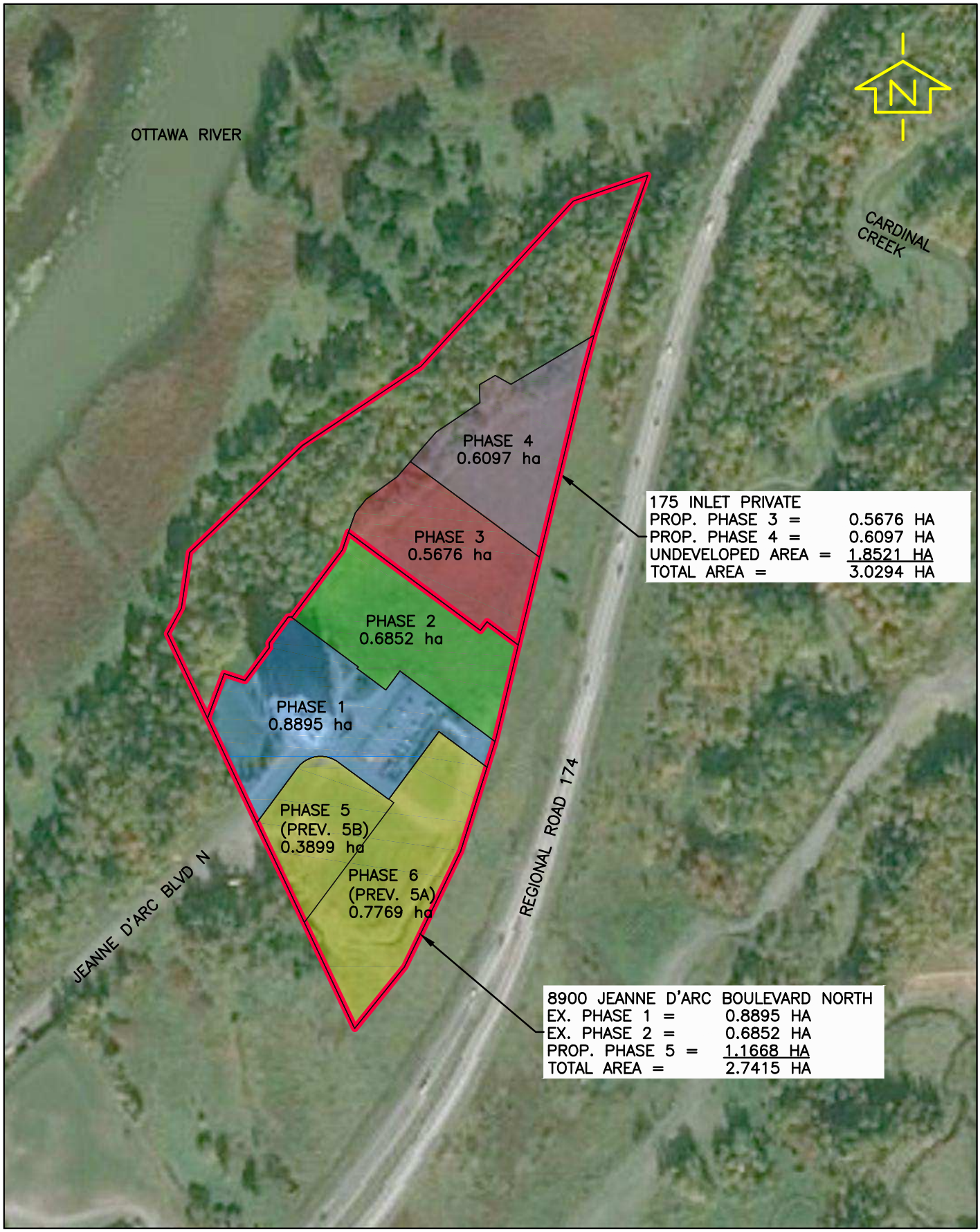
DESIGN JLF	PETRIE'S LANDING I PHASES 3 TO 5	SCALE 1:10000
DRAWN SAB		SKETCH NO
DATE JULY 2019	SITE LOCATION PLAN	FIG A1
FILE NO 247308		



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DESIGN JLF	PETRIE'S LANDING I PHASES 3 TO 5	SCALE 1:3000	
DRAWN SAB		SKETCH NO	
DATE JULY 2024	PHASING PLAN	FIG A2	
FILE NO 247308			

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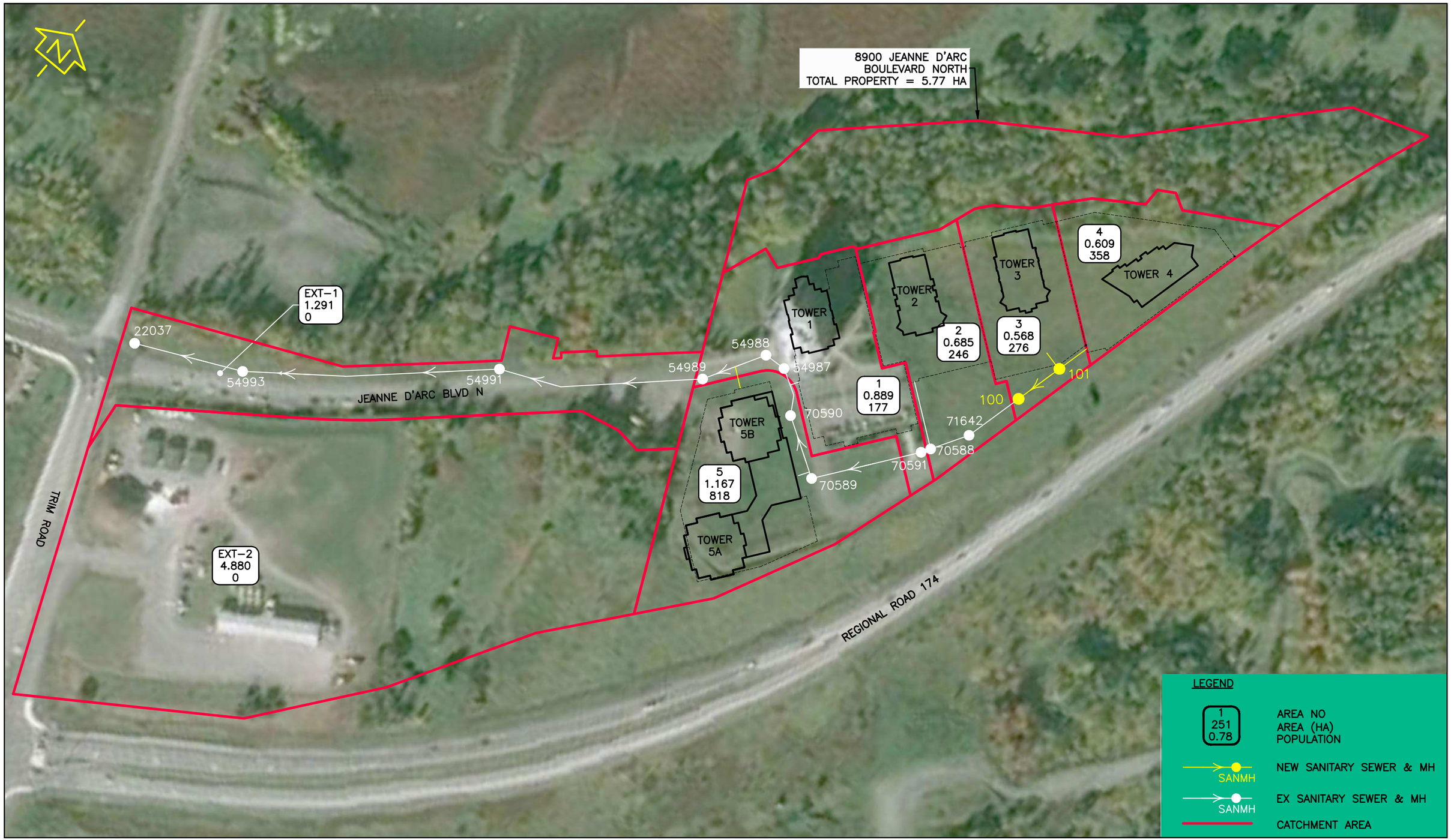
DESIGN	JLF	PETRIE'S LANDING I PHASES 3 TO 5	SCALE 1:1000
DRAWN	SAB		FIGURE NO
DATE	JUNE 2024	WATER DISTRIBUTION PLAN	FIG A3
FILE NO	247308		



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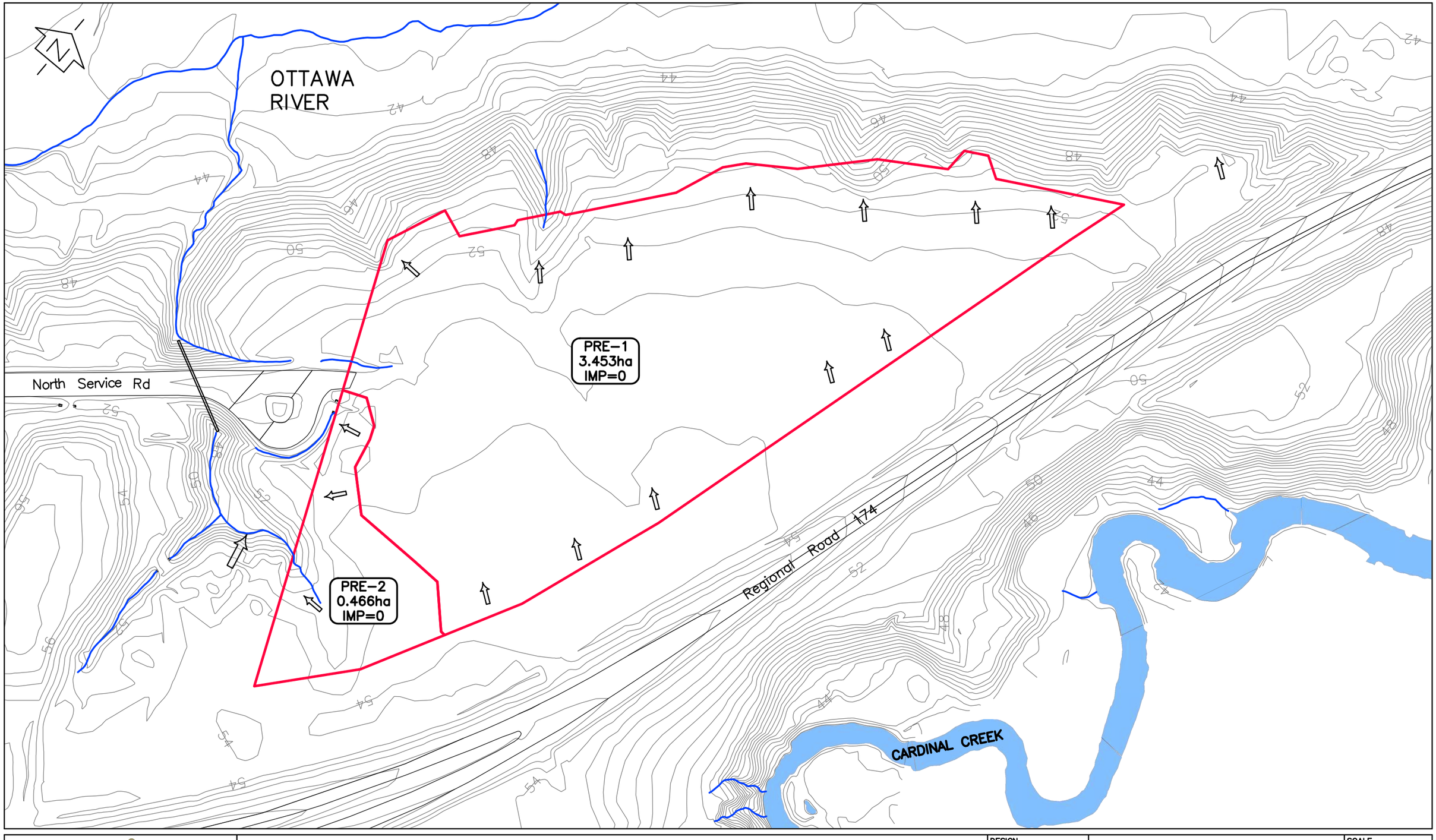
DATE	JULY 2019
FILE NO	247308

PETRIE'S LANDING I
PHASES 3 TO 5

SANITARY DRAINAGE PLAN

SCALE 1:2000

FIGURE NO FIG A4



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DRAWN	SAB
DATE	JULY 2019
FILE NO	247308

PETRIE'S LANDING I
PHASES 3 TO 5

PRE-DEVELOPMENT
DRAINAGE PLAN

SCALE	1:1500
FIGURE NO	FIG A5

Appendix B – Water Servicing Design Tables

TABLE B8: FIRE FLOW REQUIREMENTS BASED ON HYDRANT SPACING

Hydrant #	Tower 1		Tower 2		Tower 3		Tower 4		Tower 5 / 6		Fire Flow Available at Hydrant Based on Model Results (Scenario 1A)	
	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	Distance (m)	Fire Flow Contribution (L/min)	Distance (m)	Fire Flow Contribution (L/min)	Distance (m)	Fire Flow Contribution (L/min)	Distance (m)	Fire Flow Contribution (L/min)	L/min	(L/sec)
FH-1	30	5,700	100	3,800	280	0	300	0	8	5,700	> 14000	> 233
FH-2	115	3,800	60	5,700	80	3,800	145	3,800	155	0	> 12000	> 200
FH-3	156	0	105	3,800	30	5,700	60	5,700	170	0	> 12000	> 200
FH-4	200	0	145	3,800	60	5,700	20	5,700	210	0	> 12000	> 200
FH-5	135	3,800	215	0	390	0	420	0	25	5,700	> 14000	> 233
FH-6	90	3,800	130	3,800	180	0	220	0	25	5,700	> 14000	> 233
FH-7 (384040H003)	80	3,800	150	0	320	0	330	0	90	3,800	> 14000	> 233
Total (L/min)		17,100		20,900		15,200		15,200		17,100		
FUS RFF in L/min or (L/sec)		5,000 (83)		5,000 (83)		5,000 (83)		5,000 (83)		6,000 (100)		
Meets Requreiment (Yes/No)		Yes		Yes		Yes		Yes		Yes		

Notes:

[1]Distance is measured along a road or fire route.

[2]Fire Flow Contribution for Class AA Hydrant from Table 1 of Appendix I, ISTB-2018-02

TABLE B9: REQUIRED FIRE FLOW (RFF) BASED ON PROXIMITY TO ASSET

Hydrant #	Tower 1	Tower 2	Tower 3	Tower 4	Tower 5/6	Max Required FF for Hydrant (L/sec)
	Requried Fire Flow for Building (L/sec)					
FH-1	83	83			100	100
FH-2	83	83		83		83
FH-3		83	83	83		83
FH-4		83		83		83
FH-5	83				100	100
FH-6	83	83			100	100
FH-7 (384040H003)	83	83	83	83	100	100

TABLE B1: Water Demand Chart

Junction Number (Building)	No. of Units									Total Pop	Residential Demands					Commercial/Amenities						Totla Demands in (L/sec)		
	Singles/Semis/Towns				Apartments						Avg Day Demand (L/day)	Max Day Peaking Factor	Max Hour Peaking Factor	Max Day Demand (L/day)	Peak Hourly Demand (L/day)	Area (ha)	Avg Demand (L/day)	Peaking Factors (x Avg Day)		Max Day Demand (L/day)	Peak Hour Demand (L/day)	Avg Day (L/s)	Max Day (L/s)	Peak Hour (L/s)
	Single Familty	Semi	Duplex	Townhome	Bachelor	1-Bed Apt	2 Bed Apt	3 Bed Apt	Avg Apt.										Max Day	Peak Hour					
J-5 (Ex.Tower 1)						14	75			177.1	49,588	2.5	5.5	123,970	272,734							0.57	1.43	3.16
J-12 (Ex.Tower 2)					2	83	57	2		244.9	68,572	2.5	5.5	171,430	377,146							0.79	1.98	4.37
J-17 (Tower 3)					2	90	68	2		277.8	77,784	2.5	5.5	194,460	427,812							0.90	2.25	4.95
J-21 (Tower 4)					37	155	67	2		415.7	116,396	2.5	5.5	290,990	640,178							1.35	3.37	7.41
J-37 (Tower 5)					35	150	39	4		353.3	98,924	2.5	5.5	247,310	544,082	0.1360	3,808	1.5	1.8	5,712	6,854	1.19	2.93	6.38
J-7 (Tower 6)					56	229	59	4		535.3	149,884	2.5	5.5	374,710	824,362	0.1650	4,620	1.5	1.8	6,930	8,316	1.79	4.42	9.64
Totals =					132	721	365	14		2004.1	561,148			1,402,870	3,086,314					12,642	15,170	6.59	16.38	35.90

Unit Densities	Persons/Unit
Singles	3.4
Semi-Detached	2.7
Duplex	2.3
Townhome	2.7
Bachelor Apt Unit	1.4
1-Bed Apt Unit	1.4
1-Bed + Den Apt Unit	1.4
2-Bed Apt Unit	2.1
3-Bed Apt Unit	3.1
Avg. Apt Unit	1.8

Residential

Residential Consumption (L/pers/day) =	280
Max Day Peaking Factor (* avg day) =	2.5
Peak Hour Factor (* avg day) =	5.5

Industrrial/Commercial/Institutional Water Consumption

Light Industrial (L/gross ha/day) =	35,000
Heavy Industrial (L/gross ha/day) =	55,000
Commer/Instit (L/gross ha/day) =	28,000
Max Day Peaking Factor (* avg day) =	1.5
Peak Hour Factor (* avg day) =	1.8

Project:	
247308 - Petries Landing I, Phases 3 to 5	
Designed:	Location:
J. Fitzpatrick, P.Eng.	Ottawa, Ontario
Checked:	
B. Thomas, P.Eng.	
File Reference:	Page No:
247308 Water Demand Chart FINAL, June 2024 jlf update.xlsx	1 of 1

Summary

SUMMARY OF REQUIRED FIREFLOWS (RFFs)

Building #	Fire Flow, F (L/min)	[2]Type of Constr. Coeff, C	[3]Reduction Due to Occupancy (%)	[4]Reduction Due to Sprinklers (%)	[5]Total Increase due to Exposures (%)	[6]Required Fire Flow in	
						(L/min)	(L/sec)
Existing Tower 1 - 15 storeys	12,000	0.80	-15%	-50%	0%	5,000	83
Existing Tower 2 - 16 storeys	12,000	0.80	-15%	-50%	0%	5,000	83
Tower 3 - 18 storeys	12,000	0.80	-15%	-50%	0%	5,000	83
Tower 4 - 22 storeys	12,000	0.80	-15%	-50%	0%	5,000	83
Tower 5 - 22 storeys	12,000	0.80	-15%	-50%	12%	6,000	100
Tower 6 - 32 storeys	12,000	0.80	-15%	-50%	12%	6,000	100

Notes

1 - If basements are included (<50% below grade) then denoted as +.

2 -Types of constructions: 0.8 for non-combustible, 1.0 for ordinary construction,1.5 for wood frame construction.

3 - Reductions due to Occupancy are -25% for non-combustible or -15% for limited combustible.

4 - Reductions due to Sprinkler Systems

5 – Increase due to exposures were calculated based on FUS 2020.

6 – Required Fire Flows are rounded to nearest 1,000 L/min.

Min = 83

Max = 100

Tower 1

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020

Building No: **Existing Tower 1 - 15 storeys**

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where:
F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	4350.0 m²	
	Floor 8		870	50%	435	Two largest adjoining floors+ 50% of floors above (up to eight)		
	Floor 7		870	50%	435			
	Floor 6		870	50%	435			
	Floor 5		870	50%	435			
	Floor 4		870	50%	435			
	Floor 3		870	50%	435			
	Floor 2		870	100%	870			
	Floor 1 (Main Level)		870	100%	870			
	Basement (At least 50% below grade, not included)		0	0%	0			
Fire Flow (F)	F = 220 * C * SQRT(A)							11,608
Fire Flow (F)	Rounded to nearest 1,000							**12,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,800	10,200
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,060	7,140
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,020	6,120
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,020	5,100
	Not Fully Supervised or N/A	0%				
	Reduction for Community Sprinklers	-25%	ReductIon due to Community Sprinklers	0%	0	5,100

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	North	50	6	>45m		0	0	0	6	0%	0%	0	5,100
	South	50	6	>45m		0	0	0	6	0%			
	East	34	5	30.1 to 45	Type II-I (U)	41	16	656	6	0%			
	West	50	6	>45m		0	0	0	6	0%			

Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**5,000**
	Total Required Fire Flow, L/s =	**83**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings
Firewall	Firewall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

Tower 2

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020

Building No: **Existing Tower 2 - 16 storeys**

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where:
F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	4750.0 m²	
	Floor 8		950	50%	475	Two largest adjoining floors+ 50% of floors above (up to eight)		
	Floor 7		950	50%	475			
	Floor 6		950	50%	475			
	Floor 5		950	50%	475			
	Floor 4		950	50%	475			
	Floor 3		950	50%	475			
	Floor 2		950	100%	950			
	Floor 1 (Main Level)		950	100%	950			
	Basement (At least 50% below grade, not included)		0	0%	0			
Fire Flow (F)	F = 220 * C * SQRT(A)							12,130
Fire Flow (F)	Rounded to nearest 1,000							**12,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,800	10,200
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,060	7,140
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,020	6,120
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,020	5,100
	Not Fully Supervised or N/A	0%				
	Reduction for Community Sprinklers	-25%	ReductIon due to Community Sprinklers	0%	0	5,100

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	North	50	6	>45m				0	6	0%	0%	0	5,100
	South	50	6	>45m				0	6	0%			
	East	36	5	30.1 to 45	Type II-I (U)	42	18	756	6	0%			
	West	34	5	30.1 to 45	Type II-I (U)	42	15	630	6	0%			

Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**5,000**
	Total Required Fire Flow, L/s =	**83**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings
Firewall	Firewall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

Tower 3

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020

Building No: **Tower 3 - 18 storeys**

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where:
F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	4815.0 m²	
	Floor 8		963	50%	482	Two largest adjoining floors+ 50% of floors above (up to eight)		
	Floor 7		963	50%	482			
	Floor 6		963	50%	482			
	Floor 5		963	50%	482			
	Floor 4		963	50%	482			
	Floor 3		963	50%	482			
	Floor 2		963	100%	963			
	Floor 1 (Main Level)		963	100%	963			
	Basement (At least 50% below grade, not included)		0	0%	0			
Fire Flow (F)	F = 220 * C * SQRT(A)							12,213
Fire Flow (F)	Rounded to nearest 1,000							**12,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,800	10,200
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,060	7,140
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,020	6,120
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,020	5,100
	Not Fully Supervised or N/A	0%				
	Reduction for Community Sprinklers	-25%	ReductIon due to Community Sprinklers	0%	0	5,100

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	North	50	6	>45m						0%	0%	0	5,100
	South	50	6	>45m						0%			
	East	36	5	30.1 to 45	Type II-I (U)	42	16	672	6	0%			
	West	50	6	>45m						0%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												**5,000**
	Total Required Fire Flow, L/s =												**83**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings
Firewall	Firewall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

Tower 4

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020

Building No: **Tower 4 - 22 storeys**

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where:
F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	4860.0 m²	
	Floor 8		972	50%	486	Two largest adjoining floors+ 50% of floors above (up to eight)		
	Floor 7		972	50%	486			
	Floor 6		972	50%	486			
	Floor 5		972	50%	486			
	Floor 4		972	50%	486			
	Floor 3		972	50%	486			
	Floor 2		972	100%	972			
	Floor 1 (Main Level)		972	100%	972			
	Basement (At least 50% below grade, not included)		0	0%	0			
Fire Flow (F)	F = 220 * C * SQRT(A)							12,270
Fire Flow (F)	Rounded to nearest 1,000							**12,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,800	10,200
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,060	7,140
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,020	6,120
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,020	5,100
	Not Fully Supervised or N/A	0%				
	Reduction for Community Sprinklers	-25%	ReductIon due to Community Sprinklers	0%	0	5,100

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	North	50	6	>45m						0%	0%	0	5,100
	South	50	6	>45m						0%			
	East	50	6	>45m						0%			
	West	50	6	>45m						0%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												**5,000**
	Total Required Fire Flow, L/s =												**83**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings
Firewall	Firewall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

Tower 5

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020

Building No: **Tower 5 - 22 storeys**

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where:
F = required fire flow in litres per minute
A = total floor area in m² (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	4800.0 m²	
	Floor 8		960	50%	480	Two largest adjoining floors+ 50% of floors above (up to eight)		
	Floor 7		960	50%	480			
	Floor 6		960	50%	480			
	Floor 5		960	50%	480			
	Floor 4		960	50%	480			
	Floor 3		960	50%	480			
	Floor 2		960	100%	960			
	Floor 1 (Main Level)		960	100%	960			
	Basement (At least 50% below grade, not included)		0	0%	0			
Fire Flow (F)	F = 220 * C * SQRT(A)							12,194
Fire Flow (F)	Rounded to nearest 1,000							**12,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,800	10,200
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,060	7,140
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,020	6,120
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,020	5,100
	Not Fully Supervised or N/A	0%				
	Reduction for Community Sprinklers	-25%	ReductIon due to Community Sprinklers	0%	0	5,100

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	North	50	6	>45m						0%	12%	1,224	6,324
	South	0	1	0 to 3	Type II-I (U)	24	2	48	1C	12%			
	East	50	6	>45m						0%			
	West	50	6	>45m						0%			
Obtain Required Fire Flow											Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =		**6,000**
											Total Required Fire Flow, L/s =		**100**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings
Firewall	Firewall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

Tower 6

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020

Building No: **Tower 6 - 32 storeys**

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where:
F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction				0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	4905.0 m²	
	Floor 8		981	50%	491	Two largest adjoining floors+ 50% of floors above (up to eight)		
	Floor 7		981	50%	491			
	Floor 6		981	50%	491			
	Floor 5		981	50%	491			
	Floor 4		981	50%	491			
	Floor 3		981	50%	491			
	Floor 2		981	100%	981			
	Floor 1 (Main Level)		981	100%	981			
	Basement (At least 50% below grade, not included)		0	0%	0			
Fire Flow (F)	F = 220 * C * SQRT(A)							12,326
Fire Flow (F)	Rounded to nearest 1,000							**12,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,800	10,200
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-3,060	7,140
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,020	6,120
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,020	5,100
	Not Fully Supervised or N/A	0%				
	Reduction for Community Sprinklers	-25%	ReductIon due to Community Sprinklers	0%	0	5,100

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	North	50	6	>45m						0%	12%	1,224	6,324
	South	50	6	>45m						0%			
	East	0	1	0 to 3	Type II-I (U)	24	2	48	1C	12%			
	West	50	6	>45m						0%			
Obtain Required Fire Flow										Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =			**6,000**
										Total Required Fire Flow, L/s =			**100**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings
Firewall	Firewall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

Appendix C – WaterGems Result Tables

Scenario 1A Result Tables (Max Day Plus Fire Flow (13,000 L/min)

Junction Table
Pipe Table
Reservoir Table
Fire Flow Report

Scenario 1B Result Tables (Max Day Plus Fire Flow (13,000 L/min)

Junction Table
Pipe Table
Reservoir Table
Fire Flow Report

Scenario 2 Result Tables (Peak Hour)

Junction Table
Pipe Table
Reservoir Table

Scenario 3 Result Tables (High Pressure Check)

Junction Table
Pipe Table
Reservoir Table

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 1A: MAX DAY PLUS FIRE FLOW (13,000 L/min)

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-1	52.70	0.00	108.30	79
J-2	53.53	0.00	108.28	78
J-3	54.30	0.00	108.23	77
J-4	54.80	0.00	108.27	76
J-5	54.80	1.43	108.27	76
J-6	54.30	0.00	108.24	77
J-7	54.30	4.42	108.22	77
J-8	53.30	0.00	108.20	78
J-9	52.62	0.00	108.21	79
J-11	53.30	0.00	108.20	78
J-12	52.15	1.98	108.20	80
J-14	54.18	0.00	108.19	77
J-16	54.70	0.00	108.19	76
J-17	54.80	2.25	108.19	76
J-21	54.70	3.37	108.19	76
J-24	54.30	0.00	108.27	77
J-28	54.03	0.00	108.23	77
J-29	55.00	0.00	108.30	76
J-32	55.00	0.00	108.19	76
J-33	53.86	0.00	108.23	77
J-37	54.60	2.93	108.28	76

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradient (m/km)
P-4	J-4	J-5	12.72	204.0	PVC	110.0	1.43	0.04	0.022
P-5	J-4	J-6	59.98	204.0	PVC	110.0	7.55	0.23	0.478
P-10	J-9	FH-2	32.33	204.0	PVC	110.0	0.00	0.00	0.000
P-11	J-9	J-11	27.19	204.0	PVC	110.0	5.30	0.16	0.249
P-12	J-11	J-12	34.22	204.0	PVC	110.0	1.98	0.06	0.040
P-13	J-8	J-11	1.00	204.0	PVC	110.0	1.84	0.06	0.028
P-15	J-11	J-14	22.35	204.0	PVC	110.0	5.17	0.16	0.238
P-16	J-14	FH-3	9.36	204.0	PVC	110.0	2.99	0.09	0.085
P-17	J-14	J-16	35.91	204.0	PVC	110.0	2.18	0.07	0.048
P-18	J-16	J-17	5.95	204.0	PVC	110.0	2.25	0.07	0.050
P-21	R-1	J-1	1.00	600.0	PVC	130.0	19.37	0.07	0.009
P-25	J-24	J-3	80.95	204.0	PVC	110.0	7.46	0.23	0.468
P-26	J-24	FH-1	2.82	155.0	PVC	100.0	0.00	0.00	0.000
P-6	J-3	J-28	5.00	204.0	PVC	110.0	7.46	0.23	0.470
P-33	J-28	J-8	103.84	204.0	PVC	110.0	5.29	0.16	0.247
P-31	J-1	J-29	29.20	393.0	PVC	120.0	0.00	0.00	0.000
P-32	FH-5	J-29	9.31	155.0	PVC	100.0	0.00	0.00	0.000
P-38	J-32	FH-4	2.62	155.0	PVC	100.0	0.00	0.00	0.000

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 1A: MAX DAY PLUS FIRE FLOW (13,000 L/min)

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradient (m/km)
P-3	J-1	J-4	49.16	204.0	PVC	110.0	8.98	0.27	0.660
P-7	J-6	J-33	27.29	204.0	PVC	110.0	7.55	0.23	0.479
P-8	J-33	J-9	76.29	204.0	PVC	110.0	5.30	0.16	0.249
P-40	J-33	J-28	0.99	204.0	PVC	110.0	2.24	0.07	0.056
P-41	J-7	J-28	26.06	204.0	PVC	110.0	-4.42	0.14	0.177
P-45	J-8	J-32	63.22	204.0	PVC	110.0	3.44	0.11	0.112
P-46	J-32	J-21	4.45	204.0	PVC	110.0	3.37	0.10	0.107
P-47	FH-6	J-3	3.53	155.0	PVC	100.0	0.00	0.00	0.000
P-48	J-16	J-32	5.99	204.0	PVC	110.0	-0.07	0.00	0.000
P-49	384040H 003	J-1	7.50	155.0	PVC	100.0	0.00	0.00	0.000
P-1	J-1	J-2	26.29	204.0	PVC	110.0	10.39	0.32	0.865
P-2	J-2	J-24	23.95	204.0	PVC	110.0	7.46	0.23	0.468
P-9	J-2	J-37	9.56	204.0	Ductile Iron	110.0	2.93	0.09	0.083

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 1A: MAX DAY PLUS FIRE FLOW (13,000 L/min)

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
68	R-1	108.30	<None>	19.37	108.30

Fire Flow Report - Time: 0.00 hours

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Satisfies Fire Flow Constraints?
384040H003	100.00	500.00	100.00	500.00	20	99	75	True
FH-1	100.00	472.14	100.00	472.14	20	20	38	True
FH-2	100.00	278.87	100.00	278.87	20	20	40	True
FH-3	100.00	294.46	102.99	297.45	20	20	26	True
FH-4	100.00	278.38	100.00	278.38	20	20	26	True
FH-5	100.00	443.43	100.00	443.43	20	20	74	True
FH-6	100.00	388.76	100.00	388.76	20	20	36	True

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 1B: MAX DAY PLUS FIRE FLOW (16,000 L/min)

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-1	52.70	0.00	108.30	79
J-2	53.53	0.00	108.23	78
J-3	54.30	0.00	108.02	76
J-4	54.80	0.00	108.00	76
J-5	54.80	1.43	108.00	76
J-6	54.30	0.00	108.00	76
J-7	54.30	4.42	107.99	76
J-8	53.30	0.00	107.98	78
J-9	52.62	0.00	107.99	79
J-11	53.30	0.00	107.98	78
J-12	52.15	1.98	107.98	79
J-14	54.18	0.00	107.97	76
J-16	54.70	0.00	107.97	76
J-17	54.80	2.25	107.97	75
J-21	54.70	3.37	107.97	76
J-24	54.30	0.00	108.18	76
J-28	54.03	0.00	108.01	77
J-29	55.00	0.00	108.30	76
J-32	55.00	0.00	107.97	75
J-33	53.86	0.00	108.00	77
J-37	54.60	2.93	108.23	76

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradient (m/km)
P-4	J-4	J-5	12.72	204.0	PVC	110.0	1.43	0.04	0.023
P-5	J-4	J-6	59.98	204.0	PVC	110.0	-1.43	0.04	0.022
P-10	J-9	FH-2	32.33	204.0	PVC	110.0	0.00	0.00	0.000
P-11	J-9	J-11	27.19	204.0	PVC	110.0	5.24	0.16	0.244
P-12	J-11	J-12	34.22	204.0	PVC	110.0	1.98	0.06	0.040
P-13	J-8	J-11	1.00	204.0	PVC	110.0	2.93	0.09	0.084
P-15	J-11	J-14	22.35	204.0	PVC	110.0	6.19	0.19	0.331
P-16	J-14	FH-3	9.36	204.0	PVC	110.0	2.99	0.09	0.086
P-17	J-14	J-16	35.91	204.0	PVC	110.0	3.20	0.10	0.098
P-18	J-16	J-17	5.95	204.0	PVC	110.0	2.25	0.07	0.052
P-21	R-1	J-1	1.00	600.0	PVC	130.0	19.37	0.07	0.009
P-25	J-24	J-3	80.95	204.0	PVC	110.0	16.44	0.50	2.023
P-26	J-24	FH-1	2.82	155.0	PVC	100.0	0.00	0.00	0.000
P-6	J-3	J-28	5.00	204.0	PVC	110.0	16.44	0.50	2.024
P-33	J-28	J-8	103.84	204.0	PVC	110.0	5.35	0.16	0.253
P-31	J-1	J-29	29.20	393.0	PVC	120.0	0.00	0.00	0.000
P-32	FH-5	J-29	9.31	155.0	PVC	100.0	0.00	0.00	0.000

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 1B: MAX DAY PLUS FIRE FLOW (16,000 L/min)

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradient (m/km)
P-38	J-32	FH-4	2.62	152.4	Ductile Iron	130.0	0.00	0.00	0.000
P-3	J-1	J-4	49.16	152.4	Ductile Iron	130.0	0.00	0.00	0.000
P-7	J-6	J-33	27.29	204.0	PVC	110.0	-1.43	0.04	0.022
P-8	J-33	J-9	76.29	204.0	PVC	110.0	5.24	0.16	0.243
P-40	J-33	J-28	0.99	152.4	Ductile Iron	130.0	-6.67	0.37	1.150
P-41	J-7	J-28	26.06	152.4	Ductile Iron	130.0	-4.42	0.24	0.539
P-45	J-8	J-32	63.22	152.4	Ductile Iron	130.0	2.42	0.13	0.177
P-46	J-32	J-21	4.45	152.4	Ductile Iron	130.0	3.37	0.18	0.326
P-47	FH-6	J-3	3.53	152.4	Ductile Iron	130.0	0.00	0.00	0.000
P-48	J-16	J-32	5.99	152.4	Ductile Iron	130.0	0.95	0.05	0.031
P-49	384040H003	J-1	7.50	152.4	Ductile Iron	130.0	0.00	0.00	0.000
P-1	J-1	J-2	26.29	204.0	PVC	110.0	19.37	0.59	2.741
P-2	J-2	J-24	23.95	204.0	PVC	110.0	16.44	0.50	2.023
P-9	J-2	J-37	9.56	204.0	Ductile Iron	110.0	2.93	0.09	0.084

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 1B: MAX DAY PLUS FIRE FLOW (16,000 L/min)

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
68	R-1	108.30	<None>	19.37	108.30

Fire Flow Report - Time: 0.00 hours

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Satisfies Fire Flow Constraints?
384040H003	100.00	500.00	100.00	500.00	20	117	75	True
FH-1	100.00	351.39	100.00	351.39	20	20	29	True
FH-2	100.00	183.74	100.00	183.74	20	20	29	True
FH-3	100.00	187.10	102.99	190.09	20	20	23	True
FH-4	100.00	178.19	100.00	178.19	20	20	22	True
FH-5	100.00	443.43	100.00	443.43	20	20	74	True
FH-6	100.00	221.17	100.00	221.17	20	20	22	True

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 2: PEAK HOUR

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-1	52.70	0.00	106.50	76
J-2	53.53	0.00	106.40	75
J-3	54.30	0.00	106.19	74
J-4	54.80	0.00	106.36	73
J-5	54.80	3.16	106.36	73
J-6	54.30	0.00	106.24	74
J-7	54.30	9.64	106.16	74
J-8	53.30	0.00	106.07	75
J-9	52.62	0.00	106.10	76
J-11	53.30	0.00	106.07	75
J-12	52.15	4.37	106.06	77
J-14	54.18	0.00	106.05	74
J-16	54.70	0.00	106.04	73
J-17	54.80	4.95	106.04	73
J-21	54.70	7.41	106.04	73
J-24	54.30	0.00	106.35	74
J-28	54.03	0.00	106.18	74
J-29	55.00	0.00	106.50	73
J-32	55.00	0.00	106.04	72
J-33	53.86	0.00	106.18	74
J-37	54.60	6.38	106.40	74

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradient (m/km)
P-4	J-4	J-5	12.72	204.0	PVC	110.0	3.16	0.10	0.095
P-5	J-4	J-6	59.98	204.0	PVC	110.0	16.56	0.51	2.050
P-10	J-9	FH-2	32.33	204.0	PVC	110.0	0.00	0.00	0.000
P-11	J-9	J-11	27.19	204.0	PVC	110.0	11.68	0.36	1.073
P-12	J-11	J-12	34.22	204.0	PVC	110.0	4.37	0.13	0.174
P-13	J-8	J-11	1.00	204.0	PVC	110.0	4.07	0.12	0.158
P-15	J-11	J-14	22.35	204.0	PVC	110.0	11.37	0.35	1.022
P-16	J-14	FH-3	9.36	204.0	PVC	110.0	6.58	0.20	0.371
P-17	J-14	J-16	35.91	204.0	PVC	110.0	4.79	0.15	0.206
P-18	J-16	J-17	5.95	204.0	PVC	110.0	4.95	0.15	0.219
P-21	R-1	J-1	1.00	600.0	PVC	130.0	42.49	0.15	0.047
P-25	J-24	J-3	80.95	204.0	PVC	110.0	16.39	0.50	2.012
P-26	J-24	FH-1	2.82	155.0	PVC	100.0	0.00	0.00	0.000
P-6	J-3	J-28	5.00	204.0	PVC	110.0	16.39	0.50	2.013
P-33	J-28	J-8	103.84	204.0	PVC	110.0	11.63	0.36	1.066
P-31	J-1	J-29	29.20	393.0	PVC	120.0	0.00	0.00	0.000
P-32	FH-5	J-29	9.31	155.0	PVC	100.0	0.00	0.00	0.000
P-38	J-32	FH-4	2.62	155.0	PVC	100.0	0.00	0.00	0.000

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 2: PEAK HOUR

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradient (m/km)
P-3	J-1	J-4	49.16	204.0	PVC	110.0	19.72	0.60	2.833
P-7	J-6	J-33	27.29	204.0	PVC	110.0	16.56	0.51	2.050
P-8	J-33	J-9	76.29	204.0	PVC	110.0	11.68	0.36	1.074
P-40	J-33	J-28	0.99	204.0	PVC	110.0	4.88	0.15	0.215
P-41	J-7	J-28	26.06	204.0	PVC	110.0	-9.64	0.29	0.752
P-45	J-8	J-32	63.22	204.0	PVC	110.0	7.57	0.23	0.481
P-46	J-32	J-21	4.45	204.0	PVC	110.0	7.41	0.23	0.462
P-47	FH-6	J-3	3.53	155.0	PVC	100.0	0.00	0.00	0.000
P-48	J-16	J-32	5.99	204.0	PVC	110.0	-0.16	0.00	0.000
P-49	384040H 003	J-1	7.50	155.0	PVC	100.0	0.00	0.00	0.000
P-1	J-1	J-2	26.29	204.0	PVC	110.0	22.77	0.70	3.699
P-2	J-2	J-24	23.95	204.0	PVC	110.0	16.39	0.50	2.012
P-9	J-2	J-37	9.56	204.0	Ductile Iron	110.0	6.38	0.20	0.351

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
68	R-1	106.50	<None>	42.49	106.50

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 3: HIGH PRESSURE CHECK

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-1	52.70	0.00	114.00	87
J-2	53.53	0.00	113.98	86
J-3	54.30	0.00	113.93	85
J-4	54.80	0.00	113.97	84
J-5	54.80	1.43	113.97	84
J-6	54.30	0.00	113.94	85
J-7	54.30	4.42	113.92	85
J-8	53.30	0.00	113.90	86
J-9	52.62	0.00	113.91	87
J-11	53.30	0.00	113.90	86
J-12	52.15	1.98	113.90	88
J-14	54.18	0.00	113.89	85
J-16	54.70	0.00	113.89	84
J-17	54.80	2.25	113.89	84
J-21	54.70	3.37	113.89	84
J-24	54.30	0.00	113.97	85
J-28	54.03	0.00	113.93	85
J-29	55.00	0.00	114.00	84
J-32	55.00	0.00	113.89	84
J-33	53.86	0.00	113.93	85
J-37	54.60	2.93	113.98	84

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradient (m/km)
P-4	J-4	J-5	12.72	204.0	PVC	110.0	1.43	0.04	0.022
P-5	J-4	J-6	59.98	204.0	PVC	110.0	7.55	0.23	0.478
P-10	J-9	FH-2	32.33	204.0	PVC	110.0	0.00	0.00	0.000
P-11	J-9	J-11	27.19	204.0	PVC	110.0	5.30	0.16	0.249
P-12	J-11	J-12	34.22	204.0	PVC	110.0	1.98	0.06	0.040
P-13	J-8	J-11	1.00	204.0	PVC	110.0	1.84	0.06	0.028
P-15	J-11	J-14	22.35	204.0	PVC	110.0	5.17	0.16	0.238
P-16	J-14	FH-3	9.36	204.0	PVC	110.0	2.99	0.09	0.085
P-17	J-14	J-16	35.91	204.0	PVC	110.0	2.18	0.07	0.048
P-18	J-16	J-17	5.95	204.0	PVC	110.0	2.25	0.07	0.050
P-21	R-1	J-1	1.00	600.0	PVC	130.0	19.37	0.07	0.009
P-25	J-24	J-3	80.95	204.0	PVC	110.0	7.46	0.23	0.468
P-26	J-24	FH-1	2.82	155.0	PVC	100.0	0.00	0.00	0.000
P-6	J-3	J-28	5.00	204.0	PVC	110.0	7.46	0.23	0.470
P-33	J-28	J-8	103.84	204.0	PVC	110.0	5.29	0.16	0.247
P-31	J-1	J-29	29.20	393.0	PVC	120.0	0.00	0.00	0.000
P-32	FH-5	J-29	9.31	155.0	PVC	100.0	0.00	0.00	0.000
P-38	J-32	FH-4	2.62	155.0	PVC	100.0	0.00	0.00	0.000

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 3: HIGH PRESSURE CHECK

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradient (m/km)
P-3	J-1	J-4	49.16	204.0	PVC	110.0	8.98	0.27	0.660
P-7	J-6	J-33	27.29	204.0	PVC	110.0	7.55	0.23	0.479
P-8	J-33	J-9	76.29	204.0	PVC	110.0	5.30	0.16	0.249
P-40	J-33	J-28	0.99	204.0	PVC	110.0	2.24	0.07	0.056
P-41	J-7	J-28	26.06	204.0	PVC	110.0	-4.42	0.14	0.177
P-45	J-8	J-32	63.22	204.0	PVC	110.0	3.44	0.11	0.112
P-46	J-32	J-21	4.45	204.0	PVC	110.0	3.37	0.10	0.107
P-47	FH-6	J-3	3.53	155.0	PVC	100.0	0.00	0.00	0.000
P-48	J-16	J-32	5.99	204.0	PVC	110.0	-0.07	0.00	0.000
P-49	384040H 003	J-1	7.50	155.0	PVC	100.0	0.00	0.00	0.000
P-1	J-1	J-2	26.29	204.0	PVC	110.0	10.39	0.32	0.865
P-2	J-2	J-24	23.95	204.0	PVC	110.0	7.46	0.23	0.468
P-9	J-2	J-37	9.56	204.0	Ductile Iron	110.0	2.93	0.09	0.083

WATERCAD MODEL RESULTS -PETRIE'S LANDING PHASES 3,4,5

SCENARIO 3: HIGH PRESSURE CHECK

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
68	R-1	114.00	<None>	19.37	114.00

Appendix D – Sanitary Sewer Design Tables

Table D1: Sanitary Sewer Calculation Sheet

TABLE D1: SANITARY SEWER CALCULATION SHEET

LOCATION				RESIDENTIAL AREAS AND POPULATIONS													COMMERCIAL				INDUSTRIAL			INSTITUTIONAL		INFILTRATION			TOTAL FLOW (L/s)	SEWER DATA						
						NUMBER OF UNITS								POPULATION					AREA (ha)				AREA (ha)				AREA (ha)										
Street	U/S MH	D/S MH	Desc	Area (ha)	ACCU Area (ha)	Singles	Semis	Towns	Batch Apt.	1-Bed Apt.	2-Bed Apt.	3-Bed Apt.	Total Units	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	% of total	Peak Flow (L/sec)	INDIV	ACCU	Peak Factor (per MOE)	AREA (Ha)	ACCU AREA (Ha)	INDIV	ACCU	INFILT FLOW (L/s)		Nom Dia (mm)	Actual Dia (mm)	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q_{CAP} (%)	Full Velocity (m/s)
Private	MHSA101	MHSA100	Tower 4	0.6097	0.610				37	155	67	2	261	415.7	415.7	4.00	5.39										0.610	0.610	0.20	5.39							
			Tower 3	0.5676	*1.177*				*2*	*90*	*68*	*2*	*162*	277.8	*693.5*	*3.32*	*7.46*										0.568	1.177	0.39	7.85	250	251.46	1.00	28.80	60.40	0.13	1.21
	MHSA100	*MHSA71642*			*1.177*										*693.5*	*3.32*	*7.46*											*1.177*	*0.39*	*7.85*	*250*	*251.46*	*0.23*	*34.05*	*29.28*	*0.27*	*0.58*
	MHSA71642	*MHSA70588*			1.177										693.5	3.32	7.46											1.177	0.39	7.85	250	251.46	0.31	22.69	33.55	0.23	0.67
	MHSA70588	*MHSA70591*	*Ex.Tower 2*	*0.6852*	*1.863*				*2*	*83*	*57*	*2*	*144*	244.9	*938.4*	*3.25*	*9.88*										*0.685*	*1.863*	*0.61*	*10.50*	*250*	*251.46*	*0.35*	*5.79*	*35.50*	*0.30*	*0.71*
	MHSA70591	*MHSA70589*			*1.863*										*938.4*	*3.25*	*9.88*											*1.863*	*0.61*	*10.50*	*250*	*251.46*	*0.29*	*62.68*	*32.37*	*0.32*	*0.65*
	MHSA70589	*MHSA70590*	Towers 5	*0.7769*	2.639				*35*	*150*	*39*	*4*	228	353.3	1291.7	3.18	13.31	0.136	0.136	5.2%	0.04						*0.777*	*2.639*	*0.87*	*14.23*	*250*	*251.46*	*0.24*	*38.01*	*29.39*	*0.48*	*0.59*
	MHSA70590	*MHSA54986*			*2.639*										*1291.7*	*3.18*	*13.31*		*0.136*		*0.07*							*2.639*	*0.87*	*14.25*	*250*	*251.46*	*0.54*	*11.04*	*44.53*	*0.32*	*0.89*
	MHSA54986	*MHSA54987*	*Ex.Tower 1*	*0.8895*	*3.529*					*14*	*75*		*89*	177.1	*1468.8*	*3.15*	*14.99*		*0.136*		*0.07*						*0.890*	*3.529*	*1.16*	*16.22*	*250*	*251.46*	*0.51*	*15.66*	*43.17*	*0.38*	*0.86*
	MHSA54987	*MHSA54988*			*3.529*										*1468.8*	*3.15*	*14.99*		*0.136*		*0.07*							*3.529*	*1.16*	*16.22*	*250*	*251.46*	*0.56*	*12.56*	*45.09*	*0.36*	*0.90*
	MHSA54988	*MHSA54989*	Towers 6	0.3899	*3.919*				*56*	*229*	*59*	*4*	348	535.3	2004.1	3.07	19.94	0.165	0.301	4.2%	0.10						*0.390*	*3.919*	*1.29*	*21.33*	*250*	*251.46*	*0.33*	*33.03*	*34.86*	*0.61*	*0.70*
Jeane D'Arc	*MHSA54989*	*MHSA54990*			*3.919*										*2004.1*	*3.07*	*19.94*		*0.301*		*0.15*							*3.919*	*1.29*	*21.38*	*300*	*299.36*	*0.15*	*79.36*	*37.39*	*0.57*	*0.53*
	MHSA54990	*MHSA54991*	*Ext-1, Ext-2*	*6.1710*	*10.090*										*2004.1*	*3.07*	*19.94*	*6.171*	*6.472*	*61.2%*	*3.15*						*6.171*	*10.090*	*3.33*	*26.41*	*300*	*299.36*	*0.29*	*34.70*	*51.62*	*0.51*	*0.73*
	MHSA54991	*MHSA54992*			*10.090*										*2004.1*	*3.07*	*19.94*		*6.472*		*3.15*							*10.090*	*3.33*	*26.41*	*300*	*299.36*	*0.16*	*85.00*	*39.02*	*0.68*	*0.55*
	MHSA54992	*MHSA54993*			*10.090*										*2004.1*	*3.07*	*19.94*		*6.472*		*3.15*							*10.090*	*3.33*	*26.41*	*300*	*299.36*	*0.24*	*55.13*	*46.69*	*0.57*	*0.66*
	MHSA54993	*MHSA22037*			*10.090*										*2004.1*	*3.07*	*19.94*		*6.472*		*3.15*							*10.090*	*3.33*	*26.41*	*300*	*299.36*	*0.20*	*66.40*	*42.54*	*0.62*	*0.60*
				10.090					**132**	**721**	**365**	**14**	**1232**	**2004.1**			**6.472**									**10.090**			**584.90**							

Residential Avg. Daily Flow, q (L/p/day) =	280	Commercial Peak Factor =	1.5	(when area >20%)	Peak Population Flow, (L/sec) =	P*q*M/86.4	Unit Type / Persons/Unit
Commercial Avg. Daily Flow (L/gross ha/day) =	28,000		1.0	(when area <20%)	Peak Extraneous Flow, (L/sec) =	I*Ac	Singles 3.4
or L/gross ha/sec =	0.324				Residential Peaking Factor, M =	1 + (14/(4+P^0.5)) * K	Semi-Detached 5.7
Institutianal Avg. Daily Flow (L/s/ha) =	28,000	Institutional Peak Factor =	1.5	(when area >20%)	A_c = Cumulative Area (hectares)		Townhomes 2.7
or L/gross ha/sec =	0.324		1.0	(when area <20%)	P = Population (thousands)		Batch Apt. Unit 1.4
Light Industrial Flow (L/gross ha/day) =	35,000						1-bed Apt. Unit 1.4
or L/gross ha/sec =	0.4051	Residential Correction Factor, K =	0.80		Sewer Capacity, Qcap (L/sec) =	$1/N \; S^{1/2} \; R^{2/3} \; A_c$	1-bed + Den Apt. 1.4
Light Industrial Flow (L/gross ha/day) =	55,000	Manning N =	0.013		(Manning's Equation)		2-bed Apt. Unit 2.1
or L/gross ha/sec =	0.637	Peak extraneous flow, I (L/s/ha) =	0.33	(Total I/I)			3-bed Apt. Unit 3.1

Designed:	Project:
J. Fitzpatrick, P.Eng.	Petries Landing I, Phases 3 to 5
Checked:	Location:
B. Thomas, P.Eng.	Ottawa, Ontario
File Reference:	Page No:
247308 Sanitary Design Sheet, June 2024.xlsx	**1 of 1**

Notes

rows in **bold** are proposed sewer runs

rows in *itlaics* are existing sewer runs

existing sewer slopes in *italics* are as-built slopes.

Appendix E – Stormwater Design Tables

Table E1: 2-year Storm Sewer Calculation Sheet

Table E2: 5-year Storm Sewer Calculation Sheet

Table E3: Pre-Development Runoff Calculations

Table E4: Allowable Runoff Calculations

Table E5: Summary of Post-Development Runoff (Uncontrolled and Controlled)

Table E6: MRM Storage Volumes for 5-year and 100-year Storms

TABLE E1: 2-YEAR STORM SEWER CALCULATION SHEET

Return Period Storm = 2-year

LOCATION INFORMATION				AREA INFORMATION				PEAK FLOW (UNRESTRICTED)							SEWER DATA								
STREET	U/S MH	D/S MH	DESC	AREA NO.	INDIV AREA (ha)	CUMUL AREA (ha)	AVG. R	INDIV. 2.78*A*R	ACCUM 2.78*A*R	TIME OF CONC (mins)	INTEN (mm/h)	Return Period	INDIV PEAK FLOW (L/sec)	PEAK FLOW (L/sec)	NOM DIA. (mm)	ACT DIA. (mm)	TYPE	SLOPE (%)	LEN (m)	CAP (L/sec)	VEL (m/sec)	TIME IN PIPE (min)	Q/CAP
NORTH	207	206		S16	0.0280	0.0280	0.29	0.023	0.0226	10.00	76.81	2-year	1.7	1.7									
				S33	0.0302	0.0582	0.33	0.028	0.0503	10.00	76.81	2-year	2.1	3.9									
STORM				S46	0.0113	0.0695	0.33	0.010	0.0606	10.00	76.81	2-year	0.8	4.7									
SEWER				S47	0.0243	0.0938	0.84	0.057	0.1174	10.00	76.81	2-year	4.4	9.0									
				S74	0.0147	0.1085	0.52	0.021	0.1386	10.00	76.81	2-year	1.6	10.6									
				S65	0.0253	0.1338	0.23	0.016	0.1548	10.00	76.81	2-year	1.2	11.9									
				S67_1 & S67_2	0.1273	0.2611	0.90	0.319	0.4733	10.00	76.81	2-year	24.5	36.4	450	447.90	PVC	0.25	69.40	140.79	0.89	1.29	0.26
	206	205		S58	0.0211	0.2822	0.35	0.021	0.4939	11.29	72.17	2-year	1.5	35.6									
				S62	0.0443	0.3265	0.59	0.073	0.5665	11.29	72.17	2-year	5.2	40.9									
				S63	0.0435	0.3700	0.7	0.085	0.6512	11.29	72.17	2-year	6.1	47.0									
				S64	0.0516	0.4216	0.39	0.056	0.7071	11.29	72.17	2-year	4.0	51.0									
				S68	0.0279	0.4495	0.40	0.031	0.7381	11.29	72.17	2-year	2.2	53.3									
				S69	0.0366	0.4861	0.33	0.034	0.7717	11.29	72.17	2-year	2.4	55.7	450	447.90	PVC	0.25	24.40	140.79	0.89	0.46	0.40
	205	204		S01	0.0074	0.4935	0.90	0.019	0.7902	11.75	70.68	2-year	1.3	55.9									
				S06	0.0075	0.5010	0.90	0.019	0.8090	11.75	70.68	2-year	1.3	57.2									
				S09	0.0294	0.5304	0.90	0.074	0.8825	11.75	70.68	2-year	5.2	62.4									
				S49	0.0801	0.6105	0.58	0.129	1.0117	11.75	70.68	2-year	9.1	71.5									
				S66	0.0639	0.6744	0.30	0.053	1.0650	11.75	70.68	2-year	3.8	75.3									
				S70	0.0828	0.7572	0.39	0.090	1.1548	11.75	70.68	2-year	6.3	81.6									
				S71	0.0230	0.7802	0.26	0.017	1.1714	11.75	70.68	2-year	1.2	82.8									
				S73	0.0048	0.7850	0.90	0.012	1.1834	11.75	70.68	2-year	0.8	83.6									
				S76	0.0403	0.8253	0.90	0.101	1.2842	11.75	70.68	2-year	7.1	90.8	525	533.40	CONC	0.17	48.00	184.99	0.83	0.97	0.49
	204	78309		S10	0.0078	0.8331	0.90	0.020	1.3037	12.72	67.74	2-year	1.3	88.3									
				S50	0.0200	0.8531	0.43	0.024	1.3277	12.72	67.74	2-year	1.6	89.9									
				S51	0.0231	0.8762	0.47	0.030	1.3578	12.72	67.74	2-year	2.0	92.0									
				S52	0.0224	0.8986	0.41	0.026	1.3834	12.72	67.74	2-year	1.7	93.7									
				S54	0.0442	0.9428	0.26	0.032	1.4153	12.72	67.74	2-year	2.2	95.9									
				S56	0.0223	0.9651	0.51	0.032	1.4469	12.72	67.74	2-year	2.1	98.0									
				S60	0.0205	0.9856	0.37	0.021	1.4680	12.72	67.74	2-year	1.4	99.4									
				S61	0.0213	1.0069	0.44	0.026	1.4941	12.72	67.74	2-year	1.8	101.2	525	533.40	CONC	0.21	5.40	205.60	0.92	0.10	0.49
	78309	202B		S12	0.0293	1.0362	0.90	0.073	1.5674	12.81	67.46	2-year	4.9	105.7									
				S13	0.0096	1.0458	0.90	0.024	1.5914	12.81	67.46	2-year	1.6	107.4									
				S17	0.0246	1.0704	0.38	0.026	1.6174	12.81	67.46	2-year	1.8	109.1									
				S18	0.0168	1.0872	0.36	0.017	1.6342	12.81	67.46	2-year	1.1	110.2									
				S19	0.0366	1.1238	0.37	0.038	1.6719	12.81	67.46	2-year	2.5	112.8									
				S29	0.0376	1.1614	0.36	0.038	1.7095	12.81	67.46	2-year	2.5	115.3	525	533.40	CONC	0.14	52.00	167.87	0.75	1.15	0.69

TABLE E1: 2-YEAR STORM SEWER CALCULATION SHEET

Return Period Storm = 2-year

LOCATION INFORMATION				AREA INFORMATION				PEAK FLOW (UNRESTRICTED)							SEWER DATA								
STREET	U/S MH	D/S MH	DESC	AREA NO.	INDIV AREA (ha)	CUMUL AREA (ha)	AVG. R	INDIV. 2.78*A*R	ACCUM 2.78*A*R	TIME OF CONC (mins)	INTEN (mm/h)	Return Period	INDIV PEAK FLOW (L/sec)	PEAK FLOW (L/sec)	NOM DIA. (mm)	ACT DIA. (mm)	TYPE	SLOPE (%)	LEN (m)	CAP (L/sec)	VEL (m/sec)	TIME IN PIPE (min)	Q/CAP
	202B	54416		S11	0.0092	1.1706	0.90	0.023	1.7325	13.97	64.32	2-year	1.5	111.4									
				S14	0.0359	1.2065	0.90	0.090	1.8223	13.97	64.32	2-year	5.8	117.2									
				S15	0.0066	1.2131	0.90	0.017	1.8388	13.97	64.32	2-year	1.1	118.3									
				S20	0.0411	1.2542	0.33	0.038	1.8765	13.97	64.32	2-year	2.4	120.7									
				S22	0.0299	1.2841	0.68	0.057	1.9331	13.97	64.32	2-year	3.6	124.3									
				S24	0.0602	1.3443	0.28	0.047	1.9799	13.97	64.32	2-year	3.0	127.3									
				S26	0.0662	1.4105	0.27	0.050	2.0296	13.97	64.32	2-year	3.2	130.5									
				S27	0.0552	1.4657	0.77	0.118	2.1478	13.97	64.32	2-year	7.6	138.1									
				S28	0.0328	1.4985	0.70	0.064	2.2116	13.97	64.32	2-year	4.1	142.2									
				S32	0.0197	1.5182	0.90	0.049	2.2609	13.97	64.32	2-year	3.2	145.4									
				S43	0.0290	1.5472	0.90	0.073	2.3334	13.97	64.32	2-year	4.7	150.1									
				S72	0.0050	1.5522	0.90	0.013	2.3460	13.97	64.32	2-year	0.8	150.9	525	533.40	CONC	0.22	8.90	210.44	0.94	0.16	0.72
	54416	54415		S21	0.0849	1.6371	0.90	0.212	2.5584	14.12	63.91	2-year	13.6	163.5									
				S37	0.0870	1.7241	0.90	0.218	2.7761	14.12	63.91	2-year	13.9	177.4									
				S39	0.0951	1.8192	0.34	0.090	2.8659	14.12	63.91	2-year	5.7	183.2									
				S40	0.1140	1.9332	0.65	0.206	3.0719	14.12	63.91	2-year	13.2	196.3	600	600.00	CONC	0.17	41.20	253.16	0.90	0.77	0.78
POND	54415	POND-IN 1		S25	0.0338	1.9670	0.20	0.019	3.0907	14.89	62.02	2-year	1.2	191.7	600	600.00	CONC	0.20	69.40	274.59	0.97	1.19	0.70
SOUTH	209	208		S48	0.0359	0.0359	0.80	0.080	0.0798	10.00	76.81	2-year	6.1	6.1									
STORM				S55	0.0232	0.0591	0.67	0.043	0.1231	10.00	76.81	2-year	3.3	9.5	375	366.40	PVC	1.00	32.60	164.81	1.56	0.35	0.06
SEWER																							
	208	78305		S34	0.0543	0.1134	0.73	0.110	0.2333	10.35	75.50	2-year	8.3	17.6									
				S75	0.0982	0.2116	0.72	0.197	0.4298	10.35	75.50	2-year	14.8	32.4	375	366.40	PVC	0.25	36.30	82.41	0.78	0.77	0.39
	79305	76834		S45	0.0396	0.2512	0.76	0.084	0.5135	11.12	72.75	2-year	6.1	37.4	375	366.40	PVC	0.25	23.00	82.41	0.78	0.49	0.45
	76834	76835		S30	0.1517	0.4029	0.36	0.152	0.6653	11.61	71.12	2-year	10.8	47.3									
				S31	0.0372	0.4401	0.90	0.093	0.7584	11.61	71.12	2-year	6.6	53.9									
				S44	0.0496	0.4897	0.20	0.028	0.7859	11.61	71.12	2-year	2.0	55.9	375	366.40	PVC	0.21	36.20	75.53	0.72	0.84	0.74
	76835	76833				0.4897			0.7859	12.45	68.51	2-year		53.8	375	366.40	PVC	0.69	22.00	136.90	1.30	0.28	0.39

TABLE E1: 2-YEAR STORM SEWER CALCULATION SHEET

Return Period Storm = 2-year

LOCATION INFORMATION				AREA INFORMATION				PEAK FLOW (UNRESTRICTED)							SEWER DATA								
STREET	U/S MH	D/S MH	DESC	AREA NO.	INDIV AREA (ha)	CUMUL AREA (ha)	AVG. R	INDIV. 2.78*A*R	ACCUM 2.78*A*R	TIME OF CONC (mins)	INTEN (mm/h)	Return Period	INDIV PEAK FLOW (L/sec)	PEAK FLOW (L/sec)	NOM DIA. (mm)	ACT DIA. (mm)	TYPE	SLOPE (%)	LEN (m)	CAP (L/sec)	VEL (m/sec)	TIME IN PIPE (min)	Q/CAP
	78307	76833		S05	0.0370	0.0370	0.21	0.022	0.0216	10.00	76.81	2-year	1.7	1.7									
				S42	0.1341	0.1711	0.68	0.254	0.2751	10.00	76.81	2-year	19.5	21.1	375	366.40	PVC	1.50	26.24	201.85	1.91	0.23	0.10
	76833	54409		S38	0.0506	0.7114	0.90	0.127	1.1877	12.74	67.68	2-year	8.6	80.4	375	366.40	PVC	0.87	68.10	153.73	1.46	0.78	0.52
	54409	54410				0.7114			1.1877	13.52	65.51	2-year		77.8	375	366.40	PVC	2.01	18.10	233.66	2.22	0.14	0.33
	210	54411		S38	0.0506	0.0506	0.90	0.127	0.1266	10.00	76.81	2-year	9.7	9.7									
				S42	0.1270	0.1776	0.68	0.240	0.2401	11.00	73.17	2-year	17.6	17.6									
				S07	0.1402	0.3178	0.72	0.281	0.4072	10.00	76.81	2-year	21.6	31.3									
				S77	0.0208	0.3386	0.90	0.052	0.2921	11.00	73.17	2-year	3.8	21.4									
				S78	0.0210	0.3596	0.90	0.053	0.4598	12.00	69.89	2-year	3.7	32.1									
				S79	0.0583	0.4179	0.90	0.146	0.4380	13.00	66.93	2-year	9.8	29.3									
				S67	0.1003	0.5182	0.90	0.251	0.7107	14.00	64.23	2-year	16.1	45.7									
				S80	0.0169	0.5351	0.90	0.042	0.4803	15.00	61.77	2-year	2.6	29.7									
				S81	0.0210	0.5561	0.90	0.053	0.7633	16.00	59.50	2-year	3.1	45.4									
				S82	0.0583	0.6144	0.90	0.146	0.6261	17.00	57.42	2-year	8.4	36.0									
				S57	0.0235	0.6379	0.43	0.028	0.7914	10.00	76.81	2-year	2.2	60.8	300	299.40	PVC	1.00	13.17	96.19	1.37	0.16	0.63
	54411	54410		S41	0.2130	0.8509	0.79	0.468	1.2591	11.37	71.93	2-year	33.6	90.6	300	299.40	PVC	1.40	35.70	113.81	1.62	0.37	0.80
	54410	POND-IN 2				1.5623			2.4468	13.65	65.14	2-year		159.4	375	366.40	PVC	1.60	8.00	208.47	1.98	0.07	0.76
Vortex	Pond-Out	54412		S23	0.1972	3.7265	0.20	0.110	5.6472	16.08	59.32	2-year	6.5	335.0	525	533.40	CONC	1.56	20.50	560.37	2.51	0.14	0.60
	54412	54413				3.7265			5.6472	16.22	59.03	2-year		333.4	525	533.40	CONC	1.31	13.10	513.51	2.30	0.10	0.65
	54413	54414				3.7265			5.6472	16.31	58.83	2-year		332.2	525	533.40	CONC	1.37	59.30	525.14	2.35	0.42	0.63
	54414	Headwall				3.7265			5.6472	16.73	57.96	2-year		327.3	525	533.40	CONC	1.00	15.00	448.66	2.01	0.12	0.73
					3.7265			**6.2733**					**437.8**							**746.01**				

Definitions:

Q = 2.78*AIR, where
- Q = Peak Flow in Litres per second (L/s)
- A = Watershed Area (hectares)
- I = Rainfall Intensity (mm/h)
- R = Runoff Coefficients (dimensionless)

Manning Coefficient = 0.013 (dimensionless)
Default Inlet Time= 10 (minutes)

Ottawa Rainfall Intensity Values

Storm	a	b	c
2-year	732.951	6.199	0.810
5-year	998.071	6.053	0.814
100-year	1735.688	6.014	0.820

Designed:	Project:
J. Fitzpatrick, P.Eng.	Petries Landing 247038
Checked:	Location:
B. Thomas, P.Eng.	Ottawa, Ontario
File Reference:	No of pages:
247038 Storm Design Sheets, june 2024 (to be updated).xlsx	**3**

TABLE E2: 5-YEAR STORM SEWER CALCULATION SHEET

Return Period Storm = 5-year

LOCATION INFORMATiON				AREA INFORMATION				PEAK FLOW (UNRESTRICTED)							SEWER DATA								
STREET	U/S MH	D/S MH	DESC	AREA NO.	INDIV AREA (ha)	CUMUL AREA (ha)	AVG. R	INDIV. 2.78*A*R	ACCUM 2.78*A*R	TIME OF CONC (mins)	INTEN (mm/h)	Return Period	INDIV PEAK FLOW (L/sec)	PEAK FLOW (L/sec)	NOM DIA. (mm)	ACT DIA. (mm)	TYPE	SLOPE (%)	LEN (m)	CAP (L/sec)	VEL (m/sec)	TIME IN PIPE (min)	Q/CAP
NORTH	207	206		S16	0.0280	0.0280	0.29	0.023	0.0226	10.00	104.19	5-year	2.4	2.4									
				S33	0.0302	0.0582	0.33	0.028	0.0503	10.00	104.19	5-year	2.9	5.2									
STORM				S46	0.0113	0.0695	0.33	0.010	0.0606	10.00	104.19	5-year	1.1	6.3									
SEWER				S47	0.0243	0.0938	0.84	0.057	0.1174	10.00	104.19	5-year	5.9	12.2									
				S74	0.0147	0.1085	0.52	0.021	0.1386	10.00	104.19	5-year	2.2	14.4									
				S65	0.0253	0.1338	0.23	0.016	0.1548	10.00	104.19	5-year	1.7	16.1									
				S67_1 & S67_2	0.1273	0.2611	0.90	0.319	0.4733	10.00	104.19	5-year	33.2	49.3	450	447.90	PVC	0.25	69.40	140.79	0.89	1.29	0.35
	206	205		S58	0.0211	0.2822	0.35	0.021	0.4939	11.29	97.82	5-year	2.0	48.3									
				S62	0.0443	0.3265	0.59	0.073	0.5665	11.29	97.82	5-year	7.1	55.4									
				S63	0.0435	0.3700	0.7	0.085	0.6512	11.29	97.82	5-year	8.3	63.7									
				S64	0.0516	0.4216	0.39	0.056	0.7071	11.29	97.82	5-year	5.5	69.2									
				S68	0.0279	0.4495	0.40	0.031	0.7381	11.29	97.82	5-year	3.0	72.2									
				S69	0.0366	0.4861	0.33	0.034	0.7717	11.29	97.82	5-year	3.3	75.5	450	447.90	PVC	0.25	24.40	140.79	0.89	0.46	0.54
	205	204		S01	0.0074	0.4935	0.90	0.019	0.7902	11.75	95.78	5-year	1.8	75.7									
				S06	0.0075	0.5010	0.90	0.019	0.8090	11.75	95.78	5-year	1.8	77.5									
				S09	0.0294	0.5304	0.90	0.074	0.8825	11.75	95.78	5-year	7.0	84.5									
				S49	0.0801	0.6105	0.58	0.129	1.0117	11.75	95.78	5-year	12.4	96.9									
				S66	0.0639	0.6744	0.30	0.053	1.0650	11.75	95.78	5-year	5.1	102.0									
				S70	0.0828	0.7572	0.39	0.090	1.1548	11.75	95.78	5-year	8.6	110.6									
				S71	0.0230	0.7802	0.26	0.017	1.1714	11.75	95.78	5-year	1.6	112.2									
				S73	0.0048	0.7850	0.90	0.012	1.1834	11.75	95.78	5-year	1.2	113.3									
				S76	0.0403	0.8253	0.90	0.101	1.2842	11.75	95.78	5-year	9.7	123.0	525	533.40	CONC	0.17	48.00	184.99	0.83	0.97	0.66
	204	78309		S10	0.0078	0.8331	0.90	0.020	1.3037	12.72	91.74	5-year	1.8	119.6									
				S50	0.0200	0.8531	0.43	0.024	1.3277	12.72	91.74	5-year	2.2	121.8									
				S51	0.0231	0.8762	0.47	0.030	1.3578	12.72	91.74	5-year	2.8	124.6									
				S52	0.0224	0.8986	0.41	0.026	1.3834	12.72	91.74	5-year	2.3	126.9									
				S54	0.0442	0.9428	0.45	0.055	1.4387	12.72	91.74	5-year	5.1	132.0									
				S56	0.0223	0.9651	0.90	0.056	1.4945	12.72	91.74	5-year	5.1	137.1									
				S60	0.0205	0.9856	0.36	0.021	1.5150	12.72	91.74	5-year	1.9	139.0									
				S61	0.0213	1.0069	0.39	0.023	1.5381	12.72	91.74	5-year	2.1	141.1	525	533.40	CONC	0.21	5.40	205.60	0.92	0.10	0.69
	78309	202B		S12	0.0293	1.0362	0.90	0.073	1.6114	12.81	91.36	5-year	6.7	147.2									
				S13	0.0096	1.0458	0.90	0.024	1.6354	12.81	91.36	5-year	2.2	149.4									
				S17	0.0246	1.0704	0.38	0.026	1.6614	12.81	91.36	5-year	2.4	151.8									
				S18	0.0168	1.0872	0.36	0.017	1.6782	12.81	91.36	5-year	1.5	153.3									
				S19	0.0366	1.1238	0.37	0.038	1.7158	12.81	91.36	5-year	3.4	156.8									
				S29	0.0376	1.1614	0.36	0.038	1.7535	12.81	91.36	5-year	3.4	160.2	525	533.40	CONC	0.14	52.00	167.87	0.75	1.15	0.95

TABLE E2: 5-YEAR STORM SEWER CALCULATION SHEET

Return Period Storm = 5-year

LOCATION INFORMATiON				AREA INFORMATION				PEAK FLOW (UNRESTRICTED)							SEWER DATA								
STREET	U/S MH	D/S MH	DESC	AREA NO.	INDIV AREA (ha)	CUMUL AREA (ha)	AVG. R	INDIV. 2.78*A*R	ACCUM 2.78*A*R	TIME OF CONC (mins)	INTEN (mm/h)	Return Period	INDIV PEAK FLOW (L/sec)	PEAK FLOW (L/sec)	NOM DIA. (mm)	ACT DIA. (mm)	TYPE	SLOPE (%)	LEN (m)	CAP (L/sec)	VEL (m/sec)	TIME IN PIPE (min)	Q/CAP
	202B	54416		S11	0.0092	1.1706	0.90	0.023	1.7765	13.97	87.05	5-year	2.0	154.6									
				S14	0.0359	1.2065	0.90	0.090	1.8663	13.97	87.05	5-year	7.8	162.5									
				S15	0.0066	1.2131	0.90	0.017	1.8828	13.97	87.05	5-year	1.4	163.9									
				S20	0.0411	1.2542	0.33	0.038	1.9205	13.97	87.05	5-year	3.3	167.2									
				S22	0.0299	1.2841	0.68	0.057	1.9771	13.97	87.05	5-year	4.9	172.1									
				S24	0.0602	1.3443	0.28	0.047	2.0239	13.97	87.05	5-year	4.1	176.2									
				S26	0.0662	1.4105	0.27	0.050	2.0736	13.97	87.05	5-year	4.3	180.5									
				S27	0.0552	1.4657	0.77	0.118	2.1918	13.97	87.05	5-year	10.3	190.8									
				S28	0.0328	1.4985	0.70	0.064	2.2556	13.97	87.05	5-year	5.6	196.3									
				S32	0.0197	1.5182	0.90	0.049	2.3049	13.97	87.05	5-year	4.3	200.6									
				S43	0.0290	1.5472	0.90	0.073	2.3774	13.97	87.05	5-year	6.3	207.0									
				S72	0.0050	1.5522	0.90	0.013	2.3900	13.97	87.05	5-year	1.1	208.0	525	533.40	CONC	0.22	8.90	210.44	0.94	0.16	0.99
	54416	54415		S21	0.0849	1.6371	0.90	0.212	2.6024	14.12	86.50	5-year	18.4	225.1									
				S37	0.0870	1.7241	0.90	0.218	2.8200	14.12	86.50	5-year	18.8	243.9									
				S39	0.0951	1.8192	0.34	0.090	2.9099	14.12	86.50	5-year	7.8	251.7									
				S40	0.1140	1.9332	0.65	0.206	3.1159	14.12	86.50	5-year	17.8	269.5	600	600.00	CONC	0.17	41.20	253.16	0.90	0.77	1.06
POND	54415	POND-IN 1		S25	0.0338	1.9670	0.20	0.019	3.1347	14.89	83.91	5-year	1.6	263.0	600	600.00	CONC	0.20	69.40	274.59	0.97	1.19	0.96
SOUTH	209	208		S48	0.0359	0.0359	0.80	0.080	0.0798	10.00	104.19	5-year	8.3	8.3									
STORM				S55	0.0232	0.0591	0.65	0.042	0.1218	10.00	104.19	5-year	4.4	12.7	375	366.40	PVC	1.00	32.60	164.81	1.56	0.35	0.08
SEWER																							
	208	78305		S34	0.0543	0.1134	0.73	0.110	0.2320	10.35	102.39	5-year	11.3	23.8									
				S75	0.0982	0.2116	0.72	0.197	0.4285	10.35	102.39	5-year	20.1	43.9	375	366.40	PVC	0.25	36.30	82.41	0.78	0.77	0.53
	79305	76834		S45	0.0396	0.2512	0.76	0.084	0.5122	11.12	98.62	5-year	8.3	50.5	375	366.40	PVC	0.25	23.00	82.41	0.78	0.49	0.61
	76834	76835		S30	0.1517	0.4029	0.36	0.152	0.6640	11.61	96.38	5-year	14.6	64.0									
				S31	0.0372	0.4401	0.90	0.093	0.7571	11.61	96.38	5-year	9.0	73.0									
				S44	0.0496	0.4897	0.20	0.028	0.7847	11.61	96.38	5-year	2.7	75.6	375	366.40	PVC	0.21	36.20	75.53	0.72	0.84	1.00
	76835	76833				0.4897			0.7847	12.45	92.80	5-year		72.8	375	366.40	PVC	0.69	22.00	136.90	1.30	0.28	0.53

TABLE E2: 5-YEAR STORM SEWER CALCULATION SHEET

Return Period Storm = 5-year

LOCATION INFORMATION				AREA INFORMATION				PEAK FLOW (UNRESTRICTED)							SEWER DATA							
STREET	U/S MH	D/S MH	DESC	AREA NO.	INDIV AREA (ha)	CUMUL AREA (ha)	AVG. R	INDIV. 2.78*A*R	ACCUM 2.78*A*R	TIME OF CONC (mins)	INTEN (mm/h)	Return Period	INDIV PEAK FLOW (L/sec)	PEAK FLOW (L/sec)	NOM DIA. (mm)	ACT DIA. (mm)	TYPE	SLOPE (%)	LEN (m)	CAP (L/sec)	VEL (m/sec)	TIME IN PIPE (min)	Q/CAP
	78307	76833		S05	0.0370	0.0370	0.21	0.022	0.0216	10.00	104.19	5-year	2.3	2.3									
				S42	0.1341	0.1711	0.68	0.254	0.2751	10.00	104.19	5-year	26.4	28.7	375	366.40	PVC	1.50	26.24	201.85	1.91	0.23	0.14
	76833	54409		S38	0.0506	0.7114	0.90	0.127	1.1864	12.74	91.66	5-year	11.6	108.7	375	366.40	PVC	0.87	68.10	153.73	1.46	0.78	0.71
	54409	54410				0.7114			1.1864	13.52	88.68	5-year		105.2	375	366.40	PVC	2.01	18.10	233.66	2.22	0.14	0.45
	210	54411		S38	0.0506	0.0506	0.90	0.127	0.1266	10.00	104.19	5-year	13.2	13.2									
				S42	0.1270	0.1776	0.68	0.240	0.2401	11.00	99.19	5-year	23.8	23.8									
				S07	0.1402	0.3178	0.72	0.281	0.4072	10.00	104.19	5-year	29.2	42.4									
				S77	0.0208	0.3386	0.90	0.052	0.2921	11.00	99.19	5-year	5.2	29.0									
				S78	0.0210	0.3596	0.90	0.053	0.4598	12.00	94.70	5-year	5.0	43.5									
				S79	0.0583	0.4179	0.90	0.146	0.4380	13.00	90.63	5-year	13.2	39.7									
				S67	0.1003	0.5182	0.90	0.251	0.7107	14.00	86.93	5-year	21.8	61.8									
				S80	0.0169	0.5351	0.90	0.042	0.4803	15.00	83.56	5-year	3.5	40.1									
				S81	0.0210	0.5561	0.90	0.053	0.7633	16.00	80.46	5-year	4.2	61.4									
				S82	0.0583	0.6144	0.90	0.146	0.6261	17.00	77.61	5-year	11.3	48.6									
				S57	0.0235	0.6379	0.43	0.028	0.7914	10.00	104.19	5-year	2.9	82.5	300	299.40	PVC	1.00	13.17	96.19	1.37	0.16	0.86
	54411	54410		S41	0.2130	0.8509	0.79	0.468	1.2591	11.37	97.49	5-year	45.6	122.8	300	299.40	PVC	1.40	35.70	113.81	1.62	0.37	1.08
	54410	POND-IN 2				1.5623			2.4455	13.65	88.18	5-year		215.7	375	366.40	PVC	1.60	8.00	208.47	1.98	0.07	1.03
Vortex	Pond-Out	54412		S23	0.1972	3.7265	0.20	0.110	5.6899	16.08	80.21	5-year	8.8	456.4	525	533.40	CONC	1.56	20.50	560.37	2.51	0.14	0.81
	54412	54413				3.7265			5.6899	16.22	79.81	5-year		454.1	525	533.40	CONC	1.31	13.10	513.51	2.30	0.10	0.88
	54413	54414				3.7265			5.6899	16.31	79.54	5-year		452.6	525	533.40	CONC	1.37	59.30	525.14	2.35	0.42	0.86
	54414	Headwall				3.7265			5.6899	16.73	78.34	5-year		445.8	525	533.40	CONC	1.00	15.00	448.66	2.01	0.12	0.99
					3.7265			**6.3160**					**597.0**						**746.01**				

Definitions:

Q = 2.78*AIR, where
- Q = Peak Flow in Litres per second (L/s)
- A = Watershed Area (hectares)
- I = Rainfall Intensity (mm/h)
- R = Runoff Coefficients (dimensionless)

Manning Coefficient = 0.013 (dimensionless)
Default Inlet Time= 10 (minutes)

Ottawa Rainfall Intensity Values

Storm	a	b	c
2-year	732.951	6.199	0.810
5-year	998.071	6.053	0.814
100-year	1735.688	6.014	0.820

Designed:	Project:
J. Fitzpatrick, P.Eng.	Petries Landing 247038
Checked:	Location:
B. Thomas, P.Eng.	Ottawa, Ontario
File Reference:	No of pages:
247038 Storm Design Sheets, june 2024 (to be updated).xlsx	**3**

TABLE E3 - PRE-DEVELOPMENT RUNOFF CALCULATIONS

Area Description	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr		
			I_2 (mm/hr)	Cavg	Q_{2PRE} (L/sec)	I_5 (mm/hr)	Cavg	Q_{5PRE} (L/sec)	I_{100} (mm/hr)	Cavg	Q_{100PRE} (L/sec)
Phase 1 Design											
- Developed (controlled)	3.7700	20	52.03	0.25	136.3	70.25	0.25	184.1	119.95	0.31	392.9
- Developed (uncontrolled)	0.0900	20	52.03	0.20	2.6	70.25	0.25	4.4	119.95	0.31	9.4
-Undeveloped	0.1300	20	52.03	0.25	4.7	70.25	0.25	6.3	119.95	0.31	13.5
Totals	3.9900				143.6			194.8			415.8
Flows to Each Outlet											
Site (to Ottawa River) PRE-1	3.4530	20	52.03	0.20	99.9	70.25	0.25	168.6	119.95	0.31	359.8
Site (to Ravine) PRE-2	0.4659	20	52.03	0.20	13.5	70.25	0.25	22.7	119.95	0.31	48.6
Totals	3.9189				113.37			191.3			408.4

Notes

2-yr Storm Intensity, I = 732.951/(Tc+6.199) $^{0.810}$ *(City of Ottawa)*

5-yr Storm Intensity, I = 998.071/(Tc+6.035) $^{0.814}$ *(City of Ottawa)*

100-yr Storm Intensity, I = 1735.688/(Tc+6.014) $^{0.820}$ *(City of Ottawa)*

Cavg for 100-year is increased by 25%

TABLE E4 - ALLOWABLE RUNOFF CALCULATIONS

Area Description	Area (ha)	Time of Conc, Tc (min)	Storm = 5 yr		
			I_5 (mm/hr)	Cavg	Q_{ALLOW} (L/sec)
Total Site	3.7700	20	70.25	0.25	184.1
Totals	3.7700				184.1

Notes

Allowable Capture Rate is based on 5-year storm at Tc=20 minutes. Taken from Stormwater

5-yr Storm Intensity, I = 998.071/(Tc+6.035) $^{0.814}$ *(City of Ottawa)*

TABLE E5: SUMMARY OF POST DEVELOPMENT RUNOFF (Uncontrolled and Controlled)

Area No	Area (ha)	Tc	Storm = 5 yr				Storm = 100 yr			
			C_{AVG} (5-year)	I_5 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG} (100-yr)	I_{100} (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)
Phase 1	0.890	20	0.51	70.25	88.6		0.64	119.95	189.1	
Phase 2	0.685	20	0.54	70.25	72.3		0.68	119.95	154.2	
Phase 3	0.568	20	0.57	70.25	63.2	**124.3**	0.71	119.95	134.9	**177.9**
Phase 4	0.515	20	0.47	70.25	47.3		0.59	119.95	100.9	
Phase 5	1.167	20	0.60	70.25	136.7		0.75	119.95	291.8	
uncontrolled	0.095	20	0.20	70.25	3.7	**1.1**	0.25	119.95	7.9	**5.4**
Totals	3.919		0.55		411.7	125.4	0.6875		878.8	**183.3**

Notes

I_5 = 998.071 / (Tc + 6.053) $^{0.814}$

I_{100} =1735.688 / (Tc + 6.014) $^{0.820}$

Default Time of Concentration (min), Tc = **20 mins**

Taken from PCSWMM

Appendix F – Roof Storage-Outflow Tables

SUMMARY TABLE 1: Summary of Roof Drains & Roof Storage

SUMMARY TABLE 2: Storage Node Information for Modelling of Roof Storage & Outflow (Depth-Area & Depth-Outflow Curves)

Building Roof Information for Tower 1

Building Roof Information for Tower 2-1

Building Roof Information for Tower 2-2

Building Roof Information for Tower 3

Building Roof Information for Tower 4

Building Roof Information for Tower 5

Building Roof Information for Tower 5A

Building Roof Information for Tower 5A & 5BPodium

TABLE F1: SUMMARY OF ROOF & AREA DRAINS

TOWER #	LOCATION	TYPE	FLOW CONTROL	FLOW CONTROL METHOD	WEIR POSITON	COMMENT
Tower 1	HIGH ROOF (16th floor)	WATTS RD-100	YES	ACCUTROL ADJ	OPEN	MAX 30 GPM AT 150mm DEPTH
Tower 1	PARKING DECK - Hard Surfaces	JR SMITH Model 1005	YES			FLOW CONTROL BASED ON 75mm LEADER
Tower 1	PARKING DECK - Landcaping	JR SMITH Model 1005	YES			FLOW CONTROL BASED ON 75mm LEADER
Tower 2	HIGH ROOF (17th floor)	WATTS RD-100	YES	ACCUTROL ADJ	OPEN	MAX 30 GPM AT 150mm DEPTH
Tower 2	AMMENITITES ROOF (16h floor)	WATTS RD-100-BEM	YES	ACCUTROL ADJ	OPEN	MAX 30 GPM AT 150mm DEPTH
Tower 2	AMMENITITES ROOF (16h floor)	WATTS RD-100-BEM	NONE			
Tower 2	PENTHOUSE (15th floor)	WATTS RD-100-BEM	NONE			
Tower 2	PARKING DECK - Hard Surfaces	WATTS FD-463P-AF-4	YES			FLOW CONTROL BASED ON ORIFICE SIZE (76mm)
Tower 2	PARKING DECK - Landcaping	WATTS FD-870-TG	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 3	HIGH ROOF (19th floor)	WATTS RD-100	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
Tower 3	AMMENITITES ROOF (18th floor)	WATTS RD-CP-85	YES	ACCUTROL ADJ	CLOSED	MAX 5 GPM AT 150mm DEPTH (Closed Position)
Tower 3	AMMENITITES ROOF (18th floor)	WATTS RD-CP-85	NONE			
Tower 3	PARKING DECK - Hard Surfaces	WATTS FD-460-AF	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 3	PARKING DECK - Landcaping	WATTS FD-460-AF	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 4	AMMENITITES ROOF	WATTS RD-CP-85	NONE	None		
Tower 4	HIGH ROOF	WATTS RD-100	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
Tower 4	PARKING DECK - Hard Surfaces	WATTS FD-460-AF	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 4	PARKING DECK - Landcaping	WATTS FD-460-AF	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 6	HIGH ROOF	WATTS RD-100	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
Tower 6	AMMENITITES ROOF	WATTS RD-CP-85	None	None		
Tower 6	PARKING DECK - Hard Surfaces	WATTS FD-460-AF	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 6	PARKING DECK - Landcaping	WATTS FD-460-AF	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 5	HIGH ROOF	WATTS RD-100	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
Tower 5	AMMENITITES ROOF	WATTS RD-CP-85	None	None		
Tower 5	PARKING DECK - Hard Surfaces	WATTS FD-460-AF	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 5	PARKING DECK - Landcaping	WATTS FD-460-AF	YES			FLOW CONTROL BASED ON ORIFICE SIZE (75mm)
Tower 5/6 Podium	Commerical Roof	WATTS RD-100	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)

TABLE F2: SUMMARY OF ROOF DRAINS & ROOF STORAGE

Building	Area No. (see note1)	Area			Location	Roof Drain		Flow Controlled		Ponding (Yes/No)	# Drains per Area	Area Available for Ponding	
		(m^2)	(ha)	% Roof		Manuf	Model	Yes / No	Method			% of Area (See note 2)	Area (m2)
Tower 1	S37	870	0.087	100%	Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	5	87.8	764
Tower 2	S15	66	0.0066	7%	Penthouse	WATTS	RD-100-BEM	No		No	2		
	S12	293	0.0293	32%	Ammenities	WATTS	RD-100-BEM	No		No	7		
	S11	92	0.0092	10%	Ammenities	WATTS	RD-100-BEM	Yes	ACCUTROL	Yes	4	71.4	66
	S13	96	0.0096	11%	Ammenities	WATTS	RD-100-BEM	Yes	ACCUTROL	Yes	4	68.6	66
	S14	359	0.0359	40%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	5	82.6	296
Tower 3	S01	74	0.0074	8%	Ammenities	WATTS	RD100-CP-85	No		No	1		
	S09	294	0.0294	32%	Ammenities	WATTS	RD100-CP-85	No		No	8		
	S06	75	0.0075	8%	Ammenities	WATTS	RD100-CP-85	Yes	ACCUTROL	Yes	4	100	75
	S10	78	0.0078	8%	Ammenities	WATTS	RD100-CP-85	Yes	ACCUTROL	Yes	4	100	78
	S76	403	0.0403	44%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	5	56.7	228
Tower 4	S67_1	511	0.0511	40.1%	Ammenities	WATTS	RD100-CP-85	No		No	9		
	S67_2	762	0.0762	59.9%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	13	84	640
Tower 5	S79	583	0.0583	58%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	10	45	262
	S77	210	0.0210	21%	Ammenities	WATTS	RD100-CP-85	No		No	3		
	S78	208	0.0208	21%	Ammenities	WATTS	RD100-CP-85	No		No	3		
Tower 6	S82	583	0.0583	61%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	10	45	262
	S80	169	0.0169	18%	Ammenities	WATTS	RD100-CP-85	No		No	3		
	S81	210	0.021	22%	Ammenities	WATTS	RD100-CP-85	No		No	3		
Tower 5, 6 Podium	S67	1003	0.1003	75%	Podium /Comm Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	9	90	903

Notes
1) Area Number matches PCSWMM subcatchment Number

BUILDING ROOF INFORMATION: TOWER1

Subcatchment Number	**S37**	
Total Roof Area (m2)	**870**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	20,010	
Max Permitted Load from All Drains (L/sec)	22.2	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**10**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	400	
Estimated No. of Drains Required	3	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**5**	*Use if known*
Effecive Roof Percentage (%)	**87.8%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	764	
Area per Drain (m2)	153	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	43.5	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	9.5	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00158	0.025	4.2	21.2	0.0	0.2
0.050	10	0.63	0.00315	0.050	17.0	84.9	0.3	1.4
0.075	15	0.95	0.00473	0.075	38.2	191.0	1.0	4.8
0.100	20	1.26	0.00631	0.100	67.9	339.5	2.3	11.3
0.125	25	1.58	0.00789	0.125	106.1	530.5	4.4	22.1
0.150	30	1.89	0.00946	0.150	152.8	763.9	7.6	38.2
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.58
0.050	3.15
0.075	4.73
0.100	6.31
0.125	7.89
0.150	9.46

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	21
0.050	85
0.075	191
0.100	339
0.125	530
0.150	764

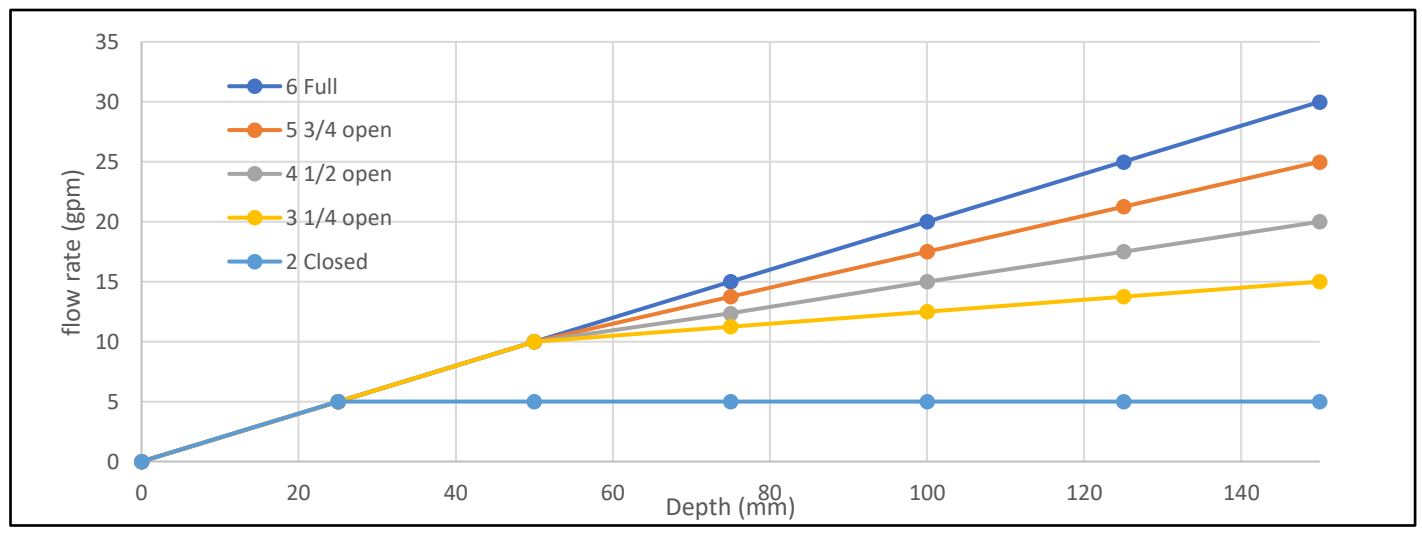
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER2-ROOF1

Subcatchment Number	**S14**	
Total Roof Area (m2)	**359**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	8,257	
Max Permitted Load from All Drains (L/sec)	9.2	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**8**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	256	
Estimated No. of Drains Required	2	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**5**	*Use if known*
Effecive Roof Percentage (%)	**82.6%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	296	
Area per Drain (m2)	59	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	18.0	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	9.5	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00158	0.025	1.6	8.2	0.0	0.1
0.050	10	0.63	0.00315	0.050	6.6	32.9	0.1	0.5
0.075	15	0.95	0.00473	0.075	14.8	74.1	0.4	1.9
0.100	20	1.26	0.00631	0.100	26.3	131.7	0.9	4.4
0.125	25	1.58	0.00789	0.125	41.2	205.8	1.7	8.6
0.150	30	1.89	0.00946	0.150	59.3	296.4	3.0	14.8
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.58
0.050	3.15
0.075	4.73
0.100	6.31
0.125	7.89
0.150	9.46

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	8
0.050	33
0.075	74
0.100	132
0.125	206
0.150	296

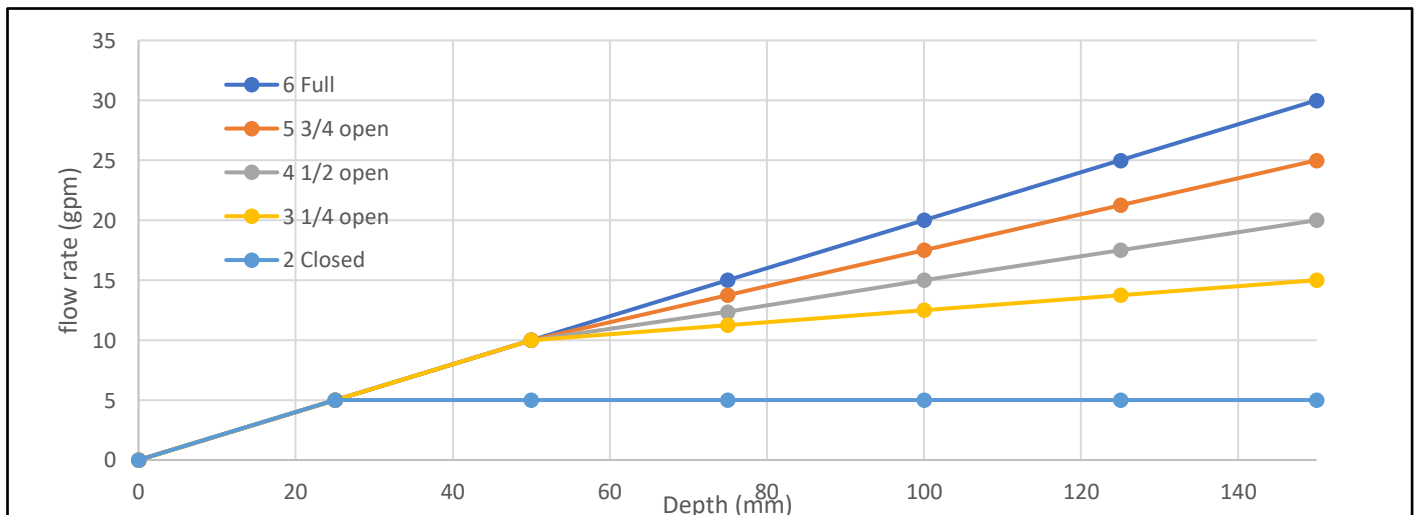
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER2-ROOF2

Subcatchment Number	**S13**	
Total Roof Area (m2)	**96**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	2,208	
Max Permitted Load from All Drains (L/sec)	2.5	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**3**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	36	
Estimated No. of Drains Required	3	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effecive Roof Percentage (%)	**68.6%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	66	
Area per Drain (m2)	16	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	4.8	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	7.6	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00126	0.025	0.5	1.8	0.0	0.0
0.050	10	0.63	0.00252	0.050	1.8	7.3	0.0	0.1
0.075	15	0.95	0.00379	0.075	4.1	16.5	0.1	0.4
0.100	20	1.26	0.00505	0.100	7.3	29.3	0.2	1.0
0.125	25	1.58	0.00631	0.125	11.4	45.7	0.5	1.9
0.150	30	1.89	0.00757	0.150	16.5	65.9	0.8	3.3
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.26
0.050	2.52
0.075	3.79
0.100	5.05
0.125	6.31
0.150	7.57

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	2
0.050	7
0.075	16
0.100	29
0.125	46
0.150	66

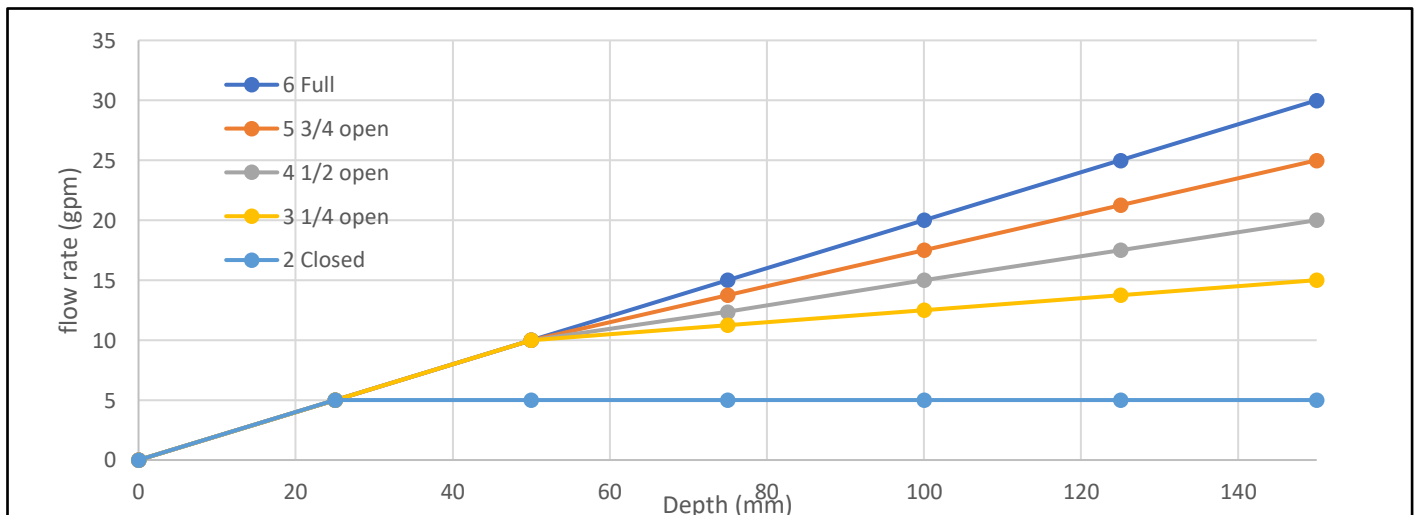
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER2-ROOF3

Subcatchment Number	**S11**	
Total Roof Area (m2)	**92**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	2,116	
Max Permitted Load from All Drains (L/sec)	2.4	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**3**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	36	
Estimated No. of Drains Required	3	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effecive Roof Percentage (%)	**71.4%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	66	
Area per Drain (m2)	16	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	4.6	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	7.6	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00126	0.025	0.5	1.8	0.0	0.0
0.050	10	0.63	0.00252	0.050	1.8	7.3	0.0	0.1
0.075	15	0.95	0.00379	0.075	4.1	16.4	0.1	0.4
0.100	20	1.26	0.00505	0.100	7.3	29.2	0.2	1.0
0.125	25	1.58	0.00631	0.125	11.4	45.6	0.5	1.9
0.150	30	1.89	0.00757	0.150	16.4	65.7	0.8	3.3
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.26
0.050	2.52
0.075	3.79
0.100	5.05
0.125	6.31
0.150	7.57

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	2
0.050	7
0.075	16
0.100	29
0.125	46
0.150	66

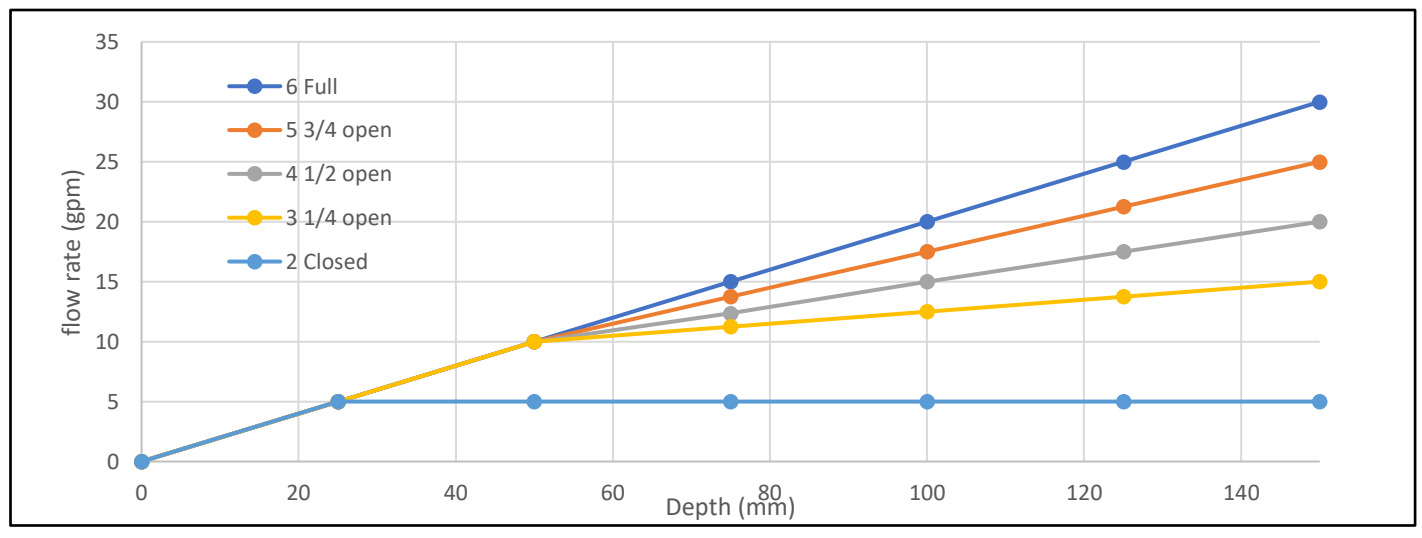
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER3-ROOF1

Subcatchment Number	**S76**	
Total Roof Area (m2)	**403**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	9,269	
Max Permitted Load from All Drains (L/sec)	10.3	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**8**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	256	
Estimated No. of Drains Required	2	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**5**	*Use if known*
Effecive Roof Percentage (%)	**56.7%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	228	
Area per Drain (m2)	46	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	20.2	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**20**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	6.3	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00158	0.025	1.3	6.3	0.0	0.1
0.050	10	0.63	0.00315	0.050	5.1	25.4	0.1	0.4
0.075	12.35	0.78	0.00390	0.075	11.4	57.1	0.3	1.4
0.100	15	0.95	0.00473	0.100	20.3	101.5	0.7	3.4
0.125	17.5	1.10	0.00552	0.125	31.7	158.6	1.3	6.6
0.150	20	1.26	0.00631	0.150	45.7	228.4	2.3	11.4
Weir Position = **4 1/2 open**								

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.58
0.050	3.15
0.075	3.90
0.100	4.73
0.125	5.52
0.150	6.31

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	6
0.050	25
0.075	57
0.100	102
0.125	159
0.150	228

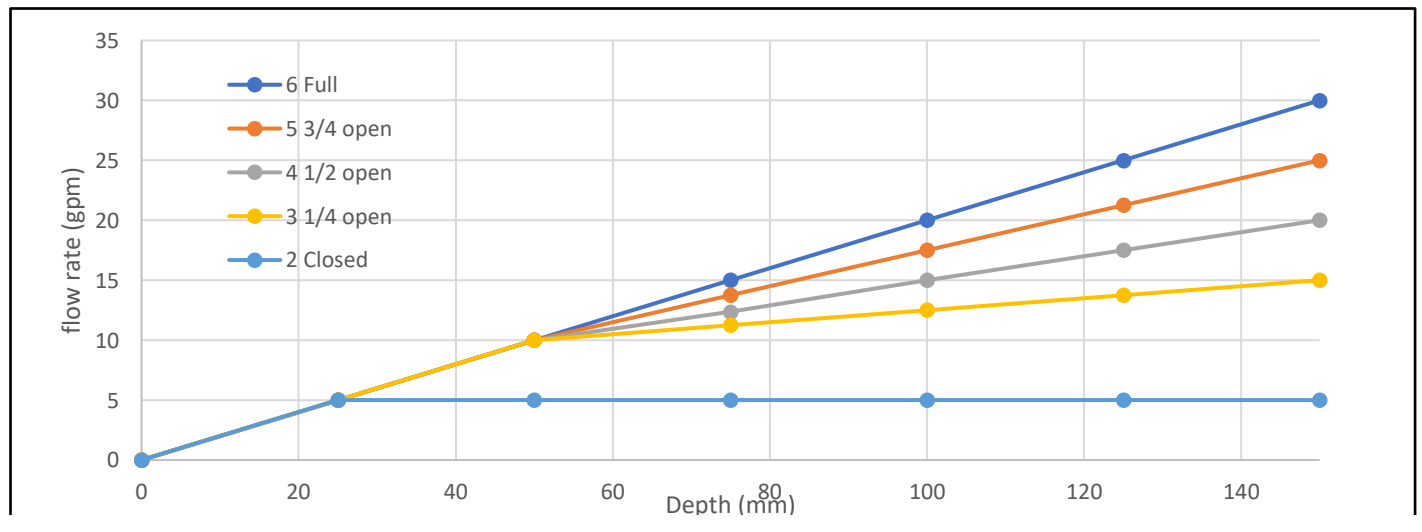
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER3-ROOF2

Subcatchment Number	**S06**	
Total Roof Area (m2)	**75**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	1,725	
Max Permitted Load from All Drains (L/sec)	1.9	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**3**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	36	
Estimated No. of Drains Required	3	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effecive Roof Percentage (%)	**100.0%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	75	
Area per Drain (m2)	19	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	3.8	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**5**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	1.3	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00126	0.025	0.5	2.1	0.0	0.0
0.050	5	0.32	0.00126	0.050	2.1	8.3	0.0	0.1
0.075	5	0.32	0.00126	0.075	4.7	18.8	0.1	0.5
0.100	5	0.32	0.00126	0.100	8.3	33.3	0.3	1.1
0.125	5	0.32	0.00126	0.125	13.0	52.1	0.5	2.2
0.150	5	0.32	0.00126	0.150	18.8	75.0	0.9	3.8
Weir Position =	**2 Closed**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.26
0.050	1.26
0.075	1.26
0.100	1.26
0.125	1.26
0.150	1.26

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	2
0.050	8
0.075	19
0.100	33
0.125	52
0.150	75

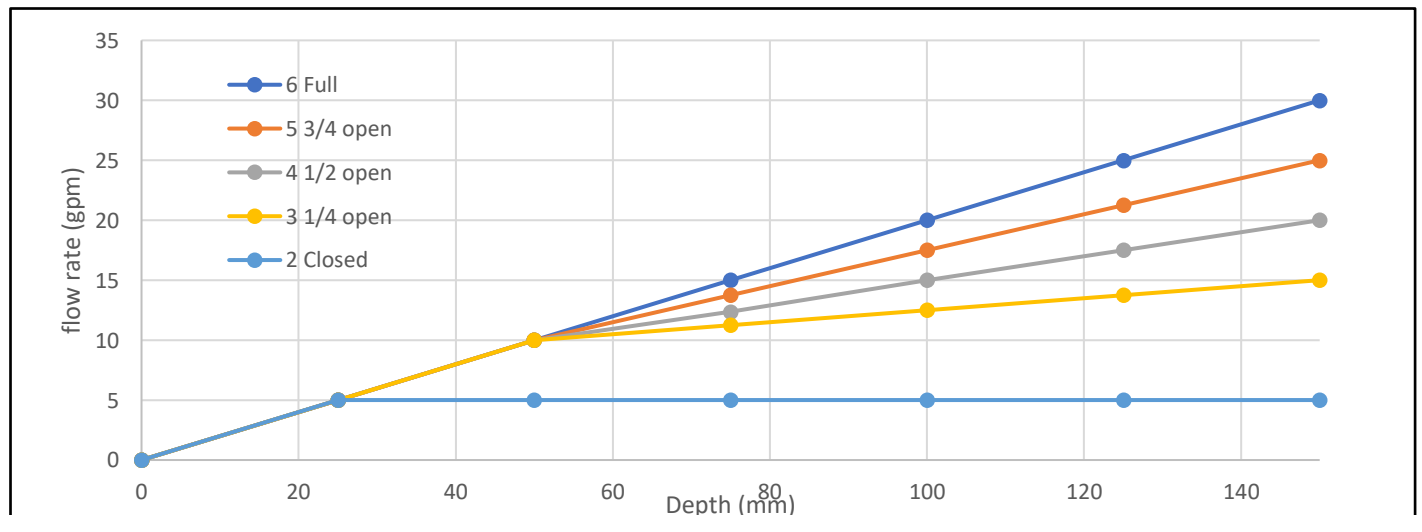
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER3-ROOF3

Subcatchment Number	**S10**	
Total Roof Area (m2)	**78**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	1,794	
Max Permitted Load from All Drains (L/sec)	2.0	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**3**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	36	
Estimated No. of Drains Required	3	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effecive Roof Percentage (%)	**100.0%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	78	
Area per Drain (m2)	20	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	3.9	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**5**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	1.3	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00126	0.025	0.5	2.2	0.0	0.0
0.050	5	0.32	0.00126	0.050	2.2	8.7	0.0	0.1
0.075	5	0.32	0.00126	0.075	4.9	19.5	0.1	0.5
0.100	5	0.32	0.00126	0.100	8.7	34.7	0.3	1.2
0.125	5	0.32	0.00126	0.125	13.5	54.2	0.6	2.3
0.150	5	0.32	0.00126	0.150	19.5	78.0	1.0	3.9
Weir Position =	**2 Closed**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	1.26
0.050	1.26
0.075	1.26
0.100	1.26
0.125	1.26
0.150	1.26

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	2
0.050	9
0.075	20
0.100	35
0.125	54
0.150	78

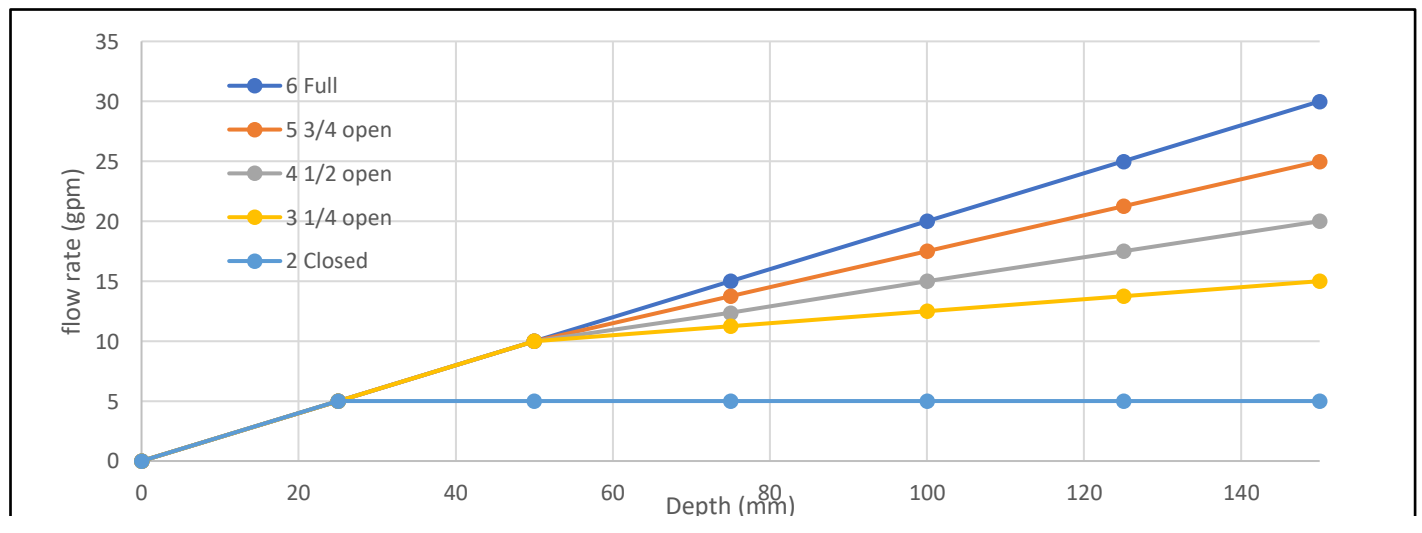
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER4-Ammenity

Subcatchment Number	**S67_1**	
Total Roof Area (m2)	**511**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	11,753	
Max Permitted Load from All Drains (L/sec)	13.1	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**4**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	64	
Estimated No. of Drains Required	8	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**9**	*Use if known*
Effecive Roof Percentage (%)	**100.0%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	511	
Area per Drain (m2)	57	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	25.6	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	17.0	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00284	0.025	1.6	14.2	0.0	0.1
0.050	10	0.63	0.00568	0.050	6.3	56.8	0.1	0.9
0.075	15	0.95	0.00852	0.075	14.2	127.8	0.4	3.2
0.100	20	1.26	0.01136	0.100	25.2	227.1	0.8	7.6
0.125	25	1.58	0.01420	0.125	39.4	354.9	1.6	14.8
0.150	30	1.89	0.01703	0.150	56.8	511.0	2.8	25.6
Weir Position =	**6 Full**							

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	2.84
0.050	5.68
0.075	8.52
0.100	11.36
0.125	14.20
0.150	17.03

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	14
0.050	57
0.075	128
0.100	227
0.125	355
0.150	511

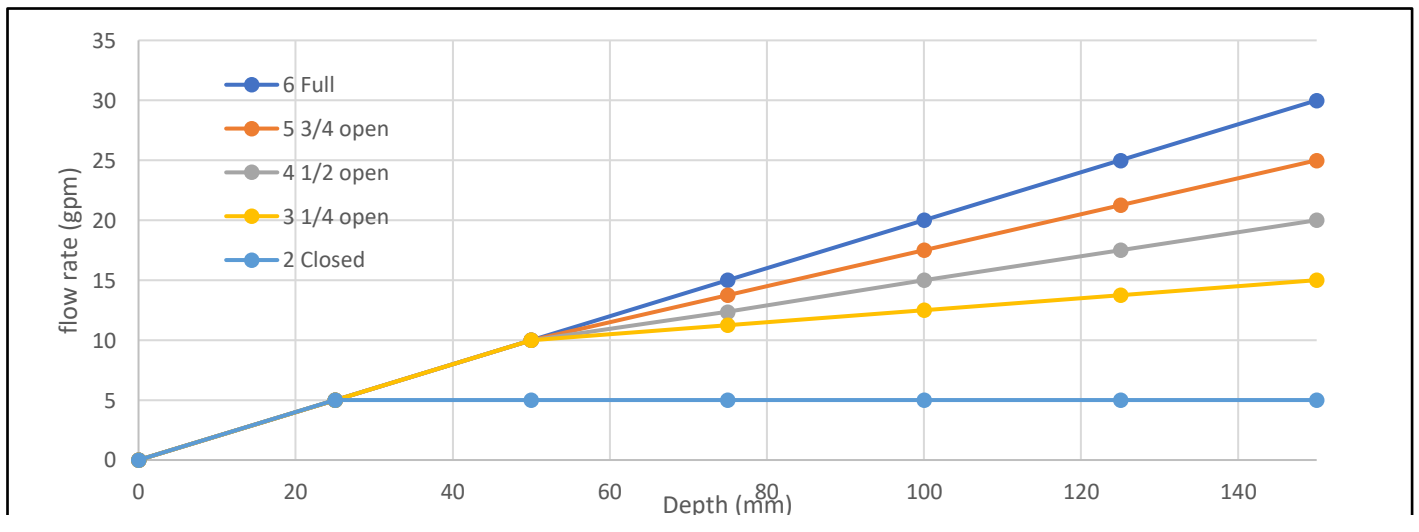
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER4-HighRoof

Subcatchment Number	**S67_2**	
Total Roof Area (m2)	**762**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	17,526	
Max Permitted Load from All Drains (L/sec)	19.5	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**5**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	100	
Estimated No. of Drains Required	8	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**13**	*Use if known*
Effecive Roof Percentage (%)	**84.0%**	*Allowance for Mechanical units on roof*
Effective Total Roof Area (m2)	640	
Area per Drain (m2)	49	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	38.1	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**15**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Roof (L/sec)	12.3	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00410	0.025	1.4	17.8	0.0	0.1
0.050	10	0.63	0.00820	0.050	5.5	71.1	0.1	1.2
0.075	11.25	0.71	0.00923	0.075	12.3	160.0	0.3	4.0
0.100	12.5	0.79	0.01025	0.100	21.9	284.4	0.7	9.5
0.125	13.75	0.87	0.01128	0.125	34.2	444.4	1.4	18.5
0.150	15	0.95	0.01230	0.150	49.2	640.0	2.5	32.0
Weir Position = **3 1/4 open**								

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	4.10
0.050	8.20
0.075	9.23
0.100	10.25
0.125	11.28
0.150	12.30

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	18
0.050	71
0.075	160
0.100	284
0.125	444
0.150	640

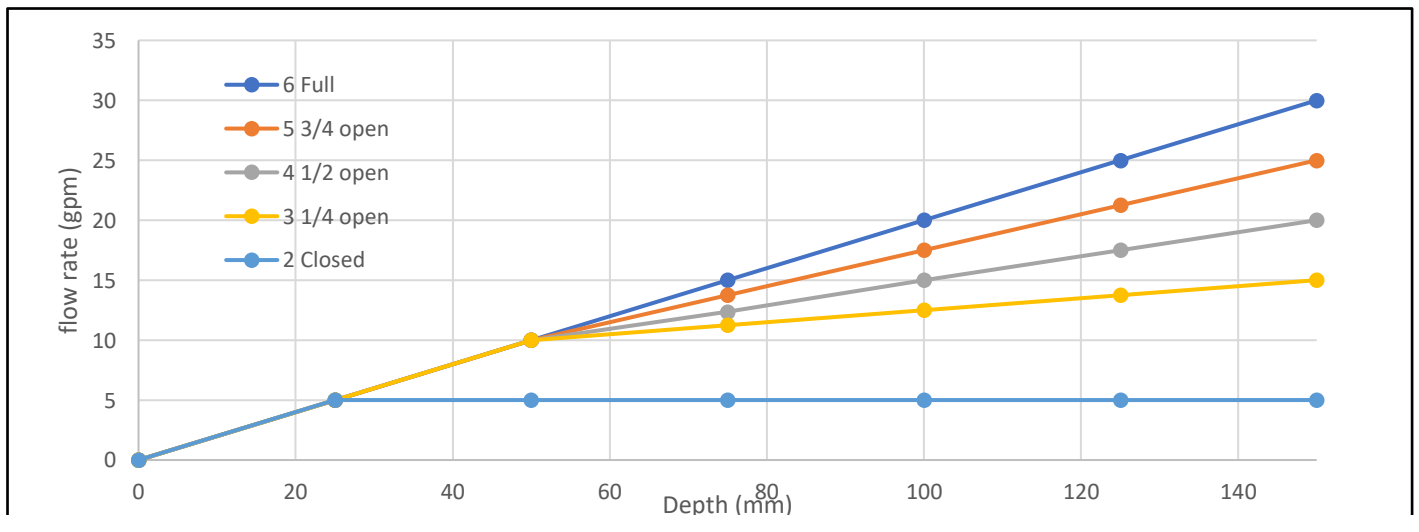
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER5 (highRoof)

Subcatchment Number	**S79**	
Total Roof Area (m2)	**583**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	13,409	
Max Permitted Load from All Drains (L/sec)	14.9	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**10**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	400	
Estimated No. of Drains Required	2	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**10**	*Use if known*
Effecive Roof Percentage (%)	**58.2%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	340	
Area per Drain (m2)	34	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	29.2	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**20**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	12.6	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00315	0.025	0.9	9.4	0.0	0.1
0.050	10	0.63	0.00631	0.050	3.8	37.7	0.1	0.6
0.075	12.35	0.78	0.00779	0.075	8.5	84.9	0.2	2.1
0.100	15	0.95	0.00946	0.100	15.1	150.9	0.5	5.0
0.125	17.5	1.10	0.01104	0.125	23.6	235.8	1.0	9.8
0.150	20	1.26	0.01262	0.150	34.0	339.5	1.7	17.0
Weir Position = **4 1/2 open**								

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	3.15
0.050	6.31
0.075	7.79
0.100	9.46
0.125	11.04
0.150	12.62

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	9
0.050	38
0.075	85
0.100	151
0.125	236
0.150	340

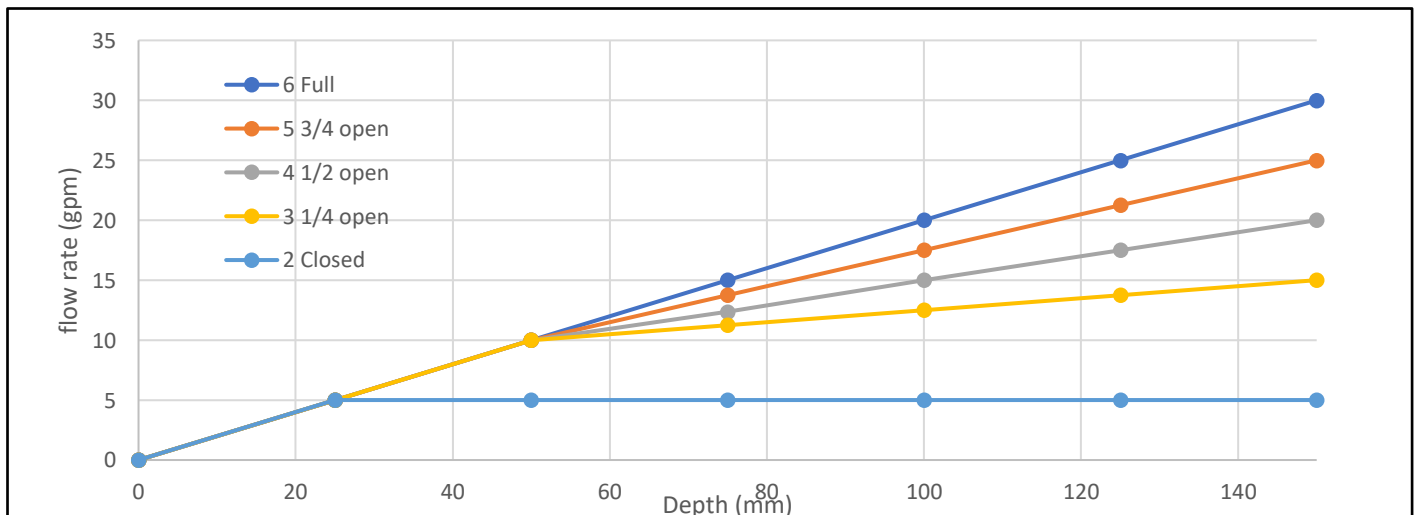
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER6 (highRoof)

Subcatchment Number	**S82**	
Total Roof Area (m2)	**583**	
Minimium Number of Drains Required	1	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	13,409	
Max Permitted Load from All Drains (L/sec)	14.9	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**10**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	400	
Estimated No. of Drains Required	2	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**10**	*Use if known*
Effecive Roof Percentage (%)	**60.6%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	353	
Area per Drain (m2)	35	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	29.2	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**20**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	12.6	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH				
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.0	0.0
0.025	5	0.32	0.00315	0.025	1.0	9.8	0.0	0.1
0.050	10	0.63	0.00631	0.050	3.9	39.3	0.1	0.7
0.075	12.35	0.78	0.00779	0.075	8.8	88.3	0.2	2.2
0.100	15	0.95	0.00946	0.100	15.7	157.0	0.5	5.2
0.125	17.5	1.10	0.01104	0.125	24.5	245.4	1.0	10.2
0.150	20	1.26	0.01262	0.150	35.3	353.3	1.8	17.7
Weir Position = **4 1/2 open**								

RATING CURVE FOR MODELLING OUTLET	
Head or Ponding Depth (m)	Outlfow (L/sec)
0.000	0.00
0.025	3.15
0.050	6.31
0.075	7.79
0.100	9.46
0.125	11.04
0.150	12.62

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	10
0.050	39
0.075	88
0.100	157
0.125	245
0.150	353

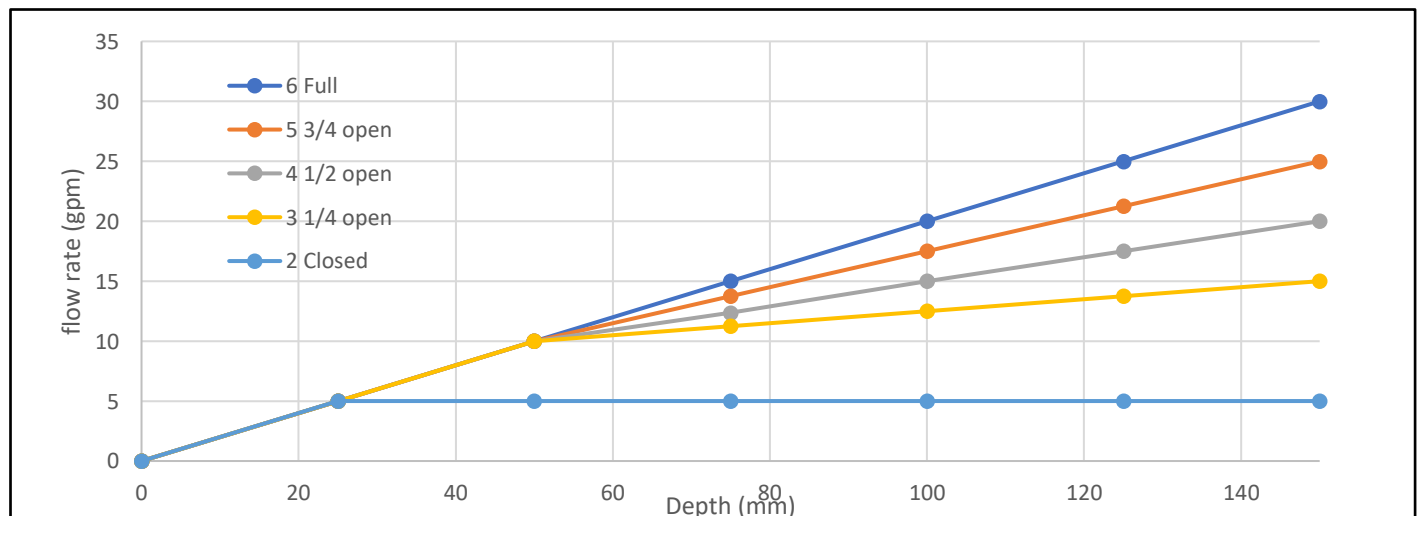
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION: TOWER5&6PODIUM

Subcatchment Number	**S67**	
Total Roof Area (m2)	**1,003**	
Minimium Number of Drains Required	2	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	23,069	
Max Permitted Load from All Drains (L/sec)	25.6	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated Distance from roof edge to drains (m)	**8**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	256	
Estimated No. of Drains Required	4	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**9**	*Use if known*
Effecive Roof Percentage (%)	**75.1%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	754	
Ballast Thickness on Inverted Roof (mm)	50	
Void Ratio of Ballast Material	0.40	
Area per Drain (m2)	84	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	50.2	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**20**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release R S03	11.4	*Based on Maximum Depth of Ponding of 150mm*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH					RATING CURVE FOR MODELLING OUTLET		RATING CURVE FOR MODELLING ROOF STORAGE	
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (Indiv) (m2)	Ponding Area (Total) (m^2)	Ponding Volume (Indiv) (m3)	Ponding Volume (Total) (m3)	Head or Ponding Depth (m)	Outlfow (L/sec)	Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0	0.00	0.00000	0.000	0.0	0.0	0.00	0.0	0.000	0.00	0.000	0
0.025	5	0.32	0.00284	0.025	2.3	20.9	0.02	0.2	0.025	2.84	0.025	8.4
0.050	10	0.63	0.00568	0.050	9.3	83.7	0.16	1.4	0.050	5.68	0.050	33.5
0.075	12.35	0.78	0.00701	0.075	20.9	188.4	0.52	4.7	0.075	7.01	0.075	188.4
0.100	15	0.95	0.00852	0.100	37.2	335.0	1.24	11.2	0.100	8.52	0.100	335
0.125	17.5	1.10	0.00994	0.125	58.2	523.4	2.42	21.8	0.125	9.94	0.125	523
0.150	20	1.26	0.01136	0.150	83.7	753.7	4.19	37.7	0.150	11.36	0.150	754
Weir Position = **4 1/2 open**												

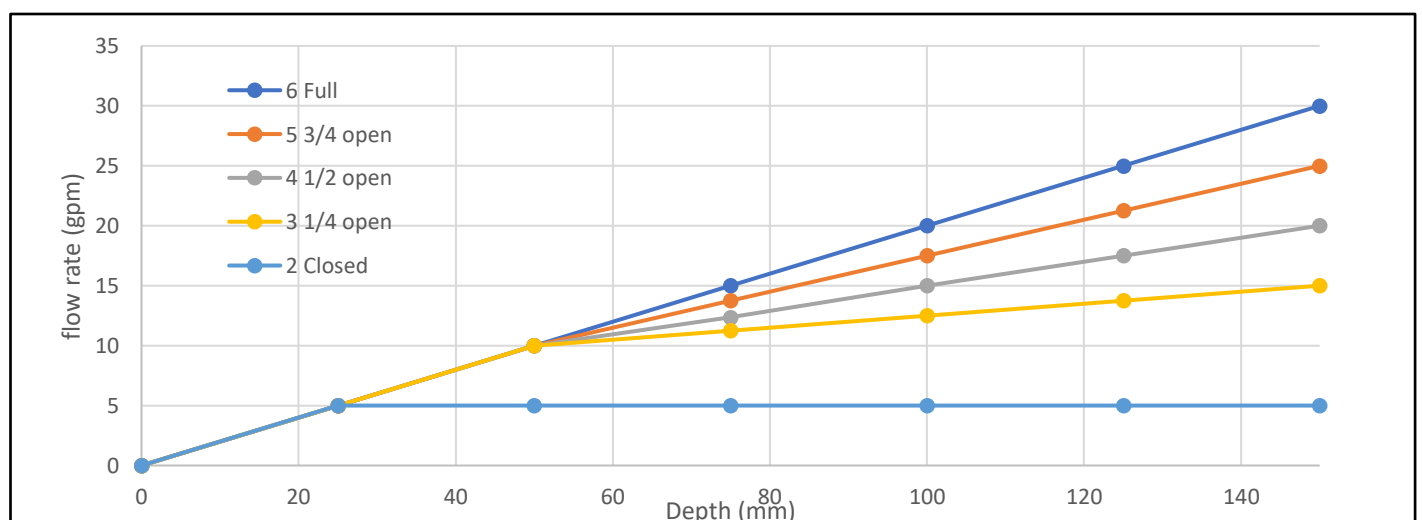
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1 None	2 Closed	3 1/4 open	4 1/2 open	5 3/4 open	6 Full
	Max Flow Rate per wier @150mm in gpm					
0.000	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.050	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.100	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.150	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1 None	0	0	0	0	0	0	0	0.000
2 Closed	0	5	5	5	5	5	5	0.315
3 1/4 open	0	5	10	11.25	12.5	13.75	15	0.946
4 1/2 open	0	5	10	12.35	15	17.5	20	1.262
5 3/4 open	0	5	10	13.75	17.5	21.25	25	1.577
6 Full	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



Appendix G – Ponding Information

Surface Storage Table (total 1 pages)

Functional Area-Depth Curves for Modelling of Surface Storage (total 9 pages)

Table G1 - Surface Storage Table

NAME	AREA	MAX PONDING ELEV (m)	MIN PONDING ELEV (m)	MAX DEPTH (m)	PRISM VOLUME (m3)	NUMBER OF INLETS
SP01	430	54.67	54.6	0.07	10.0	4
SP02	651	54.67	54.46	0.21	45.6	2
SP03	42	52.55	52.53	0.02	0.3	1
SP04	128	54.65	54.5	0.15	6.4	1
SP05	166	54.6	54.55	0.05	2.8	2
SP06	138	54.69	54.55	0.14	6.4	1
SP07	65	54.69	54.6	0.09	1.9	1
SP08	94	54.08	53.9	0.18	5.6	1
SP09	88	54.7	54.55	0.15	4.4	1
SP10	53	54.7	54.62	0.08	1.4	1
SP11	249	54.7	54.55	0.15	12.5	1
SP12	193	54.7	54.55	0.15	9.7	1
SP13	95	54.8	54.68	0.12	3.8	2
SP14	54	54.79	54.66	0.13	2.3	1
SP15	60	54.78	54.66	0.12	2.4	1
SP16	90	54.75	54.66	0.09	2.7	1
SP17	128	54.75	54.66	0.09	3.8	1
SP18	45	54.70	54.65	0.05	0.8	1
SP19	241	54.68	54.6	0.08	6.4	2
SP20	139	54.8	54.65	0.15	6.9	2
SP21	127	54.8	54.65	0.15	6.3	1
SP22	272	54.8	54.65	0.15	13.6	2
SP23	301	54.85	54.75	0.1	10.0	4
SP24	82	54.87	54.8	0.07	1.9	2
SP25	156	54.95	54.9	0.05	2.6	2
SP26	67	54.88	54.75	0.13	2.9	1
SP27	250	54.95	54.9	0.05	4.2	3
SP28	55	54.95	54.9	0.05	0.9	1
SP29	31	55	54.9	0.1	1.0	1
SP30	246	55.1	55	0.1	8.2	3
SP31, SP32	9	54.99	54.91	0.08	0.2	1
SP33	11	54.58	54.53	0.05	0.2	1
SP34	11	54.53	54.48	0.05	0.2	1
SP35	88	53.65	53.5	0.15	4.4	2
SP36	86	54.4	54.3	0.1	2.9	1
SP99	51	52.04	51.89	0.15	2.5	1

Ponding Information	
Ponding Area (trap low) No:	SP01
Structure / Inlet No:	AD2-AD5
Structrue / Inlet Type	AREA DRAIN
Include Structure Storage (yes/no)	No
Structure Shape (rect / round)	Round
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	430
Max. Ponding Elev at Spill (m):	54.67
Min. Ponding Elev (Lid Elev) (m):	54.60
Max. Prism Volume (m3)	10.03
Depth to Inv below ground (m)	0.150
Allowance for Overland Flow (m)	0.150
Ponding Rim Elevation (m)	54.82
Inv Elev of Storage Node (m)	54.45
Max Ponding Depth (m) =	0.070

Storage Function for Modelling			
Head / Depth (m)	Area (m2)	Incr Vol (m3)	Tot Vol (m3)
0.0000	0.0000	0.00	0.00
0.1500	0.0000	0.00	0.00
0.2200	430	10.03	10.03
0.2201	0	0.00	10.03
0.3700	0	0.00	10.03
Copy to PCSWMM (depth / area)			

No. of Inlets = 4 Area Drains

Ponding Information	
Ponding Area (trap low) No:	SP02
Structure / Inlet No:	AD6, AD7
Structrue / Inlet Type	AREA DRAIN
Include Structure Storage (yes/no)	No
Structure Shape (rect / round)	Round
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	651
Max. Ponding Elev at Spill (m):	54.67
Min. Ponding Elev (Lid Elev) (m):	54.46
Max. Prism Volume (m3)	45.57
Depth to Inv below ground (m)	0.150
Allowance for Overland Flow (m)	0.150
Ponding Rim Elevation (m)	54.82
Inv Elev of Storage Node (m)	54.31
Max Ponding Depth (m) =	0.210

Storage Function for Modelling			
Head / Depth (m)	Area (m2)	Incr Vol (m3)	Tot Vol (m3)
0.0000	0.0000	0.00	0.00
0.1500	0.0000	0.00	0.00
0.3600	651	45.57	45.57
0.3601	0	0.00	45.57
0.5100	0	0.00	45.57
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	SP03
Structure / Inlet No:	IN138479
Structrue / Inlet Type	Catchbasin
Include Structure Storage (yes/no)	Yes
Structure Shape (rect / round)	Rect
Structure Length or DIA (mm)	600
Structure Width (mm)	600
Max. Ponding Area (m2) =	42
Max. Ponding Elev at Spill (m):	52.55
Min. Ponding Elev (Lid Elev) (m):	52.53
Max. Prism Volume (m3)	0.28
Depth to Inv below ground (m)	1.400
Allowance for Overland Flow (m)	0.150
Ponding Rim Elevation (m)	52.70
Inv Elev of Storage Node (m)	51.13
Max Ponding Depth (m) =	0.020

Storage Function for Modelling			
Head / Depth (m)	Area (m2)	Incr Vol (m3)	Tot Vol (m3)
0.0000	0.0000	0.00	0.00
1.4000	0.3600	0.50	0.50
1.4200	42	0.28	0.78
1.4201	0	0.00	0.78
1.5700	0	0.00	0.78
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Catchbasins

Ponding Information	
Ponding Area (trap low) No:	SP04
Structure / Inlet No:	AD15
Structrue / Inlet Type	Area Drain
Include Structure Storage (yes/no)	No
Structure Shape (rect / round)	Round
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	128
Max. Ponding Elev at Spill (m):	54.65
Min. Ponding Elev (Lid Elev) (m):	54.50
Max. Prism Volume (m3)	6.40
Depth to Inv below ground (m)	0.150
Allowance for Overland Flow (m)	0.150
Ponding Rim Elevation (m)	54.80
Inv Elev of Storage Node (m)	54.35
Max Ponding Depth (m) =	0.150

Storage Function for Modelling			
Head / Depth (m)	Area (m2)	Incr Vol (m3)	Tot Vol (m3)
0.0000	0.0000	0.00	0.00
0.1500	0.0000	0.00	0.00
0.3000	128	6.40	6.40
0.3001	0	0.00	6.40
0.4500	0	0.00	6.40
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP05**
Structure / Inlet No:	**AD16, AD17**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**Round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**166**
Max. Ponding Elev at Spill (m):	**54.60**
Min. Ponding Elev (Lid Elev) (m):	**54.55**
Max. Prism Volume (m3)	2.77
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.75
Inv Elev of Storage Node (m)	54.40
Max Ponding Depth (m) =	0.050

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0	0.00
0.2000	**166**	2.77	2.77
0.2001	**0**	0.00	2.77
0.3500	**0**	0.00	2.77
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP06**
Structure / Inlet No:	**AD19**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**Round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**138**
Max. Ponding Elev at Spill (m):	**54.69**
Min. Ponding Elev (Lid Elev) (m):	**54.55**
Max. Prism Volume (m3)	6.44
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.84
Inv Elev of Storage Node (m)	54.40
Max Ponding Depth (m) =	0.140

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
2.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2900	**138**	6.44	6.44
0.2901	**0**	0.00	6.44
0.4400	**0**	0.00	6.44
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP07**
Structure / Inlet No:	**AD20**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**Round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**65**
Max. Ponding Elev at Spill (m):	**54.69**
Min. Ponding Elev (Lid Elev) (m):	**54.60**
Max. Prism Volume (m3)	1.95
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.84
Inv Elev of Storage Node (m)	54.45
Max Ponding Depth (m) =	0.090

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2400	**65**	1.95	1.95
0.2401	**0**	0.00	1.95
0.3900	**0**	0.00	1.95
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP08**
Structure / Inlet No:	**IN141920**
Structrue / Inlet Type	**Catchbasin**
Include Structure Storage (yes/no)	**Yes**
Structure Shape (rect / round)	**Rect**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**94**
Max. Ponding Elev at Spill (m):	**54.08**
Min. Ponding Elev (Lid Elev) (m):	**53.90**
Max. Prism Volume (m3)	5.64
Depth to Inv below ground (m)	**1.660**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.23
Inv Elev of Storage Node (m)	52.24
Max Ponding Depth (m) =	0.180

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
1.6600	**0.0000**	0.00	0.00
1.8400	**94**	5.64	5.64
1.8401	**0**	0.00	5.64
1.9900	**0**	0.00	5.64
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Catchbasins

Ponding Information	
Ponding Area (trap low) No:	**SP09**
Structure / Inlet No:	**AD22**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**Round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**88**
Max. Ponding Elev at Spill (m):	**54.70**
Min. Ponding Elev (Lid Elev) (m):	**54.55**
Max. Prism Volume (m3)	4.40
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.85
Inv Elev of Storage Node (m)	54.40
Max Ponding Depth (m) =	0.150

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.3000	**88**	4.40	4.40
0.3001	**0**	0.00	4.40
0.4500	**0**	0.00	4.40
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP10**
Structure / Inlet No:	**AD23**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**53**
Max. Ponding Elev at Spill (m):	**54.70**
Min. Ponding Elev (Lid Elev) (m):	**54.62**
Max. Prism Volume (m3)	1.41
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.85
Inv Elev of Storage Node (m)	54.47
Max Ponding Depth (m) =	0.080

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2300	**53**	1.41	1.41
0.2301	**0**	0.00	1.41
0.3800	**0**	0.00	1.41
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP11**
Structure / Inlet No:	**AD21**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**249**
Max. Ponding Elev at Spill (m):	**54.70**
Min. Ponding Elev (Lid Elev) (m):	**54.55**
Max. Prism Volume (m3)	12.45
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.85
Inv Elev of Storage Node (m)	54.40
Max Ponding Depth (m) =	0.150

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0	0.00
0.3000	**249**	12.45	12.45
0.3001	**0**	0.00	12.45
0.4500	**0**	0.00	12.45
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP12**
Structure / Inlet No:	**AD24**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**193**
Max. Ponding Elev at Spill (m):	**54.70**
Min. Ponding Elev (Lid Elev) (m):	**54.55**
Max. Prism Volume (m3)	9.65
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.85
Inv Elev of Storage Node (m)	54.40
Max Ponding Depth (m) =	0.150

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.3000	**193**	9.65	9.65
0.3001	**0**	0.00	9.65
0.4500	**0**	0.00	9.65
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP13**
Structure / Inlet No:	**A27, A26**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**95**
Max. Ponding Elev at Spill (m):	**54.80**
Min. Ponding Elev (Lid Elev) (m):	**54.68**
Max. Prism Volume (m3)	3.80
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.95
Inv Elev of Storage Node (m)	54.53
Max Ponding Depth (m) =	0.120

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0	0.00
0.2700	**95**	3.80	3.80
0.2701	**0**	0.00	3.80
0.4200	**0**	0.00	3.80
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP14**
Structure / Inlet No:	**AD28**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**54**
Max. Ponding Elev at Spill (m):	**54.79**
Min. Ponding Elev (Lid Elev) (m):	**54.66**
Max. Prism Volume (m3)	2.34
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.94
Inv Elev of Storage Node (m)	54.51
Max Ponding Depth (m) =	0.130

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2800	**54**	2.34	2.34
0.2801	**0**	0.00	2.34
0.4300	**0**	0.00	2.34
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP15**
Structure / Inlet No:	**AD29**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**60**
Max. Ponding Elev at Spill (m):	**54.78**
Min. Ponding Elev (Lid Elev) (m):	**54.66**
Max. Prism Volume (m3)	2.40
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.93
Inv Elev of Storage Node (m)	54.51
Max Ponding Depth (m) =	0.120

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2700	**60**	2.40	2.40
0.2701	**0**	0.00	2.40
0.4200	**0**	0.00	2.40
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP16**
Structure / Inlet No:	**AD30**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**90**
Max. Ponding Elev at Spill (m):	**54.75**
Min. Ponding Elev (Lid Elev) (m):	**54.66**
Max. Prism Volume (m3)	2.70
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.90
Inv Elev of Storage Node (m)	54.51
Max Ponding Depth (m) =	0.090

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2400	**90**	2.70	2.70
0.2401	**0**	0.00	2.70
0.3900	**0**	0.00	2.70
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP17**
Structure / Inlet No:	**AD31**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**128**
Max. Ponding Elev at Spill (m):	**54.75**
Min. Ponding Elev (Lid Elev) (m):	**54.66**
Max. Prism Volume (m3)	3.84
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.90
Inv Elev of Storage Node (m)	54.51
Max Ponding Depth (m) =	0.090

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2400	**128**	3.84	3.84
0.2401	**0**	0.00	3.84
0.3900	**0**	0.00	3.84
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP18**
Structure / Inlet No:	**AD34**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**45**
Max. Ponding Elev at Spill (m):	**54.70**
Min. Ponding Elev (Lid Elev) (m):	**54.65**
Max. Prism Volume (m3)	0.75
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.85
Inv Elev of Storage Node (m)	54.50
Max Ponding Depth (m) =	0.050

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2000	**45**	0.75	0.75
0.2001	**0**	0.00	0.75
0.3500	**0**	0.00	0.75
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP19**
Structure / Inlet No:	**AD32, AD35**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**241**
Max. Ponding Elev at Spill (m):	**54.68**
Min. Ponding Elev (Lid Elev) (m):	**54.60**
Max. Prism Volume (m3)	6.43
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.83
Inv Elev of Storage Node (m)	54.45
Max Ponding Depth (m) =	0.080

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2300	**241**	6.43	6.43
0.2301	**0**	0.00	6.43
0.3800	**0**	0.00	6.43
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP20**
Structure / Inlet No:	**AD52,54**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**139**
Max. Ponding Elev at Spill (m):	**54.80**
Min. Ponding Elev (Lid Elev) (m):	**54.65**
Max. Prism Volume (m3)	6.95
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.95
Inv Elev of Storage Node (m)	54.50
Max Ponding Depth (m) =	0.15

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.3000	**139**	6.95	6.95
0.3001	**0**	0.00	6.95
0.4500	**0**	0.00	6.95
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP21**
Structure / Inlet No:	**AD53**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**127**
Max. Ponding Elev at Spill (m):	**54.76**
Min. Ponding Elev (Lid Elev) (m):	**54.65**
Max. Prism Volume (m3)	4.66
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.91
Inv Elev of Storage Node (m)	54.50
Max Ponding Depth (m) =	0.11

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2600	**127**	4.66	4.66
0.2601	**0**	0.00	4.66
0.4100	**0**	0.00	4.66
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP22**
Structure / Inlet No:	**AD38, 40**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**272**
Max. Ponding Elev at Spill (m):	**54.80**
Min. Ponding Elev (Lid Elev) (m):	**54.65**
Max. Prism Volume (m3)	13.60
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.95
Inv Elev of Storage Node (m)	54.50
Max Ponding Depth (m) =	0.15

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.3000	**272**	13.60	13.60
0.3001	**0**	0.00	13.60
0.4500	**0**	0.00	13.60
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP23**
Structure / Inlet No:	**AD47,48,49,50**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**301**
Max. Ponding Elev at Spill (m):	**54.85**
Min. Ponding Elev (Lid Elev) (m):	**54.75**
Max. Prism Volume (m3)	10.03
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.00
Inv Elev of Storage Node (m)	54.60
Max Ponding Depth (m) =	0.10

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2500	**301**	10.03	10.03
0.2501	**0**	0.00	10.03
0.4000	**0**	0.00	10.03
Copy to PCSWMM (depth / area)			

No. of Inlets = 4 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP24**
Structure / Inlet No:	**AD45, AD46**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**82**
Max. Ponding Elev at Spill (m):	**54.87**
Min. Ponding Elev (Lid Elev) (m):	**54.80**
Max. Prism Volume (m3)	1.91
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.02
Inv Elev of Storage Node (m)	54.65
Max Ponding Depth (m) =	0.07

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2200	**82**	1.91	1.91
0.2201	**0**	0.00	1.91
0.3700	**0**	0.00	1.91
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP25**
Structure / Inlet No:	**AD59, AD60**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**156**
Max. Ponding Elev at Spill (m):	**54.95**
Min. Ponding Elev (Lid Elev) (m):	**54.90**
Max. Prism Volume (m3)	2.60
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.10
Inv Elev of Storage Node (m)	54.75
Max Ponding Depth (m) =	0.050

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2000	**156**	2.60	2.60
0.2001	**0**	0.00	2.60
0.3500	**0**	0.00	2.60
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP26**
Structure / Inlet No:	**AD61**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**67**
Max. Ponding Elev at Spill (m):	**54.88**
Min. Ponding Elev (Lid Elev) (m):	**54.75**
Max. Prism Volume (m3)	2.90
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.03
Inv Elev of Storage Node (m)	54.60
Max Ponding Depth (m) =	0.130

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2800	**67**	2.90	2.90
0.2801	**0**	0.00	2.90
0.4300	**0**	0.00	2.90
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP27**
Structure / Inlet No:	**AD63,64,65**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**250**
Max. Ponding Elev at Spill (m):	**54.95**
Min. Ponding Elev (Lid Elev) (m):	**54.90**
Max. Prism Volume (m3)	4.17
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.10
Inv Elev of Storage Node (m)	54.75
Max Ponding Depth (m) =	0.050

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2000	**250**	4.17	4.17
0.2001	**0**	0.00	4.17
0.3500	**0**	0.00	4.17
Copy to PCSWMM (depth / area)			

No. of Inlets = 3 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP28**
Structure / Inlet No:	**AD66**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**55**
Max. Ponding Elev at Spill (m):	**54.95**
Min. Ponding Elev (Lid Elev) (m):	**54.90**
Max. Prism Volume (m3)	0.92
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.10
Inv Elev of Storage Node (m)	54.75
Max Ponding Depth (m) =	0.050

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2000	**55**	0.92	0.92
0.2001	**0**	0.00	0.92
0.3500	**0**	0.00	0.92
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP29**
Structure / Inlet No:	**AD67**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**31**
Max. Ponding Elev at Spill (m):	**55.00**
Min. Ponding Elev (Lid Elev) (m):	**54.90**
Max. Prism Volume (m3)	1.03
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.15
Inv Elev of Storage Node (m)	54.75
Max Ponding Depth (m) =	0.100

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2500	**31**	1.03	1.03
0.2501	**0**	0.00	1.03
0.4000	**0**	0.00	1.03
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP30**
Structure / Inlet No:	**AD68,69,70**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**246**
Max. Ponding Elev at Spill (m):	**55.10**
Min. Ponding Elev (Lid Elev) (m):	**55.00**
Max. Prism Volume (m3)	8.20
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.25
Inv Elev of Storage Node (m)	54.85
Max Ponding Depth (m) =	0.100

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2500	**246**	8.20	8.20
0.2501	**0**	0.00	8.20
0.4000	**0**	0.00	8.20
Copy to PCSWMM (depth / area)			

No. of Inlets = 3 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP31**
Structure / Inlet No:	**AD42**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**4**
Max. Ponding Elev at Spill (m):	**54.99**
Min. Ponding Elev (Lid Elev) (m):	**54.91**
Max. Prism Volume (m3)	0.11
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.14
Inv Elev of Storage Node (m)	54.76
Max Ponding Depth (m) =	0.080

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2300	**4**	0.11	0.11
0.2301	**0**	0.00	0.11
0.3800	**0**	0.00	0.11
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP32**
Structure / Inlet No:	**AD43**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**5**
Max. Ponding Elev at Spill (m):	**54.99**
Min. Ponding Elev (Lid Elev) (m):	**54.91**
Max. Prism Volume (m3)	0.13
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	55.14
Inv Elev of Storage Node (m)	54.76
Max Ponding Depth (m) =	0.080

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2300	**5**	0.13	0.13
0.2301	**0**	0.00	0.13
0.3800	**0**	0.00	0.13
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP33**
Structure / Inlet No:	**AD77**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**11**
Max. Ponding Elev at Spill (m):	**54.58**
Min. Ponding Elev (Lid Elev) (m):	**54.53**
Max. Prism Volume (m3)	0.18
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.73
Inv Elev of Storage Node (m)	54.38
Max Ponding Depth (m) =	0.05

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2000	**11**	0.18	0.18
0.2001	**0**	0.00	0.18
0.3500	**0**	0.00	0.18
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP34**
Structure / Inlet No:	**AD76**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**11**
Max. Ponding Elev at Spill (m):	**54.53**
Min. Ponding Elev (Lid Elev) (m):	**54.48**
Max. Prism Volume (m3)	0.18
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.68
Inv Elev of Storage Node (m)	54.33
Max Ponding Depth (m) =	0.050

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2000	**11**	0.18	0.18
0.2001	**0**	0.00	0.18
0.3500	**0**	0.00	0.18
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP35**
Structure / Inlet No:	**AD75**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**88**
Max. Ponding Elev at Spill (m):	**53.65**
Min. Ponding Elev (Lid Elev) (m):	**53.50**
Max. Prism Volume (m3)	4.40
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	53.80
Inv Elev of Storage Node (m)	53.35
Max Ponding Depth (m) =	0.150

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.3000	**88**	4.40	4.40
0.3001	**0**	0.00	4.40
0.4500	**0**	0.00	4.40
Copy to PCSWMM (depth / area)			

No. of Inlets = 2 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP36**
Structure / Inlet No:	**AD79**
Structrue / Inlet Type	**Area Drain**
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	**round**
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**86**
Max. Ponding Elev at Spill (m):	**54.40**
Min. Ponding Elev (Lid Elev) (m):	**54.30**
Max. Prism Volume (m3)	2.87
Depth to Inv below ground (m)	**0.150**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	54.55
Inv Elev of Storage Node (m)	54.15
Max Ponding Depth (m) =	0.100

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.1500	**0.0000**	0.00	0.00
0.2500	**86**	2.87	2.87
0.2501	**0**	0.00	2.87
0.4000	**0**	0.00	2.87
Copy to PCSWMM (depth / area)			

No. of Inlets = 1 Area Drains

Ponding Information	
Ponding Area (trap low) No:	**SP99**
Structure / Inlet No:	**DITCH**
Structrue / Inlet Type	
Include Structure Storage (yes/no)	**No**
Structure Shape (rect / round)	
Structure Length or DIA (mm)	
Structure Width (mm)	
Max. Ponding Area (m2) =	**51**
Max. Ponding Elev at Spill (m):	**52.04**
Min. Ponding Elev (Lid Elev) (m):	**51.89**
Max. Prism Volume (m3)	2.55
Depth to Inv below ground (m)	**0.000**
Allowance for Overland Flow (m)	**0.150**
Ponding Rim Elevation (m)	52.19
Inv Elev of Storage Node (m)	51.89
Max Ponding Depth (m) =	0.150

Storage Function for Modelling			
Head / Depth (m)	**Area (m2)**	**Incr Vol (m3)**	**Tot Vol (m3)**
0.0000	**0.0000**	0.00	0.00
0.0000	**0.0000**	0.00	0.00
0.1000	**30.0000**	3.00	3.00
0.2000	**60**	3.00	6.00
0.3000	**150**	0.00	6.00
0.4500	**0**	0.00	6.00
Copy to PCSWMM (depth / area)			

Appendix H – Dual Drainage Background Data

Table H1: Major System (Street Segment) Characteristics

Table H2a: Orifice Flows for Area Drains (Phase 1)

Table H2b: Orifice Flows for Area Drains (Phase 2)

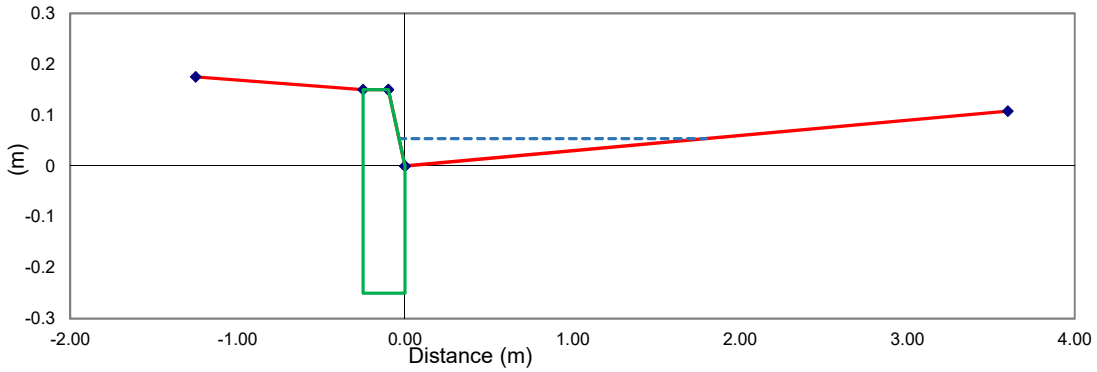
Table H2c: Orifice Flows for Area Drains (Phases 3,4,5)

Table H3: Orifice Flows for SWM Facility (All Phases)

TABLE H1: MAJOR SYSTEM (STREET SEGMENT) CHARATERISTICS

ROAD AND CURB DATA (For Gutter Grades Up to 8% and Lane Crossfalls Up to 6%)

Asphalt width, W_A (m) =	3.600	*From EOP to CL*
Total Road Width, W_R (m) =	3.600	*Includes gutter*
Lane crossfall, S_X (m/m) =	0.030	*3.0%*
Gutter Grade, S_O (m/m)	0.010	*1.0%*
Curb Type =	SC1.1	*Mountable Curb and Gutter*
Inlet Type =	S19	*Curb inlet CB*
Curb height, H_C (m) =	0.150	
Total curb height, H_T (m) =	0.400	
Curb top width, W_C (m) =	0.150	
Curb bottom width, W (m) =	0.250	
Gutter width, W_G (m) =	0.000	
Gutter slope, S_G (m/m) =	0.000	$S_G = D_G / W_G$
Gutter depth, D_G (m) =	0.000	
Mannings, N =	0.013	
Max Spread, T_{MAX} (m) =	1.800	*Max Permitted Spread = 1/2 Asphalt width, $W_A + W_G$*
Max Spread on Asphalt, T_{SMAX} (m) =	1.800	*Max Permitted Spread Over Asphalt =1/2 Asphalt width*
Max Depth at EOP, D_{SMAX}(m) =	0.054	*Based on 1/2 Lane Width*
Max depth over gutter, D_{MAX} (m) =	0.054	$D_{MAX} = D_{SMAX} + D_G$



Overland Gutter and Roadway Flow Based on Road & Curb Type

Street Flow, (L/sec)	Assumed Spread (T)	Spread on Asphalt, Ts=T-Wg	Ds=Ts*Sx	D=Ds+Dg	Road and Gutter Flows (m^3/sec)				
					$Q_{(A+C)}$	$Q_{(C)}$	Gutter Flow, $Q_{(A)}$	Road Flow, $Q_{(B)}$	$Q_{(A+B)}$
0.00	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.00
2	0.500	0.500	0.015	0.015	0.0000	0.0000	0.0000	0.0013	1.32
12	1.000	1.000	0.030	0.030	0.0000	0.0000	0.0000	0.0083	8.35
35	1.500	1.500	0.045	0.045	0.0000	0.0000	0.0000	0.0246	24.61
75	2.000	2.000	0.060	0.060	0.0000	0.0000	0.0000	0.0530	53.00
136	2.500	2.500	0.075	0.075	0.0000	0.0000	0.0000	0.0961	96.11
167	2.700	2.700	0.081	0.081	0.0000	0.0000	0.0000	0.1180	118.00
221	3.000	3.000	0.090	0.090	0.0000	0.0000	0.0000	0.1563	156.29
300	3.350	3.350	0.101	0.101	0.0000	0.0000	0.0000	0.2098	209.77

**Note: Re-iterate to get Steeet Flow Equal to Q_{A+B} (use Goal Seak Function)*

INLET CAPACITY, APPROACH FLOW & SPREAD BASED ON

Lane Crossfall = 0.030 m/m

Gutter Grade = 0.010 m/m

Street Flow (L/sec)	Total Spread, T (m)	Spread on Asphalt, T_S (metres)	Depth of Flow at Gutter (m)	Inlet Capture Rate (m3/sec)	Inlet Capture Rate (L/sec)
0	0.000	0.000	0.000	0.000	0
2	0.500	0.500	0.015	0.011	11
12	1.000	1.000	0.030	0.013	13
35	1.500	1.500	0.045	0.028	28
75	2.000	2.000	0.060	0.040	40
136	2.500	2.500	0.075	0.044	44
167	2.700	2.700	0.081	0.048	48
221	3.000	3.000	0.090	0.055	55
300	3.350	3.350	0.101	0.000	55

Note: The Total Spread (T), includes Gutter width, (Wg) plus spread on lane, (Ts) for curb & gutter type curbs

Table H2a: Orifice Flows for Area Drains (Phase 1)

Type	JR. Smith 1005 Area Drain
Size (mm)	101.6
Area (mm^2)	8,107
Area ($inch^2$)	12.566
Coeff, C	0.61
interval	0.025
Dist below (m)	0.150

Head (m)	Discharge Rate (L/sec)			
	1 Drain	2 Drain	3 Drain	4 Drain
0.000	0.00	0.00	0.00	0.00
0.025	3.46	6.93	10.39	13.85
0.050	4.90	9.80	14.69	19.59
0.075	6.00	12.00	18.00	24.00
0.100	6.93	13.85	20.78	27.71
0.125	7.74	15.49	23.23	30.98
0.150	8.48	16.97	25.45	33.94
0.175	9.16	18.33	27.49	36.66
0.200	9.80	19.59	29.39	39.19
0.225	10.39	20.78	31.17	41.56
0.250	10.95	21.91	32.86	43.81
0.275	11.49	22.97	34.46	45.95
0.300	12.00	24.00	35.99	47.99

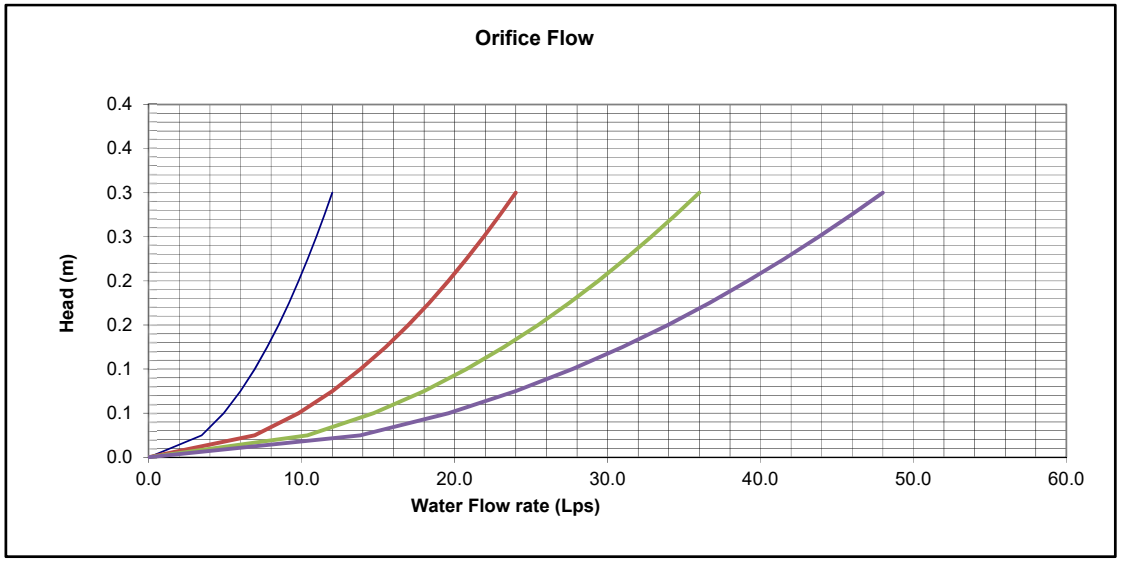


Table H2b: Orifice Flows for Area Drains (Phase 2)

Type	Watts Area Drain (FD-463-P-AF-4)
Location	Exterior Parking Areas
Size (mm)	76
Area (mm^2)	4536
Area ($inch^2$)	7.032
Coeff, C	0.610
interval	0.025
Dist below (m)	0.150

Head (m)	Discharge Rate (L/sec)				
	1 Drain	2 Drain	3 Drain	4 Drain	5 Drain
0.000	0.00	0.00	0.00	0.00	0.00
0.025	1.94	3.88	5.81	7.75	9.69
0.050	2.74	5.48	8.22	10.96	13.70
0.075	3.36	6.71	10.07	13.43	16.78
0.100	3.88	7.75	11.63	15.50	19.38
0.125	4.33	8.67	13.00	17.33	21.67
0.150	4.75	9.49	14.24	18.99	23.74
0.175	5.13	10.26	15.38	20.51	25.64
0.200	5.48	10.96	16.44	21.93	27.41
0.225	5.81	11.63	17.44	23.26	29.07
0.250	6.13	12.26	18.39	24.51	30.64
0.275	6.43	12.86	19.28	25.71	32.14
0.300	6.71	13.43	20.14	26.85	33.57

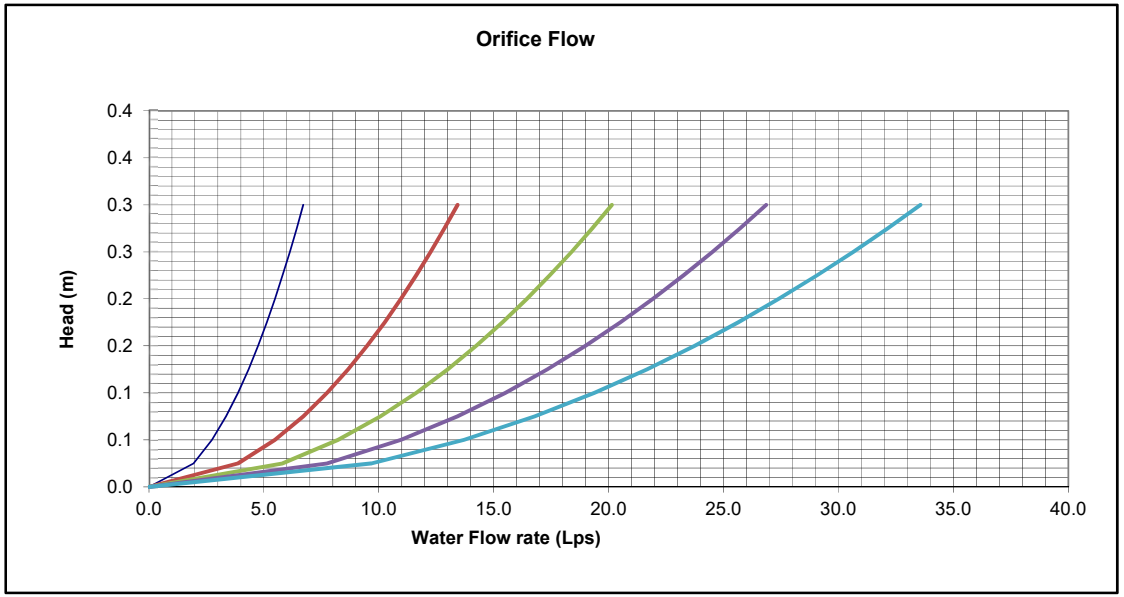


Table H2b: Orifice Flows for Area Drains (Phases 3, 4, 5)

Type	Watts Area Drain (FD-460-AF)
Location	Exterior Parking, Landscaping Areas
Size (mm)	75
Area (mm^2)	4418
Area ($inch^2$)	6.848
Coeff, C	0.610
interval	0.025
Dist below (m)	0.150

Head (m)	Discharge Rate (L/sec)				
	1 Drain	2 Drain	3 Drain	4 Drain	5 Drain
0.000	0.00	0.00	0.00	0.00	0.00
0.025	1.94	3.88	5.81	7.75	9.69
0.050	2.74	5.48	8.22	10.96	13.70
0.075	3.36	6.71	10.07	13.43	16.78
0.100	3.88	7.75	11.63	15.50	19.38
0.125	4.33	8.67	13.00	17.33	21.67
0.150	4.75	9.49	14.24	18.99	23.74
0.175	5.13	10.26	15.38	20.51	25.64
0.200	5.48	10.96	16.44	21.93	27.41
0.225	5.81	11.63	17.44	23.26	29.07
0.250	6.13	12.26	18.39	24.51	30.64
0.275	6.43	12.86	19.28	25.71	32.14
0.300	6.71	13.43	20.14	26.85	33.57

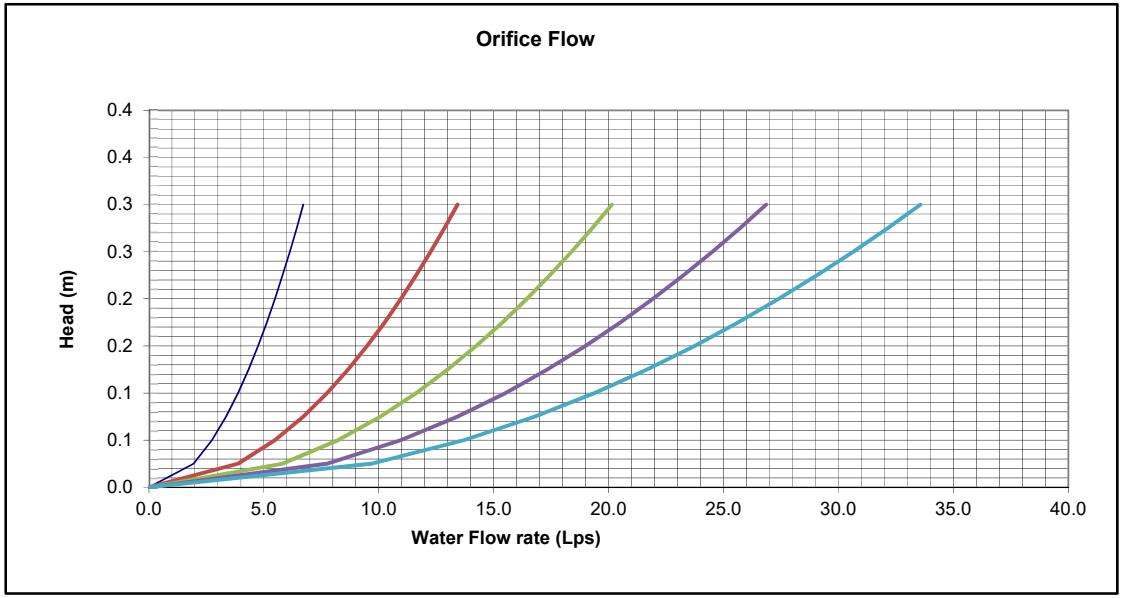
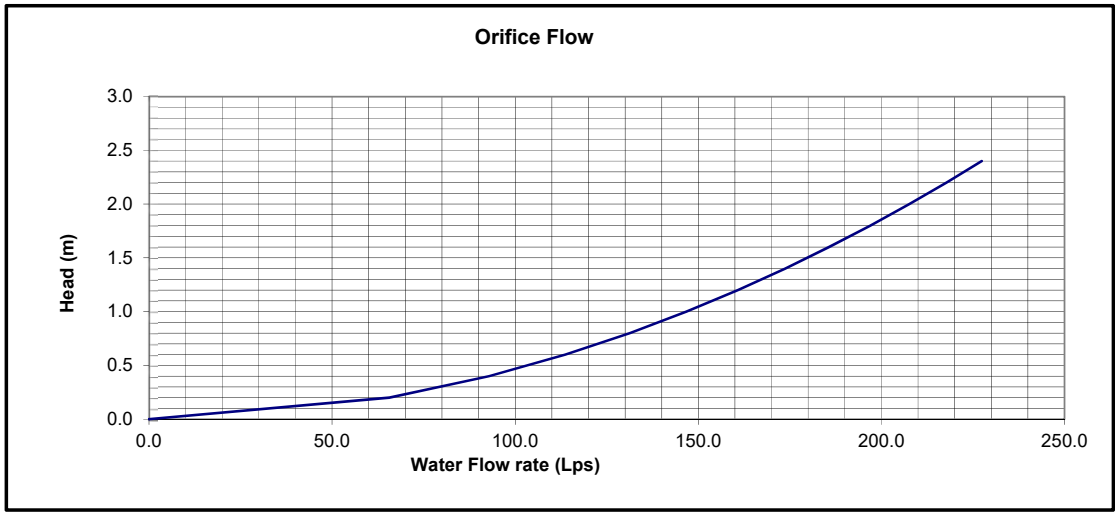


Table H3
Orifice Flows for SWM Pond (All Phases)

Type	SWM Pond Outlet
Size (mm)	263
Area (mm^2)	54,325
Area ($inch^2$)	84.204
Coeff, C	0.61
interval	0.200

Head (m)	Discharge Rate (L/sec)
0.000	0.0
0.200	65.6
0.400	92.8
0.600	113.7
0.800	131.3
1.000	146.8
1.200	160.8
1.400	173.7
1.600	185.7
1.800	196.9
2.000	207.6
2.200	217.7
2.400	227.4



Appendix I – Dual Drainage Modelling Data

PCSWMM Input File (Details) for 100-year 3-hr Chicago Storm

PCSWMM Output File (Status) for 100-year 3-hr Chicago Storm

DETAILS

```
[TITLE]
Based on Siteplan Rev G (2019.07.10)
Recieved from NEUF on July 11, 2019
For Siteplan Submission #4 July 19, 2019
RAISED SWM POND SPILL ELEV (50.07m)+0.26m TO 50.33m
Edit Tower #5 & #6 catchment areas and roof drains based on Issued for 80% Coord
dwg (2024-04-19)

[OPTIONS]
;;Options             Value
;;------------------- ------------
FLOW_UNITS           LPS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           09/01/2018
START_TIME           00:00:00
REPORT_START_DATE    09/01/2018
REPORT_START_TIME    00:00:00
END_DATE             09/01/2018
END_TIME             12:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:05:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         5

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4

[EVAPORATION]
;;Type          Parameters
;;------------- ----------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;               Rain      Time     Snow     Data
;;Name           Type      Intrvl   Catch    Source
;;-------------- --------- -------- -------- ----------
Chicago_3h_100yr INTENSITY 0:10     1.0      TIMESERIES Chicago_3h_100yr
Chicago_3h_5yr   INTENSITY 0:10     1.0      TIMESERIES Chicago_3h_5yr

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.
Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope
Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -----
--- -------- --------
S01              Chicago_3h_100yr T3-ROOF-5-NOSTORAGE 0.0074 100     24.7     1
0
S02              Chicago_3h_100yr OUTFALL_174      0.0048   22.2     9        1
0
S04              Chicago_3h_100yr OUTFALL_174      0.0285   6.7      178.1    1
0
S05              Chicago_3h_100yr IN138478         0.037    1        81.2     0.5
0
S06              Chicago_3h_100yr T3-ROOF-2-STORAGE 0.0075  100      25       1
0
S07              Chicago_3h_100yr SP35             0.1446   73.8     57.6     1
0
S08              Chicago_3h_100yr DITCH-OUT        0.0594   36.4     35.8     0.5
0
S09              Chicago_3h_100yr T3-ROOF-4-NOSTORAGE 0.0294 100     36.8     1
0
S10              Chicago_3h_100yr T3-ROOF-3-STORAGE 0.0078  100      26       1
0
S11              Chicago_3h_100yr T2-ROOF3-STORAGE 0.0092   99.7     30.7     1
0
S12              Chicago_3h_100yr T2-ROOF-4-NOSTORAGE 0.0293 99.9    36.6     1
0
S13              Chicago_3h_100yr T2-ROOF2-STORAGE 0.0096   100      32       1
0
S14              Chicago_3h_100yr T2-ROOF1-STORAGE 0.0359   100      44.9     1
0
S15              Chicago_3h_100yr T2-ROOF-5-NOSTORAGE 0.0066 99.9    22       1
0
S16              Chicago_3h_100yr CB07             0.028    13       25.8     1
0
S17              Chicago_3h_100yr SP09             0.0246   25.8     17.1     1
0
S18              Chicago_3h_100yr SP10             0.0168   22.9     16.8     1
0
S19              Chicago_3h_100yr SP11             0.0366   23.6     26       1
0
S20              Chicago_3h_100yr SP05             0.0411   18.1     30.3     1
0
S21              Chicago_3h_100yr SP02             0.0849   100      49.5     1
0
S22              Chicago_3h_100yr TOWER1-CONN      0.0299   68.9     33.3     1
0
S23              Chicago_3h_100yr SWM-POND         0.1972   0.4      143.2    1
0
S24              Chicago_3h_100yr 202B             0.0602   11.6     11       1
0
S25              Chicago_3h_100yr MHST54415        0.0338   0        11.4     1
0
S26              Chicago_3h_100yr SP04             0.0662   10.5     33.6     1
0
S27              Chicago_3h_100yr SP06             0.0552   81       38       1
0
S28              Chicago_3h_100yr SP07             0.0328   71.4     26.2     1
0
S29              Chicago_3h_100yr SP12             0.0376   23.1     30       1
0
S30              Chicago_3h_100yr CB11             0.1517   22.5     46.3     1
0
S31              Chicago_3h_100yr SP03             0.0372   99.9     56.3     1
0
S32              Chicago_3h_100yr TOWER1-CONN      0.0197   99.8     9.1      1
0
S33              Chicago_3h_100yr SP30             0.0302   17.9     47       1
0
S34              Chicago_3h_100yr SP08             0.0543   75.7     17.5     1
0
S37              Chicago_3h_100yr T1-ROOF-STORAGE  0.087    100      87       1
0
S38              Chicago_3h_100yr MHST54409        0.0506   100      59.5     1
0
S39              Chicago_3h_100yr TOWER1-CONN      0.0951   19.9     79.3     1
0
```

```
S40              Chicago_3h_100yr SP01             0.114    64.6     47       1
0
S41              Chicago_3h_100yr MHST54411        0.213    84.6     132.1    1
0
S42              Chicago_3h_100yr CB10-MAJ         0.127    68.4     38.5     1
0
S43              Chicago_3h_100yr TOWER2-CONN-1    0.029    100      7.9      1
0
S44              Chicago_3h_100yr MHST76834        0.0496   0.5      12.2     1
0
S45              Chicago_3h_100yr IN141918-MAJ     0.0396   79.7     50.1     1
0
S46              Chicago_3h_100yr SP28             0.0113   18.2     19       1
0
S47              Chicago_3h_100yr TOWER4-CONN-2    0.0243   91       9.3      1
0
S48              Chicago_3h_100yr CB05-MAJ         0.0359   85       15.9     1
0
S49              Chicago_3h_100yr SP20             0.0801   59.1     68.5     1
0
S50              Chicago_3h_100yr SP13             0.02     33.5     37.3     1
0
S51              Chicago_3h_100yr SP14             0.0231   39       22.4     1
0
S52              Chicago_3h_100yr SP15             0.0224   29.9     23.7     1
0
S53              Chicago_3h_100yr OUTFALL_OTT_RIVER_2 0.0634 0        149.3    0.5
0
S54              Chicago_3h_100yr SP19             0.0442   7.9      47.3     1
0
S55              Chicago_3h_100yr CB04-MAJ         0.0232   67.2     13.7     1
0
S56              Chicago_3h_100yr SP18             0.0223   44       38.3     1
0
S57              Chicago_3h_100yr SP36             0.0235   32.5     18       1
0
S58              Chicago_3h_100yr 206              0.0211   20.8     16.8     1
0
S59              Chicago_3h_100yr SP99             0.2066   2        256.7    0.5
0
S60              Chicago_3h_100yr SP17             0.0205   24.2     25.2     1
0
S61              Chicago_3h_100yr SP16             0.0213   34.7     21.7     1
0
S62              Chicago_3h_100yr SP22             0.0443   56       37.7     1
0
S63              Chicago_3h_100yr SP21             0.0435   71.5     31.8     1
0
S64              Chicago_3h_100yr SP27             0.0516   27.2     63       1
0
S65              Chicago_3h_100yr CB08             0.0253   4.5      10       1
0
S66              Chicago_3h_100yr CB09             0.0639   13.9     28.7     1
0
S67              Chicago_3h_100yr T5A5B-ROOF-STORAGE 0.1003 100      60.8     1
0
;T4-AMMENITY-ROOF
S67_1            Chicago_3h_100yr T4-ROOF2-NOSTORAGE 0.0511 100      102.2    1
0
;T4-HIGHROOF
S67_2            Chicago_3h_100yr T4-ROOF1-STORAGE 0.0762   100      152.4    1
0
S68              Chicago_3h_100yr SP26             0.0279   28.9     23.2     1
0
S69              Chicago_3h_100yr SP25             0.0366   18       45.5     1
0
S70              Chicago_3h_100yr SP23             0.0828   26.7     92.1     1
0
S71              Chicago_3h_100yr SP24             0.023    9.2      32.6     1
0
S72              Chicago_3h_100yr TOWER2-CONN-1    0.005    100      5.1      1
0
S73              Chicago_3h_100yr SP31,SP32        0.0048   99.9     9.7      1
0
S74              Chicago_3h_100yr SP29             0.0147   46       16       1
0
S75              Chicago_3h_100yr IN141919-MAJ     0.1074   69.6     33       1
0
S76              Chicago_3h_100yr T3-ROOF-1-STORAGE 0.0403  100      50.4     1
0
S77              Chicago_3h_100yr T5-ROOF-AMMENITY_1 0.0208 100      46.2     1
0
S78              Chicago_3h_100yr T5-ROOF_AMMENITY_2 0.021  100      46.7     1
0
S79              Chicago_3h_100yr T5-ROOF-STORAGE  0.0583   100      55.5     1
0
S80              Chicago_3h_100yr T6-ROOF_AMMENITY_1 0.0169 100      37.6     1
0
S81              Chicago_3h_100yr T6-ROOF_AMMENITY_2 0.021  100      46.7     1
0
S82              Chicago_3h_100yr T5A-ROOF-STORAGE 0.0583   100      55.5     1
0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
S01              0.013      0.4        1.57       4.67       10         OUTLET
S02              0.013      0.4        1.57       4.67       10         OUTLET
S04              0.013      0.4        1.57       4.67       10         OUTLET
S05              0.013      0.4        1.57       4.67       10         OUTLET
S06              0.013      0.4        1.57       4.67       10         OUTLET
S07              0.013      0.4        1.57       4.67       10         OUTLET
S08              0.013      0.4        1.57       4.67       10         OUTLET
S09              0.013      0.4        1.57       4.67       10         OUTLET
S10              0.013      0.4        1.57       4.67       10         OUTLET
S11              0.013      0.4        1.57       4.67       10         OUTLET
S12              0.013      0.4        1.57       4.67       10         OUTLET
S13              0.013      0.4        1.57       4.67       10         OUTLET
S14              0.013      0.4        1.57       4.67       10         OUTLET
S15              0.013      0.4        1.57       4.67       10         OUTLET
S16              0.013      0.4        1.57       4.67       10         OUTLET
S17              0.013      0.4        1.57       4.67       10         OUTLET
S18              0.013      0.4        1.57       4.67       10         OUTLET
S19              0.013      0.4        1.57       4.67       10         OUTLET
S20              0.013      0.4        1.57       4.67       10         OUTLET
S21              0.013      0.4        1.57       4.67       10         OUTLET
S22              0.013      0.4        1.57       4.67       10         OUTLET
S23              0.013      0.4        1.57       4.67       10         OUTLET
S24              0.013      0.4        1.57       4.67       10         OUTLET
S25              0.013      0.4        1.57       4.67       10         OUTLET
S26              0.013      0.4        1.57       4.67       10         OUTLET
S27              0.013      0.4        1.57       4.67       10         OUTLET
S28              0.013      0.4        1.57       4.67       10         OUTLET
S29              0.013      0.4        1.57       4.67       10         OUTLET
S30              0.013      0.4        1.57       4.67       10         OUTLET
S31              0.013      0.4        1.57       4.67       10         OUTLET
S32              0.013      0.4        1.57       4.67       10         OUTLET
S33              0.013      0.4        1.57       4.67       10         OUTLET
S34              0.013      0.4        1.57       4.67       10         OUTLET
S37              0.013      0.4        1.57       4.67       10         OUTLET
S38              0.013      0.4        1.57       4.67       10         OUTLET
S39              0.013      0.4        1.57       4.67       10         OUTLET
S40              0.013      0.4        1.57       4.67       10         OUTLET
S41              0.013      0.4        1.57       4.67       10         OUTLET
S42              0.013      0.4        1.57       4.67       10         OUTLET
S43              0.013      0.4        1.57       4.67       10         OUTLET
```

S44	0.013	0.4	1.57	4.67	10	OUTLET
S45	0.013	0.4	1.57	4.67	10	OUTLET
S46	0.013	0.4	1.57	4.67	10	OUTLET
S47	0.013	0.4	1.57	4.67	10	OUTLET
S48	0.013	0.4	1.57	4.67	10	OUTLET
S49	0.013	0.4	1.57	4.67	10	OUTLET
S50	0.013	0.4	1.57	4.67	10	OUTLET
S51	0.013	0.4	1.57	4.67	10	OUTLET
S52	0.013	0.4	1.57	4.67	10	OUTLET
S53	0.013	0.4	1.57	4.67	10	OUTLET
S54	0.013	0.4	1.57	4.67	10	OUTLET
S55	0.013	0.4	1.57	4.67	10	OUTLET
S56	0.013	0.4	1.57	4.67	10	OUTLET
S57	0.013	0.4	1.57	4.67	10	OUTLET
S58	0.013	0.4	1.57	4.67	10	OUTLET
S59	0.013	0.4	1.57	4.67	10	OUTLET
S60	0.013	0.4	1.57	4.67	10	OUTLET
S61	0.013	0.4	1.57	4.67	10	OUTLET
S62	0.013	0.4	1.57	4.67	10	OUTLET
S63	0.013	0.4	1.57	4.67	10	OUTLET
S64	0.013	0.4	1.57	4.67	10	OUTLET
S65	0.013	0.4	1.57	4.67	10	OUTLET
S66	0.013	0.4	1.57	4.67	10	OUTLET
S67	0.013	0.4	1.57	4.67	10	OUTLET
S67_1	0.013	0.4	1.57	4.67	10	OUTLET
S67_2	0.013	0.4	1.57	4.67	10	OUTLET
S68	0.013	0.4	1.57	4.67	10	OUTLET
S69	0.013	0.4	1.57	4.67	10	OUTLET
S70	0.013	0.4	1.57	4.67	10	OUTLET
S71	0.013	0.4	1.57	4.67	10	OUTLET
S72	0.013	0.4	1.57	4.67	10	OUTLET
S73	0.013	0.4	1.57	4.67	10	OUTLET
S74	0.013	0.4	1.57	4.67	10	OUTLET
S75	0.013	0.4	1.57	4.67	10	OUTLET
S76	0.013	0.4	1.57	4.67	10	OUTLET
S77	0.013	0.4	1.57	4.67	10	OUTLET
S78	0.013	0.4	1.57	4.67	10	OUTLET
S79	0.013	0.4	1.57	4.67	10	OUTLET
S80	0.013	0.4	1.57	4.67	10	OUTLET
S81	0.013	0.4	1.57	4.67	10	OUTLET
S82	0.013	0.4	1.57	4.67	10	OUTLET

[INFILTRATION]

;;Subcatchment	MaxRate	MinRate	Decay	DryTime	MaxInfil
S01	76.2	13.2	4.14	7	0
S02	76.2	13.2	4.14	7	0
S04	76.2	13.2	4.14	7	0
S05	76.2	13.2	4.14	7	0
S06	76.2	13.2	4.14	7	0
S07	76.2	13.2	4.14	7	0
S08	76.2	13.2	4.14	7	0
S09	76.2	13.2	4.14	7	0
S10	76.2	13.2	4.14	7	0
S11	76.2	13.2	4.14	7	0
S12	76.2	13.2	4.14	7	0
S13	76.2	13.2	4.14	7	0
S14	76.2	13.2	4.14	7	0
S15	76.2	13.2	4.14	7	0
S16	76.2	13.2	4.14	7	0
S17	76.2	13.2	4.14	7	0
S18	76.2	13.2	4.14	7	0
S19	76.2	13.2	4.14	7	0
S20	76.2	13.2	4.14	7	0
S21	76.2	13.2	4.14	7	0
S22	76.2	13.2	4.14	7	0
S23	76.2	13.2	4.14	7	0
S24	76.2	13.2	4.14	7	0
S25	76.2	13.2	4.14	7	0
S26	76.2	13.2	4.14	7	0
S27	76.2	13.2	4.14	7	0
S28	76.2	13.2	4.14	7	0
S29	76.2	13.2	4.14	7	0
S30	76.2	13.2	4.14	7	0
S31	76.2	13.2	4.14	7	0
S32	76.2	13.2	4.14	7	0
S33	76.2	13.2	4.14	7	0
S34	76.2	13.2	4.14	7	0
S37	76.2	13.2	4.14	7	0
S38	76.2	13.2	4.14	7	0
S39	76.2	13.2	4.14	7	0
S40	76.2	13.2	4.14	7	0
S41	76.2	13.2	4.14	7	0
S42	76.2	13.2	4.14	7	0
S43	76.2	13.2	4.14	7	0
S44	76.2	13.2	4.14	7	0
S45	76.2	13.2	4.14	7	0
S46	76.2	13.2	4.14	7	0
S47	76.2	13.2	4.14	7	0
S48	76.2	13.2	4.14	7	0
S49	76.2	13.2	4.14	7	0
S50	76.2	13.2	4.14	7	0
S51	76.2	13.2	4.14	7	0
S52	76.2	13.2	4.14	7	0
S53	76.2	13.2	4.14	7	0
S54	76.2	13.2	4.14	7	0
S55	76.2	13.2	4.14	7	0
S56	76.2	13.2	4.14	7	0
S57	76.2	13.2	4.14	7	0
S58	76.2	13.2	4.14	7	0
S59	76.2	13.2	4.14	7	0
S60	76.2	13.2	4.14	7	0
S61	76.2	13.2	4.14	7	0
S62	76.2	13.2	4.14	7	0
S63	76.2	13.2	4.14	7	0
S64	76.2	13.2	4.14	7	0
S65	76.2	13.2	4.14	7	0
S66	76.2	13.2	4.14	7	0
S67	76.2	13.2	4.14	7	0
S67_1	76.2	13.2	4.14	7	0
S67_2	76.2	13.2	4.14	7	0
S68	76.2	13.2	4.14	7	0
S69	76.2	13.2	4.14	7	0
S70	76.2	13.2	4.14	7	0
S71	76.2	13.2	4.14	7	0
S72	76.2	13.2	4.14	7	0
S73	76.2	13.2	4.14	7	0
S74	76.2	13.2	4.14	7	0
S75	76.2	13.2	4.14	7	0
S76	76.2	13.2	4.14	7	0
S77	76.2	13.2	4.14	7	0
S78	76.2	13.2	4.14	7	0
S79	76.2	13.2	4.14	7	0
S80	76.2	13.2	4.14	7	0
S81	76.2	13.2	4.14	7	0
S82	76.2	13.2	4.14	7	0

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
202B	49.06	2.24	0	0	0

```
204              49.231     2.369      0          0          0
205              49.382     1.618      0          0          0
206              49.519     1.481      0          0          0
207              49.72      1.43       0          0          0
208              50.918     2.972      0          0          0
209              51.25      3.42       0          0          0
210              50.74      2.46       0          0          0
CB04             52.57      1.4        0          0          0
CB04-MAJ         53.97      0.15       0          0          0
CB05             52.5       2.03       0          0          0
CB05-MAJ         54.53      0.15       0          0          0
CB07             50.023     0.977      0          0          0
CB08             49.297     1.653      0          0          0
CB09             49.7       0.95       0          0          0
CB10             52.35      0.97       0          0          0
CB10-MAJ         53.32      0.15       0          0          0
CB11             50.7       2.02       0          0          0
DITCH-OUT        52.45      0.55       0          0          0
IN138478         51.08      1.4        0          0          0
IN141918         50.75      1.8        0          0          0
IN141918-MAJ     52.55      0.15       0          0          0
IN141919         51.52      1.8        0          0          0
IN141919-MAJ     53.32      0.15       0          0          0
MHST54409        49.96      4.358      0          0          0
MHST54410        49         4.049      0          0          0
MHST54411        50.06      2.42       0          0          0
MHST54412        48.31      4.371      0          0          0
MHST54413        48         4.528      0          0          0
MHST54414        47.16      5.111      0          0          0
MHST54415        48.9       2.82       0          0          0
MHST54416        49         2.14       0          0          0
MHST76833        50.46      3.86       0          0          0
MHST76834        50.73      2.299      0          0          0
MHST76835        50.61      2.6        0          0          0
MHST78305        50.79      2.21       0          0          0
MHST78307        50.85      3.25       0          0          0
MHST78309        49.14      2.66       0          0          0
POND-OUTLET      48.63      1.62       0          0          0
T01              50.694     2.391      0          0          0
T02              50.67      2.63       0          0          0
T03              50.752     2.275      0          0          0
T04              50.859     2.207      0          0          0
T05              50.871     2.279      0          0          0
T06              50.953     2.59       0          0          0
T07              51.068     2.713      0          0          0
T08              49.055     2.206      0          0          0
T09              49.255     2.265      0          0          0
T10              49.618     1.472      0          0          0
TOWER1-CONN      49.45      5.39       0          0          0
TOWER2-CONN-1    49.48      5.36       0          0          0
TOWER2-CONN-2    49.51      5.33       0          0          0
TOWER2-CONN-3    51.09      3.75       0          0          0
TOWER3-CONN-1    49.51      5.33       0          0          0
TOWER3-CONN-2    49.663     5.177      0          0          0
TOWER4-CONN-1    49.59      5.25       0          0          0
TOWER4-CONN-2    49.94      4.9        0          0          0
TOWER5A5B-CONN   50.8       3.8        0          0          0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name          Elev.      Type       Time Series      Gate     Route To
;;--------------- ---------- ---------- ---------------- -------- ----------------
OUTFALL_174      53.05      FREE                        NO
OUTFALL_OTT_RIVER_1 46.96   FREE                        NO
OUTFALL_OTT_RIVER_2 48      FREE                        NO
OUTFALL_RAVINE   50.25      FREE                        NO
OUTFALL_SWMPOND  49.77      FREE                        NO

[STORAGE]
;;               Invert     Max.       Init.      Storage    Curve
Evap.
;;Name          Elev.      Depth      Depth      Curve      Params
Frac.    Infiltration parameters
;;--------------- ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----
---- -------- -------- ----------------------
SP01             54.45      0.37       0          TABULAR    SP01-STORAGE
0        0
SP02             54.31      0.51       0          TABULAR    SP02-STORAGE
0        0
SP03             52.38      0.32       0          TABULAR    SP03-STORAGE
0        0
SP04             54.35      0.45       0          TABULAR    SP04-STORAGE
0        0
SP05             54.4       0.35       0          TABULAR    SP05-STORAGE
0        0
SP06             54.4       0.44       0          TABULAR    SP06-STORAGE
0        0
SP07             54.45      0.39       0          TABULAR    SP07-STORAGE
0        0
SP08             53.75      0.48       0          TABULAR    SP12-STORAGE
0        0
SP09             54.4       0.45       0          TABULAR    SP09-STORAGE
0        0
SP10             54.47      0.38       0          TABULAR    SP10-STORAGE
0        0
SP11             54.4       0.45       0          TABULAR    SP11-STORAGE
0        0
SP12             54.4       0.45       0          TABULAR    SP12-STORAGE
0        0
SP13             54.53      0.42       0          TABULAR    SP13-STORAGE
0        0
SP14             54.51      0.43       0          TABULAR    SP14-STORAGE
0        0
SP15             54.51      0.42       0          TABULAR    SP15-STORAGE
0        0
SP16             54.51      0.4        0          TABULAR    SP16-STORAGE
0        0
SP17             54.51      0.39       0          TABULAR    SP17-STORAGE
0        0
SP18             54.5       0.35       0          TABULAR    SP18-STORAGE
0        0
SP19             54.5       0.46       0          TABULAR    SP19-STORAGE
0        0
SP20             54.5       0.46       0          TABULAR    SP20-STORAGE
0        0
SP21             54.5       0.4        0          TABULAR    SP21-STORAGE
0        0
SP22             54.5       0.45       0          TABULAR    SP22-STORAGE
0        0
SP23             54.6       0.4        0          TABULAR    SP23-STORAGE
0        0
SP24             54.65      0.37       0          TABULAR    SP24-STORAGE
0        0
SP25             54.75      0.35       0          TABULAR    SP25-STORAGE
0        0
SP26             54.6       0.43       0          TABULAR    SP26-STORAGE
0        0
SP27             54.75      0.35       0          TABULAR    SP27-STORAGE
0        0
SP28             54.75      0.35       0          TABULAR    SP28-STORAGE
0        0
SP29             54.75      0.4        0          TABULAR    SP29-STORAGE
0        0
SP30             54.85      0.4        0          TABULAR    SP30-STORAGE
0        0
SP31,SP32        54.76      0.38       0          TABULAR    SP31,SP32-STORAGE
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SP35              53.35    0.45       0          TABULAR     SP35-STORAGE
0        0
SP36              54.15    0.4        0          TABULAR     SP38-STORAGE
0        0
SP99              52.22    1.3        0          TABULAR     SP99
0        0
SWM-POND          48.63    2.37       0          TABULAR     SWM-POND-DME-ADJ
0        0
T1-ROOF-STORAGE   60       0.15       0          TABULAR     TOWER1-ROOF-STORAGE
0     0
T2-ROOF1-STORAGE  60       0.15       0          TABULAR     TOWER2-ROOF1-STORAGE
0     0
T2-ROOF2-STORAGE  60       0.15       0          TABULAR     TOWER2-ROOF2-STORAGE
0     0
T2-ROOF3-STORAGE  60       0.15       0          TABULAR     TOWER2-ROOF3-STORAGE
0     0
T2-ROOF-4-NOSTORAGE 60     0.15       0          FUNCTIONAL  0         0         0
0        0
T2-ROOF-5-NOSTORAGE 60     0.15       0          FUNCTIONAL  0         0         0
0        0
T3-ROOF-1-STORAGE 60       0.15       0          TABULAR     TOWER3-ROOF1-STORAGE
0     0
T3-ROOF-2-STORAGE 60       0.15       0          TABULAR     TOWER3-ROOF2-STORAGE
0     0
T3-ROOF-3-STORAGE 60       0.15       0          TABULAR     TOWER3-ROOF3-STORAGE
0     0
T3-ROOF-4-NOSTORAGE 60     0.15       0          FUNCTIONAL  0         0         0
0        0
T3-ROOF-5-NOSTORAGE 60     0.15       0          FUNCTIONAL  0         0         0
0        0
T4-ROOF1-STORAGE  60       0.15       0          TABULAR     TOWER4-HIGHROOF-STORAGE
0 0
T4-ROOF2-NOSTORAGE 60      0.15       0          FUNCTIONAL  0         0         0
0        0
T5A5B-ROOF-STORAGE 60      0.15       0          TABULAR     TOWER5&6-PODIUM-BALLAST
-ROOF             0 0
T5A-ROOF-STORAGE  60       0.15       0          TABULAR     TOWER5A-ROOF-STORAGE
0     0
T5-ROOF_AMMENITY_2 60      0.15       0          FUNCTIONAL  0         0         0
0        0
T5-ROOF-AMMENITY_1 60      0.15       0          FUNCTIONAL  0         0         0
0        0
T5-ROOF-STORAGE   60       0.15       0          TABULAR     TOWER5-ROOF-STORAGE
0     0
T6-ROOF_AMMENITY_1 60      0.15       0          FUNCTIONAL  0         0         0
0        0
T6-ROOF_AMMENITY_2 60      0.15       0          FUNCTIONAL  0         0         0
0        0

[CONDUITS]
;;                Inlet            Outlet                      Manning    Inlet
Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset
Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
---------- ---------- ----------
C01               CB04-MAJ         IN141919-MAJ     29.092     0.01       53.97
53.32      0          0
C01_1             IN138478         SP99             131.026    0.013      52.48
52.22      0          0
C01_5             SP99             DITCH-OUT        14.625     0.013      52.22
52.45      0          0
C02               206              205              24.414     0.013      49.519
49.457     0          0
C03               T10              206              27.793     0.01       49.618
49.519     0          0
C030              IN141918         T03              11.259     0.013      51.35
51.07      0          0
C04               CB07             207              12.499     0.013      50.023
49.959     0          0
```

```
C05               TOWER5A5B-CONN   210              1.252      0.013      50.8
50.74      0          0
C05.1             T07              T06              17.603     0.013      51.068
50.953     0          0
C05.2             209              T07              9.874      0.013      51.25
51.068     0          0
C06               CB04             T06              4.619      0.013      52.49
52.444     0          0
C060              SP08             T04              9.35       0.013      52.24
52.146     0          0
C07               CB05             T07              4.441      0.013      52.76
52.716     0          0
C08               T06              208              5.19       0.013      50.953
50.918     0          0
C080              IN141919         T05              4.94       0.013      52.12
52.02      0          0
C09               CB11             T02              6.459      0.013      51.3
51.235     0          0
C10               CB10             MHST78307        1.325      0.013      52.95
52.56      0          0
;OVERFLOW
C11               SWM-POND         OUTFALL_SWMPOND  29.932     0.4        50.33
49.77      0          0
C12               210              MHST54411        13.551     0.013      50.74
50.48      0          0
C13               T09              204              13.906     0.01       49.255
49.231     0          0
C14               208              T05              23.089     0.013      50.918
50.871     0          0
C15               207              T10              41.613     0.01       49.72
49.618     0          0
C16               TOWER3-CONN-1    204              5.614      0.01       49.65
49.54      0          0
C17               CB05-MAJ         CB04-MAJ         17.615     0.013      54.53
53.97      0          0
C18               204              MHST78309        5.416      0.01       49.231
49.205     0          0
C19               IN141919-MAJ     IN141918-MAJ     34.856     0.013      54.05
52.53      0          0
C20               CB10-MAJ         SP03             44.258     0.013      52.55
52.38      0          0
C21               DITCH-OUT        OUTFALL_RAVINE   11.412     0.1        50.35
52.45      0          0
C22               SP07             SP06             16.205     0.013      54.45
54.4       0          0
C23               SP06             SP01             37.321     0.013      54.4
54.45      0          0
C24               CB08             T10              2.611      0.01       49.297
49.618     0          0
C25               205              T09              34.073     0.01       49.382
49.255     0          0
C26               SP35             DITCH-OUT        34.918     0.1        52.95
52.45      0          0
C27               SP22             CB05-MAJ         38.051     0.013      54.76
54.53      0          0
C28               CB09             T09              6.798      0.01       49.7
49.255     0          0
C29               TOWER4-CONN-2    207              1.004      0.01       49.94
49.72      0          0
C37               IN138478         MHST78307        11.21      0.013      51.08
50.98      0          0
OL4               SP03             IN141918-MAJ     16.305     0.013      52.55
52.53      0          0
STM104099         MHST78307        MHST76833        26.105     0.013      50.85
50.46      0          0
STM104100         MHST76833        MHST54409        68.255     0.013      50.46
49.99      0          0
STM104102_1       MHST76834        T01              11.882     0.013      50.73
50.694     0          0
STM104102_3       T01              T02              8.569      0.013      50.694
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STM104102_4      T02              MHST76835        15.806     0.013      50.67
50.62      0          0
STM104104        MHST76835        MHST76833        22.029     0.013      50.61
50.46      0          0
STM105994_2      T04              MHST78305        4.714      0.013      50.859
50.85      0          0
STM105994_5      T05              T04              6.072      0.013      50.871
50.859     0          0
STM105995_1      MHST78305        T03              21.699     0.013      50.79
50.752     0          0
STM105995_2      T03              MHST76834        1.259      0.013      50.752
50.75      0          0
STM105997        TOWER2-CONN-3    MHST76834        41.319     0.013      51.09
50.89      0          0
STM106002-1_1    202B             T08              2.061      0.013      49.06
49.055     0          0
STM106002-1_2    T08              MHST54416        5.87       0.013      49.055
49.04      0          0
STM106002-2      MHST78309        202B             51.992     0.013      49.14
49.06      0          0
STM65382         MHST54416        MHST54415        41.323     0.013      49
48.93      0          0
STM65383         MHST54415        SWM-POND         6.5        0.013      48.9
48.63      0          0
STM65384         MHST54412        MHST54413        12.721     0.013      48.31
48.12      0          0
STM65386         MHST54413        MHST54414        59.288     0.013      48
47.19      0          0
STM65387         MHST54414        OUTFALL_OTT_RIVER_1 14.337  0.013      47.16
46.96      0          0
STM65388         MHST54411        MHST54410        34.501     0.013      50.06
49.57      0          0
STM65389         MHST54409        MHST54410        18.061     0.013      49.96
49.6       0          0
STM65390         MHST54410        SWM-POND         8          0.013      49
48.63      0          0
STMH65384        POND-OUTLET      MHST54412        20.597     0.013      48.63
48.31      0          0
STM-LAT-T1       TOWER1-CONN      MHST54416        2.821      0.013      49.45
49.4       0          0
STM-LAT-T2(1)    TOWER2-CONN-1    T08              6.308      0.013      49.48
49.35      0          0
STM-LAT-T2(2)    TOWER2-CONN-2    MHST78309        2.083      0.013      49.51
49.47      0          0
STM-LAT-T3       TOWER3-CONN-2    205              3.198      0.013      49.663
49.72      0          0
STM-LAT-T4       TOWER4-CONN-1    206              0.986      0.013      49.77
49.75      0          0

[ORIFICES]
;;               Inlet            Outlet           Orifice      Crest      Disch.
Flap Open/Close
;;Name           Node             Node             Type         Height     Coeff.
Gate Time
;;-------------- ---------------- ---------------- ------------ ---------- --------
-- ---- ----------
SWM-CONTROL      SWM-POND         POND-OUTLET      SIDE         48.63      0.61
NO       0

[OUTLETS]
;;               Inlet            Outlet           Outflow    Outlet
Qcoeff/                    Flap
;;Name           Node             Node             Height     Type
QTable           Qexpon     Gate
;;-------------- ---------------- ---------------- ---------- ---------------- ----
---------- ---------- ----
CB4-IC           CB04-MAJ         CB04             53.97      TABULAR/DEPTH    CB-
IC                      NO
CB5-IC           CB05-MAJ         CB05             54.53      TABULAR/DEPTH    CB-
IC                      NO
CB9-IC           CB10-MAJ         CB10             53.32      TABULAR/DEPTH    CB-
IC                      NO
IN141918-IC      IN141918-MAJ     IN141918         52.55      TABULAR/DEPTH    CB-
IC                      NO
IN141919-IC      IN141919-MAJ     IN141919         53.32      TABULAR/DEPTH    CB-
IC                      NO
SP01-OUTLET      SP01             TOWER1-CONN      54.45      TABULAR/DEPTH
Tower1_AreaDrains_4Drains          NO
SP02-OUTLET      SP02             TOWER1-CONN      54.31      TABULAR/DEPTH
Tower1_AreaDrains_2Drains          NO
SP04-OUTLET      SP04             TOWER2-CONN-1    54.35      TABULAR/DEPTH
Tower2_AreaDrains_1Drain           NO
SP05-OUTLET      SP05             TOWER2-CONN-1    54.4       TABULAR/DEPTH
Tower2_AreaDrains_2Drains          NO
SP06-OUTLET      SP06             TOWER2-CONN-1    54.4       TABULAR/DEPTH
Tower2_AreaDrains_1Drain           NO
SP07-OUTLET      SP07             TOWER2-CONN-1    54.45      TABULAR/DEPTH
Tower2_AreaDrains_1Drain           NO
SP09-OUTLET      SP09             TOWER2-CONN-2    54.4       TABULAR/DEPTH
Tower2_AreaDrains_1Drain           NO
SP10-OUTLET      SP10             TOWER2-CONN-2    54.47      TABULAR/DEPTH
Tower2_AreaDrains_1Drain           NO
SP11-OUTLET      SP11             TOWER2-CONN-2    54.4       TABULAR/DEPTH
Tower2_AreaDrains_1Drain           NO
SP12-OUTLET      SP12             TOWER2-CONN-2    54.4       TABULAR/DEPTH
Tower2_AreaDrains_1Drain           NO
SP13-OUTLET      SP13             TOWER3-CONN-1    54.53      TABULAR/DEPTH
Tower3/4/5_AreaDrains_2Drains            NO
SP14-OUTLET      SP14             TOWER3-CONN-1    54.51      TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP15-OUTLET      SP15             TOWER3-CONN-1    54.51      TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP16-OUTLET      SP16             TOWER3-CONN-1    54.51      TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP17-OUTLET      SP17             TOWER3-CONN-1    54.51      TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP18-OUTLET      SP18             TOWER3-CONN-1    54.6       TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP19-OUTLET      SP19             TOWER3-CONN-1    54.45      TABULAR/DEPTH
Tower3/4/5_AreaDrains_2Drains            NO
SP20-OUTLET      SP20             TOWER3-CONN-2    54.5       TABULAR/DEPTH
Tower3/4/5_AreaDrains_3Drains            NO
SP21-OUTLET      SP21             TOWER4-CONN-1    54.5       TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP22-OUTLET      SP22             TOWER4-CONN-1    54.5       TABULAR/DEPTH
Tower3/4/5_AreaDrains_2Drains            NO
SP23-OUTLET      SP23             TOWER3-CONN-2    54.6       TABULAR/DEPTH
Tower3/4/5_AreaDrains_4Drains            NO
SP24-OUTLET      SP24             TOWER3-CONN-2    54.65      TABULAR/DEPTH
Tower3/4/5_AreaDrains_2Drains            NO
SP25-OUTLET      SP25             TOWER4-CONN-1    54.75      TABULAR/DEPTH
Tower3/4/5_AreaDrains_2Drains            NO
SP26-OUTLET      SP26             TOWER4-CONN-1    54.6       TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP27-OUTLET      SP27             TOWER4-CONN-1    54.75      TABULAR/DEPTH
Tower3/4/5_AreaDrains_3Drains            NO
SP28-OUTLET      SP28             TOWER4-CONN-2    54.75      TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP29-OUTLET      SP29             TOWER4-CONN-2    54.75      TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
SP30-OUTLET      SP30             TOWER4-CONN-2    54.85      TABULAR/DEPTH
Tower3/4/5_AreaDrains_2Drains            NO
SP31,SP32-OUTLET SP31,SP32        TOWER3-CONN-2    54.76      TABULAR/DEPTH
Tower3/4/5_AreaDrains_2Drains            NO
SP35-OUTLET      SP35             TOWER5A5B-CONN   53.35      TABULAR/DEPTH
Tower3/4/5_AreaDrains_4Drains            NO
SP36-OULTET      SP36             TOWER5A5B-CONN   54.15      TABULAR/DEPTH
Tower3/4/5_AreaDrains_1Drain             NO
T1-ROOF-OUTLET   T1-ROOF-STORAGE  TOWER1-CONN      60         TABULAR/DEPTH
Tower1_RoofDrains_5Drains          NO
```

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T2-ROOF-1-OUTLET T2-ROOF1-STORAGE TOWER2-CONN-1    60         TABULAR/DEPTH
Tower2_RoofDrains_5Drains            NO
T2-ROOF-2-OUTLET T2-ROOF2-STORAGE TOWER2-CONN-2    60         TABULAR/DEPTH
Tower2_Roof_Drains_4Drains            NO
T2-ROOF-3-OUTLET T2-ROOF3-STORAGE TOWER2-CONN-1    60         TABULAR/DEPTH
Tower2_Roof_Drains_4Drains            NO
T2-ROOF-4-OUTLET T2-ROOF-4-NOSTORAGE TOWER2-CONN-2 60         TABULAR/DEPTH
No_Flow_Control             NO
T2-ROOF-5-OUTLET T2-ROOF-5-NOSTORAGE TOWER2-CONN-1 60         TABULAR/DEPTH
No_Flow_Control             NO
T3-ROOF-1-OUTLET T3-ROOF-1-STORAGE TOWER3-CONN-2   60         TABULAR/DEPTH
Tower3_RoofDrains_5Drains            NO
T3-ROOF-2-OUTLET T3-ROOF-2-STORAGE TOWER3-CONN-2   60         TABULAR/DEPTH
Tower3_RoofDrains_4Drains            NO
T3-ROOF-3-OUTLET T3-ROOF-3-STORAGE TOWER3-CONN-1   60         TABULAR/DEPTH
Tower3_RoofDrains_4Drains            NO
T3-ROOF-4-OUTLET T3-ROOF-4-NOSTORAGE TOWER3-CONN-2 60         TABULAR/DEPTH
No_Flow_Control             NO
T3-ROOF-5-OUTLET T3-ROOF-5-NOSTORAGE TOWER3-CONN-2 60         TABULAR/DEPTH
No_Flow_Control             NO
T4-AMENITYROOF-OUTLET T4-ROOF2-NOSTORAGE TOWER4-CONN-2 60     TABULAR/HEAD
No_Flow_Control             NO
;HIGH ROOF
T4-HIGHROOF-OUTLET T4-ROOF1-STORAGE TOWER4-CONN-2  60         TABULAR/DEPTH
Tower4_RoofDrains_13Drains            NO
T5&6_Podium-ROOF-OUTLET T5A5B-ROOF-STORAGE TOWER5A5B-CONN 60  TABULAR/DEPTH
Tower5&6_Podium_Roof_9Drains            NO
T5_AMMENITY_OUTLET_1 T5-ROOF-AMMENITY_1 TOWER5A5B-CONN 60     TABULAR/DEPTH
No_Flow_Control             NO
T5_AMMENITY_OUTLET_2 T5-ROOF_AMMENITY_2 TOWER5A5B-CONN 60     TABULAR/DEPTH
No_Flow_Control             NO
T5-ROOF_HIGH_OUTLET T5-ROOF-STORAGE TOWER5A5B-CONN 60         TABULAR/DEPTH
Tower5_HighRoofDrains_10Drains              NO
T6_AMMENITY_OUTLET_1 T6-ROOF_AMMENITY_1 TOWER5A5B-CONN 60     TABULAR/DEPTH
No_Flow_Control             NO
T6_AMMENITY_OUTLET_2 T6-ROOF_AMMENITY_2 TOWER5A5B-CONN 60     TABULAR/DEPTH
No_Flow_Control             NO
T6-ROOF-HIGH-OUTLET T5A-ROOF-STORAGE TOWER5A5B-CONN 60        TABULAR/DEPTH
Tower6_RoofDrains_10Drains            NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---
-------
C01              IRREGULAR    Half_Street      0          0          0          1
C01_1            TRAPEZOIDAL  0.6              1          2.5        2.5        1
C01_5            TRAPEZOIDAL  0.6              1          2.5        2.5        1
C02              CIRCULAR     0.45             0          0          0          1
C03              CIRCULAR     0.45             0          0          0          1
C030             CIRCULAR     0.25             0          0          0          1
C04              CIRCULAR     0.2              0          0          0          1
C05              CIRCULAR     0.3              0          0          0          1
C05.1            CIRCULAR     0.375            0          0          0          1
C05.2            CIRCULAR     0.375            0          0          0          1
C06              CIRCULAR     0.2              0          0          0          1
C060             CIRCULAR     0.2              0          0          0          1
C07              CIRCULAR     0.2              0          0          0          1
C08              CIRCULAR     0.375            0          0          0          1
C080             CIRCULAR     0.2              0          0          0          1
C09              CIRCULAR     0.2              0          0          0          1
C10              CIRCULAR     0.2              0          0          0          1
C11              TRAPEZOIDAL  0.6              1          3          3          1
C12              CIRCULAR     0.3              0          0          0          1
C13              CIRCULAR     0.525            0          0          0          1
C14              CIRCULAR     0.375            0          0          0          1
C15              CIRCULAR     0.45             0          0          0          1
C16              CIRCULAR     0.25             0          0          0          1
C17              IRREGULAR    Half_Street      0          0          0          1
C18              CIRCULAR     0.525            0          0          0          1
C19              IRREGULAR    Half_Street      0          0          0          1
C20              IRREGULAR    Half_Street      0          0          0          1
C21              IRREGULAR    Half_Street      0          0          0          1
C22              CIRCULAR     0.2              0          0          0          1
C23              TRAPEZOIDAL  0.15             0.5        3          3          1
C24              CIRCULAR     0.2              0          0          0          1
C25              CIRCULAR     0.525            0          0          0          1
C26              TRAPEZOIDAL  0.15             0.5        3          3          1
C27              IRREGULAR    Half_Street      0          0          0          1
C28              CIRCULAR     0.2              0          0          0          1
C29              CIRCULAR     0.25             0          0          0          1
C37              CIRCULAR     0.25             0          0          0          1
OL4              IRREGULAR    Half_Street      0          0          0          1
STM104099        CIRCULAR     0.375            0          0          0          1
STM104100        CIRCULAR     0.375            0          0          0          1
STM104102_1      CIRCULAR     0.375            0          0          0          1
STM104102_3      CIRCULAR     0.375            0          0          0          1
STM104102_4      CIRCULAR     0.375            0          0          0          1
STM104104        CIRCULAR     0.375            0          0          0          1
STM105994_2      CIRCULAR     0.375            0          0          0          1
STM105994_5      CIRCULAR     0.375            0          0          0          1
STM105995_1      CIRCULAR     0.375            0          0          0          1
STM105995_2      CIRCULAR     0.375            0          0          0          1
STM105997        CIRCULAR     0.25             0          0          0          1
STM106002-1_1    CIRCULAR     0.6              0          0          0          1
STM106002-1_2    CIRCULAR     0.6              0          0          0          1
STM106002-2      CIRCULAR     0.6              0          0          0          1
STM65382         CIRCULAR     0.6              0          0          0          1
STM65383         CIRCULAR     0.6              0          0          0          1
STM65384         CIRCULAR     0.525            0          0          0          1
STM65386         CIRCULAR     0.525            0          0          0          1
STM65387         CIRCULAR     0.525            0          0          0          1
STM65388         CIRCULAR     0.3              0          0          0          1
STM65389         CIRCULAR     0.375            0          0          0          1
STM65390         CIRCULAR     0.375            0          0          0          1
STMH65384        CIRCULAR     0.525            0          0          0          1
STM-LAT-T1       CIRCULAR     0.2              0          0          0          1
STM-LAT-T2(1)    CIRCULAR     0.25             0          0          0          1
STM-LAT-T2(2)    CIRCULAR     0.25             0          0          0          1
STM-LAT-T3       CIRCULAR     0.3              0          0          0          1
STM-LAT-T4       CIRCULAR     0.3              0          0          0          1
SWM-CONTROL      CIRCULAR     0.263            0          0          0

[TRANSECTS]
;;Transect Data in HEC-2 format
;
;Half street, width = 3.2m, curb = 0.15m , cross-slope = 0.02m/m, bank-slope =
0.02m/m, bank-height = 0.23m.
NC 0.02     0.02     0.013
X1 Half_Street       4        0.0      3.2      0.0      0.0      0.0      0.0
0.0
GR 0.06     0        0        3.2      0.15     3.2      0.23     7.2

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate  SeepageRate
;;-------------- ---------- ---------- ---------- ---------- ----------

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
;Inlet Capacity for Standard CB
;3% Crossfall
;2% Gutter Grade
CB-IC            Rating     0.006      0
CB-IC                       0.023      13
CB-IC                       0.029      17
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CB-IC                       0.053      33
CB-IC                       0.068      45
CB-IC                       0.074      50
CB-IC                       0.079      54
CB-IC                       0.088      61
CB-IC                       0.096      61

;IPEX-LMF-80
IPEX-LMF-80      Rating     0          0
IPEX-LMF-80                 0.2        2.544
IPEX-LMF-80                 0.4        3.597
IPEX-LMF-80                 0.6        4.406
IPEX-LMF-80                 0.8        5.087
IPEX-LMF-80                 1          5.688
IPEX-LMF-80                 1.2        6.23
IPEX-LMF-80                 1.4        6.73
IPEX-LMF-80                 1.6        7.194
IPEX-LMF-80                 1.8        7.631
IPEX-LMF-80                 2          8.044
IPEX-LMF-80                 2.2        8.436
IPEX-LMF-80                 2.4        8.811
IPEX-LMF-80                 2.6        9.171
IPEX-LMF-80                 2.8        9.517
IPEX-LMF-80                 3          9.851
IPEX-LMF-80                 3.2        10.174
IPEX-LMF-80                 3.4        10.487
IPEX-LMF-80                 3.6        10.792
IPEX-LMF-80                 3.8        11.087

;IPEX  TYPE A.
;20 L/sec @ 1.4m
IPEX-MHF-TYPEA   Rating     0          0
IPEX-MHF-TYPEA              0.2        8.088
IPEX-MHF-TYPEA              0.4        11.438
IPEX-MHF-TYPEA              0.6        14.008
IPEX-MHF-TYPEA              0.8        16.175
IPEX-MHF-TYPEA              1          18.085
IPEX-MHF-TYPEA              1.2        19.811
IPEX-MHF-TYPEA              1.4        21.398
IPEX-MHF-TYPEA              1.6        22.875
IPEX-MHF-TYPEA              1.8        24.263
IPEX-MHF-TYPEA              2          25.575
IPEX-MHF-TYPEA              2.2        26.824
IPEX-MHF-TYPEA              2.4        28.017
IPEX-MHF-TYPEA              2.6        29.16
IPEX-MHF-TYPEA              2.8        30.261
IPEX-MHF-TYPEA              3          31.323
IPEX-MHF-TYPEA              3.2        32.351
IPEX-MHF-TYPEA              3.4        33.346
IPEX-MHF-TYPEA              3.6        34.313
IPEX-MHF-TYPEA              3.8        35.253

;IPEX TYPE C.  37 l/SEC @ 1.2m
IPEX-MHF-TYPE-C  Rating     0          0
IPEX-MHF-TYPE-C             0.2        14.965
IPEX-MHF-TYPE-C             0.4        21.163
IPEX-MHF-TYPE-C             0.6        25.92
IPEX-MHF-TYPE-C             0.8        29.93
IPEX-MHF-TYPE-C             1          33.462
IPEX-MHF-TYPE-C             1.2        36.656
IPEX-MHF-TYPE-C             1.4        39.593
IPEX-MHF-TYPE-C             1.6        42.327
IPEX-MHF-TYPE-C             1.8        44.895
IPEX-MHF-TYPE-C             2          47.323
IPEX-MHF-TYPE-C             2.2        49.633
IPEX-MHF-TYPE-C             2.4        51.84
IPEX-MHF-TYPE-C             2.6        53.957
IPEX-MHF-TYPE-C             2.8        55.993
IPEX-MHF-TYPE-C             3          57.959
IPEX-MHF-TYPE-C             3.2        59.859
IPEX-MHF-TYPE-C             3.4        61.702
IPEX-MHF-TYPE-C             3.6        63.49
IPEX-MHF-TYPE-C             3.8        65.23

;IPEX TYPE D
;.  49 L/sec AT 1.0m
IPEX-MHF-TYPED   Rating     0          0
IPEX-MHF-TYPED              0.2        21.883
IPEX-MHF-TYPED              0.4        30.948
IPEX-MHF-TYPED              0.6        37.903
IPEX-MHF-TYPED              0.8        43.766
IPEX-MHF-TYPED              1          48.932
IPEX-MHF-TYPED              1.2        53.603
IPEX-MHF-TYPED              1.4        57.898
IPEX-MHF-TYPED              1.6        61.895
IPEX-MHF-TYPED              1.8        65.65
IPEX-MHF-TYPED              2          69.201
IPEX-MHF-TYPED              2.2        72.578
IPEX-MHF-TYPED              2.4        75.806
IPEX-MHF-TYPED              2.6        78.901
IPEX-MHF-TYPED              2.8        81.879
IPEX-MHF-TYPED              3          84.753
IPEX-MHF-TYPED              3.2        87.533
IPEX-MHF-TYPED              3.4        90.227
IPEX-MHF-TYPED              3.6        92.843
IPEX-MHF-TYPED              3.8        95.387

;IPEX MHF Type F.  113 L/sec at 3.05m
IPEX-MHF-TYPEF   Rating     0          0
IPEX-MHF-TYPEF              0.2        28.951
IPEX-MHF-TYPEF              0.4        40.943
IPEX-MHF-TYPEF              0.6        50.145
IPEX-MHF-TYPEF              0.8        57.902
IPEX-MHF-TYPEF              1          64.737
IPEX-MHF-TYPEF              1.2        70.916
IPEX-MHF-TYPEF              1.4        76.598
IPEX-MHF-TYPEF              1.6        81.886
IPEX-MHF-TYPEF              1.8        86.854
IPEX-MHF-TYPEF              2          91.552
IPEX-MHF-TYPEF              2.2        96.02
IPEX-MHF-TYPEF              2.4        100.29
IPEX-MHF-TYPEF              2.6        104.385
IPEX-MHF-TYPEF              2.8        108.326
IPEX-MHF-TYPEF              3          112.128
IPEX-MHF-TYPEF              3.2        115.805
IPEX-MHF-TYPEF              3.4        119.369
IPEX-MHF-TYPEF              3.6        122.83
IPEX-MHF-TYPEF              3.8        126.195

;No Flow Control
No_Flow_Control  Rating     0          0
No_Flow_Control             0.3        1000

;CUSTOM PEDRO PLASTICS
;263MM DIA
;AT INV=48.67
SWM-POND-ICD     Rating     0          0
SWM-POND-ICD                0.2        65.64
SWM-POND-ICD                0.4        92.83
SWM-POND-ICD                0.6        113.7
SWM-POND-ICD                0.8        131.29
SWM-POND-ICD                1          146.78
SWM-POND-ICD                1.2        160.79
SWM-POND-ICD                1.4        173.68
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SWM-POND-ICD                1.6         185.67
SWM-POND-ICD                1.8         196.93
SWM-POND-ICD                2           207.58
SWM-POND-ICD                2.2         217.72
SWM-POND-ICD                2.4         227.4

;JR.SMITH MODEL1005
;100mm Vert Leader with
;75mm Horiz Drain at 1%
;1 drain per catchment area
Tower1_AreaDrains_1Drain Rating     0           0
Tower1_AreaDrains_1Drain            0.025       3.464
Tower1_AreaDrains_1Drain            0.05        4.898
Tower1_AreaDrains_1Drain            0.075       5.999
Tower1_AreaDrains_1Drain            0.1         6.927
Tower1_AreaDrains_1Drain            0.125       7.745
Tower1_AreaDrains_1Drain            0.15        8.484
Tower1_AreaDrains_1Drain            0.175       9.164
Tower1_AreaDrains_1Drain            0.2         9.797
Tower1_AreaDrains_1Drain            0.225       10.391
Tower1_AreaDrains_1Drain            0.25        10.953
Tower1_AreaDrains_1Drain            0.275       11.487
Tower1_AreaDrains_1Drain            0.3         11.998

;JR.SMITH MODEL1005
;100mm Vert Leader with
;75mm Horiz Drain at 1%
;2 drains per catchment area
Tower1_AreaDrains_2Drains Rating    0           0
Tower1_AreaDrains_2Drains           0.025       6.927
Tower1_AreaDrains_2Drains           0.05        9.797
Tower1_AreaDrains_2Drains           0.075       11.998
Tower1_AreaDrains_2Drains           0.1         13.854
Tower1_AreaDrains_2Drains           0.125       15.49
Tower1_AreaDrains_2Drains           0.15        16.968
Tower1_AreaDrains_2Drains           0.175       18.328
Tower1_AreaDrains_2Drains           0.2         19.593
Tower1_AreaDrains_2Drains           0.225       20.782
Tower1_AreaDrains_2Drains           0.25        21.906
Tower1_AreaDrains_2Drains           0.275       22.975
Tower1_AreaDrains_2Drains           0.3         23.996

;JR.SMITH MODEL1005
;100mm Vert Leader with
;75mm Horiz Drain at 1%
;3 drains per catchment area
Tower1_AreaDrains_3Drains Rating    0           0
Tower1_AreaDrains_3Drains           0.025       10.391
Tower1_AreaDrains_3Drains           0.05        14.695
Tower1_AreaDrains_3Drains           0.075       17.997
Tower1_AreaDrains_3Drains           0.1         20.782
Tower1_AreaDrains_3Drains           0.125       23.234
Tower1_AreaDrains_3Drains           0.15        25.452
Tower1_AreaDrains_3Drains           0.175       27.491
Tower1_AreaDrains_3Drains           0.2         29.39
Tower1_AreaDrains_3Drains           0.225       31.172
Tower1_AreaDrains_3Drains           0.25        32.858
Tower1_AreaDrains_3Drains           0.275       34.462
Tower1_AreaDrains_3Drains           0.3         35.995

;JR.SMITH MODEL1005
;100mm Vert Leader with
;75mm Horiz Drain at 1%
;4 drains per catchment area
Tower1_AreaDrains_4Drains Rating    0           0
Tower1_AreaDrains_4Drains           0.025       13.854
Tower1_AreaDrains_4Drains           0.05        19.593
Tower1_AreaDrains_4Drains           0.075       23.996
Tower1_AreaDrains_4Drains           0.1         27.709
Tower1_AreaDrains_4Drains           0.125       30.979
Tower1_AreaDrains_4Drains           0.15        33.936
Tower1_AreaDrains_4Drains           0.175       36.655
Tower1_AreaDrains_4Drains           0.2         39.186
Tower1_AreaDrains_4Drains           0.225       41.563
Tower1_AreaDrains_4Drains           0.25        43.811
Tower1_AreaDrains_4Drains           0.275       45.95
Tower1_AreaDrains_4Drains           0.3         47.993

;WATTS RD-100 c/w
;Accutrol Adjustable Weir
;1 Weir Per Drain
;Weir in FULL Position
;Set at Open Position
;Total 5 Roof Drains
Tower1_RoofDrains_5Drains Rating    0           0
Tower1_RoofDrains_5Drains           0.025       1.58
Tower1_RoofDrains_5Drains           0.05        3.15
Tower1_RoofDrains_5Drains           0.075       4.73
Tower1_RoofDrains_5Drains           0.1         6.31
Tower1_RoofDrains_5Drains           0.125       7.89
Tower1_RoofDrains_5Drains           0.15        9.46

;WATTS FD-463-AD-4
;76mm Vert Leader
;1 drain per catchment area
Tower2_AreaDrains_1Drain Rating     0           0
Tower2_AreaDrains_1Drain            0.025       1.938
Tower2_AreaDrains_1Drain            0.05        2.741
Tower2_AreaDrains_1Drain            0.075       3.357
Tower2_AreaDrains_1Drain            0.1         3.876
Tower2_AreaDrains_1Drain            0.125       4.334
Tower2_AreaDrains_1Drain            0.15        4.747
Tower2_AreaDrains_1Drain            0.175       5.128
Tower2_AreaDrains_1Drain            0.2         5.482
Tower2_AreaDrains_1Drain            0.225       5.814
Tower2_AreaDrains_1Drain            0.25        6.129
Tower2_AreaDrains_1Drain            0.275       6.428
Tower2_AreaDrains_1Drain            0.3         6.714

;WATTS FD-463-AD-4
;76mm Vert Leader
;2 drain per catchment area
Tower2_AreaDrains_2Drains Rating    0           0
Tower2_AreaDrains_2Drains           0.025       3.876
Tower2_AreaDrains_2Drains           0.05        5.482
Tower2_AreaDrains_2Drains           0.075       6.714
Tower2_AreaDrains_2Drains           0.1         7.752
Tower2_AreaDrains_2Drains           0.125       8.667
Tower2_AreaDrains_2Drains           0.15        9.494
Tower2_AreaDrains_2Drains           0.175       10.255
Tower2_AreaDrains_2Drains           0.2         10.963
Tower2_AreaDrains_2Drains           0.225       11.628
Tower2_AreaDrains_2Drains           0.25        12.257
Tower2_AreaDrains_2Drains           0.275       12.856
Tower2_AreaDrains_2Drains           0.3         13.427

;WATTS RD-100 c/w
;Accutrol Adjustable Weir
;1 Weir Per Drain
;Set at Open Position
;Total 4 Roof Drains
;Weirs at FULL Postion
Tower2_Roof_Drains_4Drains Rating    0          0
Tower2_Roof_Drains_4Drains           0.025      1.26
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Tower2_Roof_Drains_4Drains            0.05       2.52
Tower2_Roof_Drains_4Drains            0.075      3.79
Tower2_Roof_Drains_4Drains            0.1        5.05
Tower2_Roof_Drains_4Drains            0.125      6.31
Tower2_Roof_Drains_4Drains            0.15       7.57

;WATTS RD-100 c/w
;Accutrol Adjustable Weir
;1 Weir Per Drain
;Set at FULL Position
Tower2_RoofDrains_5Drains Rating     0          0
Tower2_RoofDrains_5Drains            0.025      1.58
Tower2_RoofDrains_5Drains            0.05       3.15
Tower2_RoofDrains_5Drains            0.075      4.73
Tower2_RoofDrains_5Drains            0.1        6.31
Tower2_RoofDrains_5Drains            0.125      7.89
Tower2_RoofDrains_5Drains            0.15       9.46

;Watts Area Drain (GRD-620)
;75mm orifice set 150mm below
;1 drains per subcatchment
Tower3/4/5_AreaDrains_1Drain Rating     0          0
Tower3/4/5_AreaDrains_1Drain            0.025      1.938
Tower3/4/5_AreaDrains_1Drain            0.05       2.741
Tower3/4/5_AreaDrains_1Drain            0.075      3.357
Tower3/4/5_AreaDrains_1Drain            0.1        3.876
Tower3/4/5_AreaDrains_1Drain            0.125      4.334
Tower3/4/5_AreaDrains_1Drain            0.15       4.747
Tower3/4/5_AreaDrains_1Drain            0.175      5.128
Tower3/4/5_AreaDrains_1Drain            0.2        5.482
Tower3/4/5_AreaDrains_1Drain            0.225      5.814
Tower3/4/5_AreaDrains_1Drain            0.25       6.129
Tower3/4/5_AreaDrains_1Drain            0.275      6.428
Tower3/4/5_AreaDrains_1Drain            0.3        6.714

;Watts Area Drain (GRD-620)
;75mm orifice set 150mm below
;2 drains per subcatchment
Tower3/4/5_AreaDrains_2Drains Rating     0          0
Tower3/4/5_AreaDrains_2Drains            0.025      3.876
Tower3/4/5_AreaDrains_2Drains            0.05       5.482
Tower3/4/5_AreaDrains_2Drains            0.075      6.714
Tower3/4/5_AreaDrains_2Drains            0.1        7.752
Tower3/4/5_AreaDrains_2Drains            0.125      8.667
Tower3/4/5_AreaDrains_2Drains            0.15       9.494
Tower3/4/5_AreaDrains_2Drains            0.175      10.255
Tower3/4/5_AreaDrains_2Drains            0.2        10.963
Tower3/4/5_AreaDrains_2Drains            0.225      11.628
Tower3/4/5_AreaDrains_2Drains            0.25       12.257
Tower3/4/5_AreaDrains_2Drains            0.275      12.856
Tower3/4/5_AreaDrains_2Drains            0.3        13.427

;Watts Area Drain (GRD-620)
;75mm orifice set 150mm below
;3 drains per subcatchment
Tower3/4/5_AreaDrains_3Drains Rating     0          0
Tower3/4/5_AreaDrains_3Drains            0.025      5.814
Tower3/4/5_AreaDrains_3Drains            0.05       8.222
Tower3/4/5_AreaDrains_3Drains            0.075      10.07
Tower3/4/5_AreaDrains_3Drains            0.1        11.628
Tower3/4/5_AreaDrains_3Drains            0.125      13.001
Tower3/4/5_AreaDrains_3Drains            0.15       14.242
Tower3/4/5_AreaDrains_3Drains            0.175      15.383
Tower3/4/5_AreaDrains_3Drains            0.2        16.445
Tower3/4/5_AreaDrains_3Drains            0.225      17.442
Tower3/4/5_AreaDrains_3Drains            0.25       18.386
Tower3/4/5_AreaDrains_3Drains            0.275      19.283
Tower3/4/5_AreaDrains_3Drains            0.3        20.141

;Watts Area Drain (GRD-620)
;75mm orifice set 150mm below
;4 drains per subcatchment
Tower3/4/5_AreaDrains_4Drains Rating     0          0
Tower3/4/5_AreaDrains_4Drains            0.025      7.752
Tower3/4/5_AreaDrains_4Drains            0.05       10.963
Tower3/4/5_AreaDrains_4Drains            0.075      13.427
Tower3/4/5_AreaDrains_4Drains            0.1        15.504
Tower3/4/5_AreaDrains_4Drains            0.125      17.334
Tower3/4/5_AreaDrains_4Drains            0.15       18.989
Tower3/4/5_AreaDrains_4Drains            0.175      20.51
Tower3/4/5_AreaDrains_4Drains            0.2        21.927
Tower3/4/5_AreaDrains_4Drains            0.225      23.257
Tower3/4/5_AreaDrains_4Drains            0.25       24.515
Tower3/4/5_AreaDrains_4Drains            0.275      25.711
Tower3/4/5_AreaDrains_4Drains            0.3        26.854

;WATTS RD-100 c/w
;Accutrol Adjustable Weir
;1 Weir Per Drain
;Weirs in CLOSED Position
Tower3_RoofDrains_4Drains Rating     0          0
Tower3_RoofDrains_4Drains            0.025      1.26
Tower3_RoofDrains_4Drains            0.05       1.26
Tower3_RoofDrains_4Drains            0.075      1.26
Tower3_RoofDrains_4Drains            0.1        1.26
Tower3_RoofDrains_4Drains            0.125      1.26
Tower3_RoofDrains_4Drains            0.15       1.26

;WATTS RD-100 c/w
;Accutrol Adjustable Weir
;1 Weir Per Drain
;Weirs in 50% Position
Tower3_RoofDrains_5Drains Rating     0          0
Tower3_RoofDrains_5Drains            0.025      1.58
Tower3_RoofDrains_5Drains            0.05       3.15
Tower3_RoofDrains_5Drains            0.075      3.9
Tower3_RoofDrains_5Drains            0.1        4.73
Tower3_RoofDrains_5Drains            0.125      5.52
Tower3_RoofDrains_5Drains            0.15       6.31

;WATTS RD-100 c/w
;Accutrol Adjustable Weir
;1 Weir Per Drain
;Weirs in CLOSED Position
Tower3_RoofDrains_8Drains Rating     0          0
Tower3_RoofDrains_8Drains            0.025      2.52
Tower3_RoofDrains_8Drains            0.05       2.52
Tower3_RoofDrains_8Drains            0.075      2.52
Tower3_RoofDrains_8Drains            0.1        2.52
Tower3_RoofDrains_8Drains            0.125      2.52
Tower3_RoofDrains_8Drains            0.15       2.52

;WATTS RD-100 c/w
;Accutrol Adjustable Weir
;1 Weir Per Drain
;Weirs in 1/4 OPEN (20gpm) Position
;100% of High Roof avaialbe for Ponding
;Total 13 Drains (MAY 2024)
Tower4_RoofDrains_13Drains Rating     0          0
Tower4_RoofDrains_13Drains            0.025      4.1
Tower4_RoofDrains_13Drains            0.05       8.2
Tower4_RoofDrains_13Drains            0.075      9.23
Tower4_RoofDrains_13Drains            0.1        10.25
Tower4_RoofDrains_13Drains            0.125      11.28
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Tower4_RoofDrains_13Drains            0.15       12.3

;Ponding with WATTS RD-100 c/w
;Accutrol Adjustable Weir
;1 Weir Per Drain
;Weirs in 50% Position
;90% of Roof avaialbe for Ponding
;Total 12 Drains
Tower5&6_Podium_Roof_9Drains Rating     0          0
Tower5&6_Podium_Roof_9Drains            0.025      2.84
Tower5&6_Podium_Roof_9Drains            0.05       5.68
Tower5&6_Podium_Roof_9Drains            0.075      7.01
Tower5&6_Podium_Roof_9Drains            0.1        8.52
Tower5&6_Podium_Roof_9Drains            0.125      9.94
Tower5&6_Podium_Roof_9Drains            0.15       11.36

;WATTS RD-100 c/w
;Accutrol Adjustable Weir (some areas)
;1 Weir Per Drain
;Weirs in 50% Position
;45% of Roof avaialbe for Ponding
;Total 15 Drains
Tower5_HighRoofDrains_10Drains Rating     0          0
Tower5_HighRoofDrains_10Drains            0.025      3.15
Tower5_HighRoofDrains_10Drains            0.05       6.31
Tower5_HighRoofDrains_10Drains            0.075      7.79
Tower5_HighRoofDrains_10Drains            0.1        9.46
Tower5_HighRoofDrains_10Drains            0.125      11.04
Tower5_HighRoofDrains_10Drains            0.15       12.62

;WATTS RD-100 c/w
;Accutrol Adjustable Weir (some areas)
;1 Weir Per Drain
;Weirs in 50% Position
;45% of Roof avaialbe for Ponding
;Total 15 Drains
Tower6_RoofDrains_10Drains Rating     0          0
Tower6_RoofDrains_10Drains            0.025      3.15
Tower6_RoofDrains_10Drains            0.05       6.31
Tower6_RoofDrains_10Drains            0.075      7.79
Tower6_RoofDrains_10Drains            0.1        9.46
Tower6_RoofDrains_10Drains            0.125      11.04
Tower6_RoofDrains_10Drains            0.15       12.62

SP01-STORAGE     Storage    0          0
SP01-STORAGE                0.15       0
SP01-STORAGE                0.22       430
SP01-STORAGE                0.2201     0
SP01-STORAGE                0.37       0

SP02-STORAGE     Storage    0          0
SP02-STORAGE                0.15       0
SP02-STORAGE                0.36       651
SP02-STORAGE                0.3601     0
SP02-STORAGE                0.51       0

SP03-STORAGE     Storage    0          0
SP03-STORAGE                1.4        0.36
SP03-STORAGE                1.42       42
SP03-STORAGE                1.4201     0
SP03-STORAGE                1.57       0

SP04-STORAGE     Storage    0          0
SP04-STORAGE                0.15       0
SP04-STORAGE                0.3        128
SP04-STORAGE                0.3001     0
SP04-STORAGE                0.45       0

SP05-STORAGE     Storage    0          0
SP05-STORAGE                0.15       0
SP05-STORAGE                0.2        166
SP05-STORAGE                0.2001     0
SP05-STORAGE                0.35       0

SP06-STORAGE     Storage    0          0
SP06-STORAGE                0.15       0
SP06-STORAGE                0.29       138
SP06-STORAGE                0.2901     0
SP06-STORAGE                0.44       0

SP07-STORAGE     Storage    0          0
SP07-STORAGE                0.15       0
SP07-STORAGE                0.24       65
SP07-STORAGE                0.2401     0
SP07-STORAGE                0.39       0

SP08-STORAGE     Storage    0          0
SP08-STORAGE                1.66       0
SP08-STORAGE                1.84       94
SP08-STORAGE                1.8401     0
SP08-STORAGE                1.99       0

SP09-STORAGE     Storage    0          0
SP09-STORAGE                0.15       0
SP09-STORAGE                0.3        88
SP09-STORAGE                0.3001     0
SP09-STORAGE                0.45       0

SP10-STORAGE     Storage    0          0
SP10-STORAGE                0.15       0
SP10-STORAGE                0.23       53
SP10-STORAGE                0.2301     0
SP10-STORAGE                0.38       0

SP11-STORAGE     Storage    0          0
SP11-STORAGE                0.15       0
SP11-STORAGE                0.3        249
SP11-STORAGE                0.3001     0
SP11-STORAGE                0.45       0

SP12-STORAGE     Storage    0          0
SP12-STORAGE                0.15       0
SP12-STORAGE                0.3        193
SP12-STORAGE                0.3001     0
SP12-STORAGE                0.45       0

SP13-STORAGE     Storage    0          0
SP13-STORAGE                0.15       0
SP13-STORAGE                0.27       95
SP13-STORAGE                0.2701     0
SP13-STORAGE                0.42       0

SP14-STORAGE     Storage    0          0
SP14-STORAGE                0.15       0
SP14-STORAGE                0.28       54
SP14-STORAGE                0.2801     0
SP14-STORAGE                0.43       0

SP15-STORAGE     Storage    0          0
SP15-STORAGE                0.15       0
SP15-STORAGE                0.42       60
SP15-STORAGE                0.4201     0
SP15-STORAGE                0.57       0

SP16-STORAGE     Storage    0          0
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SP16-STORAGE               0.15       0
SP16-STORAGE               0.24       90
SP16-STORAGE               0.2401     0
SP16-STORAGE               0.39       0

SP17-STORAGE     Storage   0          0
SP17-STORAGE               0.15       0
SP17-STORAGE               0.24       128
SP17-STORAGE               0.2401     0
SP17-STORAGE               0.39       0

SP18-STORAGE     Storage   0          0
SP18-STORAGE               0.15       0
SP18-STORAGE               0.2        45
SP18-STORAGE               0.2001     0
SP18-STORAGE               0.35       0

SP19-STORAGE     Storage   0          0
SP19-STORAGE               0.15       0
SP19-STORAGE               0.23       241
SP19-STORAGE               0.2301     0
SP19-STORAGE               0.38       0

SP20-STORAGE     Storage   0          0
SP20-STORAGE               0.15       0
SP20-STORAGE               0.3        139
SP20-STORAGE               0.3001     0
SP20-STORAGE               0.45       0

SP21-STORAGE     Storage   0          0
SP21-STORAGE               0.15       0
SP21-STORAGE               0.26       127
SP21-STORAGE               0.2601     0
SP21-STORAGE               0.41       0

SP22-STORAGE     Storage   0          0
SP22-STORAGE               0.15       0
SP22-STORAGE               0.3        272
SP22-STORAGE               0.3001     0
SP22-STORAGE               0.45       0

SP23-STORAGE     Storage   0          0
SP23-STORAGE               0.15       0
SP23-STORAGE               0.25       301
SP23-STORAGE               0.2501     0
SP23-STORAGE               0.4        0

SP24-STORAGE     Storage   0          0
SP24-STORAGE               0.15       0
SP24-STORAGE               0.22       82
SP24-STORAGE               0.2201     0
SP24-STORAGE               0.37       0

SP25-STORAGE     Storage   0          0
SP25-STORAGE               0.15       0
SP25-STORAGE               0.2        156
SP25-STORAGE               0.2001     0
SP25-STORAGE               0.35       0

SP26-STORAGE     Storage   0          0
SP26-STORAGE               0.15       0
SP26-STORAGE               0.28       67
SP26-STORAGE               0.2801     0
SP26-STORAGE               0.43       0

SP27-STORAGE     Storage   0          0
SP27-STORAGE               0.15       0
SP27-STORAGE               0.2        120
SP27-STORAGE               0.2001     0
SP27-STORAGE               0.35       0

SP28-STORAGE     Storage   0          0
SP28-STORAGE               0.15       0
SP28-STORAGE               0.2        55
SP28-STORAGE               0.2001     0
SP28-STORAGE               0.35       0

SP29-STORAGE     Storage   0          0
SP29-STORAGE               0.15       0
SP29-STORAGE               0.25       31
SP29-STORAGE               0.2501     0
SP29-STORAGE               0.4        0

SP30-STORAGE     Storage   0          0
SP30-STORAGE               0.15       0
SP30-STORAGE               0.25       246
SP30-STORAGE               0.2501     0
SP30-STORAGE               0.4        0

SP31,SP32-STORAGE Storage    0          0
SP31,SP32-STORAGE            0.15       0
SP31,SP32-STORAGE            0.23       9
SP31,SP32-STORAGE            0.2301     0
SP31,SP32-STORAGE            0.38       0

SP33-STORAGE     Storage   0          0
SP33-STORAGE               0.15       0
SP33-STORAGE               0.2        11
SP33-STORAGE               0.2001     0
SP33-STORAGE               0.35       0

SP34-STORAGE     Storage   0          0
SP34-STORAGE               0.15       0
SP34-STORAGE               0.2        11
SP34-STORAGE               0.2001     0
SP34-STORAGE               0.35       0

SP35-STORAGE     Storage   0          0
SP35-STORAGE               0.15       0
SP35-STORAGE               0.3        88
SP35-STORAGE               0.3001     0
SP35-STORAGE               0.45       0

SP36-STORAGE     Storage   0          0
SP36-STORAGE               0.15       0
SP36-STORAGE               0.25       86
SP36-STORAGE               0.2501     0
SP36-STORAGE               0.4        0

SP37-STORAGE     Storage   0          0
SP37-STORAGE               0.15       0
SP37-STORAGE               0.35       251
SP37-STORAGE               0.3501     0
SP37-STORAGE               0.5        0

SP38-STORAGE     Storage   0          0
SP38-STORAGE               0.15       0
SP38-STORAGE               0.25       69
SP38-STORAGE               0.2501     0
SP38-STORAGE               0.4        0

;DITCH-PONDING
;300MM WEIR IN OUTLET DITCH
SP99             Storage   0          0
```

```
SP99                          0.1        30
SP99                          0.2        60
SP99                          0.3        150
SP99                          0.3001     0

;SWM POND BASED ON ASBUILTS
SWM-POND-ASB     Storage      0          10
SWM-POND-ASB                  0.37       269.9
SWM-POND-ASB                  0.62       444.9
SWM-POND-ASB                  0.87       522.6
SWM-POND-ASB                  1.12       591.1
SWM-POND-ASB                  1.37       660.5
SWM-POND-ASB                  1.41       671.7

SWM-POND-DME     Storage      0          390
SWM-POND-DME                  0.84       478
SWM-POND-DME                  1.44       667
SWM-POND-DME                  1.4401     0
SWM-POND-DME                  2          0

;POND OVERLOW RAISED TO
;50.33m, OR 1.70m AVOVE POND BOTTOM OF 48.63
;INCREASE OF 0.18m OVER EXISTING COND
SWM-POND-DME-ADJ Storage      0          390
SWM-POND-DME-ADJ              0.84       478
SWM-POND-DME-ADJ              1.44       667
SWM-POND-DME-ADJ              1.7        900
SWM-POND-DME-ADJ              1.95       900

;Ex SWM Pond.  Generated form 2014 DRAPE DTM 0.25m contours.
SWM-POND-LIDAR   Storage      0          249.2
SWM-POND-LIDAR                0.3        373.7
SWM-POND-LIDAR                0.8        541.1
SWM-POND-LIDAR                1.05       654.7
SWM-POND-LIDAR                1.3        733
SWM-POND-LIDAR                1.55       808.1

TOWER1-ROOF-STORAGE Storage    0          0
TOWER1-ROOF-STORAGE            0.025      21.75
TOWER1-ROOF-STORAGE            0.05       87
TOWER1-ROOF-STORAGE            0.075      195.75
TOWER1-ROOF-STORAGE            0.1        348
TOWER1-ROOF-STORAGE            0.125      543.75
TOWER1-ROOF-STORAGE            0.15       783

TOWER2-ROOF1-STORAGE Storage    0          0
TOWER2-ROOF1-STORAGE            0.025      8
TOWER2-ROOF1-STORAGE            0.05       33
TOWER2-ROOF1-STORAGE            0.075      74
TOWER2-ROOF1-STORAGE            0.1        132
TOWER2-ROOF1-STORAGE            0.125      206
TOWER2-ROOF1-STORAGE            0.15       296

TOWER2-ROOF2-STORAGE Storage    0          0
TOWER2-ROOF2-STORAGE            0.025      2
TOWER2-ROOF2-STORAGE            0.05       7
TOWER2-ROOF2-STORAGE            0.075      16
TOWER2-ROOF2-STORAGE            0.1        29
TOWER2-ROOF2-STORAGE            0.125      46
TOWER2-ROOF2-STORAGE            0.15       66

TOWER2-ROOF3-STORAGE Storage    0          0
TOWER2-ROOF3-STORAGE            0.025      2
TOWER2-ROOF3-STORAGE            0.05       7
TOWER2-ROOF3-STORAGE            0.075      16
TOWER2-ROOF3-STORAGE            0.1        29
TOWER2-ROOF3-STORAGE            0.125      46
TOWER2-ROOF3-STORAGE            0.15       66

TOWER3-ROOF1-STORAGE Storage    0          0
TOWER3-ROOF1-STORAGE            0.025      6
TOWER3-ROOF1-STORAGE            0.05       25
TOWER3-ROOF1-STORAGE            0.075      57
TOWER3-ROOF1-STORAGE            0.1        102
TOWER3-ROOF1-STORAGE            0.125      159
TOWER3-ROOF1-STORAGE            0.15       228

TOWER3-ROOF2-STORAGE Storage    0          0
TOWER3-ROOF2-STORAGE            0.025      2
TOWER3-ROOF2-STORAGE            0.05       8
TOWER3-ROOF2-STORAGE            0.075      19
TOWER3-ROOF2-STORAGE            0.1        33
TOWER3-ROOF2-STORAGE            0.125      52
TOWER3-ROOF2-STORAGE            0.15       75

TOWER3-ROOF3-STORAGE Storage    0          0
TOWER3-ROOF3-STORAGE            0.025      2
TOWER3-ROOF3-STORAGE            0.05       9
TOWER3-ROOF3-STORAGE            0.075      20
TOWER3-ROOF3-STORAGE            0.1        35
TOWER3-ROOF3-STORAGE            0.125      54
TOWER3-ROOF3-STORAGE            0.15       78

TOWER4-HIGHROOF-STORAGE Storage    0          0
TOWER4-HIGHROOF-STORAGE            0.025      18
TOWER4-HIGHROOF-STORAGE            0.05       71
TOWER4-HIGHROOF-STORAGE            0.075      160
TOWER4-HIGHROOF-STORAGE            0.1        284
TOWER4-HIGHROOF-STORAGE            0.125      444
TOWER4-HIGHROOF-STORAGE            0.15       640

;PODIUM ROOF WITH 50MM DEPTH OF BALLAST STONE AT VR=0.50
;ROOF AREA AT 150MM DEPTH  =1029M2
TOWER5&6-PODIUM-BALLAST-ROOF Storage    0          0
TOWER5&6-PODIUM-BALLAST-ROOF            0.025      8.4
TOWER5&6-PODIUM-BALLAST-ROOF            0.05       33.5
TOWER5&6-PODIUM-BALLAST-ROOF            0.075      188.4
TOWER5&6-PODIUM-BALLAST-ROOF            0.1        335
TOWER5&6-PODIUM-BALLAST-ROOF            0.125      523
TOWER5&6-PODIUM-BALLAST-ROOF            0.15       754

TOWER5&6-PODIUM-ROOF Storage    0          0
TOWER5&6-PODIUM-ROOF            0.025      29
TOWER5&6-PODIUM-ROOF            0.05       114
TOWER5&6-PODIUM-ROOF            0.075      257
TOWER5&6-PODIUM-ROOF            0.1        456
TOWER5&6-PODIUM-ROOF            0.125      713
TOWER5&6-PODIUM-ROOF            0.15       1026

TOWER5A-ROOF-STORAGE Storage    0          0
TOWER5A-ROOF-STORAGE            0.025      12
TOWER5A-ROOF-STORAGE            0.05       49
TOWER5A-ROOF-STORAGE            0.075      110
TOWER5A-ROOF-STORAGE            0.1        196
TOWER5A-ROOF-STORAGE            0.125      307
TOWER5A-ROOF-STORAGE            0.15       442

TOWER5-ROOF-STORAGE Storage    0          0
TOWER5-ROOF-STORAGE            0.025      14
TOWER5-ROOF-STORAGE            0.05       57
TOWER5-ROOF-STORAGE            0.075      127
TOWER5-ROOF-STORAGE            0.1        226
TOWER5-ROOF-STORAGE            0.125      353
TOWER5-ROOF-STORAGE            0.15       509
```

```
[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Rainfall (mm/hr)
Chicago_3h_100yr 09/01/2018 00:00:00   5.33
Chicago_3h_100yr 09/01/2018 00:10:00   6.365
Chicago_3h_100yr 09/01/2018 00:20:00   7.963
Chicago_3h_100yr 09/01/2018 00:30:00   10.778
Chicago_3h_100yr 09/01/2018 00:40:00   17.106
Chicago_3h_100yr 09/01/2018 00:50:00   44.599
Chicago_3h_100yr 09/01/2018 01:00:00   178.25
Chicago_3h_100yr 09/01/2018 01:10:00   50.968
Chicago_3h_100yr 09/01/2018 01:20:00   26.118
Chicago_3h_100yr 09/01/2018 01:30:00   17.541
Chicago_3h_100yr 09/01/2018 01:40:00   13.254
Chicago_3h_100yr 09/01/2018 01:50:00   10.693
Chicago_3h_100yr 09/01/2018 02:00:00   8.992
Chicago_3h_100yr 09/01/2018 02:10:00   7.78
Chicago_3h_100yr 09/01/2018 02:20:00   6.871
Chicago_3h_100yr 09/01/2018 02:30:00   6.164
Chicago_3h_100yr 09/01/2018 02:40:00   5.597
Chicago_3h_100yr 09/01/2018 02:50:00   5.133
Chicago_3h_100yr 09/01/2018 03:00:00   0

;Rainfall (mm/hr)
Chicago_3h_5yr   01/25/2019 00:00:00   3.273
Chicago_3h_5yr   01/25/2019 00:10:00   3.953
Chicago_3h_5yr   01/25/2019 00:20:00   5.041
Chicago_3h_5yr   01/25/2019 00:30:00   7.081
Chicago_3h_5yr   01/25/2019 00:40:00   12.386
Chicago_3h_5yr   01/25/2019 00:50:00   34.157
Chicago_3h_5yr   01/25/2019 01:00:00   104.193
Chicago_3h_5yr   01/25/2019 01:10:00   23.398
Chicago_3h_5yr   01/25/2019 01:20:00   13.754
Chicago_3h_5yr   01/25/2019 01:30:00   9.766
Chicago_3h_5yr   01/25/2019 01:40:00   7.605
Chicago_3h_5yr   01/25/2019 01:50:00   6.252
Chicago_3h_5yr   01/25/2019 02:00:00   5.325
Chicago_3h_5yr   01/25/2019 02:10:00   4.65
Chicago_3h_5yr   01/25/2019 02:20:00   4.136
Chicago_3h_5yr   01/25/2019 02:30:00   3.731
Chicago_3h_5yr   01/25/2019 02:40:00   3.404
Chicago_3h_5yr   01/25/2019 02:50:00   3.133
Chicago_3h_5yr   01/25/2019 03:00:00   0

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]
Subcatch   S67              new
Subcatch   S77              new
Subcatch   S78              new
Subcatch   S79              new
Subcatch   S80              new
Subcatch   S81              new
Subcatch   S82              new
Node       202B             STORM_MH
Node       204              STORM_MH
Node       205              STORM_MH
Node       206              STORM_MH
Node       207              STORM_MH
Node       208              STORM_MH
Node       209              STORM_MH
Node       210              STORM_MH
Node       CB04             CB
Node       CB04-MAJ         MAJOR_SYSTEM
Node       CB05             CB
Node       CB05-MAJ         MAJOR_SYSTEM
Node       CB07             CB
Node       CB08             CB
Node       CB09             CB
Node       CB10             CB
Node       CB10-MAJ         MAJOR_SYSTEM
Node       CB11             CB
Node       IN138478         CB
Node       IN141918         CB
Node       IN141918-MAJ     MAJOR_SYSTEM
Node       IN141919         CB
Node       IN141919-MAJ     MAJOR_SYSTEM
Node       MHST54409        STORM_MH
Node       MHST54410        STORM_MH
Node       MHST54411        STORM_MH
Node       MHST54412        STORM_MH
Node       MHST54413        STORM_MH
Node       MHST54414        STORM_MH
Node       MHST54415        STORM_MH
Node       MHST54416        STORM_MH
Node       MHST76833        STORM_MH
Node       MHST76834        STORM_MH
Node       MHST76835        STORM_MH
Node       MHST78305        STORM_MH
Node       MHST78307        STORM_MH
Node       MHST78309        STORM_MH
Node       POND-OUTLET      HEADWALL
Node       T01              TEE
Node       T02              TEE
Node       T03              TEE
Node       T04              TEE
Node       T05              TEE
Node       T06              TEE
Node       T07              TEE
Node       T08              TEE
Node       T09              TEE
Node       T10              TEE
Node       TOWER1-CONN      BLDG_CONN
Node       TOWER2-CONN-1    BLDG_CONN
Node       TOWER2-CONN-2    BLDG_CONN
Node       TOWER2-CONN-3    BLDG_CONN
Node       TOWER3-CONN-1    BLDG_CONN
Node       TOWER3-CONN-2    BLDG_CONN
Node       TOWER4-CONN-1    BLDG_CONN
Node       TOWER4-CONN-2    BLDG_CONN
Node       TOWER5A5B-CONN   BLDG_CONN
Node       T4-ROOF2-NOSTORAGE AMMENITY
Link       C01              MAJOR_SYSTEM
Link       C01_1            MAJOR_SYSTEM
Link       C01_5            MAJOR_SYSTEM
Link       C02              STORM-SEWER
Link       C03              STORM
Link       C030             CB-LEAD
Link       C04              CB-LEAD
Link       C05              STORM-LATERAL
Link       C05.1            STORM-SEWER
Link       C05.2            STORM-SEWER
Link       C06              CB-LEAD
Link       C060             CB-LEAD
Link       C07              CB-LEAD
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Link       C08              STORM-SEWER
Link       C080             CB-LEAD
Link       C09              CB-LEAD
Link       C10              CB-LEAD
Link       C11              MAJOR_SYSTEM
Link       C12              STORM-SEWER
Link       C13              STORM
Link       C14              STORM-SEWER
Link       C15              STORM
Link       C16              STORM-LATERAL
Link       C17              MAJOR_SYSTEM
Link       C18              STORM
Link       C19              MAJOR_SYSTEM
Link       C20              MAJOR_SYSTEM
Link       C21              MAJOR_SYSTEM
Link       C22              CB-LEAD
Link       C23              MAJOR_SYSTEM
Link       C24              CB-LEAD
Link       C25              STORM
Link       C26              MAJOR_SYSTEM
Link       C27              MAJOR_SYSTEM
Link       C28              CB-LEAD
Link       C37              STORM-SEWER
Link       OL4              MAJOR_SYSTEM
Link       STM104099        STORM-SEWER
Link       STM104100        STORM-SEWER
Link       STM104102_1      STORM-SEWER
Link       STM104102_3      STORM-SEWER
Link       STM104102_4      STORM-SEWER
Link       STM104104        STORM-SEWER
Link       STM105994_2      STORM-SEWER
Link       STM105994_5      STORM-SEWER
Link       STM105995_1      STORM-SEWER
Link       STM105995_2      STORM-SEWER
Link       STM105997        STORM-LATERAL
Link       STM106002-1_1    STORM-SEWER
Link       STM106002-1_2    STORM-SEWER
Link       STM106002-2      STORM-SEWER
Link       STM65382         STORM-SEWER
Link       STM65383         STORM-SEWER
Link       STM65384         STORM-SEWER
Link       STM65386         STORM-SEWER
Link       STM65387         STORM-SEWER
Link       STM65388         STORM-SEWER
Link       STM65389         STORM-SEWER
Link       STM65390         STORM-SEWER
Link       STMH65384        STORM-SEWER
Link       STM-LAT-T1       STORM-LATERAL
Link       STM-LAT-T2(1)    STORM-LATERAL
Link       STM-LAT-T2(2)    STORM-LATERAL
Link       STM-LAT-T3       STORM-LATERAL
Link       STM-LAT-T4       STORM-LATERAL
Link       SWM-CONTROL      DUMMY
Link       CB4-IC           CB-INLET_CONTROL
Link       CB5-IC           CB-INLET_CONTROL
Link       CB9-IC           CB-INLET_CONTROL
Link       IN141918-IC      CB-INLET_CONTROL
Link       IN141919-IC      CB-INLET_CONTROL
Link       SP01-OUTLET      AREA_DRAINS
Link       SP02-OUTLET      AREA_DRAINS
Link       SP04-OUTLET      AREA_DRAINS
Link       SP05-OUTLET      AREA_DRAINS
Link       SP06-OUTLET      AREA_DRAINS
Link       SP07-OUTLET      AREA_DRAINS
Link       SP09-OUTLET      AREA_DRAINS
Link       SP10-OUTLET      AREA_DRAINS
Link       SP11-OUTLET      AREA_DRAINS
Link       SP12-OUTLET      AREA_DRAINS
Link       SP13-OUTLET      AREA_DRAINS
Link       SP14-OUTLET      AREA_DRAINS
Link       SP15-OUTLET      AREA_DRAINS
Link       SP16-OUTLET      AREA_DRAINS
Link       SP17-OUTLET      AREA_DRAINS
Link       SP18-OUTLET      AREA_DRAINS
Link       SP19-OUTLET      AREA_DRAINS
Link       SP20-OUTLET      AREA_DRAINS
Link       SP21-OUTLET      AREA_DRAINS
Link       SP22-OUTLET      AREA_DRAINS
Link       SP23-OUTLET      AREA_DRAINS
Link       SP24-OUTLET      AREA_DRAINS
Link       SP25-OUTLET      AREA_DRAINS
Link       SP26-OUTLET      AREA_DRAINS
Link       SP27-OUTLET      AREA_DRAINS
Link       SP28-OUTLET      AREA_DRAINS
Link       SP29-OUTLET      AREA_DRAINS
Link       SP30-OUTLET      AREA_DRAINS
Link       SP31,SP32-OUTLET AREA_DRAINS
Link       SP35-OUTLET      AREA_DRAINS
Link       SP36-OULTET      AREA_DRAINS
Link       T1-ROOF-OUTLET   ROOF_DRAINS
Link       T2-ROOF-1-OUTLET ROOF_DRAINS
Link       T2-ROOF-2-OUTLET ROOF_DRAINS
Link       T2-ROOF-3-OUTLET ROOF_DRAINS
Link       T2-ROOF-4-OUTLET ROOF_DRAINS
Link       T2-ROOF-5-OUTLET ROOF_DRAINS
Link       T3-ROOF-1-OUTLET ROOF_DRAINS
Link       T3-ROOF-2-OUTLET ROOF_DRAINS
Link       T3-ROOF-3-OUTLET ROOF_DRAINS
Link       T3-ROOF-4-OUTLET ROOF_DRAINS
Link       T3-ROOF-5-OUTLET ROOF_DRAINS
Link       T4-AMENITYROOF-OUTLET ROOF_DRAINS
Link       T4-HIGHROOF-OUTLET ROOF_DRAINS
Link       T5&6_Podium-ROOF-OUTLET ROOF_DRAINS
Link       T5_AMMENITY_OUTLET_1 ROOF_DRAINS
Link       T5_AMMENITY_OUTLET_2 ROOF_DRAINS
Link       T5-ROOF_HIGH_OUTLET ROOF_DRAINS
Link       T6_AMMENITY_OUTLET_1 ROOF_DRAINS
Link       T6_AMMENITY_OUTLET_2 ROOF_DRAINS
Link       T6-ROOF-HIGH-OUTLET ROOF_DRAINS

[MAP]
DIMENSIONS       384457.4448      5040256.38855    384736.1892      5040693.78045
UNITS            Meters

[COORDINATES]
;;Node            X-Coord          Y-Coord
;;--------------- ---------------- ----------------
202B               384553.8         5040514.877
204                384589.733       5040559.131
205                384620.84        5040595.658
206                384636.875       5040614.068
207                384695.766       5040650.794
208                384674.478       5040503.308
209                384682.246       5040535.037
210                384540.692       5040397.51
CB04               384680.184       5040507.23
CB04-MAJ           384680.334       5040507.942
CB05               384684.167       5040524.387
CB05-MAJ           384684.278       5040524.835
CB07               384706.664       5040656.913
CB08               384659.064       5040630.982
CB09               384593.545       5040574.092
CB10               384644.18        5040391.559
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CB10-MAJ          384643.852       5040392.138
CB11              384649.73        5040429.302
DITCH-OUT         384571.76        5040328.427
IN138478          384652.012       5040397.821
IN141918          384665.298       5040445.722
IN141918-MAJ      384665.625       5040446.904
IN141919          384673.818       5040479.669
IN141919-MAJ      384673.973       5040480.262
MHST54409         384562.156       5040437.704
MHST54410         384544.178       5040435.993
MHST54411         384529.525       5040404.741
MHST54412         384527.271       5040411.33
MHST54413         384526.836       5040398.635
MHST54414         384483.282       5040358.42
MHST54415         384525.645       5040474.481
MHST54416         384549.052       5040508.534
MHST76833         384621.04        5040403.181
MHST76834         384655.057       5040450.479
MHST76835         384634.052       5040420.947
MHST78305         384666.48        5040470.381
MHST78307         384643.735       5040390.273
MHST78309         384588.048       5040553.984
POND-OUTLET       384528.838       5040431.857
T01               384648.172       5040440.814
T02               384643.206       5040433.832
T03               384655.682       5040451.579
T04               384667.593       5040474.972
T05               384669.027       5040480.873
T06               384675.703       5040508.351
T07               384679.856       5040525.457
T08               384552.566       5040513.244
T09               384598.749       5040569.718
T10               384660.457       5040628.774
TOWER1-CONN       384551.249       5040506.768
TOWER2-CONN-1     384557.469       5040509.276
TOWER2-CONN-2     384589.721       5040552.743
TOWER2-CONN-3     384621.978       5040475.227
TOWER3-CONN-1     384594.231       5040555.771
TOWER3-CONN-2     384623.406       5040593.746
TOWER4-CONN-1     384637.569       5040613.366
TOWER4-CONN-2     384696.303       5040649.947
TOWER5A5B-CONN    384541.692       5040396.756
OUTFALL_174       384692.691       5040436.481
OUTFALL_OTT_RIVER_1 384470.115        5040364.112
OUTFALL_OTT_RIVER_2 384656.969        5040656.735
OUTFALL_RAVINE    384560.531       5040330.463
OUTFALL_SWMPOND   384495.258       5040448.411
SP01              384596.916       5040454.734
SP02              384612.546       5040441.612
SP03              384661.082       5040431.763
SP04              384568.091       5040508.491
SP05              384580.332       5040499.494
SP06              384614.435       5040487.655
SP07              384624.079       5040500.053
SP08              384659.122       5040474.647
SP09              384604.133       5040532.048
SP10              384614.072       5040523.178
SP11              384592.814       5040540.511
SP12              384625.951       5040516.696
SP13              384602.032       5040555.676
SP14              384613.479       5040547.75
SP15              384623.729       5040539.768
SP16              384635.224       5040531.76
SP17              384644.231       5040524.812
SP18              384653.75        5040536.635
SP19              384661.958       5040525.001
SP20              384664.176       5040550.376
SP21              384686.165       5040561.317
SP22              384675.565       5040569.185
SP23              384641.936       5040577.009
SP24              384623.584       5040583.153
SP25              384638.315       5040604.686
SP26              384654.776       5040603.033
SP27              384661.379       5040621.601
SP28              384684.634       5040638.126
SP29              384699.613       5040645.812
SP30              384709.432       5040630.516
SP31,SP32         384609.562       5040575.665
SP35              384563.168       5040362.271
SP36              384627.568       5040352.206
SP99              384581.38        5040318.056
SWM-POND          384524.288       5040441.783
T1-ROOF-STORAGE   384547.224       5040474.044
T2-ROOF1-STORAGE  384595.897       5040511.139
T2-ROOF2-STORAGE  384598.825       5040519.96
T2-ROOF3-STORAGE  384588.955       5040504.558
T2-ROOF-4-NOSTORAGE 384583.475       5040520.552
T2-ROOF-5-NOSTORAGE 384576.42        5040525.143
T3-ROOF-1-STORAGE 384633.594       5040557.583
T3-ROOF-2-STORAGE 384642.363       5040562.615
T3-ROOF-3-STORAGE 384630.763       5040547.303
T3-ROOF-4-NOSTORAGE 384618.535       5040569.222
T3-ROOF-5-NOSTORAGE 384612.038       5040573.942
T4-ROOF1-STORAGE  384691.179       5040615.583
T4-ROOF2-NOSTORAGE 384686.575       5040629.775
T5A5B-ROOF-STORAGE 384592.559       5040384.207
T5A-ROOF-STORAGE  384595.446       5040332.804
T5-ROOF_AMMENITY_2 384566.974       5040411.288
T5-ROOF-AMMENITY_1 384555.995       5040394.716
T5-ROOF-STORAGE   384567.492       5040397.02
T6-ROOF_AMMENITY_1 384583.913       5040331.568
T6-ROOF_AMMENITY_2 384595.349       5040348.592

[VERTICES]
;;Link           X-Coord           Y-Coord
;;-------------- ----------------- ----------------
C01               384679.753       5040507.656
C01               384673.354       5040480.741
C01_1             384644.466       5040380.181
C01_1             384639.198       5040369.328
C01_1             384618.49        5040325.69
C01_1             384612.307       5040317.498
C01_1             384605.083       5040307.339
C01_1             384604.011       5040306.342
C01_1             384603.221       5040305.69
C01_1             384602.088       5040305.14
C01_1             384600.233       5040304.934
C01_1             384599.031       5040305.174
C01_1             384597.828       5040305.698
C01_1             384581.494       5040317.91
C01_5             384580.052       5040319.765
C01_5             384577.888       5040323.938
C01_5             384576.805       5040325.381
C01_5             384573.25        5040327.957
C060              384660.484       5040476.16
C060              384661.31        5040476.423
C11               384519.179       5040443.48
C11               384514.091       5040445.504
C11               384511.893       5040445.966
C11               384506.978       5040446.892
C11               384501.774       5040447.759
C17               384684.037       5040524.633
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C17	384679.98	5040508.448
C19	384673.325	5040480.009
C19	384665.281	5040447.717
C20	384645.859	5040393.41
C20	384647.042	5040394.593
C20	384648.226	5040395.908
C20	384650.024	5040399.061
C20	384651.149	5040402.303
C20	384651.776	5040404.814
C20	384652.381	5040407.168
C20	384660.519	5040431.622
C23	384610.348	5040478.629
C27	384686.609	5040559.718
C27	384687.216	5040558.203
C27	384687.822	5040557.058
C27	384688.361	5040556.182
C27	384689.034	5040555.138
C27	384689.607	5040553.993
C27	384689.91	5040553.05
C27	384690.179	5040551.366
C27	384690.247	5040550.153
OL4	384662.256	5040431.221
OL4	384662.506	5040430.497
STM65383	384520.752	5040470.064
STM65383	384520.895	5040466.848
STM65390	384536.953	5040439.393
SP01-OUTLET	384605.778	5040466.382
SP01-OUTLET	384605.574	5040466.956
SP01-OUTLET	384552.014	5040506.969
SP02-OUTLET	384621.944	5040454.314
SP02-OUTLET	384621.917	5040455.625
SP02-OUTLET	384552.358	5040507.449
SP04-OUTLET	384565.365	5040504.4
SP04-OUTLET	384564.742	5040504.216
SP04-OUTLET	384558.104	5040509.318
SP05-OUTLET	384576.956	5040494.884
SP05-OUTLET	384576.404	5040494.939
SP06-OUTLET	384614.512	5040487.085
SP06-OUTLET	384608.57	5040479.161
SP06-OUTLET	384608.033	5040479.039
SP06-OUTLET	384591.95	5040490.947
SP06-OUTLET	384590.99	5040490.858
SP06-OUTLET	384587.866	5040486.585
SP06-OUTLET	384587.301	5040486.492
SP06-OUTLET	384557.519	5040508.81
SP07-OUTLET	384623.966	5040498.972
SP07-OUTLET	384609.227	5040478.864
SP07-OUTLET	384607.994	5040478.479
SP07-OUTLET	384591.661	5040490.521
SP07-OUTLET	384591.051	5040490.445
SP07-OUTLET	384588.063	5040486.22
SP07-OUTLET	384587.442	5040486.038
SP07-OUTLET	384557.335	5040508.566
SP09-OUTLET	384609.407	5040539.045
SP09-OUTLET	384590.974	5040552.8
SP10-OUTLET	384620.403	5040531.475
SP10-OUTLET	384591.278	5040553.335
SP11-OUTLET	384592.714	5040540.935
SP11-OUTLET	384592.624	5040541.528
SP11-OUTLET	384596.847	5040547.383
SP12-OUTLET	384631.005	5040524.356
SP12-OUTLET	384591.09	5040553.966
SP13-OUTLET	384600.201	5040553.256
SP13-OUTLET	384596.275	5040555.923
SP13-OUTLET	384595.62	5040555.522
SP13-OUTLET	384594.832	5040555.964
SP14-OUTLET	384611.348	5040544.87
SP14-OUTLET	384596.214	5040555.633
SP14-OUTLET	384595.677	5040555.189
SP14-OUTLET	384594.755	5040555.733
SP15-OUTLET	384621.553	5040536.483
SP15-OUTLET	384596.037	5040554.85
SP15-OUTLET	384594.758	5040555.526
SP16-OUTLET	384631.854	5040527.549
SP16-OUTLET	384594.242	5040554.966
SP17-OUTLET	384641.017	5040520.075
SP17-OUTLET	384594.007	5040554.44
SP18-OUTLET	384642.171	5040518.218
SP18-OUTLET	384593.713	5040554.023
SP19-OUTLET	384651.707	5040510.255
SP19-OUTLET	384593.246	5040553.854
SP20-OUTLET	384667.771	5040558.697
SP20-OUTLET	384669.943	5040561.639
SP20-OUTLET	384628.245	5040592.919
SP20-OUTLET	384627.485	5040592.897
SP20-OUTLET	384625.201	5040594.454
SP21-OUTLET	384680.967	5040560.813
SP21-OUTLET	384670.981	5040563.353
SP21-OUTLET	384660.459	5040571.371
SP21-OUTLET	384629.303	5040594.557
SP21-OUTLET	384633.31	5040600.117
SP21-OUTLET	384630.509	5040602.096
SP21-OUTLET	384636.935	5040610.714
SP22-OUTLET	384670.698	5040564.087
SP22-OUTLET	384630.154	5040594.787
SP22-OUTLET	384634.15	5040599.991
SP22-OUTLET	384631.283	5040602.082
SP22-OUTLET	384638.376	5040611.821
SP23-OUTLET	384643.616	5040579.289
SP23-OUTLET	384624.742	5040593.323
SP24-OUTLET	384628.085	5040589.699
SP24-OUTLET	384623.907	5040592.746
SP25-OUTLET	384638.952	5040612.02
SP26-OUTLET	384639.809	5040612.532
SP27-OUTLET	384658.854	5040625.049
SP27-OUTLET	384639.785	5040613.489
SP28-OUTLET	384696.051	5040648.597
SP29-OUTLET	384696.387	5040648.165
SP30-OUTLET	384712.95	5040644.556
SP30-OUTLET	384696.943	5040648.667
SP31,SP32-OUTLET	384619.941	5040590.002
SP31,SP32-OUTLET	384621.843	5040588.694
SP31,SP32-OUTLET	384624.088	5040591.939
SP31,SP32-OUTLET	384623.619	5040592.272
SP35-OUTLET	384555.879	5040364.418
SP35-OUTLET	384541.837	5040395.002
SP36-OULTET	384635.178	5040368.798
SP36-OULTET	384560.928	5040420.136
SP36-OULTET	384543.684	5040397.402
T1-ROOF-OUTLET	384563.862	5040496.498
T1-ROOF-OUTLET	384563.791	5040497.52
T2-ROOF-1-OUTLET	384586.64	5040498.757
T2-ROOF-1-OUTLET	384566.473	5040513.738
T2-ROOF-1-OUTLET	384564.799	5040513.418
T2-ROOF-1-OUTLET	384560.831	5040508.044
T2-ROOF-1-OUTLET	384560.443	5040508.031
T2-ROOF-1-OUTLET	384558.306	5040509.662
T2-ROOF-2-OUTLET	384602.311	5040524.86
T2-ROOF-2-OUTLET	384602.228	5040526.038
T2-ROOF-2-OUTLET	384588.714	5040536.18
T2-ROOF-2-OUTLET	384588.667	5040537.001
T2-ROOF-2-OUTLET	384596.115	5040547.003

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T2-ROOF-2-OUTLET 384589.76        5040551.822
T2-ROOF-3-OUTLET 384585.584       5040499.878
T2-ROOF-3-OUTLET 384566.55        5040513.992
T2-ROOF-3-OUTLET 384564.692       5040513.621
T2-ROOF-3-OUTLET 384560.621       5040508.265
T2-ROOF-3-OUTLET 384558.424       5040509.89
T2-ROOF-4-OUTLET 384591.612       5040533.445
T2-ROOF-4-OUTLET 384588.379       5040536.107
T2-ROOF-4-OUTLET 384588.284       5040537.153
T2-ROOF-4-OUTLET 384595.319       5040546.628
T2-ROOF-4-OUTLET 384589.34        5040551.116
T2-ROOF-5-OUTLET 384567.933       5040513.253
T2-ROOF-5-OUTLET 384566.519       5040514.255
T2-ROOF-5-OUTLET 384564.638       5040513.95
T2-ROOF-5-OUTLET 384560.513       5040508.57
T2-ROOF-5-OUTLET 384558.466       5040510.037
T3-ROOF-1-OUTLET 384646.873       5040577.487
T3-ROOF-1-OUTLET 384624.907       5040593.762
T3-ROOF-2-OUTLET 384651.218       5040575.11
T3-ROOF-2-OUTLET 384628.178       5040592.613
T3-ROOF-2-OUTLET 384627.246       5040592.656
T3-ROOF-2-OUTLET 384625.047       5040594.257
T3-ROOF-3-OUTLET 384622.553       5040535.146
T3-ROOF-3-OUTLET 384596.138       5040554.333
T3-ROOF-4-OUTLET 384631.581       5040587.811
T3-ROOF-5-OUTLET 384624.968       5040591.602
T3-ROOF-5-OUTLET 384623.792       5040592.525
T4-AMENITYROOF-OUTLET 384700.566       5040629.903
T4-AMENITYROOF-OUTLET 384704.604       5040645.76
T4-AMENITYROOF-OUTLET 384696.54        5040648.224
T4-HIGHROOF-OUTLET 384699.671       5040623.206
T4-HIGHROOF-OUTLET 384705.317       5040646.015
T4-HIGHROOF-OUTLET 384696.713       5040648.27
T5&6_Podium-ROOF-OUTLET 384597.853       5040391.997
T5&6_Podium-ROOF-OUTLET 384561.502       5040417.805
T5&6_Podium-ROOF-OUTLET 384544.752       5040396.498
T5_AMMENITY_OUTLET_1 384545.287       5040394.461
T5_AMMENITY_OUTLET_2 384561.723       5040415.517
T5_AMMENITY_OUTLET_2 384545.166       5040396.07
T5-ROOF_HIGH_OUTLET 384555.366       5040406.251
T5-ROOF_HIGH_OUTLET 384545.75        5040395.103
T6_AMMENITY_OUTLET_1 384584.109       5040337.391
T6_AMMENITY_OUTLET_1 384600.11        5040359.673
T6_AMMENITY_OUTLET_1 384597.529       5040370.922
T6_AMMENITY_OUTLET_1 384565.763       5040393.207
T6_AMMENITY_OUTLET_1 384546.377       5040391.685
T6_AMMENITY_OUTLET_2 384602.075       5040359.698
T6_AMMENITY_OUTLET_2 384598.47        5040371.631
T6_AMMENITY_OUTLET_2 384565.859       5040394.691
T6_AMMENITY_OUTLET_2 384546.513       5040393.221
T6-ROOF-HIGH-OUTLET 384604.137       5040344.33
T6-ROOF-HIGH-OUTLET 384601.79        5040390.542
T6-ROOF-HIGH-OUTLET 384561.112       5040419.02
T6-ROOF-HIGH-OUTLET 384544.591       5040397.01

[POLYGONS]
;;Subcatchment   X-Coord          Y-Coord
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S01              384607.197       5040563.842
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S19	384606.155	5040533.441
S19	384605.943	5040533.588
S19	384605.725	5040533.727
S19	384605.503	5040533.859
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S19	384604.812	5040534.206
S19	384604.574	5040534.306
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S20	384594.795	5040486.006
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S21	384596.795	5040427.734
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S26	384591.075	5040484.292
S26	384590.988	5040484.206
S26	384590.904	5040484.117
S26	384590.823	5040484.026
S26	384590.746	5040483.932
S26	384590.672	5040483.835
S26	384588.961	5040481.518
S26	384584.026	5040474.878
S26	384582.491	5040476.101
S26	384582.421	5040476.869

S26	384582.325	5040477.361
S26	384582.264	5040477.792
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S26	384581.716	5040479.666
S26	384581.554	5040480.137
S26	384581.28	5040480.742
S26	384581.083	5040481.178
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S26	384579.298	5040483.937
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S26	384577.925	5040485.357
S26	384577.56	5040485.654
S26	384577.213	5040485.944
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S26	384576.444	5040486.494
S26	384576.041	5040486.76
S26	384575.634	5040487.023
S26	384575.227	5040487.23
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S30	384602.996	5040423.571
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S39	384571.243	5040488.632
S39	384571.709	5040488.537
S39	384572.171	5040488.427
S39	384572.629	5040488.3
S39	384573.083	5040488.158
S39	384573.532	5040488
S39	384573.975	5040487.827
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S39	384576.806	5040486.251
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S39	384578.933	5040484.337
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S39	384579.884	5040483.188
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S39	384580.921	5040481.537
S39	384581.083	5040481.178
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S39	384581.554	5040480.137

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S39	384590.823	5040484.026
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S42	384625.713	5040402.403
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S44	384656.933	5040442.427
S44	384656.668	5040442.326
S44	384656.341	5040442.281
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S44	384655.14	5040442.8
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S44	384629.728	5040451.478
S44	384635.031	5040458.574
S44	384631.167	5040461.445
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S44	384631.573	5040462.639
S44	384625.873	5040466.873
S44	384625.396	5040466.23
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S44	384626.663	5040476.634
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S44	384658.545	5040452.783
S44	384659.226	5040451.432
S44	384659.389	5040450.777
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S45	384658.739	5040446.873
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S45	384659.225	5040468.384
S45	384663.459	5040474.083
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S46	384688.126	5040637.982
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S47	384683.838	5040589.126
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S61	384630.681	5040534.312
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S61	384644.897	5040536.505
S61	384644.111	5040535.205
S61	384643.685	5040533.443
S61	384642.987	5040531.864
S61	384641.954	5040530.375
S61	384641.073	5040529.16
S61	384640.131	5040528.34
S61	384637.367	5040526.275
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S62	384658.774	5040573.991
S62	384660.042	5040575.2
S62	384661.394	5040576.182
S62	384663.806	5040579.511
S62	384665.353	5040583.494
S62	384663.911	5040585.484
S62	384678.481	5040586.293
S62	384679.514	5040586.35
S62	384679.96	5040588.216
S62	384683.422	5040587.388
S62	384683.876	5040587.264
S62	384683.5	5040585.708
S62	384680.904	5040575.168
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S62	384679.657	5040566.572
S62	384677.8	5040557.326
S63	384677.8	5040557.326
S63	384679.657	5040566.572
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S63	384692.913	5040565.177
S63	384692.237	5040564.123
S63	384692.088	5040563.184
S63	384692.214	5040562.405
S63	384692.409	5040561.443
S63	384692.533	5040560.679
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S74	384694.727	5040634.246
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S75	384664.926	5040517.483
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S75	384666.921	5040516.85

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S82             384605.919      5040335.947

[SYMBOLS]
;;Gage           X-Coord          Y-Coord
;;-------------- ---------------- ----------------

[PROFILES]
;;Name           Links
;;-------------- ----------
"Node 209 to Node SWM-POND (South)" C05.2 C05.1 C08 C14 STM105994_5
"Node 209 to Node SWM-POND (South)" STM105994_2 STM105995_1 STM105995_2 STM104102_1
STM104102_3
"Node 209 to Node SWM-POND (South)" STM104102_4 STM104104 STM104100 STM65389 STM653
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"Node CB06 to Node Outfall-OttawaRiver1" C08 C05.2 C05.1 STM105994_1 STM105994_3
"Node CB06 to Node Outfall-OttawaRiver1" STM105994_5 STM105994_2 STM105995_1
STM105995_2 STM104102_1
"Node CB06 to Node Outfall-OttawaRiver1" STM104102_3 STM104102_4 STM104104
STM104100 STM65389
"Node CB06 to Node Outfall-OttawaRiver1" STM65390 SWM-CONTROL STMH65384 STM65384
STM65386
"Node CB06 to Node Outfall-OttawaRiver1" STM65387
"Node CB07 to Node SWM-POND (nortM storm)" C04 C15 C03 C02 C25
"Node CB07 to Node SWM-POND (nortM storm)" C13 C18 STM106002-2 STM106002-1_1
STM106002-1_2
"Node CB07 to Node SWM-POND (nortM storm)" STM65382 STM65383

STATUS

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

Based on Siteplan Rev G (2019.07.10)
Recieved from NEUF on July 11, 2019
For Siteplan Submission #4 July 19, 2019

WARNING 03: negative offset ignored for Link C06
WARNING 03: negative offset ignored for Link C060
WARNING 03: negative offset ignored for Link C19
WARNING 03: negative offset ignored for Link C20
WARNING 03: negative offset ignored for Link C21
WARNING 04: minimum elevation drop used for Conduit C21
WARNING 03: negative offset ignored for Link C26
WARNING 03: negative offset ignored for Link OL4
WARNING 04: minimum elevation drop used for Conduit OL4
WARNING 03: negative offset ignored for Link SP19-OUTLET
WARNING 02: maximum depth increased for Node CB04-MAJ
WARNING 02: maximum depth increased for Node CB05-MAJ
WARNING 02: maximum depth increased for Node CB10-MAJ
WARNING 02: maximum depth increased for Node DITCH-OUT
WARNING 02: maximum depth increased for Node IN138478
WARNING 02: maximum depth increased for Node IN141918-MAJ
WARNING 02: maximum depth increased for Node IN141919-MAJ

****
Element Count
****
Number of rain gages 2
Number of subcatchments ... 81
Number of nodes 118
Number of links 123
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100yr	Chicago_3h_100yr	INTENSITY	10 min.
Chicago_3h_5yr	Chicago_3h_5yr	INTENSITY	10 min.

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Subcatchment Summary
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Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S01	0.01	24.70	100.00	1.0000	Chicago_3h_100yr	T3-ROOF-5-NOSTORAGE
S02	0.00	9.00	22.20	1.0000	Chicago_3h_100yr	OUTFALL_174
S04	0.03	178.10	6.70	1.0000	Chicago_3h_100yr	OUTFALL_174
S05	0.04	81.20	1.00	0.5000	Chicago_3h_100yr	IN138478
S06	0.01	25.00	100.00	1.0000	Chicago_3h_100yr	T3-ROOF-2-STORAGE
S07	0.14	57.60	73.80	1.0000	Chicago_3h_100yr	SP35
S08	0.06	35.80	36.40	0.5000	Chicago_3h_100yr	DITCH-OUT
S09	0.03	36.80	100.00	1.0000	Chicago_3h_100yr	T3-ROOF-4-NOSTORAGE
S10	0.01	26.00	100.00	1.0000	Chicago_3h_100yr	T3-ROOF-3-STORAGE
S11	0.01	30.70	99.70	1.0000	Chicago_3h_100yr	T2-ROOF3-STORAGE
S12	0.03	36.60	99.90	1.0000	Chicago_3h_100yr	T2-ROOF-4-NOSTORAGE
S13	0.01	32.00	100.00	1.0000	Chicago_3h_100yr	T2-ROOF2-STORAGE
S14	0.04	44.90	100.00	1.0000	Chicago_3h_100yr	T2-ROOF1-STORAGE
S15	0.01	22.00	99.90	1.0000	Chicago_3h_100yr	T2-ROOF-5-NOSTORAGE
S16	0.03	25.80	13.00	1.0000	Chicago_3h_100yr	CB07
S17	0.02	17.10	25.80	1.0000	Chicago_3h_100yr	SP09
S18	0.02	16.80	22.90	1.0000	Chicago_3h_100yr	SP10
S19	0.04	26.00	23.60	1.0000	Chicago_3h_100yr	SP11
S20	0.04	30.30	18.10	1.0000	Chicago_3h_100yr	SP05
S21	0.08	49.50	100.00	1.0000	Chicago_3h_100yr	SP02
S22	0.03	33.30	68.90	1.0000	Chicago_3h_100yr	TOWER1-CONN
S23	0.20	143.20	0.40	1.0000	Chicago_3h_100yr	SWM-POND
S24	0.06	11.00	11.60	1.0000	Chicago_3h_100yr	202B
S25	0.03	11.40	0.00	1.0000	Chicago_3h_100yr	MHST54415
S26	0.07	33.60	10.50	1.0000	Chicago_3h_100yr	SP04
S27	0.06	38.00	81.00	1.0000	Chicago_3h_100yr	SP06
S28	0.03	26.20	71.40	1.0000	Chicago_3h_100yr	SP07
S29	0.04	30.00	23.10	1.0000	Chicago_3h_100yr	SP12
S30	0.15	46.30	22.50	1.0000	Chicago_3h_100yr	CB11
S31	0.04	56.30	99.90	1.0000	Chicago_3h_100yr	SP03
S32	0.02	9.10	99.80	1.0000	Chicago_3h_100yr	TOWER1-CONN
S33	0.03	47.00	17.90	1.0000	Chicago_3h_100yr	SP30
S34	0.05	17.50	75.70	1.0000	Chicago_3h_100yr	SP08
S37	0.09	87.00	100.00	1.0000	Chicago_3h_100yr	T1-ROOF-STORAGE
S38	0.05	59.50	100.00	1.0000	Chicago_3h_100yr	MHST54409
S39	0.10	79.30	19.90	1.0000	Chicago_3h_100yr	TOWER1-CONN
S40	0.11	47.00	64.60	1.0000	Chicago_3h_100yr	SP01
S41	0.21	132.10	84.60	1.0000	Chicago_3h_100yr	MHST54411
S42	0.13	38.50	68.40	1.0000	Chicago_3h_100yr	CB10-MAJ
S43	0.03	7.90	100.00	1.0000	Chicago_3h_100yr	TOWER2-CONN-1
S44	0.05	12.20	0.50	1.0000	Chicago_3h_100yr	MHST76834
S45	0.04	50.10	79.70	1.0000	Chicago_3h_100yr	IN141918-MAJ
S46	0.01	19.00	18.20	1.0000	Chicago_3h_100yr	SP28
S47	0.02	9.30	91.00	1.0000	Chicago_3h_100yr	TOWER4-CONN-2
S48	0.04	15.90	85.00	1.0000	Chicago_3h_100yr	CB05-MAJ
S49	0.08	68.50	59.10	1.0000	Chicago_3h_100yr	SP20
S50	0.02	37.30	33.50	1.0000	Chicago_3h_100yr	SP13
S51	0.02	22.40	39.00	1.0000	Chicago_3h_100yr	SP14
S52	0.02	23.70	29.90	1.0000	Chicago_3h_100yr	SP15
S53	0.06	149.30	0.00	0.5000	Chicago_3h_100yr	OUTFALL_OTT_RIVER_2
S54	0.04	47.30	7.90	1.0000	Chicago_3h_100yr	SP19
S55	0.02	13.70	67.20	1.0000	Chicago_3h_100yr	CB04-MAJ
S56	0.02	38.30	44.00	1.0000	Chicago_3h_100yr	SP18
S57	0.02	18.00	32.50	1.0000	Chicago_3h_100yr	SP36
S58	0.02	16.80	20.80	1.0000	Chicago_3h_100yr	206
S59	0.21	256.70	2.00	0.5000	Chicago_3h_100yr	SP99

S60	0.02	25.20	24.20	1.0000	Chicago_3h_100yr	SP17
S61	0.02	21.70	34.70	1.0000	Chicago_3h_100yr	SP16
S62	0.04	37.70	56.00	1.0000	Chicago_3h_100yr	SP22
S63	0.04	31.80	71.50	1.0000	Chicago_3h_100yr	SP21
S64	0.05	63.00	27.20	1.0000	Chicago_3h_100yr	SP27
S65	0.03	10.00	4.50	1.0000	Chicago_3h_100yr	CB08
S66	0.06	28.70	13.90	1.0000	Chicago_3h_100yr	CB09
S67	0.10	60.80	100.00	1.0000	Chicago_3h_100yr	T5A5B-ROOF-STORAGE
S67_1	0.05	102.20	100.00	1.0000	Chicago_3h_100yr	T4-ROOF2-NOSTORAGE
S67_2	0.08	152.40	100.00	1.0000	Chicago_3h_100yr	T4-ROOF1-STORAGE
S68	0.03	23.20	28.90	1.0000	Chicago_3h_100yr	SP26
S69	0.04	45.50	18.00	1.0000	Chicago_3h_100yr	SP25
S70	0.08	92.10	26.70	1.0000	Chicago_3h_100yr	SP23
S71	0.02	32.60	9.20	1.0000	Chicago_3h_100yr	SP24
S72	0.01	5.10	100.00	1.0000	Chicago_3h_100yr	TOWER2-CONN-1
S73	0.00	9.70	99.90	1.0000	Chicago_3h_100yr	SP31,SP32
S74	0.01	16.00	46.00	1.0000	Chicago_3h_100yr	SP29
S75	0.11	33.00	69.60	1.0000	Chicago_3h_100yr	IN141919-MAJ
S76	0.04	50.40	100.00	1.0000	Chicago_3h_100yr	T3-ROOF-1-STORAGE
S77	0.02	46.20	100.00	1.0000	Chicago_3h_100yr	T5-ROOF-AMMENITY_1
S78	0.02	46.70	100.00	1.0000	Chicago_3h_100yr	T5-ROOF_AMMENITY_2
S79	0.06	55.50	100.00	1.0000	Chicago_3h_100yr	T5-ROOF-STORAGE
S80	0.02	37.60	100.00	1.0000	Chicago_3h_100yr	T6-ROOF_AMMENITY_1
S81	0.02	46.70	100.00	1.0000	Chicago_3h_100yr	T6-ROOF_AMMENITY_2
S82	0.06	55.50	100.00	1.0000	Chicago_3h_100yr	T5A-ROOF-STORAGE

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Node Summary
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
202B	JUNCTION	49.06	2.24	0.0	
204	JUNCTION	49.23	2.37	0.0	
205	JUNCTION	49.38	1.62	0.0	
206	JUNCTION	49.52	1.48	0.0	
207	JUNCTION	49.72	1.43	0.0	
208	JUNCTION	50.92	2.97	0.0	
209	JUNCTION	51.25	3.42	0.0	
210	JUNCTION	50.74	2.46	0.0	
CB04	JUNCTION	52.57	1.40	0.0	
CB04-MAJ	JUNCTION	53.97	0.23	0.0	
CB05	JUNCTION	52.50	2.03	0.0	
CB05-MAJ	JUNCTION	54.53	0.23	0.0	
CB07	JUNCTION	50.02	0.98	0.0	
CB08	JUNCTION	49.30	1.65	0.0	
CB09	JUNCTION	49.70	0.95	0.0	
CB10	JUNCTION	52.35	0.97	0.0	
CB10-MAJ	JUNCTION	53.32	0.23	0.0	
CB11	JUNCTION	50.70	2.02	0.0	
DITCH-OUT	JUNCTION	52.45	0.60	0.0	
IN138478	JUNCTION	51.08	2.00	0.0	
IN141918	JUNCTION	50.75	1.80	0.0	
IN141918-MAJ	JUNCTION	52.55	0.23	0.0	
IN141919	JUNCTION	51.52	1.80	0.0	
IN141919-MAJ	JUNCTION	53.32	0.96	0.0	
MHST54409	JUNCTION	49.96	4.36	0.0	
MHST54410	JUNCTION	49.00	4.05	0.0	
MHST54411	JUNCTION	50.06	2.42	0.0	
MHST54412	JUNCTION	48.31	4.37	0.0	
MHST54413	JUNCTION	48.00	4.53	0.0	
MHST54414	JUNCTION	47.16	5.11	0.0	
MHST54415	JUNCTION	48.90	2.82	0.0	
MHST54416	JUNCTION	49.00	2.14	0.0	
MHST76833	JUNCTION	50.46	3.86	0.0	
MHST76834	JUNCTION	50.73	2.30	0.0	
MHST76835	JUNCTION	50.61	2.60	0.0	
MHST78305	JUNCTION	50.79	2.21	0.0	
MHST78307	JUNCTION	50.85	3.25	0.0	
MHST78309	JUNCTION	49.14	2.66	0.0	
POND-OUTLET	JUNCTION	48.63	1.62	0.0	
T01	JUNCTION	50.69	2.39	0.0	
T02	JUNCTION	50.67	2.63	0.0	
T03	JUNCTION	50.75	2.27	0.0	
T04	JUNCTION	50.86	2.21	0.0	
T05	JUNCTION	50.87	2.28	0.0	
T06	JUNCTION	50.95	2.59	0.0	
T07	JUNCTION	51.07	2.71	0.0	
T08	JUNCTION	49.06	2.21	0.0	
T09	JUNCTION	49.26	2.27	0.0	
T10	JUNCTION	49.62	1.47	0.0	
TOWER1-CONN	JUNCTION	49.45	5.39	0.0	
TOWER2-CONN-1	JUNCTION	49.48	5.36	0.0	
TOWER2-CONN-2	JUNCTION	49.51	5.33	0.0	
TOWER2-CONN-3	JUNCTION	51.09	3.75	0.0	
TOWER3-CONN-1	JUNCTION	49.51	5.33	0.0	
TOWER3-CONN-2	JUNCTION	49.66	5.18	0.0	
TOWER4-CONN-1	JUNCTION	49.59	5.25	0.0	
TOWER4-CONN-2	JUNCTION	49.94	4.90	0.0	
TOWER5A5B-CONN	JUNCTION	50.80	3.80	0.0	
OUTFALL_174	OUTFALL	53.05	0.00	0.0	
OUTFALL_OTT_RIVER_1	OUTFALL	46.96	0.53	0.0	
OUTFALL_OTT_RIVER_2	OUTFALL	48.00	0.00	0.0	
OUTFALL_RAVINE	OUTFALL	50.25	2.43	0.0	
OUTFALL_SWMPOND	OUTFALL	49.77	0.60	0.0	
SP01	STORAGE	54.45	0.37	0.0	
SP02	STORAGE	54.31	0.51	0.0	
SP03	STORAGE	52.38	0.32	0.0	
SP04	STORAGE	54.35	0.45	0.0	
SP05	STORAGE	54.40	0.35	0.0	
SP06	STORAGE	54.40	0.44	0.0	
SP07	STORAGE	54.45	0.39	0.0	
SP08	STORAGE	53.75	0.48	0.0	
SP09	STORAGE	54.40	0.45	0.0	
SP10	STORAGE	54.47	0.38	0.0	
SP11	STORAGE	54.40	0.45	0.0	
SP12	STORAGE	54.40	0.45	0.0	

SP13	STORAGE	54.53	0.42	0.0
SP14	STORAGE	54.51	0.43	0.0
SP15	STORAGE	54.51	0.42	0.0
SP16	STORAGE	54.51	0.40	0.0
SP17	STORAGE	54.51	0.39	0.0
SP18	STORAGE	54.50	0.35	0.0
SP19	STORAGE	54.50	0.46	0.0
SP20	STORAGE	54.50	0.46	0.0
SP21	STORAGE	54.50	0.40	0.0
SP22	STORAGE	54.50	0.45	0.0
SP23	STORAGE	54.60	0.40	0.0
SP24	STORAGE	54.65	0.37	0.0
SP25	STORAGE	54.75	0.35	0.0
SP26	STORAGE	54.60	0.43	0.0
SP27	STORAGE	54.75	0.35	0.0
SP28	STORAGE	54.75	0.35	0.0
SP29	STORAGE	54.75	0.40	0.0
SP30	STORAGE	54.85	0.40	0.0
SP31,SP32	STORAGE	54.76	0.38	0.0
SP35	STORAGE	53.35	0.45	0.0
SP36	STORAGE	54.15	0.40	0.0
SP99	STORAGE	52.22	1.30	0.0
SWM-POND	STORAGE	48.63	2.37	0.0
T1-ROOF-STORAGE	STORAGE	60.00	0.15	0.0
T2-ROOF1-STORAGE	STORAGE	60.00	0.15	0.0
T2-ROOF2-STORAGE	STORAGE	60.00	0.15	0.0
T2-ROOF3-STORAGE	STORAGE	60.00	0.15	0.0
T2-ROOF-4-NOSTORAGE	STORAGE	60.00	0.15	0.0
T2-ROOF-5-NOSTORAGE	STORAGE	60.00	0.15	0.0
T3-ROOF-1-STORAGE	STORAGE	60.00	0.15	0.0
T3-ROOF-2-STORAGE	STORAGE	60.00	0.15	0.0
T3-ROOF-3-STORAGE	STORAGE	60.00	0.15	0.0
T3-ROOF-4-NOSTORAGE	STORAGE	60.00	0.15	0.0
T3-ROOF-5-NOSTORAGE	STORAGE	60.00	0.15	0.0
T4-ROOF1-STORAGE	STORAGE	60.00	0.15	0.0
T4-ROOF2-NOSTORAGE	STORAGE	60.00	0.15	0.0
T5A5B-ROOF-STORAGE	STORAGE	60.00	0.15	0.0
T5A-ROOF-STORAGE	STORAGE	60.00	0.15	0.0
T5-ROOF_AMMENITY_2	STORAGE	60.00	0.15	0.0
T5-ROOF-AMMENITY_1	STORAGE	60.00	0.15	0.0
T5-ROOF-STORAGE	STORAGE	60.00	0.15	0.0
T6-ROOF_AMMENITY_1	STORAGE	60.00	0.15	0.0
T6-ROOF_AMMENITY_2	STORAGE	60.00	0.15	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C01	CB04-MAJ	IN141919-MAJ	CONDUIT	29.1	2.2348	0.0130
C01_1	IN138478	SP99	CONDUIT	131.0	0.1984	0.0130
C01_5	SP99	DITCH-OUT	CONDUIT	14.6	-1.5728	0.0130
C02	206	205	CONDUIT	24.4	0.2540	0.0130
C03	T10	206	CONDUIT	27.8	0.3562	0.0100
C030	IN141918	T03	CONDUIT	11.3	2.4877	0.0130
C04	CB07	207	CONDUIT	12.5	0.5120	0.0130
C05	TOWER5A5B-CONN	210	CONDUIT	1.3	4.7978	0.0130
C05.1	T07	T06	CONDUIT	17.6	0.6533	0.0130
C05.2	209	T07	CONDUIT	9.9	1.8435	0.0130
C06	CB04	T06	CONDUIT	4.6	2.7289	0.0130
C060	SP08	T04	CONDUIT	9.3	17.4132	0.0130
C07	CB05	T07	CONDUIT	4.4	0.9908	0.0130
C08	T06	208	CONDUIT	5.2	0.6744	0.0130
C080	IN141919	T05	CONDUIT	4.9	2.0247	0.0130
C09	CB11	T02	CONDUIT	6.5	1.0064	0.0130
C10	CB10	MHST78307	CONDUIT	1.3	30.7983	0.0130
C11	SWM-POND	OUTFALL_SWMPOND	CONDUIT	29.9	1.8712	0.4000
C12	210	MHST54411	CONDUIT	13.6	1.9190	0.0130
C13	T09	204	CONDUIT	13.9	0.1726	0.0100
C14	208	T05	CONDUIT	23.1	0.2036	0.0130
C15	207	T10	CONDUIT	41.6	0.2451	0.0100
C16	TOWER3-CONN-1	204	CONDUIT	5.6	1.9598	0.0100
C17	CB05-MAJ	CB04-MAJ	CONDUIT	17.6	3.1807	0.0130
C18	204	MHST78309	CONDUIT	5.4	0.4801	0.0100
C19	IN141919-MAJ	IN141918-MAJ	CONDUIT	34.9	4.3074	0.0130
C20	CB10-MAJ	SP03	CONDUIT	44.3	2.1244	0.0130
C21	DITCH-OUT	OUTFALL_RAVINE	CONDUIT	11.4	0.0027	0.0130
C22	SP07	SP06	CONDUIT	16.2	0.3085	0.0130
C23	SP06	SP01	CONDUIT	37.3	-0.1340	0.0130
C24	CB08	T10	CONDUIT	2.6	-12.3881	0.0100
C25	205	T09	CONDUIT	34.1	0.3727	0.0100
C26	SP35	DITCH-OUT	CONDUIT	34.9	2.5783	0.1000
C27	SP22	CB05-MAJ	CONDUIT	38.1	0.6045	0.0130
C28	CB09	T09	CONDUIT	6.8	6.5601	0.0100
C29	TOWER4-CONN-2	207	CONDUIT	1.0	22.4581	0.0100
C37	IN138478	MHST78307	CONDUIT	11.2	0.8921	0.0130
OL4	SP03	IN141918-MAJ	CONDUIT	16.3	0.0019	0.0130
STM104099	MHST78307	MHST76833	CONDUIT	26.1	1.4941	0.0130
STM104100	MHST76833	MHST54409	CONDUIT	68.3	0.6886	0.0130
STM104102_1	MHST76834	T01	CONDUIT	11.9	0.3030	0.0130
STM104102_3	T01	T02	CONDUIT	8.6	0.2801	0.0130
STM104102_4	T02	MHST76835	CONDUIT	15.8	0.3163	0.0130
STM104104	MHST76835	MHST76833	CONDUIT	22.0	0.6809	0.0130
STM105994_2	T04	MHST78305	CONDUIT	4.7	0.1909	0.0130
STM105994_5	T05	T04	CONDUIT	6.1	0.1976	0.0130
STM105995_1	MHST78305	T03	CONDUIT	21.7	0.1751	0.0130
STM105995_2	T03	MHST76834	CONDUIT	1.3	0.1589	0.0130
STM105997	TOWER2-CONN-3	MHST76834	CONDUIT	41.3	0.4840	0.0130
STM106002-1_1	202B	T08	CONDUIT	2.1	0.2426	0.0130
STM106002-1_2	T08	MHST54416	CONDUIT	5.9	0.2555	0.0130
STM106002-2	MHST78309	202B	CONDUIT	52.0	0.1539	0.0130
STM65382	MHST54416	MHST54415	CONDUIT	41.3	0.1694	0.0130
STM65383	MHST54415	SWM-POND	CONDUIT	6.5	4.1574	0.0130
STM65384	MHST54412	MHST54413	CONDUIT	12.7	1.4938	0.0130
STM65386	MHST54413	MHST54414	CONDUIT	59.3	1.3663	0.0130
STM65387	MHST54414	OUTFALL_OTT_RIVER_1	CONDUIT	14.3	1.3951	0.0130
STM65388	MHST54411	MHST54410	CONDUIT	34.5	1.4204	0.0130
STM65389	MHST54409	MHST54410	CONDUIT	18.1	1.9936	0.0130
STM65390	MHST54410	SWM-POND	CONDUIT	8.0	4.6300	0.0130
STMH65384	POND-OUTLET	MHST54412	CONDUIT	20.6	1.5538	0.0130
STM-LAT-T1	TOWER1-CONN	MHST54416	CONDUIT	2.8	1.7727	0.0130
STM-LAT-T2(1)	TOWER2-CONN-1	T08	CONDUIT	6.3	2.0613	0.0130
STM-LAT-T2(2)	TOWER2-CONN-2	MHST78309	CONDUIT	2.1	1.9207	0.0130

STM-LAT-T3	TOWER3-CONN-2	205	CONDUIT	3.2	-1.7826	0.0130
STM-LAT-T4	TOWER4-CONN-1	206	CONDUIT	1.0	2.0288	0.0130
SWM-CONTROL	SWM-POND	POND-OUTLET	ORIFICE			
CB4-IC	CB04-MAJ	CB04	OUTLET			
CB5-IC	CB05-MAJ	CB05	OUTLET			
CB9-IC	CB10-MAJ	CB10	OUTLET			
IN141918-IC	IN141918-MAJ	IN141918	OUTLET			
IN141919-IC	IN141919-MAJ	IN141919	OUTLET			
SP01-OUTLET	SP01	TOWER1-CONN	OUTLET			
SP02-OUTLET	SP02	TOWER1-CONN	OUTLET			
SP04-OUTLET	SP04	TOWER2-CONN-1	OUTLET			
SP05-OUTLET	SP05	TOWER2-CONN-1	OUTLET			
SP06-OUTLET	SP06	TOWER2-CONN-1	OUTLET			
SP07-OUTLET	SP07	TOWER2-CONN-1	OUTLET			
SP09-OUTLET	SP09	TOWER2-CONN-2	OUTLET			
SP10-OUTLET	SP10	TOWER2-CONN-2	OUTLET			
SP11-OUTLET	SP11	TOWER2-CONN-2	OUTLET			
SP12-OUTLET	SP12	TOWER2-CONN-2	OUTLET			
SP13-OUTLET	SP13	TOWER3-CONN-1	OUTLET			
SP14-OUTLET	SP14	TOWER3-CONN-1	OUTLET			
SP15-OUTLET	SP15	TOWER3-CONN-1	OUTLET			
SP16-OUTLET	SP16	TOWER3-CONN-1	OUTLET			
SP17-OUTLET	SP17	TOWER3-CONN-1	OUTLET			
SP18-OUTLET	SP18	TOWER3-CONN-1	OUTLET			
SP19-OUTLET	SP19	TOWER3-CONN-1	OUTLET			
SP20-OUTLET	SP20	TOWER3-CONN-2	OUTLET			
SP21-OUTLET	SP21	TOWER4-CONN-1	OUTLET			
SP22-OUTLET	SP22	TOWER4-CONN-1	OUTLET			
SP23-OUTLET	SP23	TOWER3-CONN-2	OUTLET			
SP24-OUTLET	SP24	TOWER3-CONN-2	OUTLET			
SP25-OUTLET	SP25	TOWER4-CONN-1	OUTLET			
SP26-OUTLET	SP26	TOWER4-CONN-1	OUTLET			
SP27-OUTLET	SP27	TOWER4-CONN-1	OUTLET			
SP28-OUTLET	SP28	TOWER4-CONN-2	OUTLET			
SP29-OUTLET	SP29	TOWER4-CONN-2	OUTLET			
SP30-OUTLET	SP30	TOWER4-CONN-2	OUTLET			
SP31,SP32-OUTLET	SP31,SP32	TOWER3-CONN-2	OUTLET			
SP35-OUTLET	SP35	TOWER5A5B-CONN	OUTLET			
SP36-OULTET	SP36	TOWER5A5B-CONN	OUTLET			
T1-ROOF-OUTLET	T1-ROOF-STORAGE	TOWER1-CONN	OUTLET			
T2-ROOF-1-OUTLET	T2-ROOF1-STORAGE	TOWER2-CONN-1	OUTLET			
T2-ROOF-2-OUTLET	T2-ROOF2-STORAGE	TOWER2-CONN-2	OUTLET			
T2-ROOF-3-OUTLET	T2-ROOF3-STORAGE	TOWER2-CONN-1	OUTLET			
T2-ROOF-4-OUTLET	T2-ROOF-4-NOSTORAGE	TOWER2-CONN-2	OUTLET			
T2-ROOF-5-OUTLET	T2-ROOF-5-NOSTORAGE	TOWER2-CONN-1	OUTLET			
T3-ROOF-1-OUTLET	T3-ROOF-1-STORAGE	TOWER3-CONN-2	OUTLET			
T3-ROOF-2-OUTLET	T3-ROOF-2-STORAGE	TOWER3-CONN-2	OUTLET			
T3-ROOF-3-OUTLET	T3-ROOF-3-STORAGE	TOWER3-CONN-1	OUTLET			
T3-ROOF-4-OUTLET	T3-ROOF-4-NOSTORAGE	TOWER3-CONN-2	OUTLET			
T3-ROOF-5-OUTLET	T3-ROOF-5-NOSTORAGE	TOWER3-CONN-2	OUTLET			
T4-AMENITYROOF-OUTLET	T4-ROOF2-NOSTORAGE	TOWER4-CONN-2	OUTLET			
T4-HIGHROOF-OUTLET	T4-ROOF1-STORAGE	TOWER4-CONN-2	OUTLET			
T5&6_Podium-ROOF-OUTLET	T5A5B-ROOF-STORAGE	TOWER5A5B-CONN	OUTLET			
T5_AMMENITY_OUTLET_1	T5-ROOF-AMMENITY_1	TOWER5A5B-CONN	OUTLET			
T5_AMMENITY_OUTLET_2	T5-ROOF_AMMENITY_2	TOWER5A5B-CONN	OUTLET			
T5-ROOF_HIGH_OUTLET	T5-ROOF-STORAGE	TOWER5A5B-CONN	OUTLET			
T6_AMMENITY_OUTLET_1	T6-ROOF_AMMENITY_1	TOWER5A5B-CONN	OUTLET			
T6_AMMENITY_OUTLET_2	T6-ROOF_AMMENITY_2	TOWER5A5B-CONN	OUTLET			
T6-ROOF-HIGH-OUTLET	T5A-ROOF-STORAGE	TOWER5A5B-CONN	OUTLET			

****
Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C01	Half_Street	0.23	0.80	0.14	7.20	1	2495.07
C01_1	TRAPEZOIDAL	0.60	1.50	0.35	4.00	1	2574.79
C01_5	TRAPEZOIDAL	0.60	1.50	0.35	4.00	1	7248.96
C02	CIRCULAR	0.45	0.16	0.11	0.45	1	143.68
C03	CIRCULAR	0.45	0.16	0.11	0.45	1	221.22
C030	CIRCULAR	0.25	0.05	0.06	0.25	1	93.80
C04	CIRCULAR	0.20	0.03	0.05	0.20	1	23.47
C05	CIRCULAR	0.30	0.07	0.07	0.30	1	211.83
C05.1	CIRCULAR	0.38	0.11	0.09	0.38	1	141.72
C05.2	CIRCULAR	0.38	0.11	0.09	0.38	1	238.07
C06	CIRCULAR	0.20	0.03	0.05	0.20	1	54.18
C060	CIRCULAR	0.20	0.03	0.05	0.20	1	136.87
C07	CIRCULAR	0.20	0.03	0.05	0.20	1	32.65
C08	CIRCULAR	0.38	0.11	0.09	0.38	1	143.99
C080	CIRCULAR	0.20	0.03	0.05	0.20	1	46.67
C09	CIRCULAR	0.20	0.03	0.05	0.20	1	32.91
C10	CIRCULAR	0.20	0.03	0.05	0.20	1	182.03
C11	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	285.56
C12	CIRCULAR	0.30	0.07	0.07	0.30	1	133.97
C13	CIRCULAR	0.53	0.22	0.13	0.53	1	232.28
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	79.11
C15	CIRCULAR	0.45	0.16	0.11	0.45	1	183.51
C16	CIRCULAR	0.25	0.05	0.06	0.25	1	108.23
C17	Half_Street	0.23	0.80	0.14	7.20	1	2976.61
C18	CIRCULAR	0.53	0.22	0.13	0.53	1	387.39
C19	Half_Street	0.23	0.80	0.14	7.20	1	3463.92
C20	Half_Street	0.23	0.80	0.14	7.20	1	2432.63
C21	Half_Street	0.23	0.80	0.14	7.20	1	86.26
C22	CIRCULAR	0.20	0.03	0.05	0.20	1	18.22
C23	TRAPEZOIDAL	0.15	0.14	0.10	1.40	1	85.50
C24	CIRCULAR	0.20	0.03	0.05	0.20	1	150.08
C25	CIRCULAR	0.53	0.22	0.13	0.53	1	341.35
C26	TRAPEZOIDAL	0.15	0.14	0.10	1.40	1	48.76
C27	Half_Street	0.23	0.80	0.14	7.20	1	1297.61
C28	CIRCULAR	0.20	0.03	0.05	0.20	1	109.21
C29	CIRCULAR	0.25	0.05	0.06	0.25	1	366.38
C37	CIRCULAR	0.25	0.05	0.06	0.25	1	56.17
OL4	Half_Street	0.23	0.80	0.14	7.20	1	72.16
STM104099	CIRCULAR	0.38	0.11	0.09	0.38	1	214.33
STM104100	CIRCULAR	0.38	0.11	0.09	0.38	1	145.50
STM104102_1	CIRCULAR	0.38	0.11	0.09	0.38	1	96.51
STM104102_3	CIRCULAR	0.38	0.11	0.09	0.38	1	92.79
STM104102_4	CIRCULAR	0.38	0.11	0.09	0.38	1	98.62
STM104104	CIRCULAR	0.38	0.11	0.09	0.38	1	144.69
STM105994_2	CIRCULAR	0.38	0.11	0.09	0.38	1	76.61
STM105994_5	CIRCULAR	0.38	0.11	0.09	0.38	1	77.95
STM105995_1	CIRCULAR	0.38	0.11	0.09	0.38	1	73.38

STM105995_2	CIRCULAR	0.38	0.11	0.09	0.38	1	69.89
STM105997	CIRCULAR	0.25	0.05	0.06	0.25	1	41.38
STM106002-1_1	CIRCULAR	0.60	0.28	0.15	0.60	1	302.45
STM106002-1_2	CIRCULAR	0.60	0.28	0.15	0.60	1	310.41
STM106002-2	CIRCULAR	0.60	0.28	0.15	0.60	1	240.87
STM65382	CIRCULAR	0.60	0.28	0.15	0.60	1	252.73
STM65383	CIRCULAR	0.60	0.28	0.15	0.60	1	1252.03
STM65384	CIRCULAR	0.53	0.22	0.13	0.53	1	525.65
STM65386	CIRCULAR	0.53	0.22	0.13	0.53	1	502.73
STM65387	CIRCULAR	0.53	0.22	0.13	0.53	1	508.00
STM65388	CIRCULAR	0.30	0.07	0.07	0.30	1	115.26
STM65389	CIRCULAR	0.38	0.11	0.09	0.38	1	247.57
STM65390	CIRCULAR	0.38	0.11	0.09	0.38	1	377.29
STMH65384	CIRCULAR	0.53	0.22	0.13	0.53	1	536.11
STM-LAT-T1	CIRCULAR	0.20	0.03	0.05	0.20	1	43.67
STM-LAT-T2(1)	CIRCULAR	0.25	0.05	0.06	0.25	1	85.38
STM-LAT-T2(2)	CIRCULAR	0.25	0.05	0.06	0.25	1	82.42
STM-LAT-T3	CIRCULAR	0.30	0.07	0.07	0.30	1	129.12
STM-LAT-T4	CIRCULAR	0.30	0.07	0.07	0.30	1	137.75

****
Transect Summary
****

Transect Half_Street
Area:

0.0007	0.0028	0.0063	0.0113	0.0176
0.0254	0.0346	0.0451	0.0571	0.0705
0.0853	0.1016	0.1192	0.1376	0.1560
0.1744	0.1928	0.2112	0.2296	0.2480
0.2664	0.2848	0.3032	0.3216	0.3400
0.3584	0.3768	0.3952	0.4136	0.4320
0.4504	0.4688	0.4873	0.5069	0.5278
0.5500	0.5736	0.5984	0.6246	0.6521
0.6810	0.7111	0.7426	0.7754	0.8095
0.8450	0.8818	0.9198	0.9593	1.0000

Hrad:

0.0159	0.0318	0.0478	0.0637	0.0796
0.0955	0.1114	0.1273	0.1433	0.1592
0.1751	0.1910	0.2069	0.2374	0.2684
0.2993	0.3299	0.3604	0.3907	0.4208
0.4508	0.4806	0.5103	0.5398	0.5691
0.5983	0.6273	0.6561	0.6848	0.7134
0.7417	0.7700	0.7982	0.8246	0.8481
0.8689	0.8875	0.9038	0.9183	0.9310
0.9423	0.9522	0.9609	0.9686	0.9754
0.9814	0.9868	0.9916	0.9960	1.0000

Width:

0.0341	0.0681	0.1022	0.1363	0.1704
0.2044	0.2385	0.2726	0.3067	0.3407
0.3748	0.4089	0.4430	0.4444	0.4444
0.4444	0.4444	0.4444	0.4444	0.4444
0.4444	0.4444	0.4444	0.4444	0.4444
0.4444	0.4444	0.4444	0.4444	0.4444
0.4444	0.4444	0.4569	0.4889	0.5208
0.5528	0.5847	0.6167	0.6486	0.6806
0.7125	0.7444	0.7764	0.8083	0.8403
0.8722	0.9042	0.9361	0.9681	1.0000

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
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****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Starting Date 09/01/2018 00:00:00
Ending Date 09/01/2018 12:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 4
Head Tolerance ..... 0.001500 m

********** Runoff Quantity Continuity **********	Volume hectare-m	Depth mm
Total Precipitation	0.280	71.584
Evaporation Loss	0.000	0.000
Infiltration Loss	0.085	21.742
Surface Runoff	0.195	49.675
Final Storage	0.003	0.741
Continuity Error (%)	-0.803	

********** Flow Routing Continuity **********	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.195	1.946
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000

External Outflow	0.190	1.896
Flooding Loss	0.000	0.001
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.005	0.055
Continuity Error (%)	-0.253	

****
Highest Continuity Errors
****
Node SP99 (28.98%)
Node SP03 (18.43%)
Node CB08 (3.28%)
Node CB05 (2.04%)
Node CB10 (1.59%)

****
Time-Step Critical Elements
****
Link C05 (49.12%)
Link C10 (6.88%)
Link C29 (6.61%)
Link STM65384 (5.68%)
Link STM105995_2 (4.26%)

****
Highest Flow Instability Indexes
****
Link T2-ROOF-5-OUTLET (9)
Link STM-LAT-T3 (8)
Link T3-ROOF-4-OUTLET (8)
Link T2-ROOF-4-OUTLET (8)
Link T4-AMENITYROOF-OUTLET (8)

****
Routing Time Step Summary
****

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.69 sec
Maximum Time Step	:	5.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.12
Percent Not Converging	:	1.27

****
Subcatchment Runoff Summary
****

Subcatchment	Precip mm	Runon mm	Evap mm	Infil mm	Runoff mm	Runoff 10^6 ltr	Runoff LPS	Coeff
S01	71.58	0.00	0.00	0.00	70.32	0.01	3.66	0.982
S02	71.58	0.00	0.00	34.28	38.33	0.00	1.88	0.535
S04	71.58	0.00	0.00	40.55	33.81	0.01	12.12	0.472
S05	71.58	0.00	0.00	44.10	28.71	0.01	11.53	0.401
S06	71.58	0.00	0.00	0.00	70.32	0.01	3.71	0.982
S07	71.58	0.00	0.00	11.68	59.40	0.09	64.42	0.830
S08	71.58	0.00	0.00	29.38	42.16	0.03	17.99	0.589
S09	71.58	0.00	0.00	0.00	70.33	0.02	14.56	0.982
S10	71.58	0.00	0.00	0.00	70.32	0.01	3.86	0.982
S11	71.58	0.00	0.00	0.13	70.21	0.01	4.55	0.981
S12	71.58	0.00	0.00	0.04	70.29	0.02	14.51	0.982
S13	71.58	0.00	0.00	0.00	70.32	0.01	4.75	0.982
S14	71.58	0.00	0.00	0.00	70.33	0.03	17.78	0.982
S15	71.58	0.00	0.00	0.04	70.28	0.00	3.27	0.982
S16	71.58	0.00	0.00	39.30	32.93	0.01	8.03	0.460
S17	71.58	0.00	0.00	33.69	38.19	0.01	7.49	0.533
S18	71.58	0.00	0.00	34.56	37.58	0.01	5.59	0.525
S19	71.58	0.00	0.00	34.70	37.22	0.01	10.92	0.520
S20	71.58	0.00	0.00	37.26	34.77	0.01	11.52	0.486
S21	71.58	0.00	0.00	0.00	70.45	0.06	42.04	0.984
S22	71.58	0.00	0.00	13.61	57.78	0.02	13.87	0.807
S23	71.58	0.00	0.00	45.79	26.48	0.05	40.44	0.370
S24	71.58	0.00	0.00	44.79	26.85	0.02	7.48	0.375
S25	71.58	0.00	0.00	48.45	23.49	0.01	3.88	0.328
S26	71.58	0.00	0.00	41.75	30.20	0.02	13.60	0.422
S27	71.58	0.00	0.00	8.31	62.70	0.03	26.28	0.876
S28	71.58	0.00	0.00	12.57	58.66	0.02	15.11	0.819
S29	71.58	0.00	0.00	34.76	37.23	0.01	11.61	0

S30	71.58	0.00	0.00	37.09	34.53	0.05	32.19
0.482							
S31	71.58	0.00	0.00	0.04	70.28	0.03	18.42
0.982							
S32	71.58	0.00	0.00	0.09	70.43	0.01	9.75
0.984							
S33	71.58	0.00	0.00	36.38	36.15	0.01	10.96
0.505							
S34	71.58	0.00	0.00	10.88	60.17	0.03	24.14
0.841							
S37	71.58	0.00	0.00	0.00	70.35	0.06	43.08
0.983							
S38	71.58	0.00	0.00	0.00	70.33	0.04	25.05
0.982							
S39	71.58	0.00	0.00	36.21	35.86	0.03	28.67
0.501							
S40	71.58	0.00	0.00	15.93	55.26	0.06	47.32
0.772							
S41	71.58	0.00	0.00	6.73	64.21	0.14	102.40
0.897							
S42	71.58	0.00	0.00	14.33	56.79	0.07	52.71
0.793							
S43	71.58	0.00	0.00	0.00	70.66	0.02	14.35
0.987							
S44	71.58	0.00	0.00	49.55	22.30	0.01	4.48
0.311							
S45	71.58	0.00	0.00	8.83	62.37	0.02	18.99
0.871							
S46	71.58	0.00	0.00	36.17	36.42	0.00	4.19
0.509							
S47	71.58	0.00	0.00	3.93	66.92	0.02	11.83
0.935							
S48	71.58	0.00	0.00	6.58	64.35	0.02	17.15
0.899							
S49	71.58	0.00	0.00	18.08	53.38	0.04	34.76
0.746							
S50	71.58	0.00	0.00	29.22	43.18	0.01	8.31
0.603							
S51	71.58	0.00	0.00	27.16	44.70	0.01	8.85
0.624							
S52	71.58	0.00	0.00	31.26	40.80	0.01	8.10
0.570							
S53	71.58	0.00	0.00	44.46	28.42	0.02	20.14
0.397							
S54	71.58	0.00	0.00	41.44	30.96	0.01	12.67
0.432							
S55	71.58	0.00	0.00	14.56	56.66	0.01	10.21
0.792							
S56	71.58	0.00	0.00	24.57	47.57	0.01	9.64
0.665							
S57	71.58	0.00	0.00	30.40	41.43	0.01	7.99
0.579							
S58	71.58	0.00	0.00	35.85	36.18	0.01	6.32
0.505							
S59	71.58	0.00	0.00	44.59	27.77	0.06	49.08
0.388							
S60	71.58	0.00	0.00	33.73	38.52	0.01	7.34
0.538							
S61	71.58	0.00	0.00	29.09	42.87	0.01	7.96
0.599							
S62	71.58	0.00	0.00	19.49	52.03	0.02	18.84
0.727							
S63	71.58	0.00	0.00	12.55	58.65	0.03	19.95
0.819							
S64	71.58	0.00	0.00	32.36	39.83	0.02	18.92
0.556							
S65	71.58	0.00	0.00	45.53	26.40	0.01	3.83
0.369							
S66	71.58	0.00	0.00	40.39	31.47	0.02	13.27
0.440							
S67	71.58	0.00	0.00	0.00	70.44	0.07	49.66
0.984							
S67_1	71.58	0.00	0.00	0.00	70.31	0.04	25.30
0.982							
S67_2	71.58	0.00	0.00	0.00	70.31	0.05	37.73
0.982							
S68	71.58	0.00	0.00	31.99	39.94	0.01	9.34
0.558							
S69	71.58	0.00	0.00	36.56	35.79	0.01	12.43
0.500							
S70	71.58	0.00	0.00	32.68	39.46	0.03	29.49
0.551							
S71	71.58	0.00	0.00	40.45	32.14	0.01	7.51
0.449							
S72	71.58	0.00	0.00	0.00	70.34	0.00	2.48
0.983							
S73	71.58	0.00	0.00	0.04	70.28	0.00	2.38
0.982							
S74	71.58	0.00	0.00	23.89	47.91	0.01	6.06
0.669							
S75	71.58	0.00	0.00	13.76	57.36	0.06	45.14
0.801							
S76	71.58	0.00	0.00	0.00	70.33	0.03	19.95
0.982							
S77	71.58	0.00	0.00	0.00	70.31	0.01	10.30
0.982							
S78	71.58	0.00	0.00	0.00	70.31	0.01	10.40
0.982							
S79	71.58	0.00	0.00	0.00	70.35	0.04	28.87
0.983							
S80	71.58	0.00	0.00	0.00	70.31	0.01	8.37
0.982							
S81	71.58	0.00	0.00	0.00	70.31	0.01	10.40
0.982							
S82	71.58	0.00	0.00	0.00	70.35	0.04	28.87
0.983							

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
202B	JUNCTION	0.63	1.32	50.38	0 01:40	1.32
204	JUNCTION	0.53	1.25	50.48	0 01:12	1.15

205	JUNCTION	0.45	1.21	50.59	0	01:12	1.00
206	JUNCTION	0.37	1.17	50.69	0	01:12	0.87
207	JUNCTION	0.26	1.20	50.92	0	01:12	0.67
208	JUNCTION	0.05	0.50	51.41	0	01:12	0.40
209	JUNCTION	0.00	0.16	51.41	0	01:13	0.07
210	JUNCTION	0.08	0.98	51.72	0	01:05	0.87
CB04	JUNCTION	0.01	0.06	52.63	0	01:10	0.06
CB04-MAJ	JUNCTION	0.01	0.02	53.99	0	01:10	0.02
CB05	JUNCTION	0.27	0.34	52.84	0	01:10	0.34
CB05-MAJ	JUNCTION	0.01	0.02	54.55	0	01:10	0.02
CB07	JUNCTION	0.11	0.98	51.00	0	01:12	0.37
CB08	JUNCTION	0.63	1.55	50.85	0	01:11	1.09
CB09	JUNCTION	0.25	0.82	50.52	0	01:12	0.68
CB10	JUNCTION	0.60	0.65	53.00	0	01:10	0.65
CB10-MAJ	JUNCTION	0.01	0.04	53.36	0	01:10	0.04
CB11	JUNCTION	0.62	0.76	51.46	0	01:10	0.76
DITCH-OUT	JUNCTION	0.03	0.07	52.52	0	01:19	0.07
IN138478	JUNCTION	0.02	0.12	51.20	0	01:19	0.12
IN141918	JUNCTION	0.61	0.74	51.49	0	01:11	0.73
IN141918-MAJ	JUNCTION	0.01	0.08	52.63	0	01:11	0.08
IN141919	JUNCTION	0.63	0.78	52.30	0	01:10	0.78
IN141919-MAJ	JUNCTION	0.01	0.07	53.39	0	01:10	0.07
MHST54409	JUNCTION	0.16	0.48	50.44	0	01:21	0.45
MHST54410	JUNCTION	0.66	1.38	50.38	0	01:40	1.38
MHST54411	JUNCTION	0.19	1.68	51.74	0	01:05	1.40
MHST54412	JUNCTION	0.14	0.21	48.52	0	01:43	0.21
MHST54413	JUNCTION	0.14	0.22	48.22	0	01:43	0.22
MHST54414	JUNCTION	0.14	0.22	47.38	0	01:43	0.22
MHST54415	JUNCTION	0.70	1.47	50.37	0	01:43	1.47
MHST54416	JUNCTION	0.67	1.38	50.38	0	01:41	1.38
MHST76833	JUNCTION	0.09	0.66	51.12	0	01:09	0.47
MHST76834	JUNCTION	0.09	0.62	51.35	0	01:12	0.54
MHST76835	JUNCTION	0.08	0.53	51.14	0	01:13	0.47
MHST78305	JUNCTION	0.08	0.60	51.39	0	01:13	0.51
MHST78307	JUNCTION	0.03	0.12	50.97	0	01:13	0.11
MHST78309	JUNCTION	0.59	1.32	50.46	0	01:12	1.24
POND-OUTLET	JUNCTION	0.14	0.21	48.84	0	01:43	0.21
T01	JUNCTION	0.09	0.60	51.29	0	01:13	0.53
T02	JUNCTION	0.09	0.57	51.24	0	01:13	0.51
T03	JUNCTION	0.08	0.61	51.36	0	01:12	0.53
T04	JUNCTION	0.07	0.54	51.39	0	01:12	0.45
T05	JUNCTION	0.07	0.53	51.40	0	01:13	0.44
T06	JUNCTION	0.04	0.45	51.41	0	01:12	0.37
T07	JUNCTION	0.02	0.34	51.41	0	01:12	0.25
T08	JUNCTION	0.63	1.32	50.38	0	01:40	1.32
T09	JUNCTION	0.52	1.26	50.51	0	01:12	1.13
T10	JUNCTION	0.31	1.29	50.91	0	01:11	0.77
TOWER1-CONN	JUNCTION	0.42	1.09	50.54	0	01:12	1.00
TOWER2-CONN-1	JUNCTION	0.38	0.90	50.38	0	01:40	0.90
TOWER2-CONN-2	JUNCTION	0.36	0.96	50.47	0	01:12	0.87
TOWER2-CONN-3	JUNCTION	0.01	0.83	51.92	0	01:12	0.19
TOWER3-CONN-1	JUNCTION	0.42	1.00	50.51	0	01:12	0.87
TOWER3-CONN-2	JUNCTION	0.32	0.95	50.61	0	01:12	0.72
TOWER4-CONN-1	JUNCTION	0.41	1.11	50.70	0	01:12	0.80
TOWER4-CONN-2	JUNCTION	0.15	1.00	50.94	0	01:12	0.45
TOWER5A5B-CONN	JUNCTION	0.07	0.93	51.73	0	01:05	0.83
OUTFALL_174	OUTFALL	0.00	0.00	53.05	0	00:00	0.00
OUTFALL_OTT_RIVER_1	OUTFALL	0.14	0.22	47.18	0	01:44	0.22
OUTFALL_OTT_RIVER_2	OUTFALL	0.00	0.00	48.00	0	00:00	0.00
OUTFALL_RAVINE	OUTFALL	0.00	0.00	50.25	0	00:00	0.00
OUTFALL_SWMPOND	OUTFALL	0.00	0.00	49.77	0	01:43	0.00
SP01	STORAGE	0.02	0.20	54.65	0	01:13	0.19
SP02	STORAGE	0.04	0.24	54.55	0	01:13	0.23
SP03	STORAGE	0.18	0.26	52.64	0	01:11	0.26
SP04	STORAGE	0.05	0.25	54.60	0	01:24	0.25
SP05	STORAGE	0.01	0.16	54.56	0	01:11	0.16
SP06	STORAGE	0.04	0.25	54.65	0	01:12	0.24
SP07	STORAGE	0.03	0.20	54.65	0	01:12	0.19
SP08	STORAGE	0.01	0.06	53.81	0	01:10	0.06
SP09	STORAGE	0.02	0.19	54.59	0	01:12	0.19
SP10	STORAGE	0.01	0.16	54.63	0	01:11	0.16
SP11	STORAGE	0.03	0.20	54.60	0	01:16	0.20
SP12	STORAGE	0.03	0.21	54.61	0	01:16	0.21
SP13	STORAGE	0.01	0.11	54.64	0	01:10	0.11
SP14	STORAGE	0.02	0.22	54.73	0	01:13	0.21
SP15	STORAGE	0.02	0.22	54.73	0	01:12	0.21
SP16	STORAGE	0.02	0.19	54.70	0	01:12	0.18
SP17	STORAGE	0.01	0.18	54.69	0	01:12	0.17
SP18	STORAGE	0.12	0.35	54.85	0	01:08	0.35
SP19	STORAGE	0.01	0.17	54.67	0	01:12	0.16
SP20	STORAGE	0.03	0.27	54.77	0	01:13	0.27
SP21	STORAGE	0.07	0.40	54.90	0	01:12	0.40
SP22	STORAGE	0.02	0.21	54.71	0	01:13	0.20
SP23	STORAGE	0.02	0.19	54.79	0	01:12	0.18
SP24	STORAGE	0.00	0.09	54.74	0	01:10	0.09
SP25	STORAGE	0.01	0.16	54.91	0	01:11	0.16
SP26	STORAGE	0.02	0.22	54.82	0	01:13	0.21
SP27	STORAGE	0.01	0.17	54.92	0	01:11	0.17
SP28	STORAGE	0.01	0.10	54.85	0	01:10	0.10
SP29	STORAGE	0.01	0.18	54.93	0	01:11	0.18
SP30	STORAGE	0.01	0.16	55.01	0	01:11	0.16
SP31,SP32	STORAGE	0.00	0.02	54.78	0	01:06	0.02
SP35	STORAGE	0.03	0.27	53.62	0	01:12	0.26
SP36	STORAGE	0.02	0.19	54.34	0	01:13	0.19
SP99	STORAGE	0.22	0.30	52.52	0	01:18	0.30
SWM-POND	STORAGE	0.88	1.73	50.36	0	01:43	1.73
T1-ROOF-STORAGE	STORAGE	0.07	0.14	60.14	0	01:23	0.14
T2-ROOF1-STORAGE	STORAGE	0.03	0.12	60.12	0	01:14	0.12
T2-ROOF2-STORAGE	STORAGE	0.01	0.08	60.08	0	01:10	0.08
T2-ROOF3-STORAGE	STORAGE	0.01	0.08	60.08	0	01:10	0.08
T2-ROOF-4-NOSTORAGE	STORAGE	0.00	0.00	60.00	0	01:05	0.00
T2-ROOF-5-NOSTORAGE	STORAGE	0.00	0.00	60.00	0	01:05	0.00
T3-ROOF-1-STORAGE	STORAGE	0.04	0.14	60.14	0	01:14	0.14
T3-ROOF-2-STORAGE	STORAGE	0.02	0.11	60.11	0	01:14	0.11
T3-ROOF-3-STORAGE	STORAGE	0.02	0.11	60.11	0	01:14	0.11
T3-ROOF-4-NOSTORAGE	STORAGE	0.00	0.00	60.00	0	01:05	0.00
T3-ROOF-5-NOSTORAGE	STORAGE	0.00	0.00	60.00	0	01:05	0.00
T4-ROOF1-STORAGE	STORAGE	0.04	0.12	60.12	0	01:14	0.12
T4-ROOF2-NOSTORAGE	STORAGE	0.00	0.01	60.01	0	01:05	0.01
T5A5B-ROOF-STORAGE	STORAGE	0.06	0.14	60.14	0	01:22	0.14
T5A-ROOF-STORAGE	STORAGE	0.03	0.12	60.12	0	01:14	0.12
T5-ROOF_AMMENITY_2	STORAGE	0.00	0.00	60.00	0	01:05	0.00
T5-ROOF-AMMENITY_1	STORAGE	0.00	0.00	60.00	0	01:05	0.00
T5-ROOF-STORAGE	STORAGE	0.03	0.12	60.12	0	01:14	0.12

T6-ROOF_AMMENITY_1	STORAGE	0.00	0.00	60.00	0	01:05	0.00	
T6-ROOF_AMMENITY_2	STORAGE	0.00	0.00	60.00	0	01:05	0.00	

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
202B	JUNCTION	7.48	297.03	0	01:12	0.0162	0.572	-0.064
204	JUNCTION	0.00	254.12	0	01:12	0	0.485	-0.004
205	JUNCTION	0.00	194.41	0	01:09	0	0.389	-0.458
206	JUNCTION	6.32	127.53	0	01:12	0.00763	0.245	0.454
207	JUNCTION	0.00	74.37	0	01:10	0	0.142	-0.224
208	JUNCTION	0.00	23.66	0	01:15	0	0.0294	-0.089
209	JUNCTION	0.00	9.92	0	01:10	0	0.000479	0.994
210	JUNCTION	0.00	100.53	0	01:10	0	0.276	0.002
CB04	JUNCTION	0.00	10.83	0	01:10	0	0.0145	0.007
CB04-MAJ	JUNCTION	10.21	16.78	0	01:10	0.0131	0.0213	-0.045
CB05	JUNCTION	0.00	10.53	0	01:10	0	0.0149	2.082
CB05-MAJ	JUNCTION	17.15	17.15	0	01:10	0.0231	0.0231	0.012
CB07	JUNCTION	8.03	26.80	0	01:12	0.00922	0.00938	0.471
CB08	JUNCTION	3.83	20.25	0	01:11	0.00668	0.00704	3.388
CB09	JUNCTION	13.27	18.06	0	01:09	0.0201	0.0201	-0.043
CB10	JUNCTION	0.00	22.74	0	01:10	0	0.0441	1.617
CB10-MAJ	JUNCTION	52.71	52.71	0	01:10	0.0721	0.0721	-0.372
CB11	JUNCTION	32.19	32.19	0	01:10	0.0524	0.0524	1.357
DITCH-OUT	JUNCTION	17.99	51.08	0	01:17	0.025	0.0756	0.416
IN138478	JUNCTION	11.53	26.08	0	01:19	0.0106	0.0415	0.001
IN141918	JUNCTION	0.00	54.86	0	01:11	0	0.0691	1.090
IN141918-MAJ	JUNCTION	18.99	58.52	0	01:10	0.0247	0.0692	0.047
IN141919	JUNCTION	0.00	49.88	0	01:10	0	0.0684	1.037
IN141919-MAJ	JUNCTION	45.14	50.93	0	01:10	0.0616	0.0684	0.057
MHST54409	JUNCTION	25.05	192.74	0	01:10	0.0356	0.377	-0.720
MHST54410	JUNCTION	0.00	391.24	0	01:10	0	0.791	-0.285
MHST54411	JUNCTION	102.40	202.61	0	01:10	0.137	0.413	0.508
MHST54412	JUNCTION	0.00	181.26	0	01:43	0	1.82	-0.001
MHST54413	JUNCTION	0.00	181.26	0	01:43	0	1.82	0.002
MHST54414	JUNCTION	0.00	181.26	0	01:44	0	1.82	0.004
MHST54415	JUNCTION	3.88	471.11	0	01:12	0.00794	0.981	-0.524
MHST54416	JUNCTION	0.00	465.33	0	01:12	0	0.971	0.589
MHST76833	JUNCTION	0.00	176.39	0	01:13	0	0.345	1.065
MHST76834	JUNCTION	4.48	127.48	0	01:11	0.0111	0.21	-0.024
MHST76835	JUNCTION	0.00	148.65	0	01:12	0	0.26	-0.013
MHST78305	JUNCTION	0.00	82.21	0	01:07	0	0.129	-0.056
MHST78307	JUNCTION	0.00	37.70	0	01:19	0	0.0849	-0.011
MHST78309	JUNCTION	0.00	289.36	0	01:12	0	0.555	-0.071
POND-OUTLET	JUNCTION	0.00	181.26	0	01:43	0	1.82	0.002
T01	JUNCTION	0.00	124.77	0	01:12	0	0.209	-0.008
T02	JUNCTION	0.00	150.92	0	01:12	0	0.261	0.084
T03	JUNCTION	0.00	123.51	0	01:11	0	0.198	-0.019
T04	JUNCTION	0.00	83.53	0	01:07	0	0.13	0.045
T05	JUNCTION	0.00	62.95	0	01:07	0	0.0971	0.011
T06	JUNCTION	0.00	20.85	0	01:14	0	0.0294	0.008
T07	JUNCTION	0.00	20.55	0	01:10	0	0.0154	-0.054
T08	JUNCTION	0.00	352.41	0	01:12	0	0.704	-0.117
T09	JUNCTION	0.00	208.46	0	01:12	0	0.411	0.005
T10	JUNCTION	0.00	85.94	0	01:10	0	0.144	-0.001
TOWER1-CONN	JUNCTION	52.28	118.71	0	01:10	0.0653	0.266	0.003
TOWER2-CONN-1	JUNCTION	16.82	57.83	0	01:10	0.024	0.131	0.077
TOWER2-CONN-2	JUNCTION	0.00	39.44	0	01:10	0	0.0709	0.118
TOWER2-CONN-3	JUNCTION	0.00	11.42	0	01:10	0	0.00137	2.773
TOWER3-CONN-1	JUNCTION	0.00	46.91	0	01:10	0	0.0742	0.259
TOWER3-CONN-2	JUNCTION	0.00	74.02	0	01:10	0	0.146	0.349
TOWER4-CONN-1	JUNCTION	0.00	48.67	0	01:12	0	0.0931	0.206
TOWER4-CONN-2	JUNCTION	11.83	66.59	0	01:10	0.0163	0.132	0.119
TOWER5A5B-CONN	JUNCTION	0.00	100.29	0	01:10	0	0.276	0.061
OUTFALL_174	OUTFALL	14.00	14.00	0	01:10	0.0115	0.0115	0.000
OUTFALL_OTT_RIVER_1	OUTFALL	0.00	181.26	0	01:44	0	1.82	0.000
OUTFALL_OTT_RIVER_2	OUTFALL	20.14	20.14	0	01:10	0.018	0.018	0.000
OUTFALL_RAVINE	OUTFALL	0.00	30.38	0	01:19	0	0.0458	0.000
OUTFALL_SWMPOND	OUTFALL	0.00	0.47	0	01:43	0	0.000432	0.000
SP01	STORAGE	47.32	61.65	0	01:08	0.063	0.0812	-0.020
SP02	STORAGE	42.04	42.04	0	01:10	0.0598	0.0598	-0.001
SP03	STORAGE	18.42	47.91	0	01:10	0.0261	0.0546	22.593
SP04	STORAGE	13.60	13.60	0	01:10	0.02	0.02	0.003
SP05	STORAGE	11.52	11.52	0	01:10	0.0143	0.0143	0.002
SP06	STORAGE	26.28	32.90	0	01:09	0.0346	0.0412	0.031
SP07	STORAGE	15.11	15.11	0	01:10	0.0192	0.0196	-0.012
SP08	STORAGE	24.14	24.14	0	01:10	0.0327	0.0327	-0.002
SP09	STORAGE	7.49	7.49	0	01:10	0.00939	0.00939	0.001
SP10	STORAGE	5.59	5.59	0	01:10	0.00631	0.00631	0.007
SP11	STORAGE	10.92	10.92	0	01:10	0.0136	0.0136	0.002
SP12	STORAGE	11.61	11.61	0	01:10	0.014	0.014	0.002
SP13	STORAGE	8.31	8.31	0	01:10	0.00864	0.00864	-0.003
SP14	STORAGE	8.85	8.85	0	01:10	0.0103	0.0103	0.001
SP15	STORAGE	8.10	8.10	0	01:10	0.00914	0.00914	0.001
SP16	STORAGE	7.96	7.96	0	01:10	0.00913	0.00913	0.003
SP17	STORAGE	7.34	7.34	0	01:10	0.0079	0.0079	0.001
SP18	STORAGE	9.64	9.64	0	01:10	0.0106	0.0106	1.147
SP19	STORAGE	12.67	12.67	0	01:10	0.0137	0.0137	0.012
SP20	STORAGE	34.76	34.76	0	01:10	0.0428	0.0428	-0.002
SP21	STORAGE	19.95	19.95	0	01:10	0.0255	0.0255	-0.012
SP22	STORAGE	18.84	18.84	0	01:10	0.023	0.023	-0.001
SP23	STORAGE	29.49	29.49	0	01:10	0.0327	0.0327	0.001
SP24	STORAGE	7.51	7.51	0	01:10	0.00739	0.00739	0.002
SP25	STORAGE	12.43	12.43	0	01:10	0.0131	0.0131	0.001
SP26	STORAGE	9.34	9.34	0	01:10	0.0111	0.0111	0.002
SP27	STORAGE	18.92	18.92	0	01:10	0.0206	0.0206	0.003
SP28	STORAGE	4.19	4.19	0	01:10	0.00412	0.00411	-0.001
SP29	STORAGE	6.06	6.06	0	01:10	0.00704	0.00704	0.007
SP30	STORAGE	10.96	10.96	0	01:10	0.0109	0.0109	0.011
SP31,SP32	STORAGE	2.38	2.38	0	01:05	0.00337	0.00337	-0.009
SP35	STORAGE	64.42	64.42	0	01:10	0.0859	0.0859	-0.328
SP36	STORAGE	7.99	7.99	0	01:10	0.00974	0.00974	0.001
SP99	STORAGE	49.08	84.77	0	01:10	0.0574	0.0869	40.807
SWM-POND	STORAGE	40.44	856.80	0	01:12	0.0522	1.83	0.005
T1-ROOF-STORAGE	STORAGE	43.08	43.08	0	01:10	0.0612	0.0612	0.004
T2-ROOF1-STORAGE	STORAGE	17.78	17.78	0	01:10	0.0252	0.0252	0.000

T2-ROOF2-STORAGE	STORAGE	4.75	4.75	0	01:05	0.00675	0.00675	-0.000
T2-ROOF3-STORAGE	STORAGE	4.55	4.55	0	01:05	0.00646	0.00646	-0.001
T2-ROOF-4-NOSTORAGE	STORAGE	14.51	14.51	0	01:10	0.0206	0.0206	-1.131
T2-ROOF-5-NOSTORAGE	STORAGE	3.27	3.27	0	01:05	0.00464	0.00464	-1.694
T3-ROOF-1-STORAGE	STORAGE	19.95	19.95	0	01:10	0.0283	0.0283	0.001
T3-ROOF-2-STORAGE	STORAGE	3.71	3.71	0	01:05	0.00527	0.00527	0.000
T3-ROOF-3-STORAGE	STORAGE	3.86	3.86	0	01:05	0.00548	0.00548	0.000
T3-ROOF-4-NOSTORAGE	STORAGE	14.56	14.56	0	01:10	0.0207	0.0207	-1.131
T3-ROOF-5-NOSTORAGE	STORAGE	3.66	3.66	0	01:05	0.0052	0.0052	-1.257
T4-ROOF1-STORAGE	STORAGE	37.73	37.73	0	01:05	0.0536	0.0536	0.000
T4-ROOF2-NOSTORAGE	STORAGE	25.30	25.30	0	01:05	0.0359	0.0359	-0.880
T5A5B-ROOF-STORAGE	STORAGE	49.66	49.66	0	01:10	0.0706	0.0706	0.001
T5A-ROOF-STORAGE	STORAGE	28.87	28.87	0	01:10	0.041	0.041	-0.001
T5-ROOF_AMMENITY_2	STORAGE	10.40	10.40	0	01:05	0.0148	0.0148	-0.877
T5-ROOF-AMMENITY_1	STORAGE	10.30	10.30	0	01:05	0.0146	0.0146	-0.880
T5-ROOF-STORAGE	STORAGE	28.87	28.87	0	01:10	0.041	0.041	-0.000
T6-ROOF_AMMENITY_1	STORAGE	8.37	8.37	0	01:05	0.0119	0.0119	-1.147
T6-ROOF_AMMENITY_2	STORAGE	10.40	10.40	0	01:05	0.0148	0.0148	-0.877

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
202B	JUNCTION	2.04	0.717	0.923
204	JUNCTION	1.85	0.694	1.116
205	JUNCTION	1.43	0.573	0.407
206	JUNCTION	1.38	0.642	0.308
207	JUNCTION	1.16	0.755	0.225
208	JUNCTION	0.08	0.120	2.477
210	JUNCTION	0.13	0.676	1.484
CB07	JUNCTION	0.99	0.777	0.000
CB08	JUNCTION	11.68	1.354	0.099
CB09	JUNCTION	1.66	0.621	0.129
MHST54409	JUNCTION	0.58	0.070	3.883
MHST54410	JUNCTION	1.53	0.408	2.666
MHST54411	JUNCTION	0.15	0.958	0.742
MHST54415	JUNCTION	2.22	0.836	1.354
MHST54416	JUNCTION	2.07	0.736	0.764
MHST76833	JUNCTION	0.19	0.284	3.201
MHST76834	JUNCTION	0.13	0.215	1.674
MHST76835	JUNCTION	0.12	0.142	2.073
MHST78305	JUNCTION	0.10	0.163	1.612
MHST78309	JUNCTION	1.93	0.725	1.335
T01	JUNCTION	0.15	0.222	1.794
T03	JUNCTION	0.04	0.039	1.668
T08	JUNCTION	2.05	0.721	0.885
T09	JUNCTION	1.87	0.731	1.009
T10	JUNCTION	1.35	0.842	0.180
TOWER1-CONN	JUNCTION	2.19	0.890	4.300
TOWER2-CONN-1	JUNCTION	1.94	0.653	4.457
TOWER2-CONN-2	JUNCTION	1.90	0.714	4.366
TOWER2-CONN-3	JUNCTION	0.01	0.584	2.916
TOWER3-CONN-1	JUNCTION	1.66	0.606	4.334
TOWER3-CONN-2	JUNCTION	1.55	0.649	4.228
TOWER4-CONN-1	JUNCTION	1.34	0.629	4.141
TOWER4-CONN-2	JUNCTION	1.11	0.748	3.902
TOWER5A5B-CONN	JUNCTION	0.11	0.633	2.867

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Node Flooding Summary
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Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days	hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
CB07	0.01	20.95	0	01:12	0.000	0.000
SP18	0.07	3.51	0	01:10	0.001	0.000
SP21	0.04	5.75	0	01:12	0.000	0.000
SP99	12.00	0.00	0	00:00	0.000	-1.000

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days	hr:min	Maximum Outflow LPS
SP01	0.000	2	0	0	0.007	43	0	01:13	38.78
SP02	0.001	1	0	0	0.011	17	0	01:13	21.28
SP03	0.000	34	0	0	0.000	65	0	01:11	40.40
SP04	0.001	6	0	0	0.004	44	0	01:24	6.12
SP05	0.000	0	0	0	0.000	4	0	01:11	9.81
SP06	0.000	3	0	0	0.005	47	0	01:12	25.21
SP07	0.000	1	0	0	0.001	30	0	01:12	12.58
SP08	0.000	0	0	0	0.000	0	0	00:00	24.12
SP09	0.000	0	0	0	0.000	7	0	01:12	5.35
SP10	0.000	0	0	0	0.000	2	0	01:11	4.93
SP11	0.000	1	0	0	0.002	11	0	01:16	5.47
SP12	0.000	1	0	0	0.002	16	0	01:16	5.60
SP13	0.000	0	0	0	0.000	0	0	00:00	8.09
SP14	0.000	1	0	0	0.001	28	0	01:13	5.73
SP15	0.000	0	0	0	0.001	7	0	01:12	5.78
SP16	0.000	1	0	0	0.001	17	0	01:12	5.30
SP17	0.000	0	0	0	0.000	8	0	01:12	5.13
SP18	0.000	8	0	0	0.001	100	0	01:07	6.13
SP19	0.000	0	0	0	0.000	4	0	01:12	9.98
SP20	0.000	4	0	0	0.007	66	0	01:13	19.17
SP21	0.001	14	0	0	0.007	100	0	01:12	6.71
SP22	0.000	1	0	0	0.003	15	0	01:13	11.15

SP23	0.000	0	0	0	0.002	12	0	01:12	21.08
SP24	0.000	0	0	0	0.000	0	0	00:00	7.26
SP25	0.000	0	0	0	0.000	9	0	01:11	9.94
SP26	0.000	1	0	0	0.001	26	0	01:13	5.70
SP27	0.000	0	0	0	0.001	19	0	01:11	15.23
SP28	0.000	0	0	0	0.000	0	0	00:00	3.94
SP29	0.000	0	0	0	0.000	9	0	01:11	5.19
SP30	0.000	0	0	0	0.000	1	0	01:11	9.75
SP31,SP32	0.000	0	0	0	0.000	0	0	00:00	2.38
SP35	0.000	2	0	0	0.005	69	0	01:12	51.24
SP36	0.000	1	0	0	0.001	20	0	01:13	5.41
SP99	0.009	0	0	0	0.000	0	0	00:00	39.14
SWM-POND	0.442	29	0	0	0.943	62	0	01:43	181.73
T1-ROOF-STORAGE	0.010	26	0	0	0.029	74	0	01:23	8.54
T2-ROOF1-STORAGE	0.001	7	0	0	0.008	50	0	01:14	7.51
T2-ROOF2-STORAGE	0.000	1	0	0	0.001	17	0	01:10	4.19
T2-ROOF3-STORAGE	0.000	1	0	0	0.001	16	0	01:10	4.06
T2-ROOF-4-NOSTORAGE	0.000	0	0	0	0.000	0	0	00:00	14.51
T2-ROOF-5-NOSTORAGE	0.000	0	0	0	0.000	0	0	00:00	3.27
T3-ROOF-1-STORAGE	0.002	16	0	0	0.010	86	0	01:14	6.07
T3-ROOF-2-STORAGE	0.000	5	0	0	0.001	38	0	01:14	1.26
T3-ROOF-3-STORAGE	0.000	5	0	0	0.002	38	0	01:14	1.26
T3-ROOF-4-NOSTORAGE	0.000	0	0	0	0.000	0	0	00:00	14.56
T3-ROOF-5-NOSTORAGE	0.000	0	0	0	0.000	0	0	00:00	3.66
T4-ROOF1-STORAGE	0.003	10	0	0	0.018	55	0	01:14	11.19
T4-ROOF2-NOSTORAGE	0.000	0	0	0	0.000	0	0	00:00	25.30
T5A5B-ROOF-STORAGE	0.009	23	0	0	0.030	82	0	01:22	10.82
T5A-ROOF-STORAGE	0.002	8	0	0	0.012	55	0	01:14	10.90
T5-ROOF_AMMENITY_2	0.000	0	0	0	0.000	0	0	00:00	10.40
T5-ROOF-AMMENITY_1	0.000	0	0	0	0.000	0	0	00:00	10.30
T5-ROOF-STORAGE	0.002	7	0	0	0.013	49	0	01:14	10.59
T6-ROOF_AMMENITY_1	0.000	0	0	0	0.000	0	0	00:00	8.37
T6-ROOF_AMMENITY_2	0.000	0	0	0	0.000	0	0	00:00	10.40

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OUTFALL_174	69.18	1.29	14.00	0.011
OUTFALL_OTT_RIVER_1	98.34	102.89	181.26	1.820
OUTFALL_OTT_RIVER_2	32.02	4.41	20.14	0.018
OUTFALL_RAVINE	86.76	3.75	30.38	0.046
OUTFALL_SWMPOND	11.38	0.30	0.47	0.000
System	59.53	112.64	206.39	1.896

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C01	CHANNEL	5.80	0	01:10	0.21	0.00	0.20
C01_1	CONDUIT	21.62	0	01:20	0.09	0.01	0.28
C01_5	CONDUIT	40.62	0	01:16	0.37	0.01	0.31
C02	CONDUIT	126.46	0	01:12	1.22	0.88	1.00
C03	CONDUIT	73.60	0	01:12	0.82	0.33	1.00
C030	CONDUIT	55.38	0	01:11	1.95	0.59	0.78
C04	CONDUIT	20.23	0	01:12	0.71	0.86	1.00
C05	CONDUIT	100.53	0	01:10	2.19	0.47	1.00
C05.1	CONDUIT	15.26	0	01:15	0.47	0.11	0.95
C05.2	CONDUIT	9.92	0	01:10	0.25	0.04	0.66
C06	CONDUIT	10.83	0	01:10	1.35	0.20	0.30
C060	CONDUIT	24.12	0	01:10	3.27	0.18	0.28
C07	CONDUIT	10.53	0	01:10	0.93	0.32	0.39
C08	CONDUIT	23.66	0	01:15	0.48	0.16	1.00
C080	CONDUIT	49.87	0	01:10	1.70	1.07	0.92
C09	CONDUIT	32.06	0	01:10	1.22	0.97	0.78
C10	CONDUIT	22.74	0	01:10	3.92	0.12	0.24
C11	CONDUIT	0.47	0	01:43	0.02	0.00	0.03
C12	CONDUIT	100.56	0	01:10	1.98	0.75	1.00
C13	CONDUIT	208.64	0	01:12	1.05	0.90	1.00
C14	CONDUIT	27.81	0	01:15	0.30	0.35	1.00
C15	CONDUIT	74.87	0	01:10	1.08	0.41	1.00
C16	CONDUIT	55.55	0	01:09	2.02	0.51	1.00
C17	CHANNEL	6.57	0	01:10	0.62	0.00	0.09
C18	CONDUIT	254.26	0	01:12	1.20	0.66	1.00
C19	CHANNEL	0.00	0	00:00	0.00	0.00	0.17
C20	CHANNEL	29.53	0	01:10	0.14	0.01	0.58
C21	CHANNEL	30.38	0	01:19	0.31	0.35	0.26
C22	CONDUIT	7.90	0	01:05	0.29	0.43	1.00
C23	CONDUIT	18.40	0	01:24	0.14	0.22	1.00
C24	CONDUIT	16.66	0	01:11	0.68	0.11	1.00
C25	CONDUIT	197.41	0	01:12	1.21	0.58	1.00
C26	CONDUIT	28.36	0	01:17	0.31	0.58	0.74
C27	CHANNEL	0.00	0	00:00	0.00	0.00	0.04
C28	CONDUIT	17.81	0	01:09	0.60	0.16	1.00
C29	CONDUIT	66.59	0	01:10	2.44	0.18	1.00
C37	CONDUIT	26.09	0	01:19	1.12	0.46	0.48
OL4	CHANNEL	40.40	0	01:10	0.26	0.56	0.37
STM104099	CONDUIT	37.68	0	01:19	0.70	0.18	0.66
STM104100	CONDUIT	176.36	0	01:13	1.67	1.21	1.00
STM104102_1	CONDUIT	124.77	0	01:12	1.13	1.29	1.00
STM104102_3	CONDUIT	124.73	0	01:12	1.13	1.34	1.00
STM104102_4	CONDUIT	148.65	0	01:12	1.38	1.51	1.00
STM104104	CONDUIT	148.60	0	01:12	1.38	1.03	1.00
STM105994_2	CONDUIT	82.21	0	01:07	1.12	1.07	1.00
STM105994_5	CONDUIT	60.54	0	01:07	0.76	0.78	1.00
STM105995_1	CONDUIT	80.05	0	01:07	0.85	1.09	1.00
STM105995_2	CONDUIT	123.05	0	01:11	1.11	1.76	1.00
STM105997	CONDUIT	11.42	0	01:10	0.29	0.28	1.00
STM106002-1_1	CONDUIT	299.92	0	01:12	1.06	0.99	1.00
STM106002-1_2	CONDUIT	358.49	0	01:12	1.27	1.15	1.00
STM106002-2	CONDUIT	290.68	0	01:12	1.03	1.21	1.00

STM65382	CONDUIT	467.36	0	01:12	1.65	1.85	1.00
STM65383	CONDUIT	471.58	0	01:12	2.16	0.38	1.00
STM65384	CONDUIT	181.26	0	01:43	2.20	0.34	0.41
STM65386	CONDUIT	181.26	0	01:44	2.13	0.36	0.42
STM65387	CONDUIT	181.26	0	01:44	2.15	0.36	0.41
STM65388	CONDUIT	202.63	0	01:10	2.87	1.76	1.00
STM65389	CONDUIT	192.28	0	01:10	2.44	0.78	1.00
STM65390	CONDUIT	386.99	0	01:10	3.50	1.03	1.00
STMH65384	CONDUIT	181.26	0	01:43	2.22	0.34	0.40
STM-LAT-T1	CONDUIT	118.73	0	01:10	3.78	2.72	1.00
STM-LAT-T2(1)	CONDUIT	57.85	0	01:09	1.79	0.68	1.00
STM-LAT-T2(2)	CONDUIT	39.67	0	01:09	1.61	0.48	1.00
STM-LAT-T3	CONDUIT	77.69	0	01:09	1.43	0.60	1.00
STM-LAT-T4	CONDUIT	64.99	0	01:11	1.77	0.47	1.00
SWM-CONTROL	ORIFICE	181.26	0	01:43			1.00
CB4-IC	DUMMY	10.83	0	01:10			
CB5-IC	DUMMY	10.53	0	01:10			
CB9-IC	DUMMY	22.74	0	01:10			
IN141918-IC	DUMMY	54.86	0	01:11			
IN141919-IC	DUMMY	49.88	0	01:10			
SP01-OUTLET	DUMMY	38.78	0	01:13			
SP02-OUTLET	DUMMY	21.28	0	01:13			
SP04-OUTLET	DUMMY	6.12	0	01:24			
SP05-OUTLET	DUMMY	9.81	0	01:11			
SP06-OUTLET	DUMMY	6.08	0	01:12			
SP07-OUTLET	DUMMY	5.47	0	01:12			
SP09-OUTLET	DUMMY	5.35	0	01:12			
SP10-OUTLET	DUMMY	4.93	0	01:11			
SP11-OUTLET	DUMMY	5.47	0	01:16			
SP12-OUTLET	DUMMY	5.60	0	01:16			
SP13-OUTLET	DUMMY	8.09	0	01:10			
SP14-OUTLET	DUMMY	5.73	0	01:13			
SP15-OUTLET	DUMMY	5.78	0	01:12			
SP16-OUTLET	DUMMY	5.30	0	01:12			
SP17-OUTLET	DUMMY	5.13	0	01:12			
SP18-OUTLET	DUMMY	6.13	0	01:08			
SP19-OUTLET	DUMMY	9.98	0	01:12			
SP20-OUTLET	DUMMY	19.17	0	01:13			
SP21-OUTLET	DUMMY	6.71	0	01:12			
SP22-OUTLET	DUMMY	11.15	0	01:13			
SP23-OUTLET	DUMMY	21.08	0	01:12			
SP24-OUTLET	DUMMY	7.26	0	01:10			
SP25-OUTLET	DUMMY	9.94	0	01:11			
SP26-OUTLET	DUMMY	5.70	0	01:13			
SP27-OUTLET	DUMMY	15.23	0	01:11			
SP28-OUTLET	DUMMY	3.94	0	01:10			
SP29-OUTLET	DUMMY	5.19	0	01:11			
SP30-OUTLET	DUMMY	9.75	0	01:11			
SP31,SP32-OUTLET	DUMMY	2.38	0	01:06			
SP35-OUTLET	DUMMY	25.67	0	01:12			
SP36-OULTET	DUMMY	5.41	0	01:13			
T1-ROOF-OUTLET	DUMMY	8.54	0	01:23			
T2-ROOF-1-OUTLET	DUMMY	7.51	0	01:14			
T2-ROOF-2-OUTLET	DUMMY	4.19	0	01:10			
T2-ROOF-3-OUTLET	DUMMY	4.06	0	01:10			
T2-ROOF-4-OUTLET	DUMMY	14.51	0	01:10			
T2-ROOF-5-OUTLET	DUMMY	3.27	0	01:05			
T3-ROOF-1-OUTLET	DUMMY	6.07	0	01:14			
T3-ROOF-2-OUTLET	DUMMY	1.26	0	01:01			
T3-ROOF-3-OUTLET	DUMMY	1.26	0	01:01			
T3-ROOF-4-OUTLET	DUMMY	14.56	0	01:05			
T3-ROOF-5-OUTLET	DUMMY	3.66	0	01:05			
T4-AMENITYROOF-OUTLET	DUMMY	25.30	0	01:05			
T4-HIGHROOF-OUTLET	DUMMY	11.19	0	01:14			
T5&6_Podium-ROOF-OUTLET	DUMMY	10.82	0	01:22			
T5_AMMENITY_OUTLET_1	DUMMY	10.30	0	01:05			
T5_AMMENITY_OUTLET_2	DUMMY	10.40	0	01:05			
T5-ROOF_HIGH_OUTLET	DUMMY	10.59	0	01:14			
T6_AMMENITY_OUTLET_1	DUMMY	8.37	0	01:05			
T6_AMMENITY_OUTLET_2	DUMMY	10.40	0	01:05			
T6-ROOF-HIGH-OUTLET	DUMMY	10.90	0	01:14			

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Flow Classification Summary
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	Adjusted	Fraction of Time in Flow Class								
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C01	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.99	0.00
C01_1	1.00	0.00	0.63	0.00	0.00	0.00	0.37	0.00	0.00	0.00
C01_5	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.06	0.00
C02	1.00	0.00	0.00	0.00	0.55	0.00	0.00	0.44	0.01	0.00
C03	1.00	0.00	0.03	0.00	0.97	0.00	0.00	0.00	0.80	0.00
C030	1.00	0.04	0.00	0.00	0.01	0.02	0.00	0.93	0.01	0.00
C04	1.00	0.00	0.00	0.00	0.43	0.00	0.00	0.57	0.01	0.00
C05	1.00	0.00	0.00	0.00	0.24	0.76	0.00	0.00	0.79	0.00
C05.1	1.00	0.01	0.04	0.00	0.95	0.00	0.00	0.00	0.93	0.00
C05.2	1.00	0.05	0.80	0.00	0.15	0.00	0.00	0.00	0.89	0.00
C06	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C060	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C07	1.00	0.05	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00
C08	1.00	0.22	0.03	0.00	0.75	0.01	0.00	0.00	0.93	0.00
C080	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
C09	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
C10	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
C11	1.00	0.87	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00
C12	1.00	0.00	0.00	0.00	0.04	0.01	0.00	0.95	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.98	0.01	0.00	0.00	0.54	0.00
C14	1.00	0.01	0.21	0.00	0.78	0.00	0.00	0.00	0.91	0.00
C15	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.38	0.00
C16	1.00	0.01	0.00	0.00	0.54	0.01	0.00	0.44	0.01	0.00
C17	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00	0.87	0.00
C18	1.00	0.00	0.00	0.00	0.60	0.03	0.00	0.37	0.00	0.00
C19	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C21	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C22	1.00	0.18	0.04	0.00	0.78	0.00	0.00	0.00	0.94	0.00
C23	1.00	0.18	0.04	0.00	0.78	0.00	0.00	0.00	0.33	0.00
C24	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.49	0.00
C25	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.68	0.00

C26	1.00	0.00	0.19	0.00	0.81	0.00	0.00	0.00	0.90	0.00
C27	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C28	1.00	0.00	0.20	0.00	0.79	0.00	0.00	0.00	0.82	0.00
C29	1.00	0.00	0.00	0.00	0.67	0.33	0.00	0.00	0.80	0.00
C37	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
OL4	1.00	0.00	0.00	0.00	0.83	0.00	0.17	0.00	0.00	0.00
STM104099	1.00	0.01	0.24	0.00	0.75	0.01	0.00	0.00	0.96	0.00
STM104100	1.00	0.01	0.00	0.00	0.37	0.00	0.00	0.61	0.10	0.00
STM104102_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.80	0.00
STM104102_3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.76	0.00
STM104102_4	1.00	0.01	0.00	0.00	0.07	0.00	0.00	0.92	0.00	0.00
STM104104	1.00	0.01	0.00	0.00	0.86	0.12	0.00	0.00	0.90	0.00
STM105994_2	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.00	0.00
STM105994_5	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.75	0.00
STM105995_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.86	0.00
STM105995_2	1.00	0.00	0.00	0.00	0.21	0.00	0.00	0.78	0.00	0.00
STM105997	1.00	0.17	0.03	0.00	0.08	0.00	0.00	0.72	0.01	0.00
STM106002-1_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.65	0.00
STM106002-1_2	1.00	0.00	0.00	0.00	0.75	0.00	0.00	0.25	0.00	0.00
STM106002-2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04	0.00
STM65382	1.00	0.00	0.00	0.00	0.59	0.00	0.00	0.41	0.01	0.00
STM65383	1.00	0.00	0.00	0.00	0.85	0.14	0.00	0.00	0.68	0.00
STM65384	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM65386	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
STM65387	1.00	0.01	0.00	0.00	0.00	0.99	0.00	0.00	0.45	0.00
STM65388	1.00	0.00	0.00	0.00	0.53	0.00	0.00	0.47	0.07	0.00
STM65389	1.00	0.00	0.00	0.00	0.51	0.01	0.00	0.48	0.05	0.00
STM65390	1.00	0.00	0.00	0.00	0.83	0.17	0.00	0.00	0.69	0.00
STMH65384	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.86	0.00
STM-LAT-T1	1.00	0.00	0.00	0.00	0.55	0.00	0.00	0.45	0.01	0.00
STM-LAT-T2(1)	1.00	0.00	0.00	0.00	0.56	0.01	0.00	0.43	0.02	0.00
STM-LAT-T2(2)	1.00	0.00	0.00	0.00	0.56	0.01	0.00	0.44	0.01	0.00
STM-LAT-T3	1.00	0.00	0.00	0.00	0.50	0.00	0.49	0.00	0.00	0.00
STM-LAT-T4	1.00	0.01	0.00	0.00	0.50	0.00	0.00	0.49	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C02	1.53	1.53	1.65	0.01	0.01
C03	1.35	1.35	1.53	0.01	0.01
C030	0.01	0.01	0.04	0.01	0.01
C04	0.99	0.99	1.18	0.01	0.01
C05	0.11	0.11	0.13	0.01	0.01
C05.1	0.01	0.01	0.06	0.01	0.01
C08	0.06	0.06	0.08	0.01	0.01
C080	0.01	0.01	0.01	0.05	0.01
C12	0.13	0.13	0.15	0.01	0.01
C13	1.87	1.87	1.90	0.01	0.01
C14	0.08	0.08	0.10	0.01	0.01
C15	1.16	1.16	1.35	0.01	0.01
C16	1.66	1.66	1.85	0.01	0.01
C18	1.90	1.90	1.94	0.01	0.01
C20	0.01	0.01	0.25	0.01	0.01
C22	0.01	0.01	0.31	0.01	0.01
C23	0.30	0.30	0.38	0.01	0.01
C24	1.81	1.81	11.68	0.01	0.01
C25	1.65	1.65	1.87	0.01	0.01
C26	0.01	0.23	0.01	0.01	0.01
C28	1.66	1.66	2.44	0.01	0.01
C29	1.11	1.11	1.52	0.01	0.01
STM104099	0.01	0.01	0.19	0.01	0.01
STM104100	0.06	0.19	0.58	0.20	0.03
STM104102_1	0.15	0.16	0.15	0.19	0.14
STM104102_3	0.14	0.15	0.14	0.20	0.14
STM104102_4	0.12	0.14	0.12	0.24	0.11
STM104104	0.13	0.13	0.19	0.04	0.03
STM105994_2	0.10	0.10	0.10	0.05	0.01
STM105994_5	0.10	0.10	0.10	0.01	0.01
STM105995_1	0.14	0.14	0.14	0.06	0.01
STM105995_2	0.14	0.14	0.14	0.25	0.13
STM105997	0.01	0.01	0.13	0.01	0.01
STM106002-1_1	2.04	2.04	2.05	0.01	0.02
STM106002-1_2	2.05	2.05	2.07	0.02	0.03
STM106002-2	1.93	1.93	2.05	0.07	0.04
STM65382	2.12	2.14	2.21	0.33	0.23
STM65383	2.26	2.26	2.69	0.01	0.01
STM65388	0.89	0.92	1.79	0.21	0.17
STM65389	0.70	0.70	1.53	0.01	0.01
STM65390	2.49	2.49	3.12	0.03	0.03
STM-LAT-T1	2.17	2.18	2.24	0.51	0.49
STM-LAT-T2(1)	1.94	1.94	2.14	0.01	0.01
STM-LAT-T2(2)	1.90	1.90	1.96	0.01	0.01
STM-LAT-T3	1.43	1.43	1.55	0.01	0.01
STM-LAT-T4	1.34	1.34	1.38	0.01	0.01

Analysis begun on: Fri Jun 21 16:12:09 2024
Analysis ended on: Fri Jun 21 16:12:13 2024
Total elapsed time: 00:00:04

Appendix J – Environmental Compliance Approvals

Municipal and Private Sewage Works (Stormwater) ECA # 8254-758SZW

Municipal and Private Sewage Works (Storm & Sanitary Sewers) ECA # 5176-744QFM

Ontario

Ministry of the Environment

Ministère de l'Environnement

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 8254-758SZW
Issue Date: October 2, 2007

6383009 Canada Inc.
839 Shefford Rd Suite 202
Ottawa, Ontario
K1J 9K8

Site Location: 8911 North Service Road
Lot 28 & 29, Concession 1, Cumberland
Russell Township, United Counties of Prescott and Russell

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

A stormwater management facility and appurtenances for a condominium development located at the above-referenced location as follows:

Storage volume consisting of:

- an active storage of approx. 718 cubic metres for the 100 year storm.

Flow Control consisting of:

- a headwall as per 804.030 OPSD at the outlet of the pond;

- a 20.5 metre long 525 millimetre diameter pipe from the headwall to a stormwater separator; the pipe is equipped with a 267 millimetre diameter orifice at its inlet rated at 180 litres per second for a head of 1.42 metres;

Water Quality Control consisting of :

- a stormwater separator with a maximum hydraulic capacity of 243 litres per second, sediment storage capacity of 2.45 cubic metres and an oil storage capacity of 1380 litres;

all in accordance with the Application for Approval of Municipal and Private Sewage Works submitted by 6383009 Canada Inc. and received on June 11, 2007, and Stormwater Management Report and other supporting documents prepared and submitted by David McManus Engineering Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the Ontario Water Resources Act, and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the Ontario Water Resources Act;

"District Manager" means the District Manager of the Cornwall District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Owner" means 6383009 Canada Inc. and includes its successors and assignees;

"Works" means the sewage works described in the Owner's application, this Certificate and in the supporting documentation referred to herein, to the extent approved by this Certificate.

"OPSD" means Ontario Provincial Standard;

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

(2) Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(3) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

2. EXPIRY OF APPROVAL

The approval issued by this Certificate will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Certificate.

3. CHANGE OF OWNER

The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; and

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

4. OPERATION AND MAINTENANCE.

(1) The Owner shall inspect the stormwater separator, clean and maintain it as per the manufacturer's specifications

(3) The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook available for inspection by the Ministry. The logbook shall include the following:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. RECORD KEEPING

The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Certificate.

6. TEMPORARY SEDIMENT AND EROSION CONTROL

(1) The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two weeks and after each significant storm event. The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required at which time they shall be removed and all disturbed areas reinstated properly.

(2) The Owner shall maintain records of inspections and maintenance activities undertaken to maintain the temporary sediment and erosion control measures, which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment..

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.

4. Condition 4 is included to require that the Works be properly operated and maintained such that the environment is protected .

5. Condition 5 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

6. Condition 6 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;

8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, Ontario Water Resources Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 2nd day of October, 2007

Mohamed Dhalla, P.Eng.
Director
Section 53, Ontario Water Resources Act

SK/
c: District Manager, MOE Cornwall
Ryan Polkinghorne, David McManus Engineering Ltd.

Ontario

Ministry of the Environment | Ministère de l'Environnement

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 5176-744QFM
Issue Date: June 17, 2007

6383009 Canada Inc.
839 Shefford Rd, Suite 202
Ottawa, Ontario
K1J 9K8

Site Location: Petrie's Landing Development
8911 North Service Road, Part of Lots 28 and 29, Concession 1
Ward 1, Cumberland, Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

storm and sanitary sewers to be constructed in the City of Ottawa on North Service Road;

all in accordance with the application from 6383009 Canada Inc., dated August 11, 2005, including final plans and specifications prepared by David McManus Engineering Limited.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, Ontario Water Resources Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 17th day of June, 2007

Sarah Paul, P.Eng.
Director
Section 53, Ontario Water Resources Act

MT/
c: District Manager, MOE Ottawa District Office
Ryan Polkinghorne, David McManus Engineering Ltd.
Charles Warnock, P. Eng., Acting Program Manager, Infrastructure Approvals

Appendix K – Background Information

Building Statistics (NEUF Architects - 4 pages)

BRIGIL

NEUF ARCHITECT(E)S

INFORMATION SUR LE PROJET - *PROJECT INFORMATION*

2024-06-14

11596 | **Petrie's Landing I** | **Tour 3 / Tower 3**

Dernière Révision/*Last Revised:*	2019-09-04 (Émis pour SPA - Rev 5/ Issued for SPA - Rev 5)

Zonage / *Zoning*	City of Ottawa zoning By-law No. 2008-250			
Superficie du Lot / *Property Area*	5 659,9	m² / *sq. m.*	60 923	pi² / *sq. ft*

STATISTIQUES SUR LE PROJET / *PROJECT STATISTICS*	Tour 3 / Tower 3
Hauteur du Bâtiment / *Building Height* (m)	61,100 (18 étages / *storeys*)

STATISTIQUES DES UNITÉS / *UNIT STATISTICS*	Tour 3 / Tower 3
Unités de Cohabitation / *Rooming Units*	0
Studio / *Bachelor*	2
1 Chambre / *1 Bedroom*	15
1 Chambre + Den / *1 Bedroom + Den*	75
2 Chambres / *2 Bedrooms*	68
3 Chambres / *2 Bedrooms*	2
TOTAL	162

STATIONNEMENT RÉSIDENTIEL / *RESIDENTIAL PARKING*

	EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
TOUR 3 / *TOWER 3*	#/Unit / *#/Unité*		Ratio (stat /unité) / *Ratio (parking/unit)*	
	1,2/unit	194	1,24	201
Tour 3 - Visiteurs / *Tower 3 - Visitors*	0,2/unit	32	0,20	32
Tour 3 - Accessible (inclus dans compte des visiteurs) / *Tower 3 - Accessible (included in visitors count)*	1-12=1 Type A 13-100=4% of total (50% Type A / 50% Type B) 101-200=1+3% of total (50% Type A / 50% Type B) 201-1000=2+2% of total (50% Type A / 50% Type B) 1001+=11+1% of total (50% Type A / 50% Type B)	7		7
TOTAL		226	1,44	233

STATIONNEMENT COMMERCIAL / *COMMERCIAL PARKING*

TOUR 3 / *TOWER 3*	Aire (m²) / *Area (m²)*	EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
		Ratio (stat /m²) / *Ratio (parking/m²)*		Ratio (stat /m²) / *Ratio (parking/m²)*	
Commercial / *Commercial*	0,00		0		0
Stationnement Accessible / *Accessible parking*			0		0
TOTAL					0

STATIONNEMENT POUR VÉLOS / *BICYCLE PARKING*

TOUR 3 / *TOWER 3*	EXIGÉ / *REQUIRED*				FOURNIS / *PROVIDED*
	Unités / *Units*	Aire (m²) / *Area (m²)*	Ratio / *Ratio*		
Résidentiel / *Residential*	162		0,5/unit	81	81
Commercial / *Commercial*		0,0		0	0
TOTAL				81	81

BRIGIL

NEUF ARCHITECT(E)S

INFORMATION SUR LE PROJET - *PROJECT INFORMATION*

2024-06-14

11467 **Petrie's Landing I** **Tour 4 / Tower 4**

Dernière Révision/*Last Revised:*	2021-09-14	(Émis pour SPA - Rev 6/ Issued for SPA - Rev 6)

Zonage / *Zoning*	**City of Ottawa zoning By-law No. 2008-250**			
Superficie du Lot / *Property Area*	**6 112,5**	**m² / *sq. m.***	**65 795**	**pi² / *sq. ft***

STATISTIQUES SUR LE PROJET / *PROJECT STATISTICS*	**Tour 4 / Tower 4**
Hauteur du Bâtiment / *Building Height* (m)	**73,900 (22 étages / *storeys*)**

STATISTIQUES DES UNITÉS / *UNIT STATISTICS*	**Tour 4 / Tower 4**
Unités de Cohabitation / *Rooming Units*	**0**
Studio / *Bachelor*	**37**
1 Chambre / *1 Bedroom*	**59**
1 Chambre + Den / *1 Bedroom + Den*	**96**
2 Chambres / *2 Bedrooms*	**41**
2 Chambres + Den / *2 Bedrooms + Den*	**26**
3 Chambres + Den / *3 Bedrooms + Den*	**2**
TOTAL	**261**

STATIONNEMENT RÉSIDENTIEL / *RESIDENTIAL PARKING*

TOUR 4 / *TOWER 4*	**EXIGÉ / *REQUIRED***		**FOURNIS / *PROVIDED***	
	# / Unit / # / *Unité*		**Ratio (stat /unité) / *Ratio (parking/unit)***	
Tour 4 - Résidentiel / *Tower 4 - Residential*	**1,2/unit**	313	1,10	286
Tour 4 - Visiteurs / *Tower 4 - Visitors*	**0,2/unit**	52	0,20	52
Tour 4 - Accessible (inclus dans compte des visiteurs) / *Tower 4 - Accessible (included in visitors count)*	**1-12=1 Type A 13-100=4% of total (50% Type A / 50% Type B) 101-200=1+3% of total (50% Type A / 50% Type B) 201-1000=2+2% of total (50% Type A / 50% Type B) 1001+=11+1% of total (50% Type A / 50% Type B)**	9		8
TOTAL		**365**	**1,30**	**338**

STATIONNEMENT COMMERCIAL / *COMMERCIAL PARKING*

TOUR 4 / *TOWER 4*	**Aire (m²) / *Area (m²)***	**EXIGÉ / *REQUIRED***		**FOURNIS / *PROVIDED***	
		Ratio (stat /m²) / *Ratio (parking/m²)*		**Ratio (stat /m²) / *Ratio (parking/m²)***	
Commercial / *Commercial*	**0,00**				
Stationnement Accessible / *Accessible parking*			**0**		
TOTAL					

STATIONNEMENT POUR VÉLOS / *BICYCLE PARKING*

TOUR 4 / *TOWER 4*	**EXIGÉ / *REQUIRED***				**FOURNIS / *PROVIDED***
	Unités / *Units*	**Aire (m²) / *Area (m²)***	**Ratio / *Ratio***		
Résidentiel / *Residential*	**261**		**0,5/unit**	**131**	**131**
Commercial / *Commercial*		**0,00**		**0**	**0**
TOTAL				**131**	**131**

BRIGIL

NEUF ARCHITECT(E)S

INFORMATION SUR LE PROJET - *PROJECT INFORMATION*

11597 **Petrie's Landing I** **(Tower 5)** **Tour 5b / Tower 5b** **2024-06-14**

Dernière Révision/*Last Revised:*	2021-09-14 (Émis pour SPA - Rev 6 / Issued for SPA - Rev 6)

Zonage / *Zoning*	City of Ottawa zoning By-law No. 2008-250			
Superficie du Lot / *Property Area*	3 909,6	m² / *sq. m.*	42 083	pi² / *sq. ft*

STATISTIQUES SUR LE PROJET / *PROJECT STATISTICS*	Tour 5b / Tower 5b
Hauteur du Bâtiment / *Building Height* (m)	70.2 m (22 étages / *storeys*)

STATISTIQUES DES UNITÉS / *UNIT STATISTICS*	Tour 5b / Tower 5b
Studio / *Studio*	35
1 Chambre / *1 Bedroom*	150
2 Chambres / *2 Bedrooms*	39
3 Chambres / 3 *Bedrooms*	4
TOTAL	228

STATIONNEMENT RÉSIDENTIEL / *RESIDENTIAL PARKING*

TOUR 5b / *TOWER 5b*	EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
	#/Unit / *#/Unité*		Ratio (stat /unité) / *Ratio (parking/unit)*	
Tour 5b - Résidentiel / *Tower 5b - Residential*	0,5/unit	114	0,57	130
Tour 5b - Visiteurs / *Tower 5b - Visitors*	0,2/unit	46	0,20	46
Tour 5b - Accessible (inclus dans compte des visiteurs) / *Tower 5b - Accessible (included in visitors count)*	1-12=1 Type A 13-100=4% of total (50% Type A / 50% Type B) 101-200=1+3% of total (50% Type A / 50% Type B) 201-1000=2+2% of total (50% Type A / 50% Type B) 1001+=11+1% of total (50% Type A / 50% Type B)	6		6
TOTAL		160	0,77	176

STATIONNEMENT COMMERCIAL / *COMMERCIAL PARKING*

TOUR 5b / TOWER 5b	Aire (m²) / *Area (m²)*	EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
		Ratio (stat /m²) / *Ratio (parking/m²)*		Ratio (stat /m²) / *Ratio (parking/m²)*	
Commercial / *Commercial*	877,65	3,4/100	30	0,000	0 ☆
Stationnement Accessible (inclus dans le compte commercial) / Accessible parking (included in commercial count)			2		0 ☆ T5a &T5b commercial parking required Total 2 accessible parking.
TOTAL ☆*Parking spaces located in Tower 5a*			30		0 ☆

STATIONNEMENT POUR VÉLOS / *BICYCLE PARKING*

TOUR 5b / TOWER 5b	EXIGÉ / *REQUIRED*				FOURNIS / *PROVIDED*
	Unités / *Units*	Aire (m²) / *Area (m²)*	Ratio / *Ratio*		
Résidentiel / *Residential*	228		0,5/unit	114	146
Commercial / *Commercial*		877,65	1/250	4	4
TOTAL				118	150

BRIGIL

NEUF ARCHITECT(E)S

INFORMATION SUR LE PROJET - *PROJECT INFORMATION*

12191 **Petrie's Landing I** **(Tower 6)** **Tour 5a / Tower 5a** **2024-06-14**

Dernière Révision/*Last Revised:*	2021-09-14 (Émis pour SPA - Rev 6 / Issued for SPA - Rev 6)

Zonage / *Zoning*	City of Ottawa zoning By-law No. 2008-250			
Superficie du Lot / *Property Area*	7 750,5	m² / *sq. m.*	83 427	pi² / *sq. ft*

STATISTIQUES SUR LE PROJET / *PROJECT STATISTICS*	Tour 5a / Tower 5a
Hauteur du Bâtiment / *Building Height* (m)	100.8 m (32 étages / *storeys*)

STATISTIQUES DES UNITÉS / *UNIT STATISTICS*	Tour 5a / Tower 5a
Studio / *Studio*	56
2 Chambre / *1 Bedroom*	229
2 Chambres / *2 Bedrooms*	59
3 Chambres / 3 *Bedrooms*	4
TOTAL	**348**

STATIONNEMENT RÉSIDENTIEL / *RESIDENTIAL PARKING*

TOUR 5a / *TOWER 5a*	EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
	#/Unit / *#/Unité*		Ratio (stat /unité) / *Ratio (parking/unit)*	
Tour 5a - Résidentiel / *Tower 5a - Résidential*	0,5/unit	174	0,39	135 ★
Tour 5a - Visiteurs / *Tower 5a - Visitors*	0,2/unit	70	0,19	65
Tour 5a - Accessible (inclus dans compte des visiteurs) / *Tower 5a - Accessible (included in visitors count)*	1-12=1 Type A 13-100=4% of total (50% Type A / 50% Type B) 101-200=1+3% of total (50% Type A / 50% Type B) 201-1000=2+2% of total (50% Type A / 50% Type B) 1001+=11+1% of total (50% Type A / 50% Type B)	7		6
TOTAL ★6 parking spaces located in Tower 5b		**244**	**0,57**	**200 ★**

STATIONNEMENT COMMERCIAL / *COMMERCIAL PARKING*

TOUR 5a / TOWER 5a	Aire (m²) / *Area (m²)*	EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
		Ratio (stat /m²) / *Ratio (parking/m²)*		Ratio (stat /m²) / *Ratio (parking/m²)*	
Commercial / *Commercial*	286,72	3,4/100	10	3,4/100	42 ☆
Stationnement Accessible (inclus dans le compte commercial) / Accessible parking (included in commercial count)			1		2 ☆
TOTAL ☆ Parking for T5b included in count			10		42 ☆

STATIONNEMENT POUR VÉLOS / *BICYCLE PARKING*

TOUR 5a / TOWER 5a	EXIGÉ / *REQUIRED*				FOURNIS / *PROVIDED*
	Unités / *Units*	Aire (m²) / *Area (m²)*	Ratio / *Ratio*		
Résidentiel / *Residential*	348		0,5/unit	174	145 ✳
Commercial / *Commercial*		286,72	1/250	2	2
TOTAL ✳ 20 Bicycle parking lcoated in Tower 5b				176	147 ✳

Appendix L – Roof / Area Drain Information

Tower 1 – Roof Plan, Rev 1, A1-09

Tower 1 – Parking Garage Plumping Layout, Rev 1, M04

Tower 1 – Siphonic Roof Drain Spec (Area Drains), 1005(-WD2)

Tower 1 – Roof Drain Technical Data Section, (2 pages)

Tower 1 – WATTS Drainage, RD-100, Large Capacity Drain Roof

Tower 2 – WATTS Drainage, RD-100, Large Capacity Drain Roof

Tower 2 – Plumbing & Roof Drain Layout: M-109 (Rev 11), M-110 (Rev 11), M-111 (Rev 11)

Tower 2 – Plumbing Specialties Schedule (Mechanical Spec Table)

Tower 2 – WATTS Drains (5 Pages)

Tower 3 – Amenities Level 18th Floor Plate, Rev 1, A257

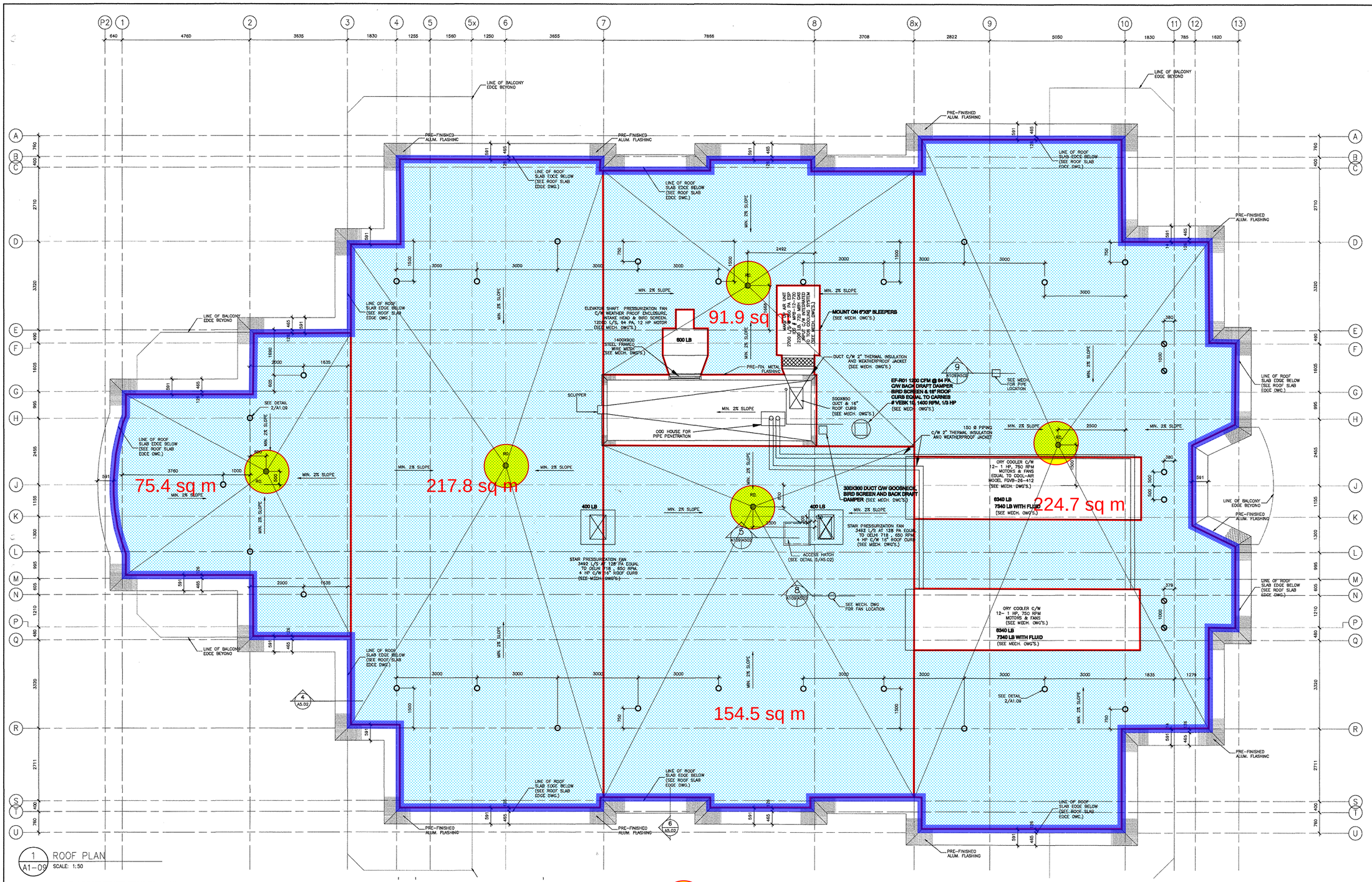
Tower 3 – WATTS Drains (4 Pages)

Tower 4 - Roof plans

Tower 5/6 - Podium Roof Plan

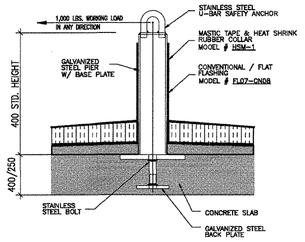
Tower 5 - Amenities and High Roof Plan

Tower 6 - Amenities and High Roof Plan



15" HIGH CAST IN PLACE ROOF ANCHOR (SINGLE S.S. STUD) - 5" SLAB

NOTES:
1. 1,000 lbs. WORKING LOAD IN ANY DIRECTION.
2. ASSEMBLY SHOWN IS 15" HIGH MODELS FOR STANDARD SLAB THICKNESS OF 5".
3. MINIMUM SLAB THICKNESS TO BE 5".
4. ASSEMBLY SHOWN WITH CONVENTIONAL BUR ROOFING (BY OTHERS).



2 A1-09 ANCHOR DETAIL SCALE: 1:10

LEGEND

- TIE BACK ROOF ANCHORS
- R.D. ROOF DRAIN

4.3 sq m

ROOF DRAINS (5 TOTAL)

AREA AVAILABLE FOR PONDING 764 m2

TOTAL ROOF AREA 870 m2

SYMBOL LEGEND:

- INDICATES DETAIL NUMBER
- X / DRAWING TITLE / DRAWING NO. — DETAIL FOUND ON FACE — INDICATES REFERENCE PAGE
- (DOO) INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON 800 SERIES.
- (WO) INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON 800 SERIES.
- (P3) INDICATES PARTITION TYPE; REFER TO WALL TYPE LEGEND ON DRAWING A001.

GENERAL NOTES:

A. FOR WALL AND PARTITION TYPES REFER TO WALL TYPE SCHEDULE.
B. FOR DOOR TYPES AND HARDWARE REQUIREMENTS REFER TO DOOR SCHEDULE.
C. FOR WINDOW TYPES AND ELEVATIONS REFER TO WINDOW SCHEDULE.
D. FOR INTERIOR FINISHES REFER TO FINISH SCHEDULE.
E. ALL DIMENSIONS ARE TAKEN FROM DRYWALL FACE.
F. ALL EXTERIOR WALLS ARE TYPE "W1" UNLESS NOTED OTHERWISE.
G. ALL INTERIOR PARTITIONS IN SUITES ARE PARTITION TYPE "P1B" UNLESS NOTED DIFFERENTLY.
H. REPLACE 13mm GYPSUM BOARD WITH 13mm CEMENT BOARD TO INTERIOR SURFACES OF ALL TUB & SHOWER SURROUNDS WITH IN ALL BATHROOMS, ENSUITS & POWDER ROOMS. REMAINING WALLS INSIDE WILL BE 13mm WATERPROOF DRYWALL.
I. ALL KITCHEN BAR TOPS TO REST ON A TYPE W10 STUD WALL @15mm HIGH c/w STEEL REINFORCING FOR STONE BAR TOP.
J. PROVIDE 300mm DP. ROO & SELF IN ALL CLOSETS & WALK-IN CLOSETS.
K. PROVIDE 5 WOOD SELFS IN ALL LINEN CLOSETS.
L. PROVIDE MEDICINE CABINET (400x600mm) IN ALL BATH ROOMS & 1/2 BATH ROOMS.

No.	DESCRIPTION	DATE	CHK
1	ISSUED FOR CONSTRUCTION	31/01/08	V.C.

REVISIONS

CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY OMMISSIONS OR DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.

DO NOT SCALE THE DRAWINGS

STAMP

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DATE 07/11/07

NORTH — PROJECT NORTH / TRUE NORTH

DRAWN K.S
DATE 07/11/09
CHECKED V.P.C.
DATE PRINTED

CLIENT BRIGIL

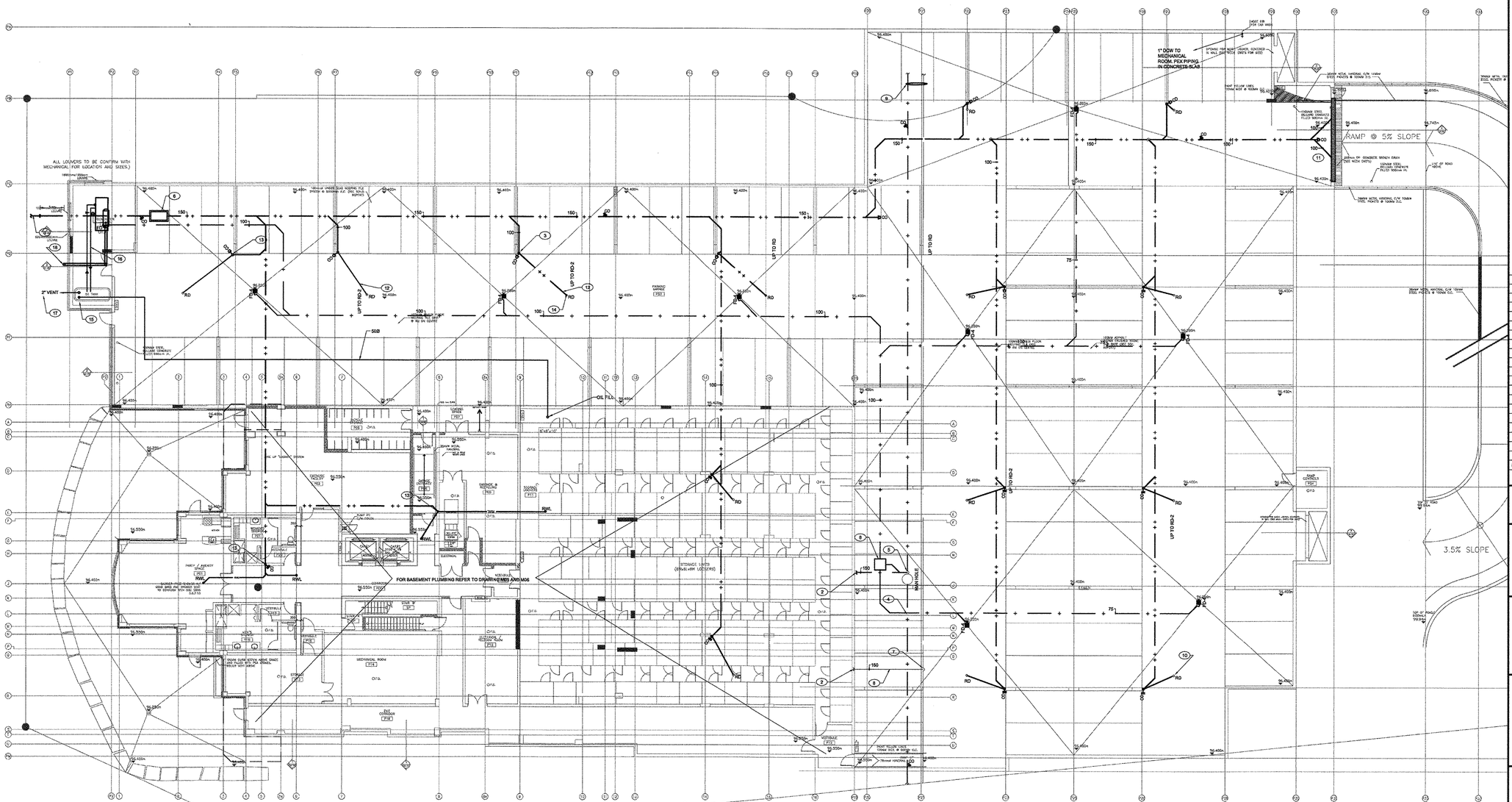
CONSULTANT

ARCHITECT
VINCENT P. COLIZZA ARCHITECT INCORPORATED

PROJECT
PETRIES LANDING CONDOMINIUM
CUMBERLAND, OTTAWA

DWG. TITLE
ROOF PLAN

SCALE 1/50
PROJ. NO. 1304
DWG. NO. A1-09



PARKING GARAGE PLUMBING LAYOUT

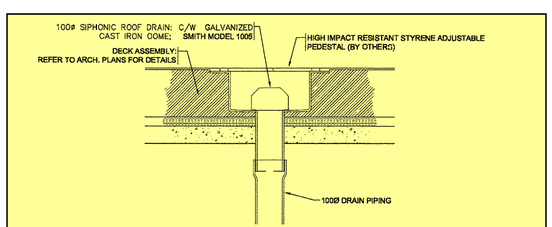
(1 / M04) Scale: 1/100

GENERAL NOTES

1. RESERVED.
2. LAYOUT, ROUTING AND LOCATIONS ARE INDICATIVE. CONTRACTOR TO VERIFY SITE CONDITIONS AND COORDINATE INSTALLATION WITH ALL OTHER TRADES.
3. PROVIDE WALL SLEEVE FOR ALL DUCTWORK AND PIPING PENETRATIONS. COORDINATE LOCATIONS WITH ALL TRADES.

DRAWING NOTES

1. CONNECT NEW STORM LINE. COORDINATE LOCATION, INVERT AND SIZES WITH SITE SERVICES DRAWINGS AND OTHER TRADES.
2. FOR CONTINUATION OF PIPING REFER TO DRAWING M05 AND M06. (TYPICAL)
3. ALL PIPES TO BE INSTALLED AS CLOSE TO THE WALLS AND AS TIGHT TO THE CEILING SLAB AS POSSIBLE. (TYPICAL)
4. APPROXIMATE LOCATION OF SANITARY MAIN. COORDINATE LOCATION, INVERT AND SIZES WITH SITE SERVICES DRAWINGS AND OTHER TRADES.
5. APPROXIMATE CONNECTION TO SANITARY MAIN. COORDINATE LOCATION, INVERT AND SIZES WITH SITE SERVICES DRAWINGS AND OTHER TRADES.
6. INSTALL NEW SAND INTERCEPTOR. SEE DETAIL 2/M13.
7. APPROXIMATE CONNECTION TO WATER MAIN. COORDINATE LOCATION WITH SITE SERVICES DRAWINGS AND OTHER TRADES.
8. MAIN WATER ENTRY. REFER TO DRAWINGS M05 AND M06 FOR CONTINUATION.
9. PIPE CONTINUES TO SERVE FUTURE BUILDING IN OTHER PHASES. (REFER TO SITE SERVICES DRAWINGS).
10. AREA DRAINS (TYPICAL).
11. TRENCH DRAIN: PROVIDE ONLY TWO PIPE OUTLETS. TRENCH IS TO BE CASTED CONCRETE BY GENERAL CONTRACTOR. PROVIDE HEAVY DUTY TRENCH FRAME AND GRATE. GRATE IS SMITH MODEL 2982. PROVIDE A QUANITITY OF GRATES TO SUIT TRENCH LAYOUT.
12. 75Ø HORIZONTAL STORM DRAIN PIPING. RUN TIGHT TO BUILDING STRUCTURE AND UP TO AREA /DECK DRAIN.
13. 100Ø VERTICAL STORM RISER. PROVIDE C.O. AT THE BASE.
14. 100Ø PIPING UP TO AREA/DECK DRAIN.
15. FUEL OIL STORAGE TANK COMPLETE WITH VALVES, SPILL AND CONTAINMENT SYSTEM, ACCESSORIES, SUPPORTS ETC...
16. FUEL OIL SUPPLY AND RETURN PIPING COMPLETE WITH VALVES, FITTINGS AND ACCESSORIES. ALL JOINTS TO BE WELDED. (TYPICAL)
17. FUEL OIL STORAGE TANK VENT RISER TO OUTSIDE.
18. GENERATOR EXHAUST



(2 / M04) DECK DRAIN DETAIL
Scale: NTS

No.	DESCRIPTION	DATE	CHD
1	ISSUED FOR CONSTRUCTION	JAN. 21, 08	M.Y.

REVISIONS

CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY OMMISSIONS OR DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.

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STAMP: LICENSED PROFESSIONAL ENGINEER — M. YAZDANI — DEC. 19, 07 — PROVINCE OF ONTARIO

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DATE

NORTH

DRAWN: S.Y.

DATE

CHECKED: M.Y.

DATE PRINTED

CLIENT: BRIGIL

CONSULTANT: M&E ENGINEERING
Division of 1436668 Ontario Ltd.
205 Kincardine Drive Kanata, Ontario, K2V1C5
Tel: (613) 836-3435 Fax: (613) 836-0997

ARCHITECT: VINCENT P. COLIZZA ARCHITECT INCORPORATED

PROJECT: PETRIES LANDING CONDOMINIUM CUMBERLAND, OTTAWA

DWG. TITLE: PARKING GARAGE PLUMBING LAYOUT

SCALE: AS NOTED

PROJ. NO.

DWG. NO. M04

SHEET SIZE – METRIC A0(1173X825mm) – PAPERSPACE – PLOT 1=1

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LOCATION

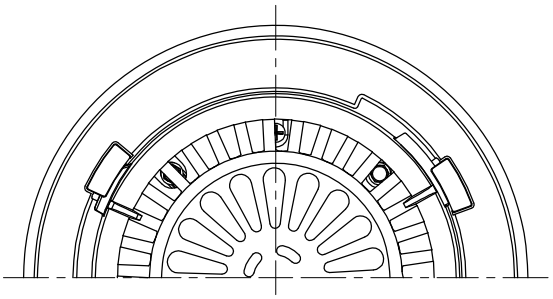
SIPHONIC ROOF DRAIN

15 1/4"(390) DIAMETER - LOW PROFILE DOME WITH WATER DAM

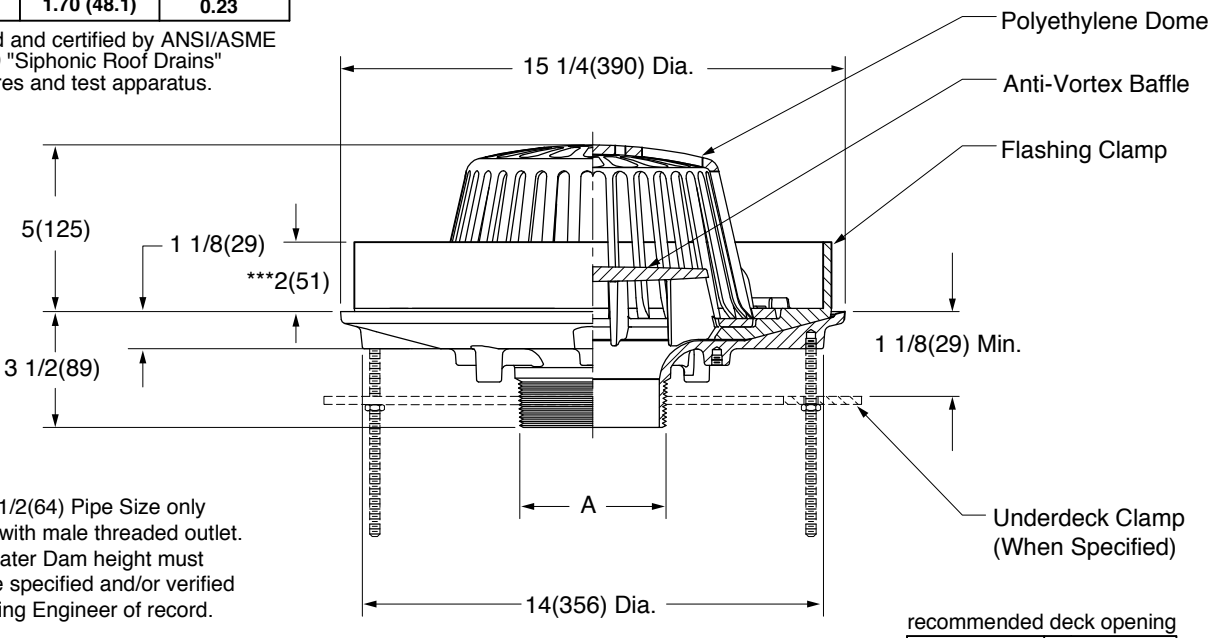
FUNCTION: Used in flat roofs of any construction as an overflow drain. Internal anti-vortex baffle creates siphonic drainage action producing more efficient drainage than conventional roof drains.

**Performance Data		
A(Pipe Size) in. (mm)	Max. Capacity cfs (lps)	Resistance Value, K
02 (50)	0.50 (41.2)	0.13
0250 (64)	0.60 (17.0)	0.13
03 (75)	1.40 (39.5)	0.16
04 (100)	1.70 (48.1)	0.23

**As tested and certified by ANSI/ASME A112.6.9 "Siphonic Roof Drains" Procedures and test apparatus.



Free Area
102.5 Sq. In.
(661) Sq. Cm.



***NOTE:** 2 1/2(64) Pipe Size only available with male threaded outlet.
****NOTE:** Water Dam height must always be specified and/or verified by Plumbing Engineer of record.

recommended deck opening

with suffix -R	17 (430) DIA
less suffix -R	14 (355) DIA

A(Pipe Size) = 02(50), *0250(64), 03(75) or 04(100)

☐ **Fig. 1005T (-WD2)** ..... **MALE THREADED OUTLET**
☐ **Fig. 1005Y(-WD2)** ..... ***NO HUB OUTLET**

REGULARLY FURNISHED:
Duco Cast Iron Body, Flashing Clamp with 2" High Water Dam, Anti-Vortex Baffle and Polyethylene Dome.

VARIATIONS:
- ☐ Sump Receiver -R
- ☐ Underdeck Clamp -C
- ☐ Underdeck Clamp for 10" Deck Opening -C10"
- ☐ "L" Shaped Underdeck Clamp -CL
- ☐ Vandal Proof Dome -U

OPTIONAL MATERIALS:
- ☐ Aluminum Dome -AD
- ☐ Cast Iron Dome -CID
- ☐ Galvanized Cast Iron Dome -CIDG
- ☐ Galvanized Cast Iron Body &Collar -G
- ☐ Rough Bronze Dome -RBD

NOTE: Dimensions shown in parentheses are in millimeters.

REV.	DATE	DESCRIPTION	BY	CKD. BY
A	7-27-15	Revised Function, added ***Note	TBW	JM

WEIGHT POUNDS | VOLUME CUBIC FEET | FIGURE NUMBER 1005(-WD2)

FIGURE NUMBER 1005(-WD2) | DRAWN BY: TBW | CHECKED BY: CR | APPROVED BY: CR | DATE: 7-16-14 | SCALE: NONE | SIZE A | DRAWING NUMBER S1005-WD2 | A

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ROOF DRAIN TECHNICAL DATA SECTION

DEFINITION - ORIGIN - USAGE

The modern roof drain is designed to drain off rainwater in the most effective manner possible while maintaining an aesthetic appeal because in many instances it is placed in full view of the public.

Through the years, Smith has attempted to satisfy both the artistic eye of the architect and the calculating mind of the engineer, concluding the properly designed roof drain must have the following features:

- Pleasing dome shape with a low profile and adequate free drainage area
- Corrosion-resisting dome material
- Effective debris protection
- Overflow drainage to allow drainage during debris build-up
- Gravel stop
- Positive Flashing Clamp
- Seepage control channels
- Sump designed to minimize air entrapment
- Flexibility to meet all construction requirements

Smith roof drains include all of these features.

TYPICAL SMITH ROOF DRAINS

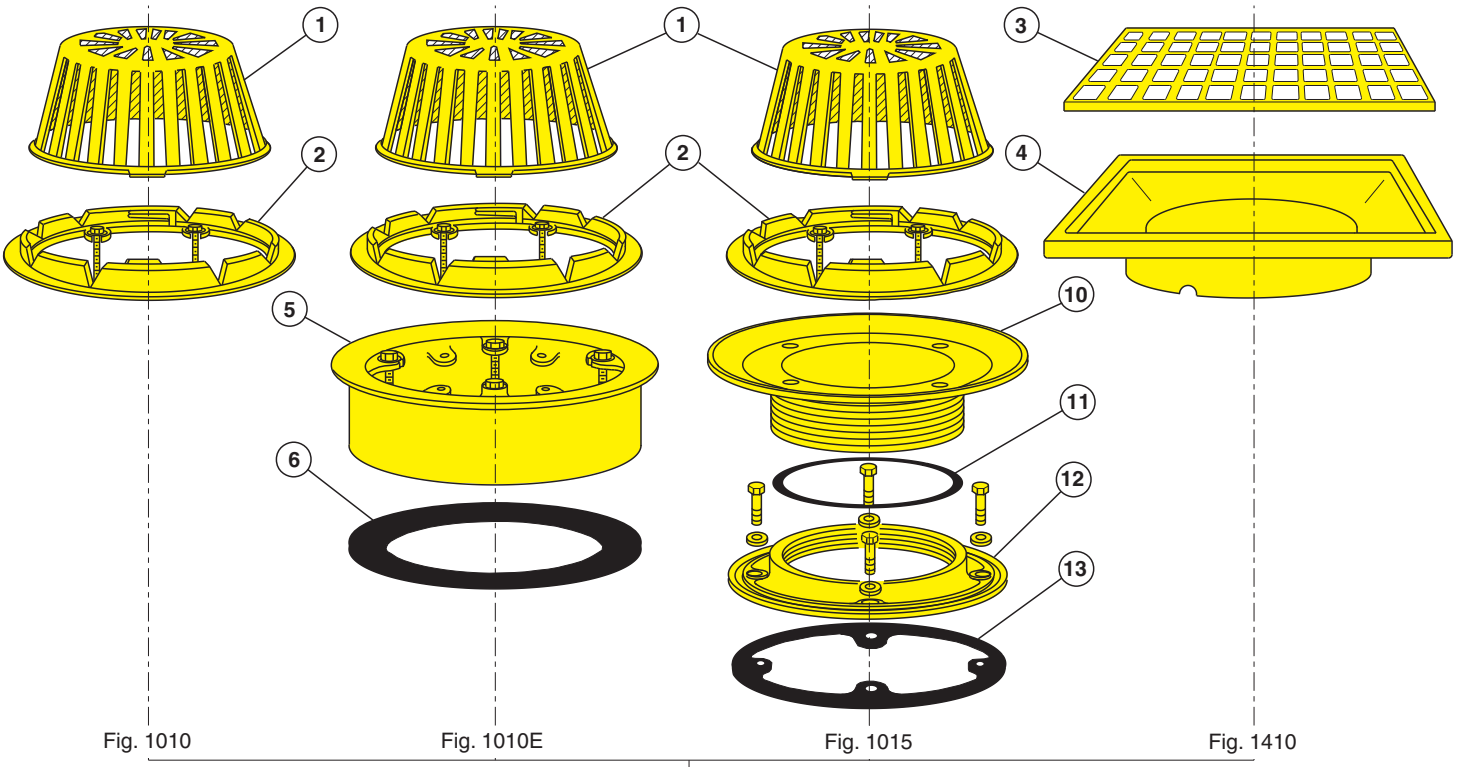
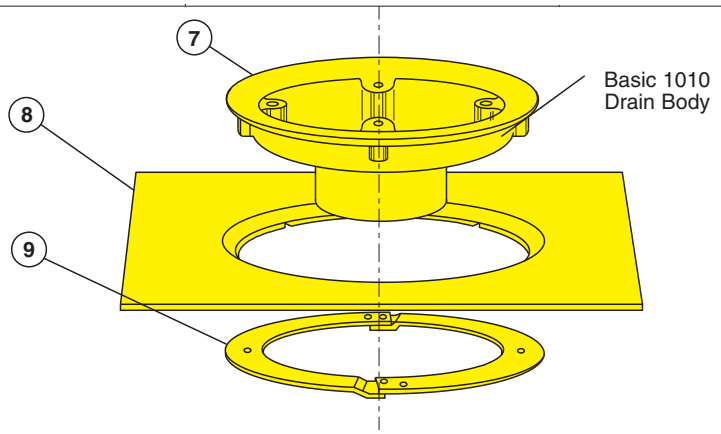


Fig. 1010 Fig. 1010E Fig. 1015 Fig. 1410



ROOF DRAIN PARTS LIST

NO.	DESCRIPTION	NO.	DESCRIPTION
1	High Density Polyethylene Dome	7	Drain Body
2	Combined Cast Iron Flashing Clamp and Gravel Stop	8	Sump Receiver
3	Secured Square Hole Grate	9	Underdeck Clamp
4	Flashing Clamp for Square Grate	10	Adjustable Extension Sleeve
5	Fixed Extension	11	O-Ring Gasket
6	Fixed Extension Gasket	12	Reversible Collar
		13	Neoprene Gasket

SELECTING A ROOF DRAIN

To select the proper roof drain, the following information must be determined by the designer/specifier.

- Type of roof construction
- Roof pitch
- Maximum volume of expected rainfall and storm design criteria (This information must be obtained from your local weather bureau and/or local code authority)
- Desired rate of drainage
- Safety overflow requirements (Emergency/secondary overflow roof drains are recommended. Local codes vary but it is recommended to provide a 1 to 1 ratio)
- Roof load (The maximum possible rainwater [build-up] load should be determined and provided to the structural engineer for inclusion in the roof structure design)
- Location of drains (Consult your local code requirements)
- Size
- Vandal-proofing
- **NOTE: ALWAYS CONSULT YOUR LOCAL CODE FOR SIZING AND DESIGN CRITERIA WHEN DESIGNING THE ROOF DRAIN SYSTEM. LOCAL CODE REQUIREMENTS TAKE PRECEDENCE OVER CATALOG INFORMATION.**
- **DATA SHOWN IN TABLES 1 AND 2 BELOW ARE TAKEN FROM THE UNIFORM PLUMBING CODE (UPC) - 2006 EDITION.**

SUGGESTED STEPS FOR SELECTING PROPER ROOF DRAIN LEADER SIZES AND NUMBER REQUIRED FOR A GIVEN ROOF

1. Calculate the total roof area.
2. Determine the maximum hourly rainfall in inches. (The figure can be acquired from your local weather bureau and/or local code authority.)
3. Select leader size.
4. From Table 1, determine the number of square feet that can be drained by one roof leader at the local maximum rainfall rate.
5. Divide the total roof area by the area that one leader will handle. The above result is the number of roof drains required for the building. If the result is a fraction less, use the next higher number.

Example: Using a 4" Vertical Leader

1. Total roof area - 500' by 200' = 100,000 sq. ft.
2. Determine rate of rainfall - for this example use 4".
3. After studying building plan and physical arrangement, assume that 4" leaders are required for this project.
4. From Table 1 - one 4" leader at 4" rate of rainfall will take care of 3,460 sq. ft. of roof area.
5. Number of roof leaders required is 29 (100,000 sq. ft. divided by 3,460 sq. ft.), Therefore 29 roof drains would be required.

Example: Using a 6" Vertical Leader

1. Total roof area - 500' by 200' = 100,000 sq. ft.
2. Determine rate of rainfall - for this example use 4".
3. After studying building plan and physical arrangement, assume that 6" leaders are required for this project.
4. From Table 1 - one 6" leader at 4" rate of rainfall will take care of 10,200 sq. ft. of roof area.
5. Number of roof leaders required is 10 (100,000 sq. ft. divided by 10,200 sq. ft.), Therefore 10 roof drains would be required.

TABLE 1
ROOF DRAIN VERTICAL LEADER REQUIREMENTS FOR HORIZONTAL ROOF AREAS AT VARIOUS RAINFALL RATES

Leaders [2] [4] Pipe Size Inches	Size Open Area SQ. In.	Maximum Allowable Horizontal Projected Roof Area Square Feet at Various Rainfall Rates [1]					
		1 IN./HR.	2 IN./HR.	3 IN./HR.	4 IN./HR.	5 IN./HR.	6 IN./HR.
02	3.14	2,176	1,088	725	544	435	363
03	7.06	6,440	3,220	2,147	1,610	1,288	1,073
04	12.56	13,840	6,920	4,613	3,460	2,768	2,307
05	19.60	25,120	12,560	8,373	6,280	5,024	4,187
06	28.30	40,800	20,400	13,600	10,200	8,160	6,800
08	50.25	88,000	44,000	29,333	22,000	17,600	14,667

TABLE 1 IS BASED ON TABLE 11-1 FROM THE UNIFORM PLUMBING CODE (UPC) - 2006 EDITION

[1] For rainfall rates other than those listed, determine the allowable roof area by dividing the area given in the 1 in./hr. column by the desired rainfall rate.

TABLE 2
ALLOWABLE FLOW FOR VERTICAL LEADERS AND HORIZONTAL STORM DRAINS
ALLOWABLE FLOW IN G.P.M. [2] [3]

PIPE SIZE	[2] [4] VERTICAL LEADER	HORIZONTAL STORM DRAIN SLOPE PER FOOT		
		1/8"[3]	1/4"[3]	1/2"[3]
02	23	10	15	20
03	67	34	48	68
04	144	78	110	156
05	261	139	196	278
06	424	222	314	445
08	913	478	677	956
10	—	860	1214	1721
12	—	1384	1953	2768
15	—	2473	3491	4946

TABLE 2 IS BASED ON TABLE 11-2 FROM THE UNIFORM PLUMBING CODE (UPC) - 2006 EDITION.

[2] The sizing data for vertical conductors, leaders, and drains are based on the pipes flowing 7/24 full. Head of water over drain will determine exact flow rates.

[3] The sizing for the horizontal piping is based on the pipes flowing full.

[4] To avoid severe hydraulic jump and/or backpressure, good engineering practice requires the vertical leader transition into a larger size horizontal storm drain per the GPM flow indicated in Table 2 for 1/8" and 1/4" sloped storm drains.

STEPS FOR CALCULATING DRAINAGE REQUIREMENTS FOR ABOVE EXAMPLE USING G.P.M.

1. Use the following formula to determine G.P.M.:
   G.P.M. = .0104 x R x A
   G.P.M. = Gallons per minute
   R = Rainfall intensity - inches/hour
   A = Roof area - square feet
   .0104 = Conversion factor - G.P.M./sq. ft. for 1" (one) inch/hr. rainfall
2. **Example:**
   A. 4" rainfall inches/hr.
   B. 100,000 sq. ft. roof area
   C. G.P.M. = .0104 x 4" x 100,000 sq. ft. = 4,160 G.P.M.
3. Refer to table 2: a 4" leader [2] will handle 144 G.P.M.
   4,160 G.P.M/ ÷ 144 = (28.8) 29 - 4" vertical leaders required.

   Refer to Table 2: a 6" leader [2] will handle 424 G.P.M.
   4, 160 G.P.M. ÷ 424 = (9.8) 10 - 6" vertical leaders required.

RD-100

Tag: _____

Large Capacity Roof Drain

Components:

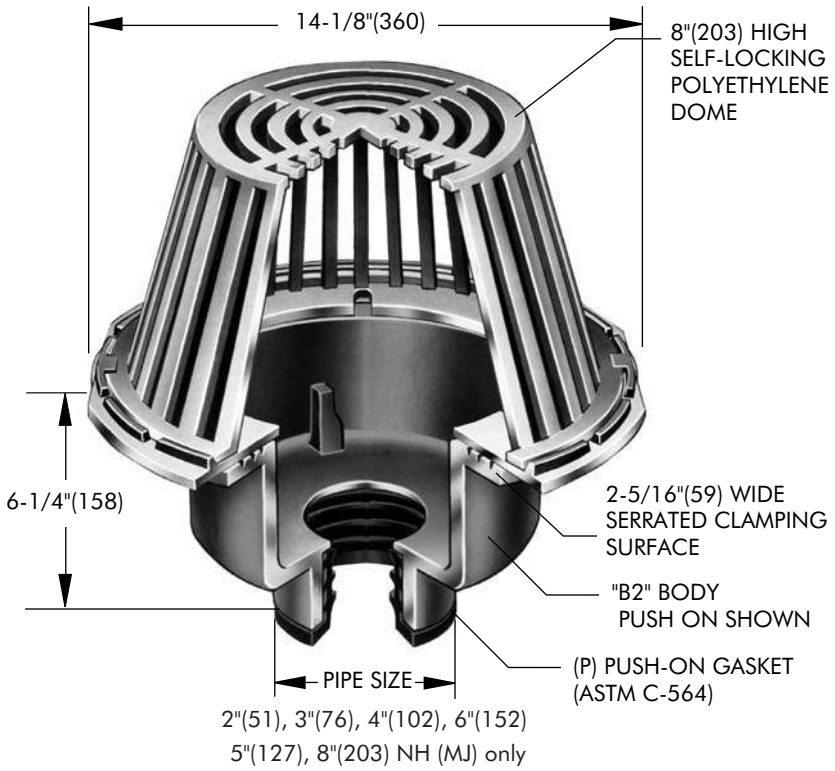

B2


B2-DM


B2-FLG


FC-2

SPECIFICATION: Watts Drainage Products RD-100 epoxy coated cast iron roof drain with deep sump, wide serrated flashing flange, flashing clamp device with integral gravel stop and self-locking polyethylene (standard) dome strainer.



Free Area Sq. In.
137

Deck opening 10" (254) with sump receiver 13-1/4" (337)

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes. Underdeck Clamp (-BED and -D options) are not available when -SO is selected.

Order Code: RD-10☐☐-☐-☐

Ex. RD-102P-K

Pipe Sizing (Select One)

Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size	☐
6	6"(152) Pipe Size	☐
8	8"(203) Pipe Size	☐

Outlet Type (Select One)

Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Options (Select One or More)

Suffix	Description	
-A	Accutrol weir (specify # 1-6 slots)	☐
-B	Sump Receiver Flange	☐
-BED	Sump Receiver, Adj Ext., Deck Clamp	☐
-C	Secondary Membrane Clamp	☐
-D	Underdeck Clamp	☐
-E	Adjustable Extension	☐
-GSS	Stainless Steel Ballast Guard	☐
-H	Adj. to 6" IRMA Ballast Guard	☐
-K	Ductile Iron Dome	☐
-K80	Aluminum Dome	☐
-L	Vandal Proof Dome	☐
-R	2" High External Water Dam	☐
-SO	Side Outlet**	☐
-V	Fixed Extension (1-1/2",2",3",4")	☐
-W	Adj. Water Level Regulator	☐
-W-1	Waterproofing Flange	☐
-Z	Extended Integral Wide Flange	☐
-5	Sediment Bucket	☐
-12	Galvanized Dome	☐
-13	All Galvanized	☐
-83	Mesh Covered Dome	☐
-113M	Special Epoxy from 3M Range	☐

Optional Body Material (NH Only)

Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

WATTS DRAINAGE
CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca

NOTE:

1. ALL VENT PIPING IN AREA BETWEEN GRID LINES 1 & 4 TO BE DIRECTED TOWARDS AREA BETWEEN GRID LINES 4 AND 10.

LIMIT OF UNIT BELOW

LIMIT OF UNITS BELOW

1070mm HIGH GUARDRAIL

PRIVACY SCREEN REFER TO 11-A857

SPRINKLER TEST DRAIN

SPRINKLER RISER

DCW & DHW TO SHOWER ON POOL DECK PROVIDE ISOLATING VALVES

DCW & DHW TO SHOWER ON POOL DECK PROVIDE ISOLATING VALVES & DRAIN VALVES

2" DRAIN TO BE RUN ON CEILING OF 14TH FLOOR AND BE CONNECTED TO SPRINKLER TEST PIPE

OFF- SET ON CEILING OF 14TH FLOOR

POOL DRAIN

ELEC. CLOSET PH12

CORRIDOR PH11

STAIRS #1 ST-PH01

STAIRS #2 ST-PH02

FIREFIGHTER'S ELEVATOR

TYPICAL BALCONY SECTION AT ALUMINUM PANEL & CURB

NO.	DATE	REVISION	NAME
11	06/03/2018	UPDATED WITH ARCH. PLANS	MY
10	09/3/2017	FINAL IFC	MY
9	08/15/2017	UPDATED PLANS	MY
9	6/23/2017	ISSUED FOR CONSTRUCTION	MY
8	5/5/2017	ISSUED FOR FINAL	MY
7	2/1/2017	PRICING	MY
4	10/25/2016	FINAL REVIEW	MY
3	6/24/2016	PERMIT	MY
2	5/24/2016	FINAL COORDINATION	MY
1	5/9/2016	75% SUBMISSION	MY

CLIENT

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98 Lois Street, Gatineau QC J8Y 3R7
T: 819-243-7392 Email: JLRivard@brigil.com; mchenier@brigil.com

M&E ENGINEERING

1436868 Ontario Ltd.

205 Kincardine Drive, Kanata, Ontario, K2V1C5
Tel: 613-836-3420 Fax: 613-836-5957

PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER
M. YAZDANI
MARCH 6, 2018
PROVINCE OF ONTARIO

NORTH

PROJECT

PETRIES LANDING PHASE 2

DRAWING

PLUMBING LAYOUT PENTHOUSE CEILING

PROJECT NUMBER

CHECKED BY MY

DESIGNED BY MY

DRAWN BY

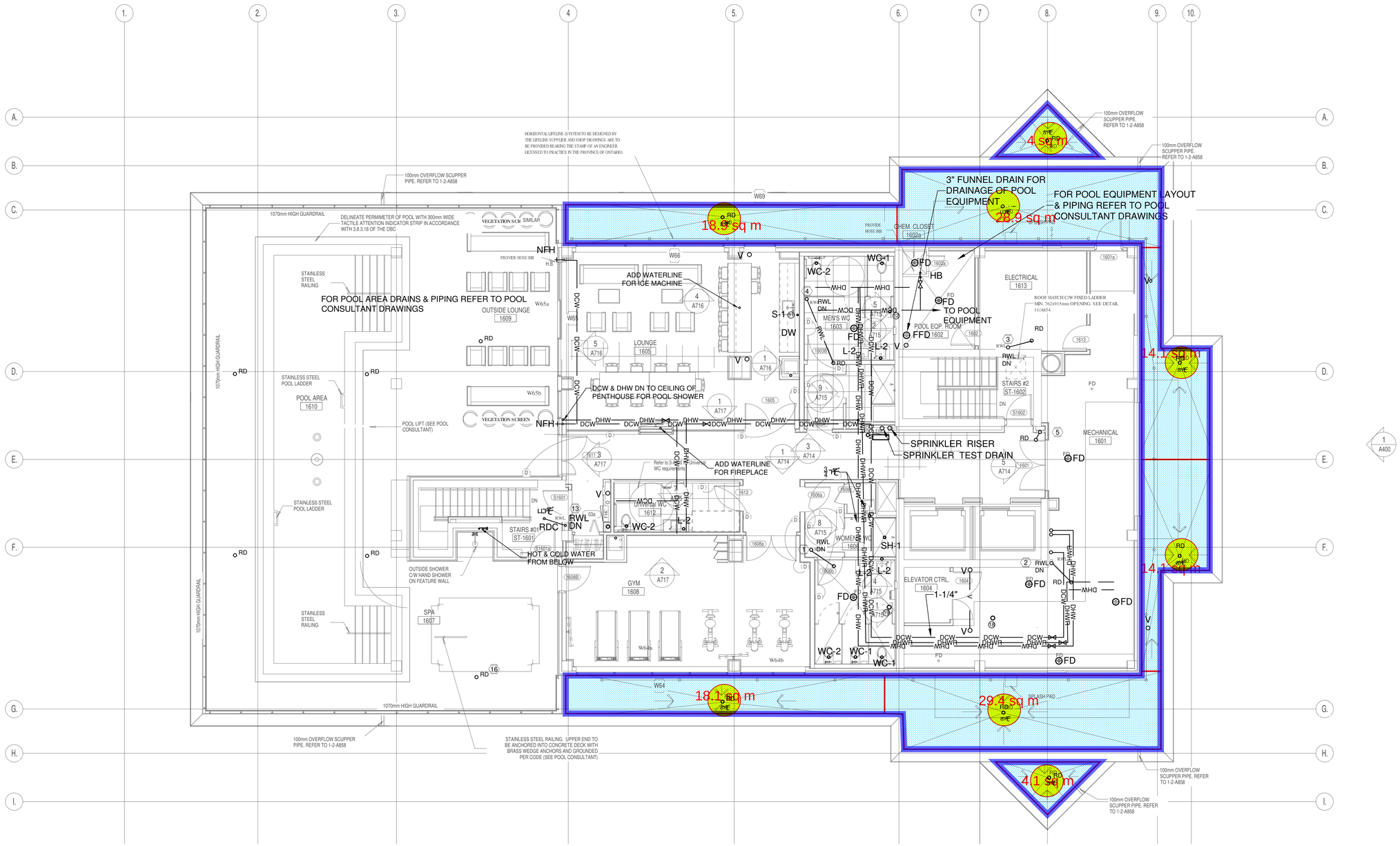
SCALE 1 : 75

DATE

REVISION

DRAWING NUMBER

M-109



PLUMBING FIXTURES:

WC: TANK TOILET IN APARTMENT
WC-1: FLUSH VALVE WALL MOUNTED IN PUBLIC W/R C/W AUTOMATED FLUSH
WC-2 SAME AS WC-1 BUT FOR BARRIER FREE
L-1: COUNTER MOUNTED IN THE APARTMENT
L-2: COUNTER MOUNTED , BARRIER FREE IN PUBLIC WASHROOM
S-1 1 SMALL & 1 LARGER BOWL STAINLESS STEEL SINK
S-2 SINGLE BOWL STAINLESS STEEL SINK
BT: BATH TUB
SH: SHOWER STALL
1: 1500X900, 3 SIDED WALL C/W GLASS PANEL DOOR
2: SAME AS SH-1 BUT 1200X900
3: SAME AS SH-1 BUT 2 SIDED WALL WITH ONE SIDE GLASS PANEL DOOR
4: SAME AS SH-1 BUT 900X900
RD: STANDARD ROOF DRAIN
RDC: FLOW CONTROL ROOF DRAIN
PDC: PARKING DECK DRAIN C/W FLOW CONTROL

ROOF DRAINS (8 TOTAL)

4.3 sq m — AREA AVAILABLE FOR PONDING 764 m2

TOTAL ROOF AREA 870 m2

NO.	DATE	REVISION	NAME
11	06/03/2018	UPDATED WITH ARCH. PLANS	MY
10	09/3/2017	FINAL IFC	MY
9	08/15/2017	UPDATED PLANS	MY
9	6/23/2017	ISSUED FOR CONSTRUCTION	MY
8	5/5/2017	ISSUED FOR FINAL	MY
7	2/1/2017	PRICING	MY
4	10/25/2016	FINAL REVIEW	MY
3	6/24/2016	PERMIT	MY
2	5/24/2016	FINAL COORDINATION	MY
1	5/9/2016	75% SUBMISSION	MY

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PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER — M. YAZDANI — MARCH 6, 2018 — PROVINCE OF ONTARIO

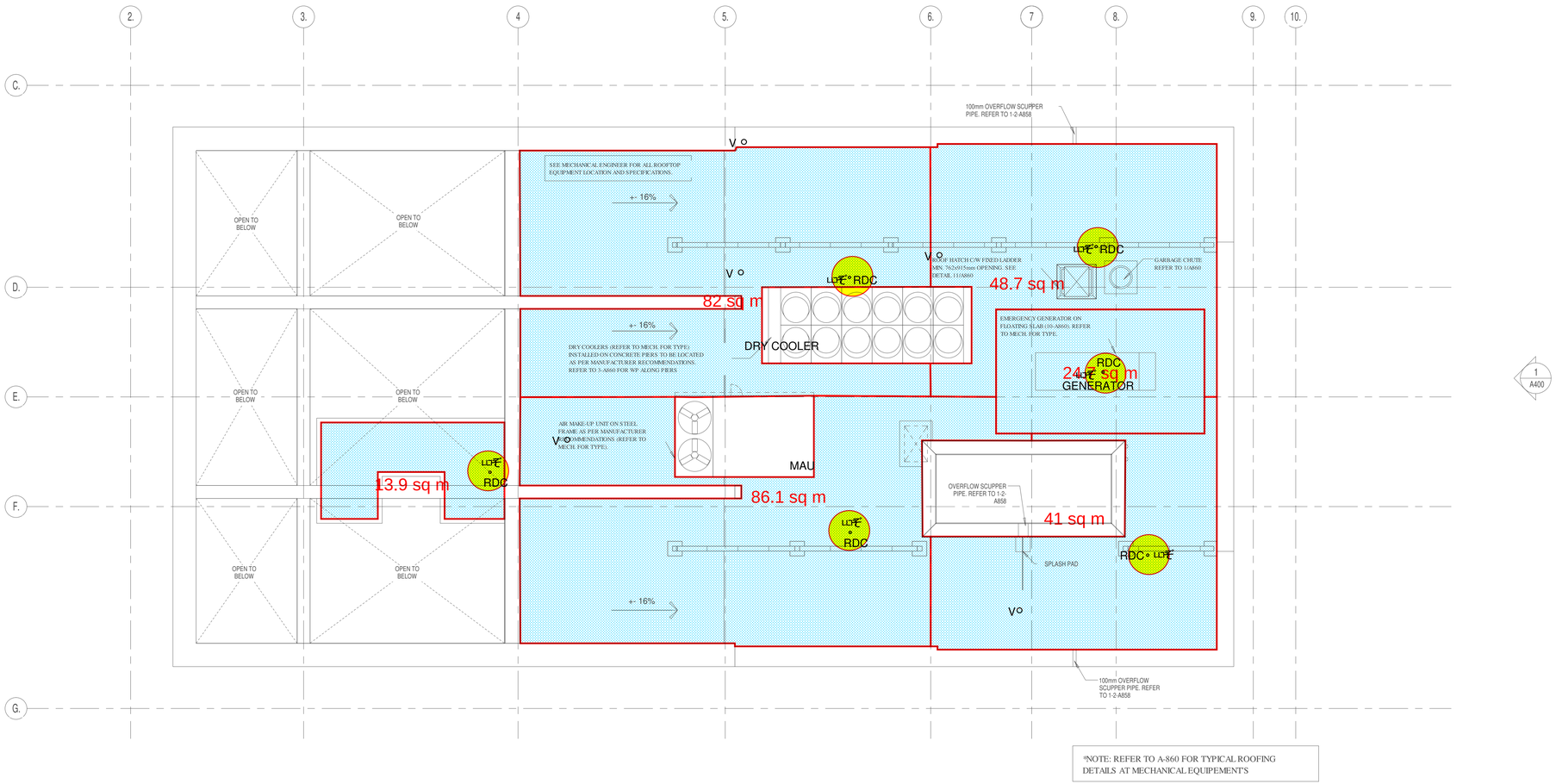
NORTH

PROJECT: PETRIES LANDING PHASE 2

DRAWING: PLUMBING LAYOUT AMENITIES FLOOR

PROJECT NUMBER

CHECKED BY: MY
DESIGNED BY: MY
DRAWN BY:
SCALE: 1 : 75
DATE:
REVISION:
DRAWING NUMBER: M-110



*NOTE: REFER TO A-860 FOR TYPICAL ROOFING DETAILS AT MECHANICAL EQUIPEMENT'S

ROOF DRAINS (6 TOTAL)

4.3 sq m — AREA AVAILABLE FOR PONDING 282.5 m2

TOTAL ROOF AREA 296.4 m2

NO.	DATE	REVISION	NAME
11	06/03/2018	UPDATED WITH ARCH. PLANS	MY
10	09/3/2017	FINAL IFC	MY
9	08/15/2017	UPDATED PLANS	MY
9	6/23/2017	ISSUED FOR CONSTRUCTION	MY
8	5/5/2017	ISSUED FOR FINAL	MY
7	2/1/2017	PRICING	MY
4	10/25/2016	FINAL REVIEW	MY
3	6/24/2016	PERMIT	MY
2	5/24/2016	FINAL COORDINATION	MY
1	5/9/2016	75% SUBMISSION	MY

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PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER
M. YAZDANI
MARCH 6, 2018
PROVINCE OF ONTARIO

NORTH

PROJECT
PETRIES LANDING PHASE 2

DRAWING
ROOF DRAIN LAYOUT HIGH ROOF

PROJECT NUMBER

CHECKED BY MY

DESIGNED BY MY

DRAWN BY

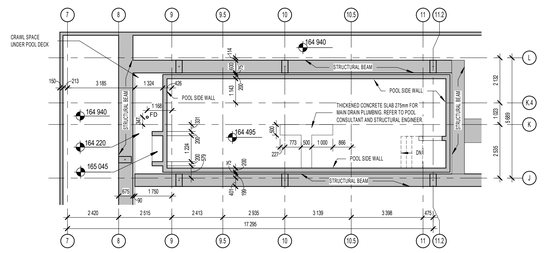
SCALE 1 : 75

DATE

REVISION

DRAWING NUMBER
M-111

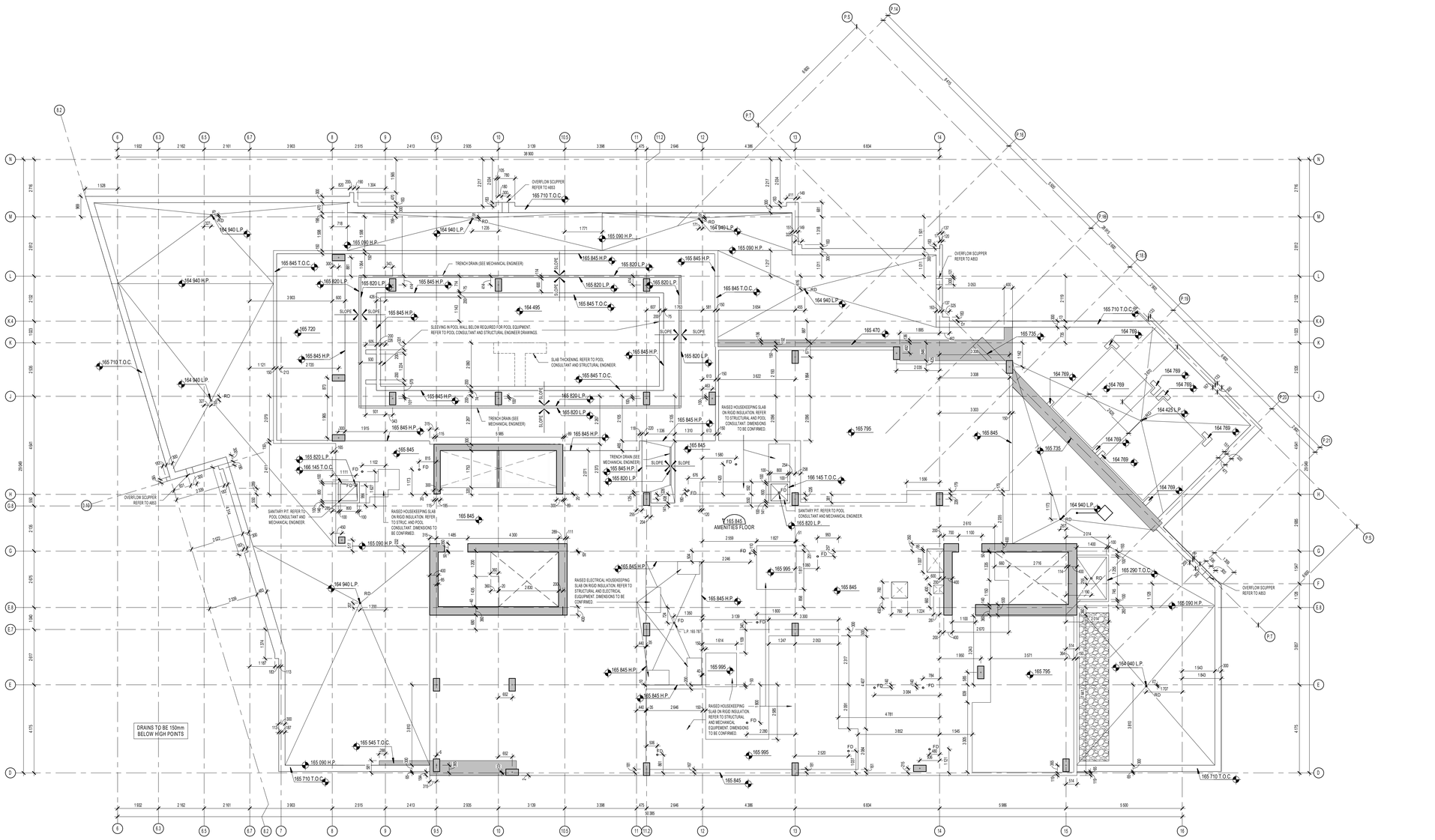
Tower 4 - Amenties



LOWER POOL SLAB FLOOR PLATE

1 : 100

2 / A257



AMENITIES FLOOR PLATE

1 : 75

1 / A257

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130 blvd. Henri-Bourassa Est, Montréal QC H3L 1B7
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OUVRAGE Project

PETRIE'S LANDING I - TOWER 4

EMPLACEMENT Location
ORLEANS, ON

NO PROJET No.
12190.00

NO	RÉVISION	DATE (aa-mm-jj)
1	30% ISSUE	2020-03-31
2	60% ISSUE	2020-04-30
3	60% ISSUE	2021-09-10
4	90% DRAFT ISSUE	2021-12-01
5	ISSUED FOR PERMIT	2021-12-15
6	ISSUED FOR TENDER	2022-03-02
7	FOR PERMIT UPDATE	2022-03-14
8	ISSUED FOR ADD-01	2022-03-25
9	ISSUED FOR ADD-02	2022-04-18
10	ISSUED FOR ADD-04	2022-07-15
11	ISSUED FOR ADD-06	2022-08-05
12	ISSUED FOR COORDINATION	2023-12-22
13	ISSUED FOR PERMIT - REV. 1	2024-01-17
14	ISSUED FOR COORDINATION	2024-03-07

DESSINÉ PAR Drawn by
MU/RR

VÉRIFIÉ PAR Checked by
MU

DATE (aa.mm.jj)
10/15/2019

ÉCHELLE Scale
As indicated

TITRE DU DESSIN Drawing Title
AMENITIES & LOWER POOL SLAB FLOOR PLATE

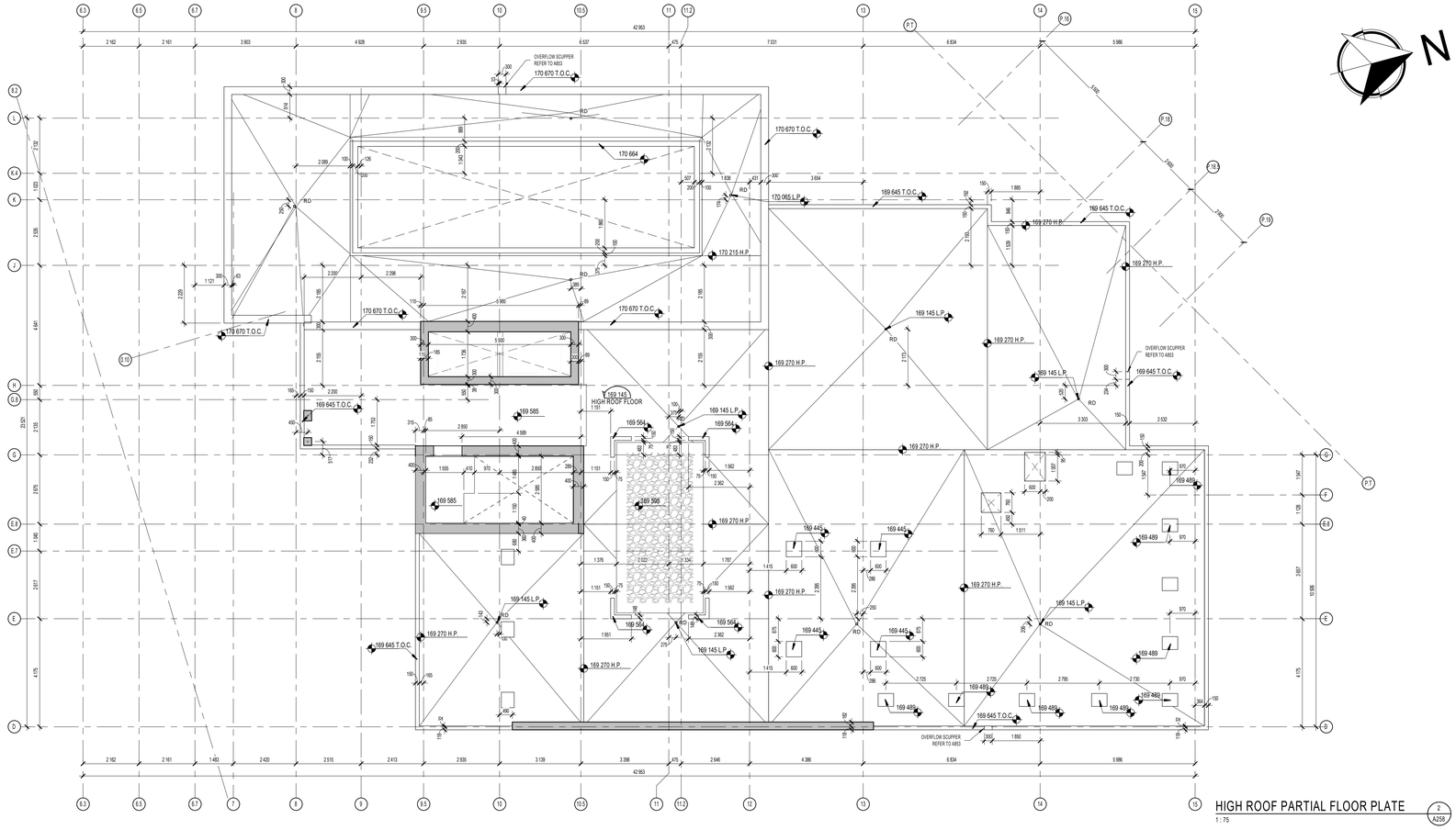
RÉVISION Revision
14

NO. DESSIN Dwg Number
A257

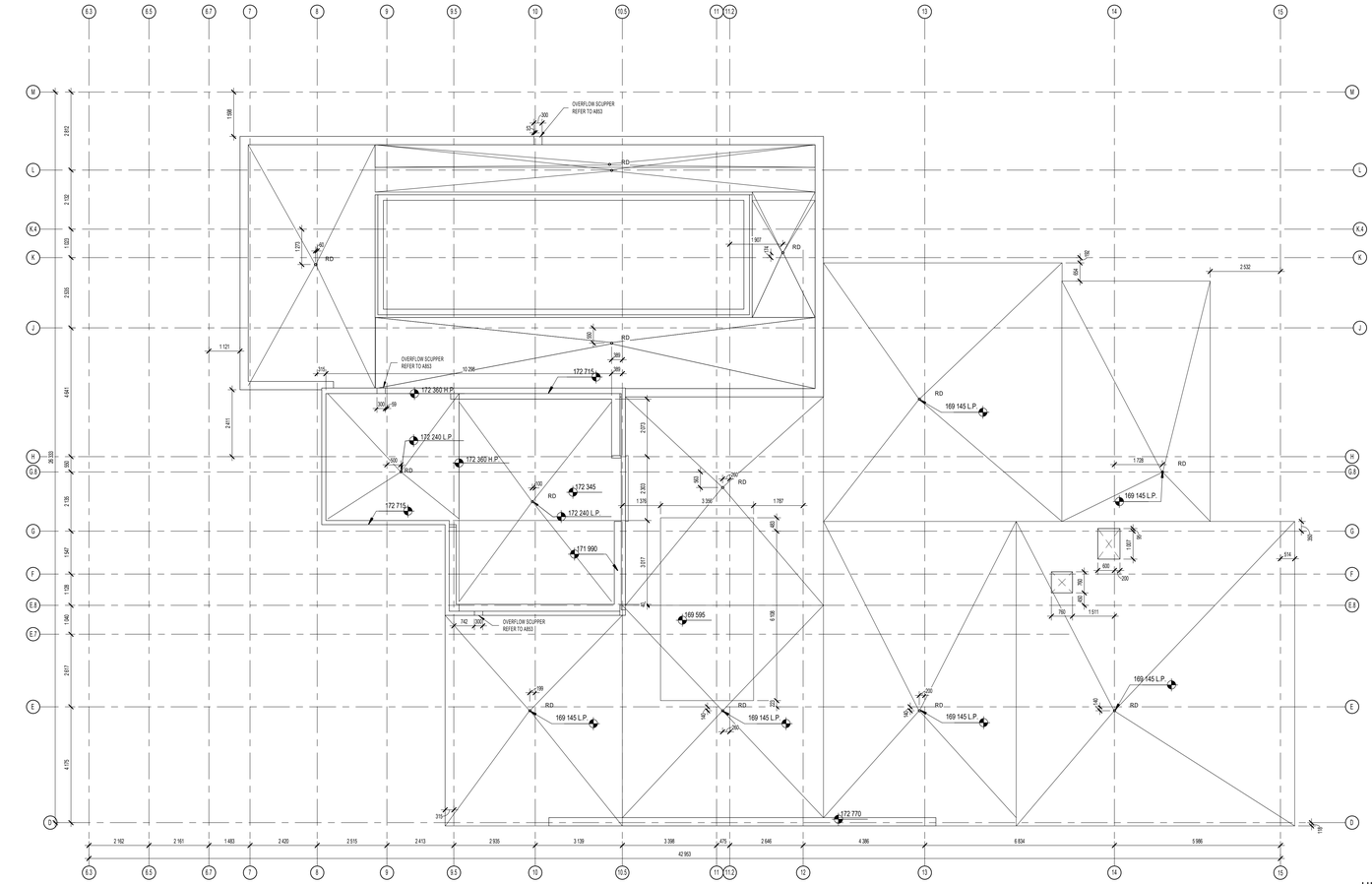
14602

C:\Fichiers Revit Locaux\PLT4_12190_ARC_R20_rroddQU42H.rvt

Tower 4 - High Roof



HIGH ROOF PARTIAL FLOOR PLATE
1 : 75
2 / A258



HIGH ROOF FLOOR PLATE
1 : 75
1 / A258

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T: 613-688-1899 Email: chris.collins@exp.com

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OUVRAGE Project

PETRIE'S LANDING I - TOWER 4

EMPLACEMENT Location
ORLEANS, ON

NO PROJET No.
12190.00

NO	RÉVISION	DATE (aa-mm-jj)
1	30% ISSUE	2020-03-31
2	60% ISSUE	2020-04-30
3	60% ISSUE	2021-09-10
4	80% DRAFT ISSUE	2021-12-01
5	ISSUED FOR PERMIT	2021-12-15
6	ISSUED FOR TENDER	2022-03-02
7	FOR PERMIT UPDATE	2022-03-14
8	ISSUED FOR ACO-01	2022-03-25
9	ISSUED FOR ACO-02	2022-04-18
10	ISSUED FOR ACO-04	2022-07-15
11	ISSUED FOR ACO-06	2022-08-05
12	ISSUED FOR PTA-99%	2023.02.24
13	ISSUED FOR COORDINATION	2023-12-22
14	ISSUED FOR PERMIT - REV. 1	2024-01-17
15	ISSUED FOR COORDINATION	2024-03-07

DESSINÉ PAR Drawn by
MU/RR

VÉRIFIÉ PAR Checked by
MU

DATE (aa.mm.jj)
10/15/2019

ÉCHELLE Scale
1 : 75

TITRE DU DESSIN Drawing Title
HIGH ROOF FLOOR PLATE

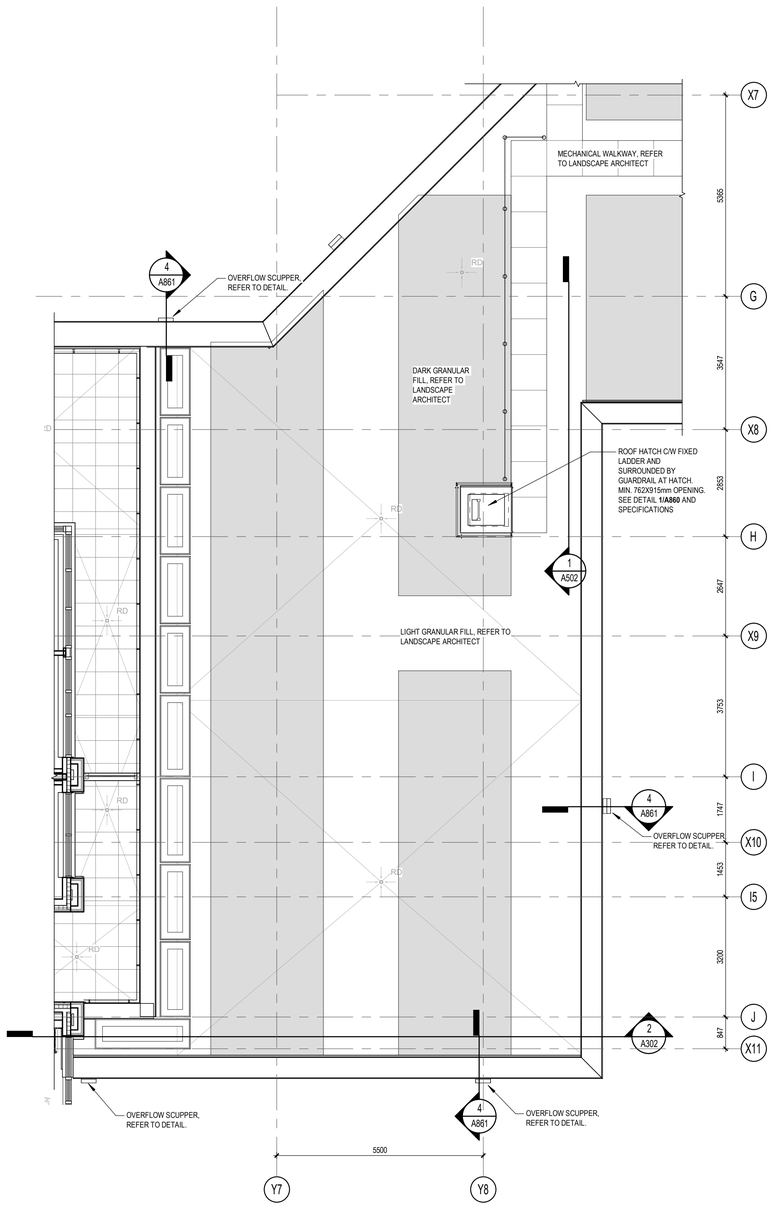
RÉVISION Revision
15

NO. DESSIN Dwg Number
A258

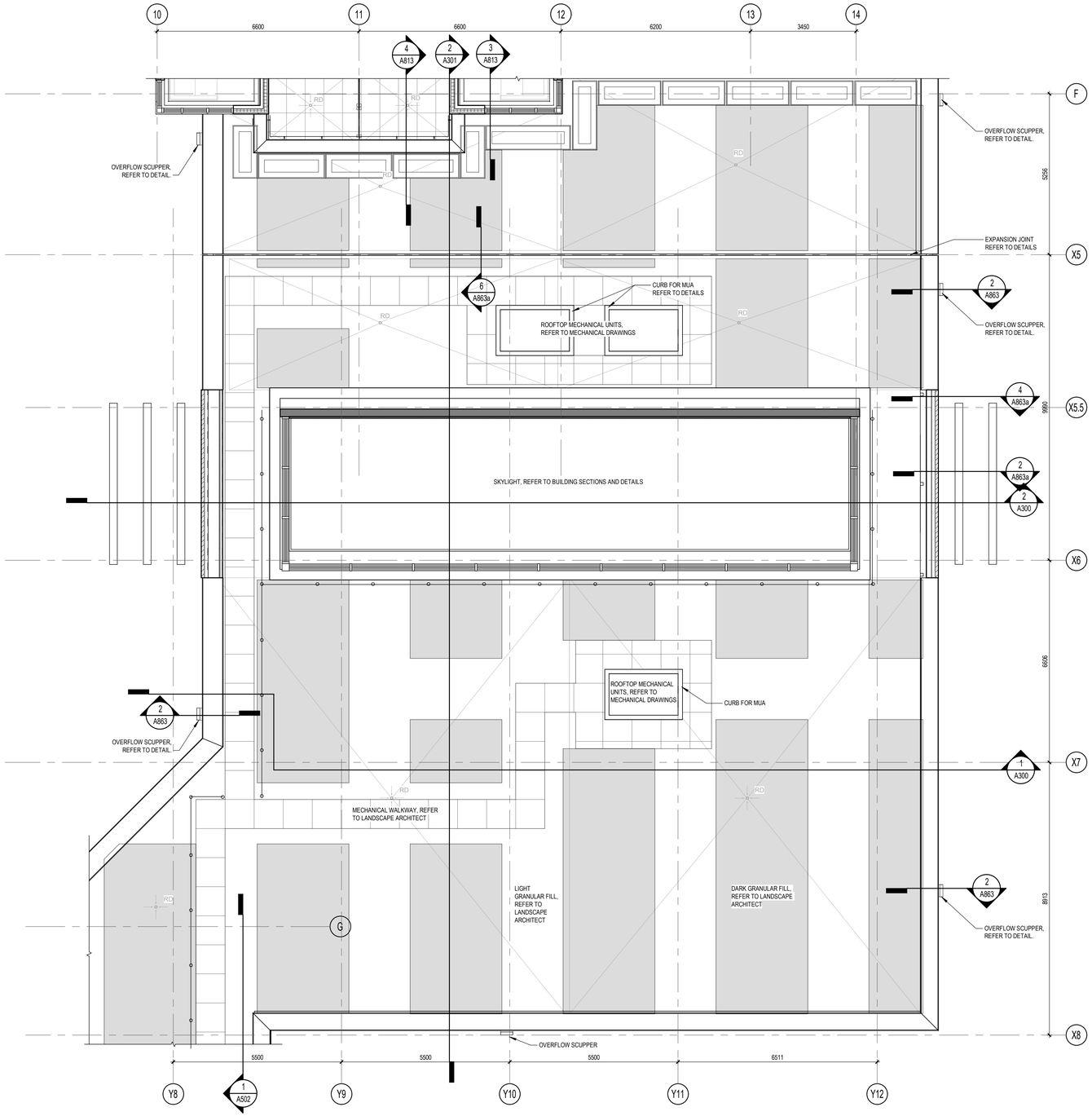
D07-12-21-0085

14602

Tower 5/6 - Podium



GENERAL 3RD FLOOR PLAN ROOF TOP
T6
1 : 75
2 A218A



GENERAL 3RD FLOOR PLAN ROOF TOP
T5
1 : 75
1 A218A

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SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES INC.

CLIENT Client
brigil

OUVRAGE Project
PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location
ORLEANS, ON

NO PROJET No.
11597/12191

NO	RÉVISION	DATE (aa-mm-jj)
A	RE-ISSUED FOR TENDER	2023-03-10
B	ISSUED FOR 60% COORD.	2024-03-22
C	ISSUED FOR 80% COORD.	2024-04-19
D	ISSUED FOR INTERNAL AUDIT A3.2	2024-04-30
E	ISSUED FOR 95% TENDER	2024-05-31

DESSINÉ PAR Drawn by
MU

VÉRIFIÉ PAR Checked
MU

DATE (aa.mm.jj)
03/03/23

ÉCHELLE Scale
1 : 75

TITRE DU DESSIN Drawing Title
3RD FLOOR COMMERCIAL ROOF PLAN

RÉVISION Revision
E

NO. DESSIN Dwg Number
A218A

P:\56_11597_ARC_INT_R20_detached.rvt

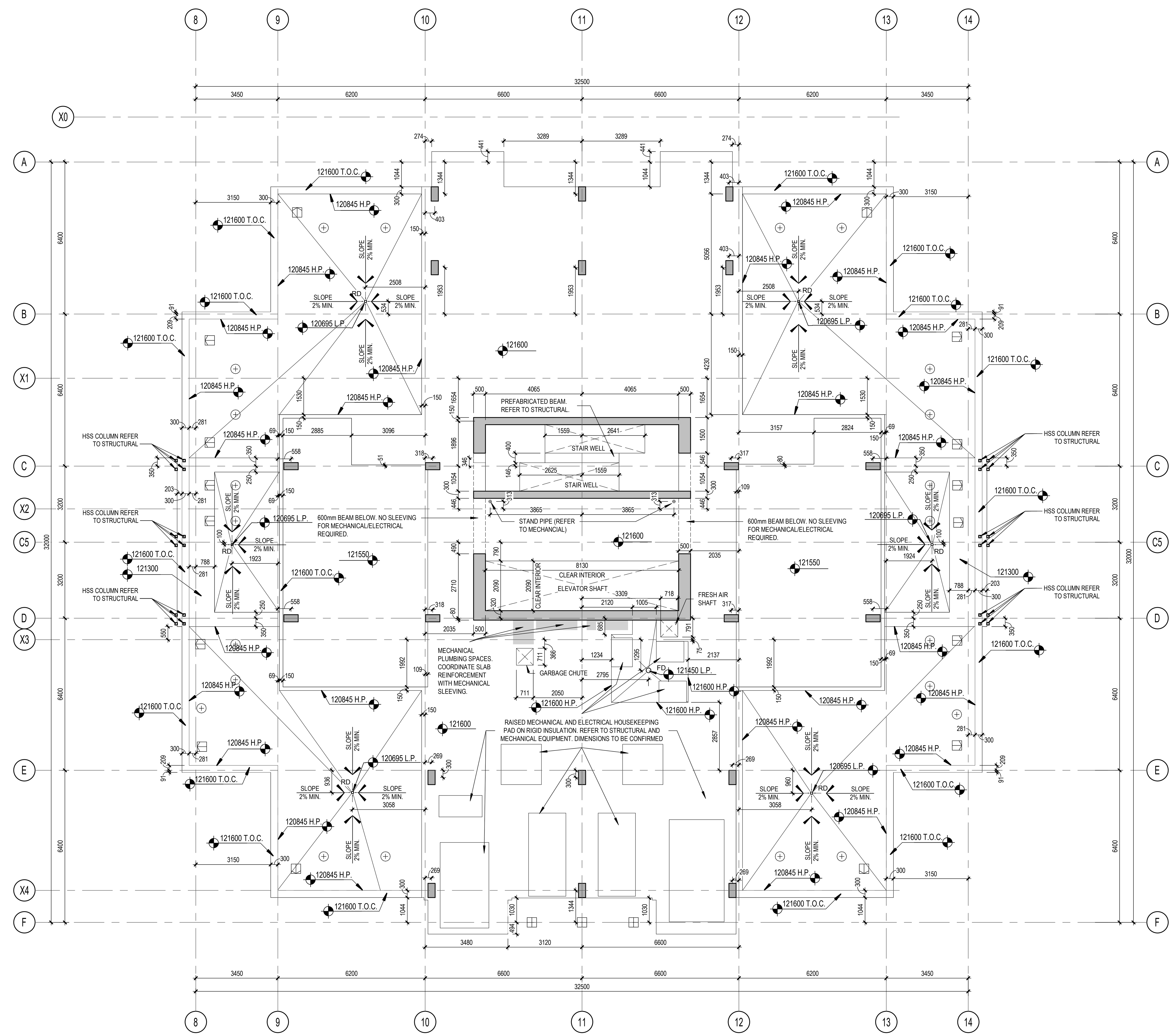
Tower 5 - Amenties

NOTE:
-ALL STAIR OPENINGS ARE SHOWN FOR POURED CONCRETE STAIR. IF PRECAST STAIRS ARE TO BE INSTALLED IN LIEU OF POURED CONCRETE STAIRS, ADJUST OPENING SIZE BASED ON PRECAST MANUFACTURER'S SHOP DRAWINGS.

ROOF DETAIL SYMBOLS

REFER TO WINDOW CLEANING FOR LOCATION AND DIMENSIONS

- CAST-IN PIER
- PORTABLE LINE REDIRECTOR
- CAST-IN PLACE ANCHOR WITH STUDS
- RECESSED CAST-IN PLACE ANCHOR REFER SHEET A861 DETAIL 8



TOWER 5 - AMENITY FLOOR SLAB EDGE PLAN

1 : 100

1
A284

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T: 438-381-7773 Email: gleroux@lerouxcyr.com

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T: 613-727-5111 Email: m.sarasin@gwal.com / rajv@gwal.com

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GEOTECHNICAL Géotechnique
Paterson Group
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T: 613-226-7381 Email: jvilleneuve@patersongroup.ca

CIVIL Civil
exp Services Inc.
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T: 613-688-1899 Email: Chris.collins@exp.com

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T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF ARCHITECT(E)S
NEUF ARCHITECTES INC.

CLIENT Client
brigil

OUVRAGE Project
PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location: ORLEANS, ON
NO PROJET No.: 11597/12191

NO	RÉVISION	DATE (aa-mm-jj)
A	ISSUED FOR 80% REVIEW	2022-04-21
B	ISSUED FOR PERMIT	2022-07-15
C	ISSUED FOR TENDER	2022-12-02
D	RE-ISSUED FOR TENDER	2023-03-10
E	ISSUED FOR 60% COORD.	2024-03-22
F	ISSUED FOR 80% COORD.	2024-04-19
G	ISSUED FOR INTERNAL AUDIT A3.2	2024-04-30
H	ISSUED FOR 95% TENDER	2024-05-31

DESSINÉ PAR Drawn by: AJ
VÉRIFIÉ PAR Checked: MU
DATE (aa.mm.jj): 12/20/21
ÉCHELLE Scale: As indicated

TITRE DU DESSIN Drawing Title
TOWER 5 - AMENITY FLOOR SLAB EDGE PLAN

RÉVISION Revision: H
NO. DESSIN Dwg Number: A284

PT56_11597_ARC_INT_R20_detached.rvt

Tower 6 - Amenties

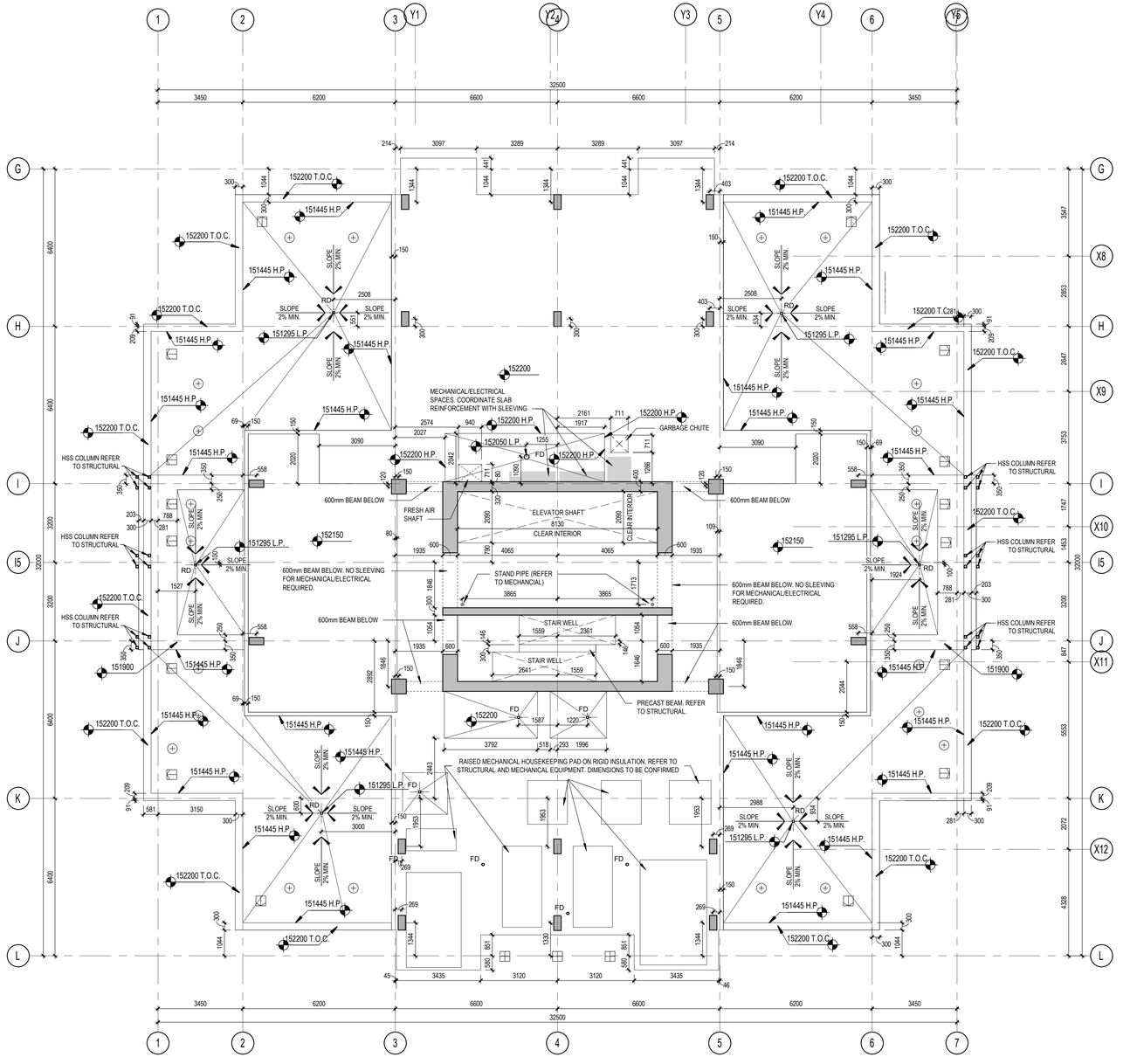
ROOF DETAIL SYMBOLS

REFER TO WINDOW CLEANING FOR LOCATION AND DIMENSIONS

- CAST-IN PIER
- PORTABLE LINE REDIRECTOR
- CAST-IN PLACE ANCHOR WITH STUDS
- RECESSED CAST-IN PLACE ANCHOR REFER SHEET A861 DETAIL 8

NOTE:
-ALL STAIR OPENINGS ARE SHOWN FOR POURED CONCRETE STAIR. IF PRECAST STAIRS ARE TO BE INSTALLED IN LIEU OF POURED CONCRETE STAIRS, ADJUST OPENING SIZE BASED ON PRECAST MANUFACTURER'S SHOP DRAWINGS.

-REFER TO THE MECHANICAL DRAWINGS SLEEVING AND SPACING FOR MECHANICAL RAISERS.



TOWER 6 - AMENITY FLOOR SLAB EDGE PLAN

1 ; 100

1
A285

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SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES INC.

CLIENT Client
brigil

OUVRAGE Project
PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location
ORLEANS, ON

NO PROJET No.
11597/12191

NO	RÉVISION	DATE (aa-mm-jj)
A	ISSUED FOR 80% REVIEW	2022-04-21
B	ISSUED FOR PERMIT	2022-07-15
C	ISSUED FOR TENDER	2022-12-02
D	RE-ISSUED FOR TENDER	2023-03-10
E	ISSUED FOR 60% COORD.	2024-03-22
F	ISSUED FOR 80% COORD.	2024-04-19
G	ISSUED FOR INTERNAL AUDIT A3.2	2024-04-30
H	ISSUED FOR 95% TENDER	2024-05-31

DESSINÉ PAR Drawn by
AJ

VÉRIFIÉ PAR Checked
MU

DATE (aa.mm.jj)
12/20/21

ÉCHELLE Scale
As indicated

TITRE DU DESSIN Drawing Title
TOWER 6 - AMENITY FLOOR SLAB EDGE PLAN

RÉVISION Revision
H

NO. DESSIN Dwg Number
A285

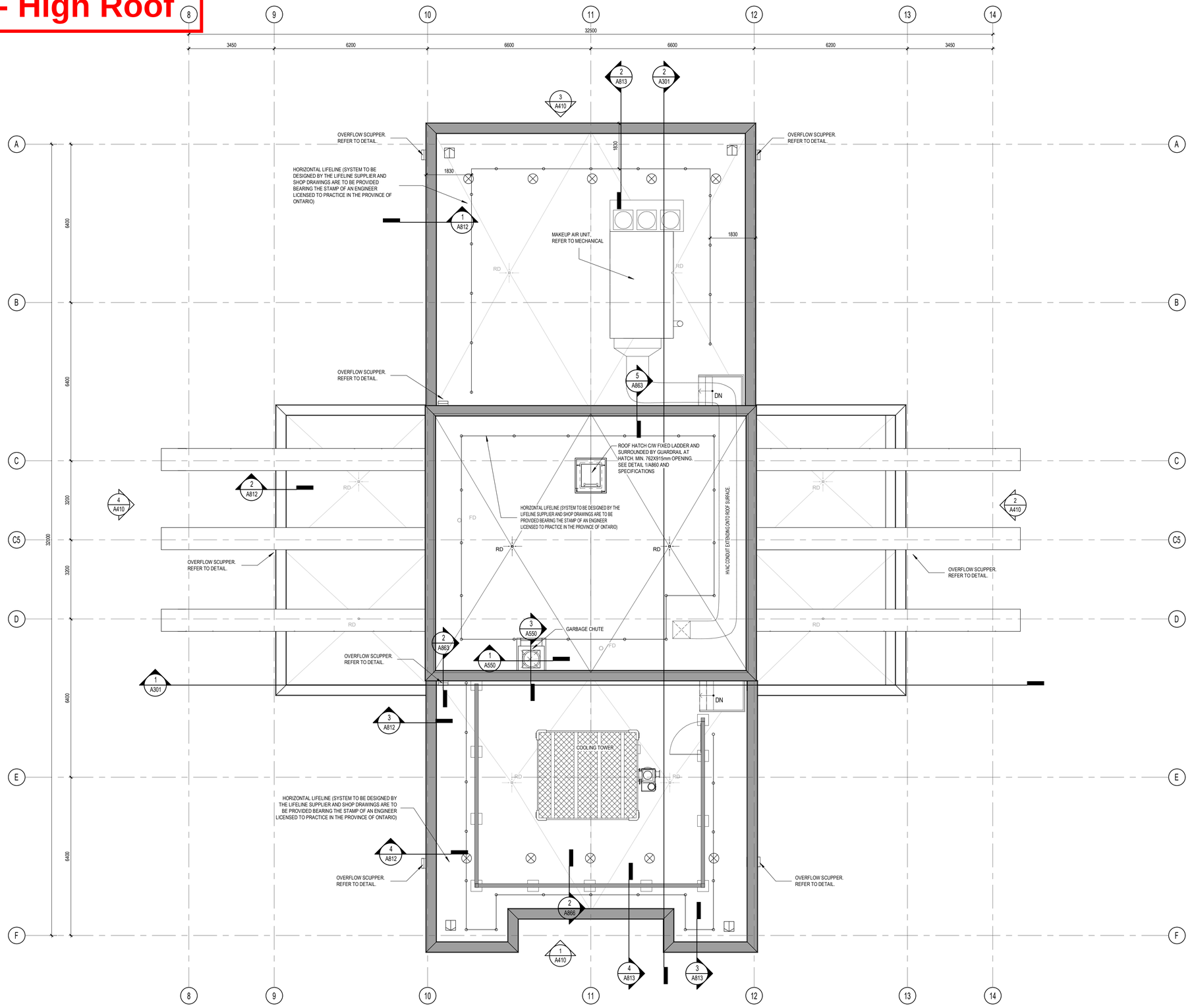
PT56_11597_ARC_INT_R20_detached.rvt

Tower 5 - High Roof

ROOF DETAIL SYMBOLS

REFER TO WINDOW CLEANING FOR LOCATION AND DIMENSIONS

- CAST-IN PIER
- PORTABLE LINE REDIRECTOR
- CAST-IN PLACE ANCHOR WITH STUDS
- RECESSED CAST-IN PLACE ANCHOR REFER SHEET A861 DETAIL 8



TOWER 5 - ROOF PLAN
1 : 75

1 A229

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NEUF ARCHITECTES INC.

CLIENT Client
brigil

OUVRAGE Project
PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location
ORLEANS, ON

NO PROJET No.
11597/12191

NO	RÉVISION	DATE (aa-mm-jj)
A	ISSUED FOR 30%	2021-10-29
B	ISSUED FOR 60%	2021-12-16
C	ISSUED FOR 80% REVIEW	2022-04-21
D	ISSUED FOR PERMIT	2022-07-15
E	ISSUED FOR TENDER	2022-12-02
F	RE-ISSUED FOR TENDER	2023-03-10
G	ISSUED FOR PERMIT COMMENTS	2023-06-16
H	ISSUED FOR 60% COORD.	2024-03-22
I	ISSUED FOR 80% COORD.	2024-04-19
J	ISSUED FOR INTERNAL AUDIT A3.2	2024-04-30
K	ISSUED FOR 95% TENDER	2024-05-31

DESSINÉ PAR Drawn by
AJ

VÉRIFIÉ PAR Checked
MU

DATE (aa.mm.jj)
10/29/21

ÉCHELLE Scale
As indicated

TITRE DU DESSIN Drawing Title
TOWER 5 - ROOF PLAN

RÉVISION Revision
K

NO. DESSIN Dwg Number
A229

PT56_11597_ARC_INT_R20_detached.rvt

Tower 6 - High Roof

ROOF DETAIL SYMBOLS

REFER TO WINDOW CLEANING FOR LOCATION AND DIMENSIONS

- CAST-IN PIER
- PORTABLE LINE REDIRECTOR
- CAST-IN PLACE ANCHOR WITH STUDS
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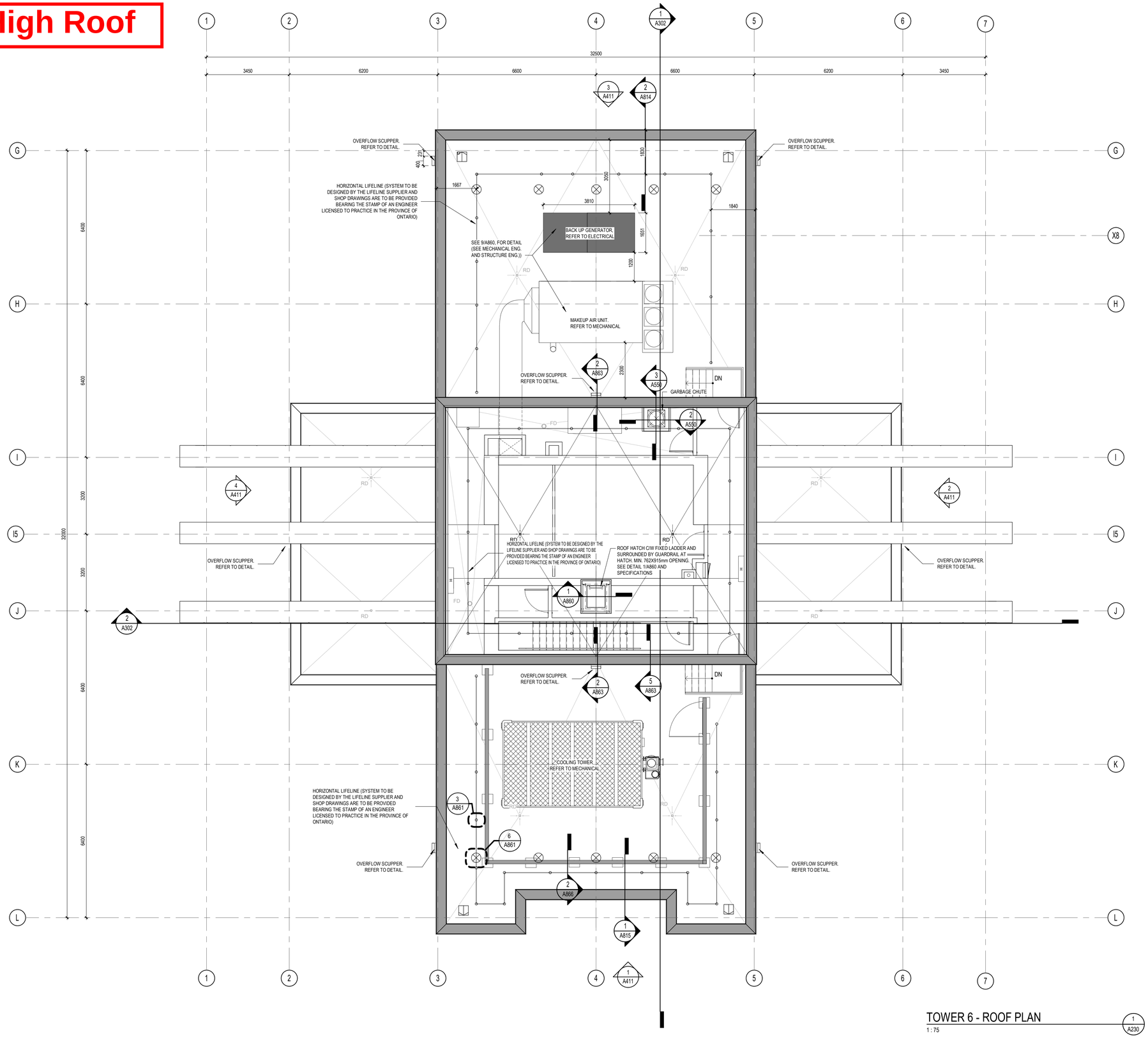

TOWER 6 - ROOF PLAN

1 : 75

1 A230

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DESSINÉ PAR Drawn by
AJ

VÉRIFIÉ PAR Checked
MU

DATE (aa.mm.jj)
10/29/21

ÉCHELLE Scale
As indicated

TITRE DU DESSIN Drawing Title
TOWER 6 - ROOF PLAN

RÉVISION Revision
K

NO. DESSIN Dwg Number
A230

PT56_11597_ARC_INT_R20_detached.rvt

PLUMBING SPECIALTIES SCHEDULE

No.	FIXTURE TYPE	PLUMBING CONNECTIONS				MAKE/ MODEL	TRIM		ACCESSORIES	REMARKS
		D.H.W.	D.C.W.	TRAP	VENT		MAKE	MODEL		
FD IN UNITS	FLOOR DRAIN	-	1/2"	3"	1-1/2"Ø	WATTS FD-100-A-2-A5	-	-	-ADJUSTABLE STRAINER ASSEMBLY -TRAP SEAL TAPPING	-EPOXY COATED CAST IRON BODY -POLISHED NICKLE BRONZE FRAME AND NON-TILTING GRATING AND FLASHING CLAMP
FD-1	LARGE PARKING FLOOR DRAIN		1/2"	3"	1-1/2"Ø	WATTS FD-463P-AF-4	-	-	-ADJUSTABLE STRAINER ASSEMBLY -TRAP SEAL TAPPING	- DUCTILE IRON STRAINER
FD-2	FLOOR DRAIN		1/2"	3"	1-1/2"Ø	WATTS FD-200-B-3	-	-	-ADJUSTABLE STRAINER ASSEMBLY -TRAP SEAL TAPPING	- DUCTILE IRON STRAINER
RD RD-BEM	ROOF DRAIN	-		-	-	WATTS - RD-100 WATTS - RD-100-BEM	-	-	-FLASHING FLANGE -FLASHING CLAMP -GRAVEL STOP -DOME	-GENERAL DUTY -EPOXY COATED CAST IRON
FFD	FLOOR FUNNEL DRAIN			3"Ø	1-1/2"Ø	WATTS FD-100-C-EG	-	3"Ø'P'	TSP	PROVIDE OVAL FLOOR FUNNEL GRATE
NFWH	NON-FREEZE WALL HYDRANT	-	3/4"	-	-	HY-2VB	-	-	VACUUM BREAKER KEY OPERATED WALL BOX	-CONCEALED -CHROME PLATED BRONZE
TD	TRENCH DRAIN					JAY SMITH 9812 SERIES				-C/W LOCKDOWN DUCTILE IRON GRATE AND FRAME. -INSTALL AS PER MANUFACTURER'S INSTRUCTIONS -C/W CATCH BASIN.
WD-1	CLOTHES WASHER FITTINGS	1/2"	1/2"	2"	1-1/4"	OATEY THE ELIMINATOR			-C/W CONNECTIONS FOR CONDENSATE DRAIN -AND VALVED DCW AND DHW SUPPLY	-PROVIDE PLASTIC DRAIN PAN FOR WASHER DRYER, CONNECT TO OPEN DRAIN.
DW-1	DISHWASHER CONNECTION	1/2"	1/2"	1-1/2"	1-1/4"				-VALVE STOP	-DHW WATER SUPPLY -DRAIN CONNECTION AND FINAL CONNECTION TO SANITARY DRAIN.
FD-3	ELEVATOR PIT DRAIN		1/2"	3"		WATTS FD-230-A-2-A5			-TRAP SEAL TAPPING	-GENERAL DUTY -EPOXY COATED CAST IRON
RDC FDC	ROOF DRAIN WITH FLOW CONTROL					WATTS - RD-100 WATTS - RD-100-BEM			-FLASHING FLANGE -FLASHING CLAMP -GRAVEL STOP -DOME	-GENERAL DUTY -EPOXY COATED CAST IRON -FLOW CONTROL
PD	PARKING DECK DRAIN		1/2"	3"	1-1/2"Ø	WATTS FD-463P-AF-4			-ADJUSTABLE STRAINER ASSEMBLY -TRAP SEAL TAPPING	HEAVY DUTY - DUCTILE IRON STRAINER

HIGH ROOF

EXTERIOR AREAS

AMMENITIES, PENTHOUSE ROOF

WATTS DRAINAGE

RD-100

Tag: _____

Large Capacity Roof Drain

Components:

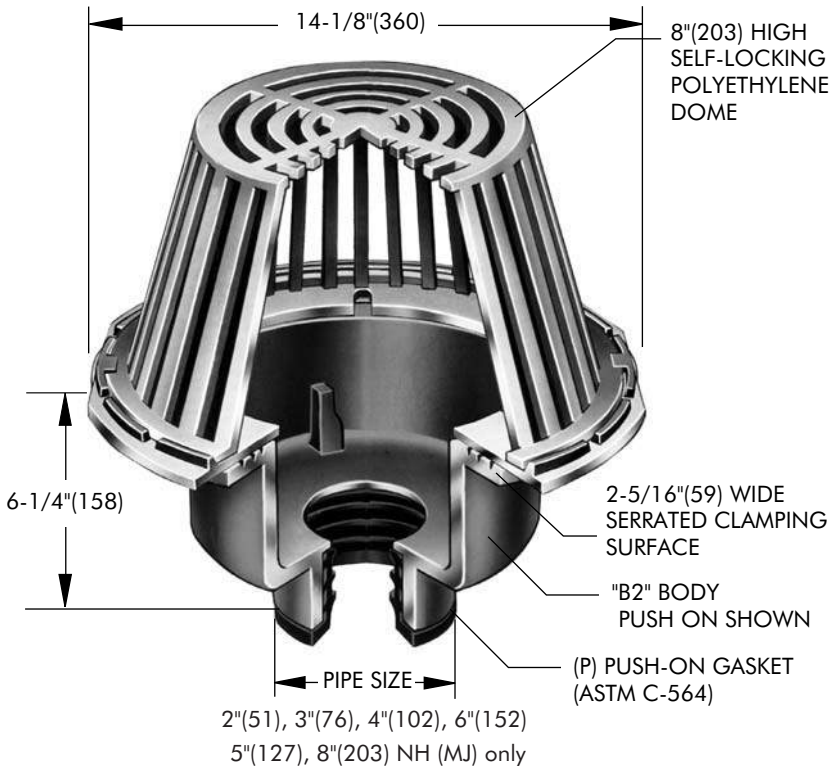

B2


B2-DM


B2-FLG


FC-2

SPECIFICATION: Watts Drainage Products RD-100 epoxy coated cast iron roof drain with deep sump, wide serrated flashing flange, flashing clamp device with integral gravel stop and self-locking polyethylene (standard) dome strainer.



Free Area Sq. In.
137

Deck opening 10" (254) with sump receiver 13-1/4" (337)

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes. Underdeck Clamp (-BED and -D options) are not available when -SO is selected.

Order Code: RD-10☐☐-☐-☐

Ex. RD-102P-K

Pipe Sizing (Select One)

Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size	☐
6	6"(152) Pipe Size	☐
8	8"(203) Pipe Size	☐

Outlet Type (Select One)

Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Options (Select One or More)

Suffix	Description	
-A	Accutrol weir (specify # 1-6 slots)	☐
-B	Sump Receiver Flange	☐
-BED	Sump Receiver, Adj Ext., Deck Clamp	☐
-C	Secondary Membrane Clamp	☐
-D	Underdeck Clamp	☐
-E	Adjustable Extension	☐
-GSS	Stainless Steel Ballast Guard	☐
-H	Adj. to 6" IRMA Ballast Guard	☐
-K	Ductile Iron Dome	☐
-K80	Aluminum Dome	☐
-L	Vandal Proof Dome	☐
-R	2" High External Water Dam	☐
-SO	Side Outlet**	☐
-V	Fixed Extension (1-1/2",2",3",4")	☐
-W	Adj. Water Level Regulator	☐
-W-1	Waterproofing Flange	☐
-Z	Extended Integral Wide Flange	☐
-5	Sediment Bucket	☐
-12	Galvanized Dome	☐
-13	All Galvanized	☐
-83	Mesh Covered Dome	☐
-113M	Special Epoxy from 3M Range	☐

Optional Body Material (NH Only)

Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

Job Name _____

Job Location _____

Engineer _____

Shop Drawing Review
M & E ENGINEERING
This review is only for the verification of general quality and design and does not relieve the contractor from his responsibility for ensuring that all spaces, capacities, specification, coordination, installation, and contractual requirements are met.
Reviewed by: M. Yazdani
Date: Aug. 8, 2017
comments; as noted

WATTS Drainage reserves the right to make similar changes and modifications to products previously or subsequently ...olerances.

WATTS DRAINAGE

CANADA

1-888-208-8927 Website: www.wattsdrainage.ca

TOWER 2 - INVERTED ROOF

RD-100-CH

Tag: _____

Large Area IRMA Roof Drain with Adjustable Ballast Guard

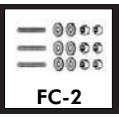
Components:


B2

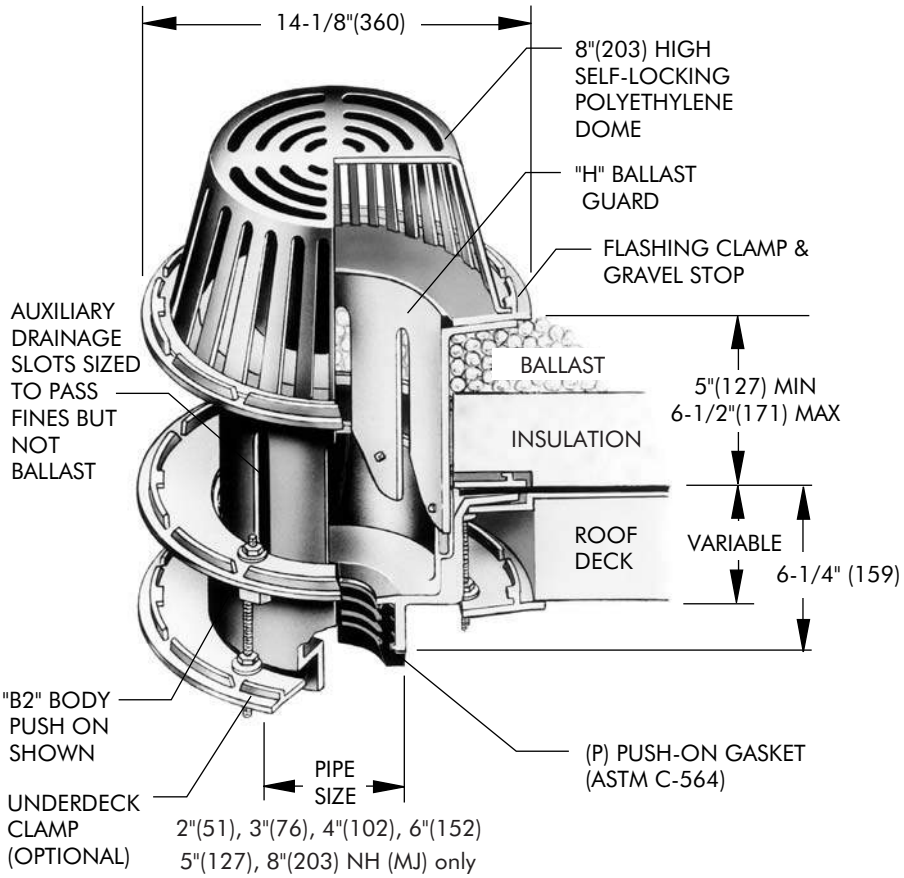

B2-FIG


B2-H


B2-DM


FC-2

SPECIFICATION: Watts Drainage Products RD-100-CH lacquered cast iron roof drain with deep sump, wide serrated flashing flange, membrane clamp, adjustable extension with auxilliary drainage slots, dome securing ring gravel stop and self-locking polyethylene dome strainer.



Free Area Sq. In.
137

Deck opening 10" (254) with sump receiver 13-1/4" (337)

Order Code: RD-10☐☐-CH-☐-☐

Ex. RD-102P-CH-K

Pipe Sizing (Select One)		
Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size	☐
6	6"(152) Pipe Size	☐
8	8"(203) Pipe Size	☐

Outlet Type (Select One)		
Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Options (Select One or More)		
Suffix	Description	
-A	Accutrol weir (specify # 1-6 slots)	☐
-B	Sump Receiver Flange	☐
-C	Secondary Membrane Clamp	☐
-D	Underdeck Clamp	☐
-E	Adjustable Extension	☐
-GSS	Stainless Steel Ballast Guard	☐
-K	Ductile Iron Dome	☐
-K80	Aluminum Dome	☐
-L	Vandal Proof Dome	☐
-R	2" High External Water Dam	☐
-SO	Side Outlet**	☐
-V	Fixed Extension (1-1/2",2",3",4")	☐
-W	Adj. Water Level Regulator	☐
-W-1	Waterproofing Flange	☐
-Z	Extended Integral Wide Flange	☐
-5	Sediment Bucket	☐
-12	Galvanized Dome	☐
-13	All Galvanized	☐
-83	Mesh Covered Dome	☐
-113M	Special Epoxy from 3M Range	☐

Optional Body Material (NH Only)		
Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes.
Underdeck Clamp (-BED and -D options) are not available when -SO is selected.

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

WATTS DRAINAGE
CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca
CANADA

TOWER 2 - EXTERIOR PARKING AREAS

WATTS® DRAINAGE

RD-100-CP

Tag: _____

Large Area IRMA Roof Drain with 12"x12" Promenade Top

Components:

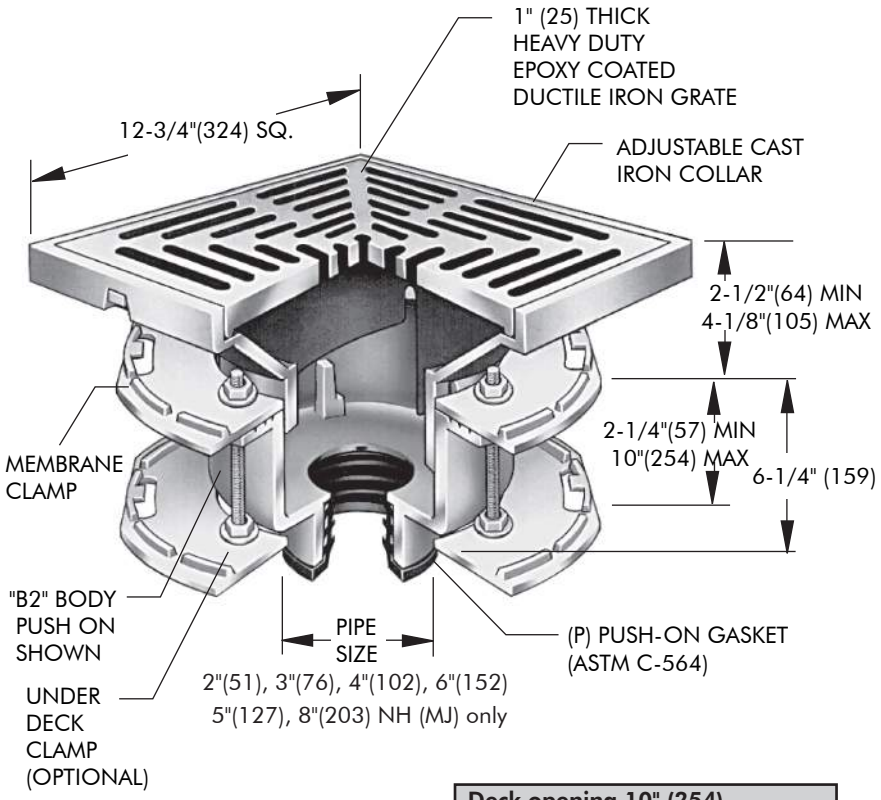

B2


FD-460-AF


B2-FLG


FC-1

SPECIFICATION: Watts Drainage Products RD-100-CP epoxy coated ductile iron roof drain with deep sump and wide serrated flashing flange, membrane clamp, square adjustable lacquered cast iron collar with square epoxy coated locking type ductile iron grate with 3/8"(10) maximum width drainage slots.



Deck opening 10" (254) with sump receiver 13-1/4" (337)

Load Rating & Free Area

Suffix	Load Rating	Free Area Sq. In.
CP-1	*XHD	41
CP-3	*XHD	41
CP-4	*XHD	41

* The load classifications are in accordance with the American National Standards ASME A112.21.1M ASME Ratings are as follows:
XHD - Safe Live Load 7500-10000 lbs.(3375-4500kg)
The above categories are given as a guide only.
Please consult factory.

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes.
Underdeck Clamp (-BED and -D options) are not available when -SO is selected.

Order Code: RD-10☐☐-CP-☐-☐-☐

Ex. RD-102P-CP-3

Pipe Sizing (Select One)

Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size	☐
6	6"(152) Pipe Size	☐
8	8"(203) Pipe Size	☐

Outlet Type (Select One)

Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Grate (Select One)

Suffix	Description	
-1	Nickel Bronze	☐
-3	Stainless Steel	☐
-4	Ductile Iron	☐

Options (Select One or More)

Suffix	Description	
-B	Sump Receiver Flange	☐
-C	Secondary Membrane Clamp	☐
-D	Underdeck Clamp	☐
-E	Adjustable Extension	☐
-GSS	Stainless Steel Ballast Guard	☐
-H	Adj. to 6" IRMA Ballast Guard	☐
-SIFC	Flow Control (2", 3", 4" Outlets only) Specify flow required	☐
-SO	Side Outlet**	☐
-V	Fixed Extension (1-1/2",2",3",4")	☐
-W-1	Waterproofing Flange	☐
-Z	Extended Integral Wide Flange	☐
-5	Sediment Bucket	☐
-6	Vandal Proof Top	☐
-9	Hinged Grate	☐
-10	Secured Top	☐
-12	Galvanized Top	☐
-13	All Galvanized	☐
-26	Hinged Locking Grate	☐
-113M	Special Epoxy from 3M Range	☐

Optional Body Material (NH Only)

Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

WATTS® DRAINAGE
CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca
CANADA

FD-870-TG

Tag: _____

Planting Area Drain with Deck Level Drainage Grate

Components:


B3


B3-CB


FD-320


B3-XY

SPECIFICATION: Watts Drainage Products FD-870-TG planting area drain with epoxy coated cast iron body, membrane clamp, adjustable ballast guard riser section, epoxy coated ductile iron (standard) grate and no hub (MJ) (standard) outlet.

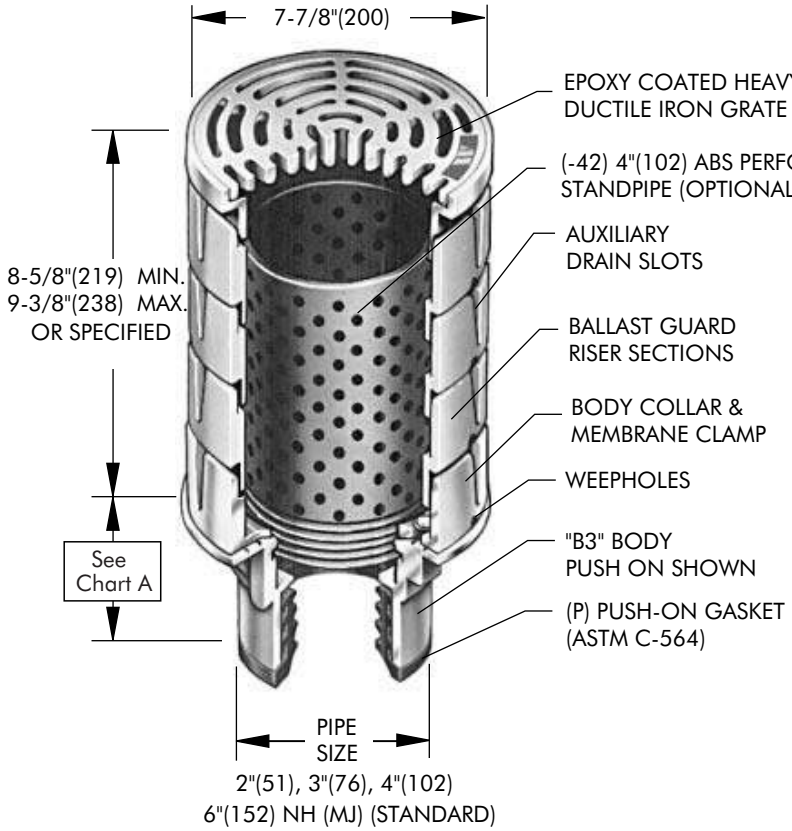


Chart A

	Std.	P	T	X	60/61
Pipe Size	No Hub	Push On	Female Thread	Inside Caulk	PVC/ ABS
2"(51)	3-5/8"(92)	4-1/4"(108)	4-1/4"(108)	4-1/2"(114)	3-3/4"(95)
3"(76)	3-5/8"(92)	4-1/4"(108)	4-1/4"(108)	4-1/2"(114)	3-3/4"(95)
4"(102)	3-5/8"(92)	4-1/4"(108)	4-1/4"(108)	4-1/2"(114)	4"(102)
6"(152)	3-1/2"(89)				

Order Code: FD-87☐☐-TG-☐-☐-☐

Ex. FD-872P-TG-1

Pipe Sizing (Select One)

Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
6	6"(152) Pipe Size	☐

Outlet Type (Select One)

Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Strainer (Select One)

Suffix	Description	
-1	8"(203), Nickel Bronze	☐
-3	8"(203), Stainless Steel Veneer	☐
-4	8"(203), Ductile Iron	☐

Options (Select One or More)

Suffix	Description	
-6	Vandal Proof	☐
-10	Secured Top c/w Phillips Screws	☐
-12	Galvanized Top	☐
-13	All Galvanized	☐
-15	Adj. Extension (2"-2-3/4")	☐
-42	Perforated Standpipe	☐
-81	Bronze Dome	☐
-B	Sump Receiver	☐
-D	Underdeck Clamp**	☐
-SO	Side Outlet	☐

Optional Body Material (NH Only)

Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes.
Underdeck Clamp (-D option) is not available when -SO is selected.

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

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TOWER 2 - USED WITH RD-100 & RD-100-CH ON CONVENTIONAL ROOF & INVERTED ROOF

Adjustable Accutrol Weir

Tag: _____

Adjustable Flow Control for Roof Drains

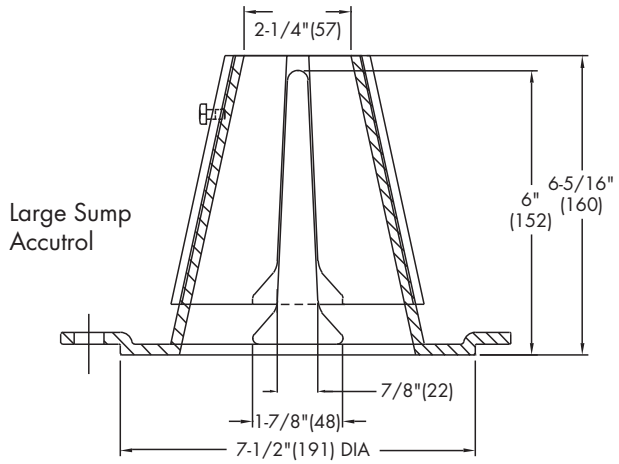
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

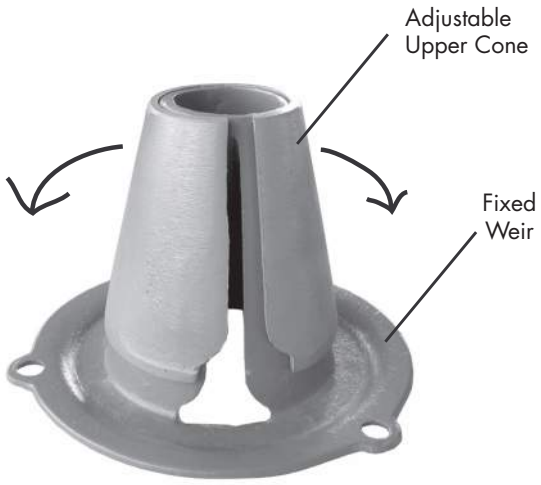
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

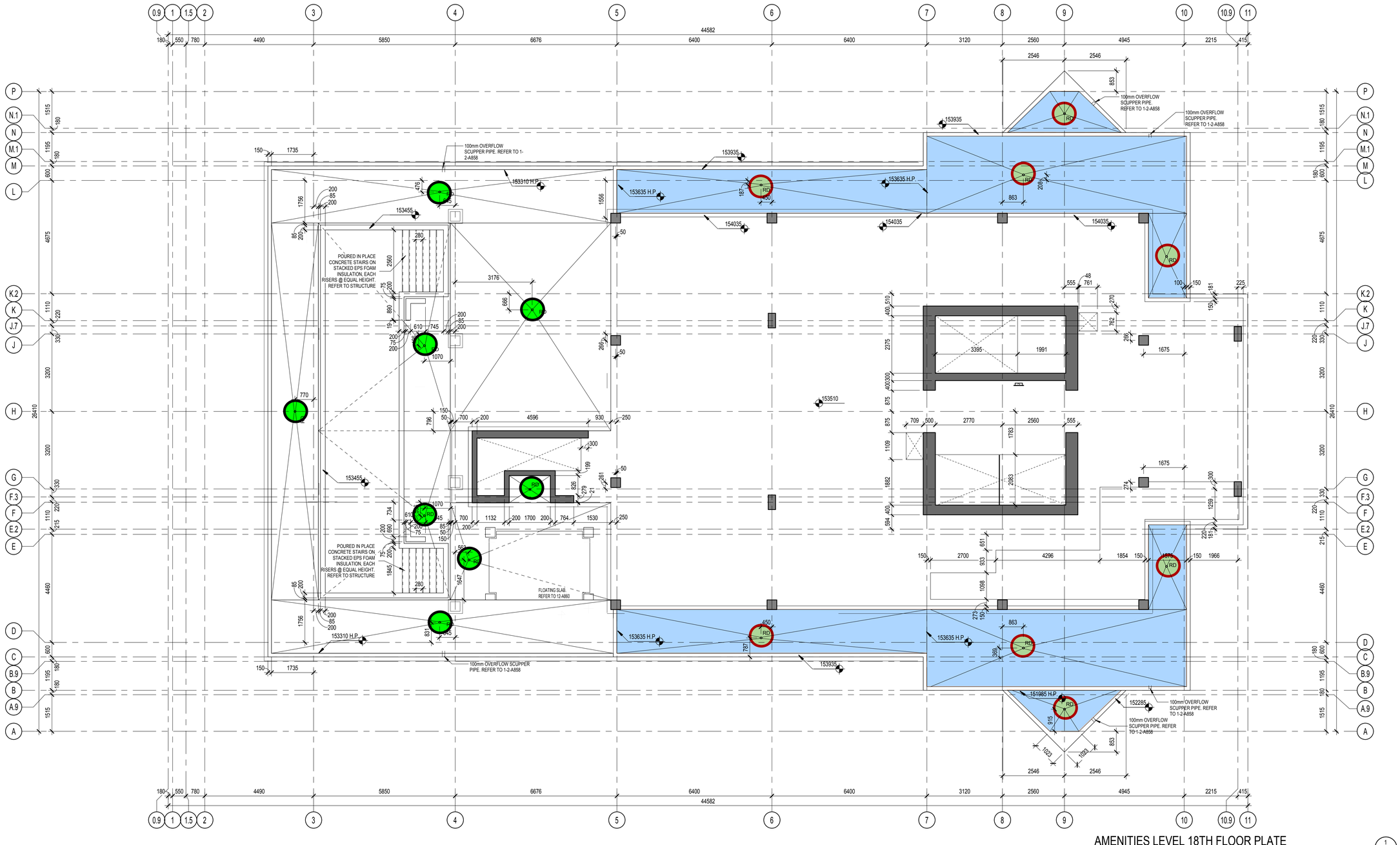
USA: Tel: (800) 338-2581 • Fax: (828) 248-3929 • Watts.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • Watts.ca
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

A Watts Water Technologies Company

AREAS WHERE PONDING CAN OCCUR

WATTS RD-100-CP-85 (IRMA ROOF DRIAN WITH 12X12" PROMENADE WITH ACCUTROL WEIR

WATTS RD-100-CP-85 (IRMA ROOF DRIAN WITH 12X12" PROMENADE TOP)



AMENITIES LEVEL 18TH FLOOR PLATE

1 : 75

1 / A257

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T: 819-243-7392 Email: JLRivard@brigil.com; mchenier@brigil.com

OUVRAGE Project

PETRIE'S LANDING I - TOWER 3

EMPLACEMENT Location
300 INLET PRIVATE, ORLEANS, ONTARIO

NO PROJET No.
11596.00

NO	RÉVISION	DATE (aa-mm-jj)
1	ISSUE FOR FOUNDATION PERMIT	2019.05.06

DESSINÉ PAR Drawn by
M.D.

VÉRIFIÉ PAR Checked
F.P.

DATE (aa.mm.jj)
19.01.18

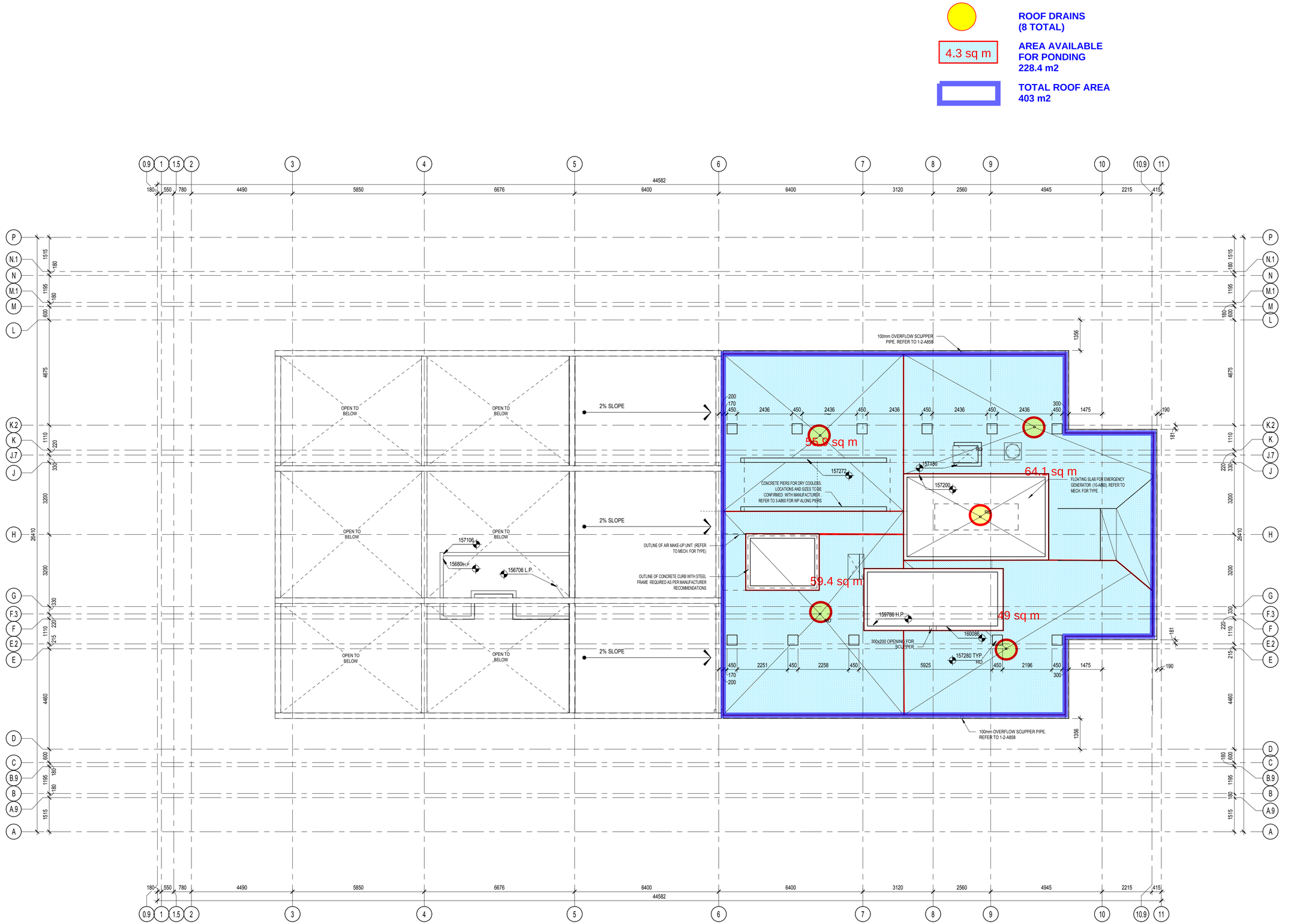
ÉCHELLE Scale
1 : 75

TITRE DU DESSIN Drawing Title

AMENITIES LEVEL 18TH FLOOR PLATE

RÉVISION Revision
1

NO. DESSIN Dwg Number
A257



HIGH ROOF PLATE

1 : 75

1
A 258

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exp Services Inc.
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CLIENT Client

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T: 819-243-7392 Email: JLRivard@brigil.com; mchenier@brigil.com

OUVRAGE Project

PETRIE'S LANDING I - TOWER 3

EMPLACEMENT Location
300 INLET PRIVATE, ORLEANS, ONTARIO

NO PROJET No.
11596.00

NO	RÉVISION	DATE (aa-mm-jj)
1	ISSUE FOR FOUNDATION PERMIT	2019.05.06

DESSINÉ PAR Drawn by
M.D.

VÉRIFIÉ PAR Checked
F.P.

DATE (aa.mm.jj)
19.01.18

ÉCHELLE Scale
1 : 75

TITRE DU DESSIN Drawing Title

HIGH ROOF FLOOR PLATE

RÉVISION Revision
1

NO. DESSIN Dwg Number
A 258

WATTS DRAINAGE

RD-100

Tag: _____

Large Capacity Roof Drain

Components:

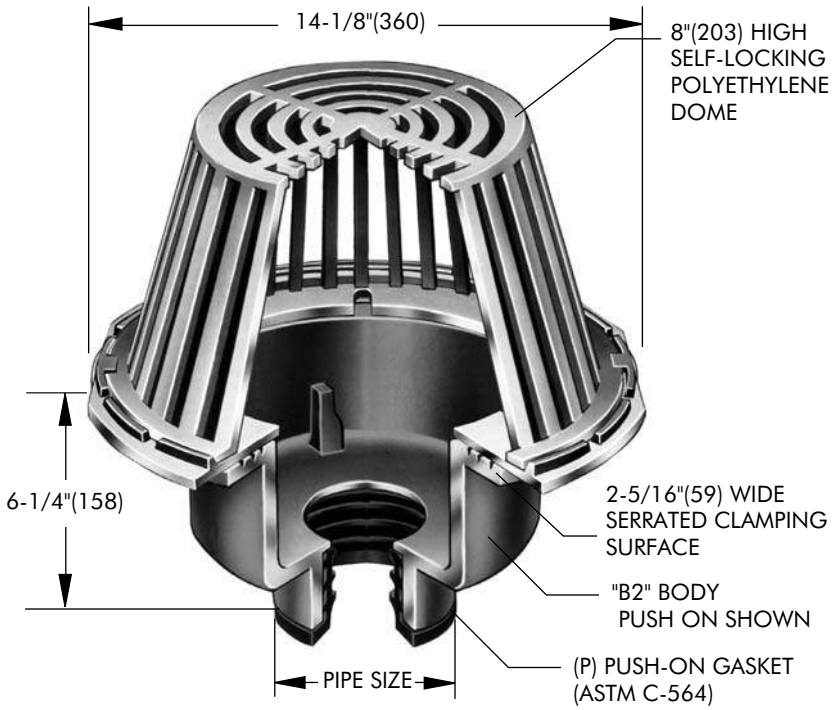

B2


B2-DM


B2-FLG


FC-2

SPECIFICATION: Watts Drainage Products RD-100 epoxy coated cast iron roof drain with deep sump, wide serrated flashing flange, flashing clamp device with integral gravel stop and self-locking polyethylene (standard) dome strainer.



Free Area Sq. In.
137

Deck opening 10" (254) with sump receiver 13-1/4" (337)

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes. Underdeck Clamp (-BED and -D options) are not available when -SO is selected.

Order Code: RD-10☐☐-☐-☐

Ex. RD-102P-K

Pipe Sizing (Select One)

Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size	☐
6	6"(152) Pipe Size	☐
8	8"(203) Pipe Size	☐

Outlet Type (Select One)

Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Options (Select One or More)

Suffix	Description	
-A	Accutrol weir (specify # 1-6 slots)	☐
-B	Sump Receiver Flange	☐
-BED	Sump Receiver, Adj Ext., Deck Clamp	☐
-C	Secondary Membrane Clamp	☐
-D	Underdeck Clamp	☐
-E	Adjustable Extension	☐
-GSS	Stainless Steel Ballast Guard	☐
-H	Adj. to 6" IRMA Ballast Guard	☐
-K	Ductile Iron Dome	☐
-K80	Aluminum Dome	☐
-L	Vandal Proof Dome	☐
-R	2" High External Water Dam	☐
-SO	Side Outlet**	☐
-V	Fixed Extension (1-1/2",2",3",4")	☐
-W	Adj. Water Level Regulator	☐
-W-1	Waterproofing Flange	☐
-Z	Extended Integral Wide Flange	☐
-5	Sediment Bucket	☐
-12	Galvanized Dome	☐
-13	All Galvanized	☐
-83	Mesh Covered Dome	☐
-113M	Special Epoxy from 3M Range	☐

Optional Body Material (NH Only)

Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

WATTS DRAINAGE
CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca
CANADA

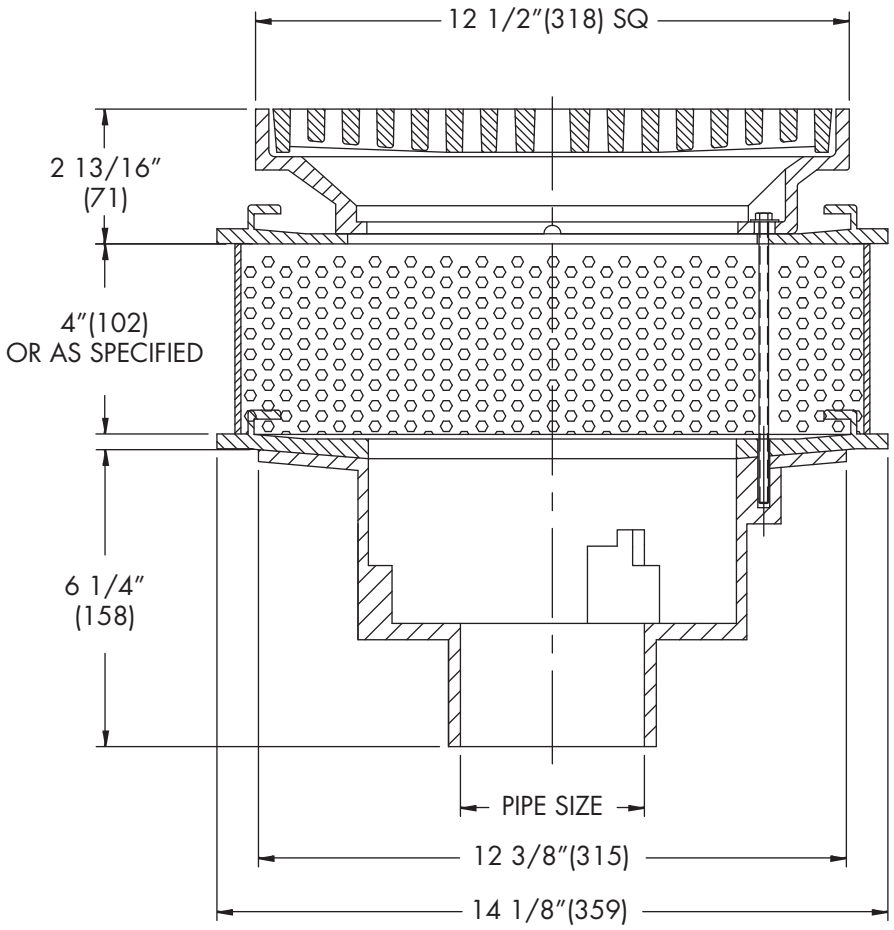
TOWER 3 - AMMENTITIES ROOF

RD-100-CP-85

Tag: _____

IRMA Roof Drain with 12"x12" Promenade Top

SPECIFICATION: Watts Drainage RD-100-CP-85 epoxy coated cast iron roof drain with flashing clamp, 4"(102) stainless steel perforated extension, 12-3/4"x12-3/4"(324x324) square epoxy coated ductile iron heel proof promenade top, and no hub (standard) outlet.



Pipe Sizing (Select One)		
Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size (NH Only)	☐
6	6"(152) Pipe Size	☐

Outlet Type (Select One)		
Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Options (Select One or More)		
Suffix	Description	
-1	All Nickle Bronze Top	☐
-5	Sediment Bucket	☐
-6	Vandal Proof Top	☐
-9	Hinged Grate	☐
-13	Galvanized	☐
-B	Sump Receiver	☐
-D	Underdeck Clamp	☐
-F	Deck Flange/Adj. Extension	☐
-SO	Side Outlet (2", 3", 4" Only)	☐
-US	Buy American Compliant	☐

Optional Body Material		
Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

Load Rating	Free Area Sq. In.
MD*	41

NOTICE

The load classifications are in accordance with the American National Standards ASME A112.21.1M
ASME Ratings are as follows:
MD - Safe Live Load 2000-4999 lbs.(900-2250kg)
The above categories are given as a guide only.
Please consult factory.

Deck opening 10"(254) with sump receiver 13-1/4"(337)

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

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Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

A Watts Water Technologies Company

WATTS DRAINAGE

FD-460-AF

Tag: _____

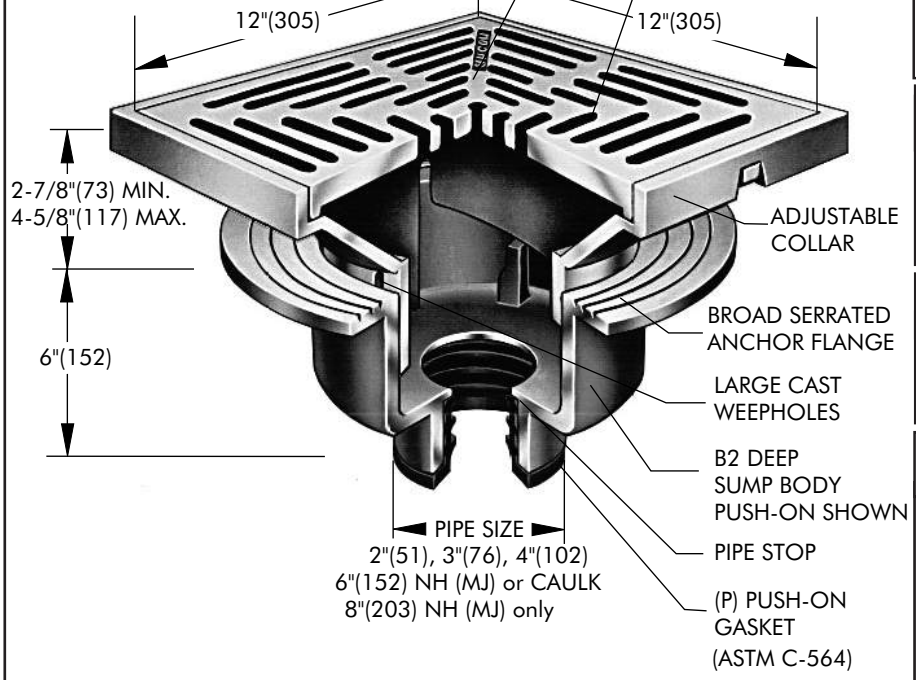
Area Drain with 12" Square Adjustable Top

Components:


B2


FD-460-AF

SPECIFICATION: Watts Drainage Products FD-460-AF epoxy coated cast iron area drain with anchor flange, weepholes, 12-3/4"x12-3/4"(324x324) adjustable top with ductile iron (standard) tractor grate, no hub (MJ) (standard) outlet.



Order Code: FD-46☐☐-☐-☐

Ex. FD-462P-AF-1

Pipe Sizing (Select One)		
Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
6	6"(152) Pipe Size	☐
8	8"(203) Pipe Size	☐

Outlet Type (Select One)		
Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Grate (Select One)		
Suffix	Description	
AF-1	Nickel Bronze	☐
AF-4	Ductile Iron	☐
AF-28	Cast S.S.	☐

Options (Select One or More)		
Suffix	Description	
-5	Sediment Bucket	☐
-6	Vandal Proof	☐
-7	Trap Primer Tapping	☐
-8	Backwater Valve (3" / 4" Only)	☐
-9	Hinged Grate	☐
-10	Secured Top c/w Phillips screws	☐
-12	Galvanized Top	☐
-13	All Galvanized	☐
-15	Adj. Extension (4" to 5-5/8")	☐
-26	Hinged Locking Grate	☐
-34	Closure Plug	☐
-113M	Special Epoxy from 3M Range	☐
-Z	Elastomeric Flange	☐

Load Rating & Free Area

Suffix	Load Rating	Free Area Sq. In.
AF-1	*XHD	41
AF-4	*XHD	41
AF-28	*XHD	41

* The load classifications are in accordance with the American National Standards ASME A112.21.1M
ASME Ratings are as follows:
XHD - Safe Live Load 7500-10000 lbs.(3375-4500kg)
The above categories are given as a guide only.
Please consult factory.

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

WATTS DRAINAGE
CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca

TOWER 3 - USED WITH RD-100 (CONVENTIONAL ROOF) & GRD-620 (EXTERIOR PARKING AND LANDSCAPING AREAS)

WATTS®

Adjustable Accutrol Weir

Tag: _____

Adjustable Flow Control for Roof Drains

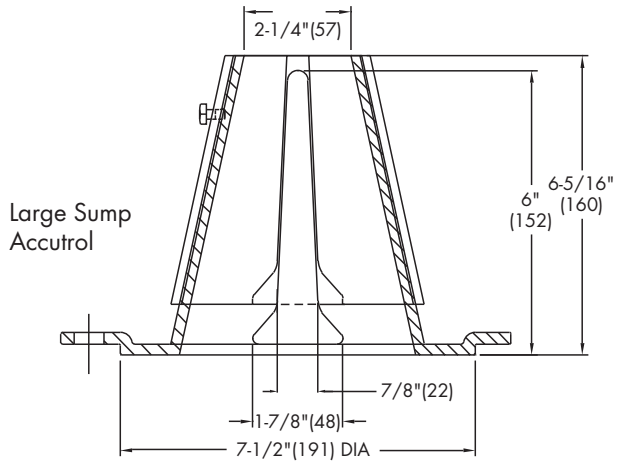
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

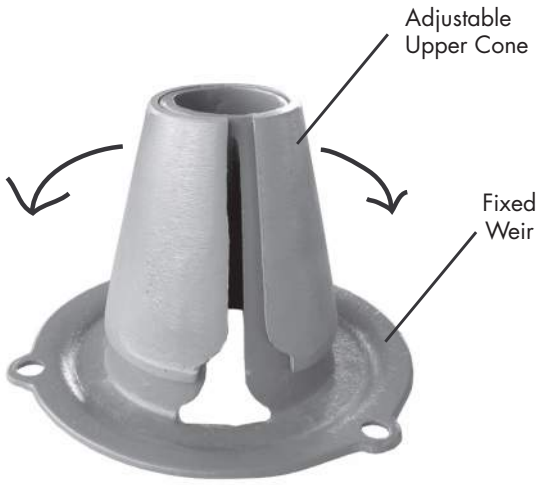
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

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A Watts Water Technologies Company

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Appendix M – Correspondence

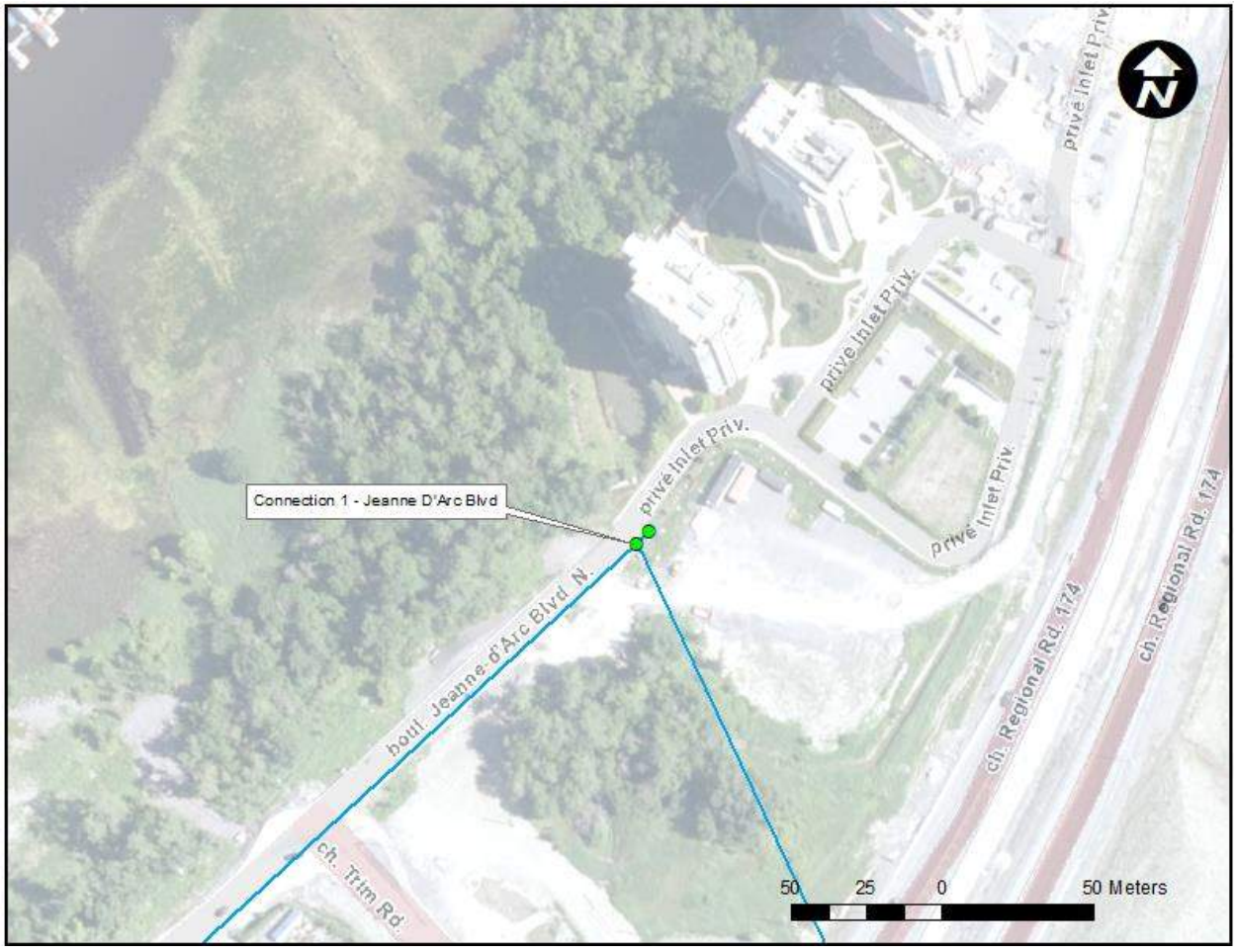
Correspondence from City of Ottawa – Boundary Conditions

Boundary Conditions
Petrie's Landing

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	400	6.67
Maximum Daily Demand	976	16.27
Peak Hour	2,114	35.23
Fire Flow Demand #1	6,000	100.00

Location



Results

Connection 1 - Jeanne D'Arc Blvd

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	114.0	87.1
Peak Hour	106.5	76.5
Max Day plus Fire Flow	108.3	79.0

[1] Ground Elevation = 52.7 m

Notes

1. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
    a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
    b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

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

Appendix N – Checklist

4.1 General Content

☒ Executive Summary (for larger reports only).

Comments: *Included in Site Servicing & Stormwater Management Report*

☒ Date and revision number of the report.

Comments: *Dated May 2019. Site Plan Submission.*

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

Comments: *A Site location Plan is included as Figure A1 in Appendix A.*

☒ Plan showing the site and location of all existing services.

Comments: *Refer to the Site Servicing Plans for service locations.*

☒ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.

Comments: *Refer to site plan prepared by Neuf Architects.*

☒ Summary of Pre-consultation Meetings with City and other approval agencies.

Comments: *A pre-consultation meeting was held with City and others on team.*

☒ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.

Comments: *No higher level studies available.*

☒ Statement of objectives and servicing criteria.

Comments: *Stated throughout the Servicing & SWM Report.*

☒ Identification of existing and proposed infrastructure available in the immediate area.

Comments: *Refer to the Site Servicing Plans for service locations.*

☒ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).

Comments: *Refer to reports prepared by others.*

☒ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.

Comments: *Refer to Grading Plan*

☒ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.

Comments: *N/A*

☒ Proposed phasing of the development, if applicable.

Comments: *All existing and proposed phasing shown on the Site Servicing Plan.*

☒ Reference to geotechnical studies and recommendations concerning servicing.

Comments: *Geo-technical Investigation (Patterson Group, dated May 09, 2019) is referenced in the report and drawings.*

☒ All preliminary and formal site plan submissions should have the following information:

- ☒ Metric scale
- ☒ North arrow (including construction North)
- ☒ Key plan
- ☒ Name and contact information of applicant and property owner
- ☐ Property limits including bearings and dimensions
- ☒ Existing and proposed structures and parking areas
- ☒ Easements, road widening and rights-of-way
- ☒ Adjacent street names

Comments: Refer to legal plans for property information.

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available

Comments: *Water as per City Guidelines. No Master Servicing Studies.*

☒ Availability of public infrastructure to service proposed development

Comments: *Refer to the Servicing & SWM Report.*

☒ Identification of system constraints

Comments: *Refer to the Servicing & SWM Report.*

☒ Identify boundary conditions

Comments: *Refer to the Servicing & SWM Report, Section 4.2.3 for the water system boundary conditions.*

☒ Confirmation of adequate domestic supply and pressure

Comments: *Refer to the Servicing & SWM Report, Section 4.*

☒ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.

Comments: *Refer to the Servicing & SWM Report, Sections 4.3.3 & 4.4.2*

☒ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.

Comments: *Refer to the Servicing & SWM Report, Section 4.*

☒ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

Comments: *No Phasing constraints.*

☒ Address reliability requirements such as appropriate location of shut-off valves

Comments: *This is addressed in Section 4.3 of the Servicing & SWM Report.*

☒ Check on the necessity of a pressure zone boundary modification.

Comments: *N/A*

☒ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

Comments: *Refer to the Servicing & SWM Report, Section 4.4.*

☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

Comments: *Refer to the Servicing & SWM Report, Section 4.*

☒ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.

Comments: *N/A*

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

Comments: *Water Demands as per City Guidelines. Refer to the Servicing & SWM Report and Appendices for the demand calculations.*

☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

Comments: *N/A*

4.3 Development Servicing Report: Wastewater

☒ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).

Comments: *N/A*

☒ Confirm consistency with Master Servicing Study and/ or justifications for deviations.

Comments: *N/A*

☒ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.

Comments: *N/A*

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

Comments: *Refer to the Servicing & SWM Report, Section 5.*

☒ Verify available capacity in downstream sanitary sewer and/ or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)

Comments: *No upgrades are recommended to the downstream sewer. Refer to the Servicing & SWM Report, Section 5.*

☒ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

Comments: *N/A*

☒ Special considerations such as contamination, corrosive environment etc.

Comments: *N/A*

4.4 Development Servicing Report: Stormwater

☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

Comments: *Storm runoff discharges to an existing on-site dry pond located in Phase 1. SWM facility was sized for Phases 1 - 5.*

☒ Analysis of available capacity in existing public infrastructure.

Comments: *Flows controlled to allowable rate based on City Guidelines. Post-development peak flows controlled to pre-development rates. Refer to Site Servicing and SWM Preport*

☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

Comments: *Refer to the Grading Plan and the Storm Drainage Area Plan included in the report*

☒ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.

Comments: *Refer to the Servicing and SWM Report for the quantity control objectives.*

☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

Comments: *No additional on-site quality control required. Quality control provided during Phase 1 for entire development.*

☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

Comments: *Refer to Servicing & SWM Report.*

☒ Set-back from private sewage disposal systems.

Comments: *N/A*

☒ Watercourse and hazard lands setbacks.

Comments: *N/A*

☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

Comments: *Pre-consultation to follow.*

☒ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

Comments: *N/A*

☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).

Comments: *Refer to calculations provided in the Servicing & SWM Report, Section 5 and within Appendix E*

☒ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.

Comments: *N/A*

☒ Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.

Comments: *Included in the Servicing & SWM Report.*

☒ Any proposed diversion of drainage catchment areas from one outlet to another.

Comments: *N/A*

☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.

Comments: *N/A*

☒ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.

Comments: *Quantity control is proposed. Refer to the Servicing & SWM Report.*

☒ Identification of potential impacts to receiving watercourses

Comments: *N/A*

☒ Identification of municipal drains and related approval requirements.

Comments: *N/A*

☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.

Comments: *Refer to the Servicing & SWM Report.*

☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

Comments: *Maximum ponding levels of 150mm on top of parking structure and 300mm on local roads. Major flow routing to the existing roadway or watercourse.*

☒ Inclusion of hydraulic analysis including hydraulic grade line elevations.

Comments: *Dynamic PCSWMM model included for City review.*

☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.

Comments: *Refer to the Servicing & SWM Report, Section 7 and Erosion & Sediment Control Plan.*

☒ Identification of floodplains - proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.

Comments: *N/A*

☒ Identification of fill constraints related to floodplain and geotechnical investigation.

Comments: *N/A*

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

☒ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/ fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.

Comments: *N/A*

☒ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

Comments: *N/A*

☒ Changes to Municipal Drains.

Comments: *N/A*

☒ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

Comments: *N/A*

4.6 Conclusion Checklist

☒ Clearly stated conclusions and recommendations

Comments: *Refer to the Servicing & SWM Report, Section 8.*

☒ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

Comments: *N/A*

☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

Comments: *All reports are signed and stamped by a professional Engineer registered in Ontario.*

Appendix O – Drawings (folded separately)

Dwg. C100 SITE SERVICING PLAN, TOWERS 3 & 4
Dwg. C101 SITE SERVICING PLAN, TOWERS 5a & 5b
Dwg. C200 SITE GRADING PLAN, TOWERS 3 & 4
Dwg. C201 SITE GRADING PLAN, TOWERS 5A & 5B
Dwg. C202 CONSTRUCTION ACCESS PLAN, TOWERS 3 & 4
Dwg. C203 MUP GRADING PLAN 1
Dwg. C204 MUP GRADING PLAN 2
Dwg. C300 EROSION AND SEDIMENT CONTROL PLAN, TOWERS 3 & 4
Dwg. C301 EROSION AND SEDIMENT CONTROL PLAN, TOWERS 5a & 5B
Dwg. C400 STORM DRAINAGE PLAN
Dwg. C401 STORM PONDING PLAN, TOWERS 3 & 4
Dwg. C402 STORM PONDING PLAN, TOWERS 5A & 5B
Dwg. C700 DETAIL SHEET