Site Servicing and Stormwater Management Report

Petrie's Landing I, Phase 5 (Towers 5 & 6)

Type of Document
Site Plan Submission

Project Name
Petrie's Landing I, Phase 5 (Towers 5 & 6)

Project Number
OTT-00247308-A0

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

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November 17, 2025

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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 *2050 persons based on 1,263 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	Ex. Tower 4	0.6097	22	261
Phase 5	Future Towers 5	0.7769	22	236
	Future Towers 6	0.3899	32	371
	Undeveloped	1.8521		0
Totals =		5.7709		1,263

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 three existing servicing reports that are relevant to the now proposed Phases 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.
- Site Servicing and Stormwater Management Report, Petris's Landing I, Phases 3 to 5, EXP Services Inc. October 2024.

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. revision 11, dated November 26 2021, 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 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	=	141
1-bedroom / 1-bedroom + den apartment units	=	740
2-bedroom / 2-bedroom + den apartment units	=	368
3-bedroom / 3-bedroom + den apartment units	=	14
Total units	=	1263

Population

141 Studio / Bachelor units (@ 1.4 persons per unit)	=	197.4
740 1-bedroom / 1-bedroom + den units (@ 1.4 persons per unit)	=	1036
368 2-bedroom / 2-bedroom + den units (@ 2.1 persons per unit)	=	772.8
14 3-bedroom / 3-bedroom + den units (@ 3.1 persons per unit)	=	43.4
Total Population	=	2049.6

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 (2049.6 persons x 280 L/person/day x (1/86,400 sec/day)	=	6.640 L/sec

Total Commercial Average Day Water Demands (in Phase 5)

(0.1074 ha x 28,000 L/gross ha/day x (1/86,400 sec/day)	=	0.0348 L/sec
Total Maximum Day Demands (6.640 L/sec x 2.5) + (0.0348 L/sec x 1.5)	=	16.66 L/sec
Total Peak Hour Demands (6.495 L/sec x 5.5) + (0.0975 L/sec x 1.8)	=	36.59 L/sec

The average day, maximum day, and peak hourly demands for all phases of Petrie's Landing development are ***6.68 L/sec***, ***16.66 L/sec***, and ***36.59 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 7,000 L/min) = 107.2 m
- Peak Hour HGL = 106.4 m
- High Pressure Check = 113.9 m

Based on a ground elevation of approximately 52.7m at the boundary condition location this results in a system water pressure of 53.7 m or 76.4 psi during peak hour conditions, and 61.2 m or 87.0 psi at a maximum value. This represents 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 7,000 L/min)
Scenario 1B	Max Day Plus FF	(Based on HGL with Fire Flow Requirement of 7,000 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.

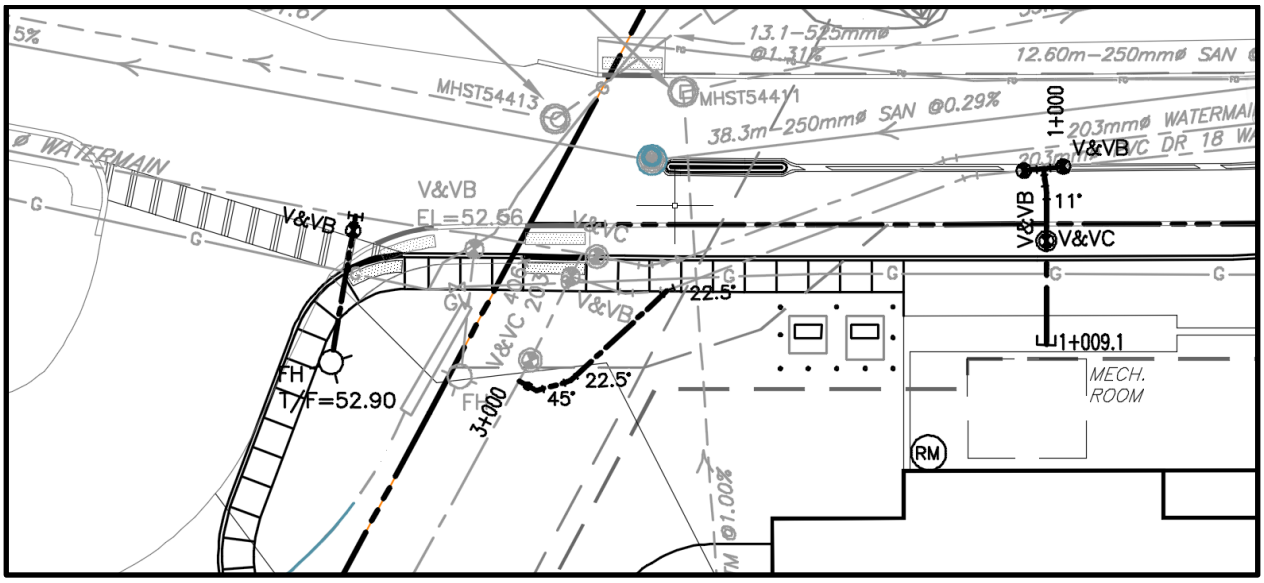
4.3.2 Distribution Layout

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 6. 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 117 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.

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)
Tower 1	high-rise condo	15	12,000	0.8	-15%	0%	5,000	83
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 & 6	high-rise condo	22 & 32	19,000	0.8	-15%	0%	8,000	133

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 maximum fire flow requirement for the proposed site is **8,000 L/min (or 133 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	106.40	76
J-2	53.53	10.18	106.31	75
J-3	54.30	0.00	106.21	74
J-4	54.80	0.00	106.31	73
J-5	54.80	3.16	106.31	73
J-6	54.30	0.00	106.24	74
J-7	54.30	6.53	106.20	74
J-8	53.30	0.00	106.15	75
J-9	52.62	0.00	106.16	76
J-11	53.30	0.00	106.15	75
J-12	52.15	4.37	106.14	77
J-14	54.18	0.00	106.14	74
J-16	54.70	0.00	106.13	73
J-17	54.80	4.95	106.13	73
J-21	54.70	7.41	106.13	73
J-24	54.30	0.00	106.29	74
J-28	54.03	0.00	106.21	74
J-32	55.00	0.00	106.13	73
J-33	53.86	0.00	106.21	74
J-37	54.60	0.00	106.31	73

The calculated minimum and maximum working pressures anticipated within the development are 73 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 under maximum day plus fire flow conditions.

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

Hydrant Node	Required Fire Flow (L/sec)	Modeled Residual Pressure at Required Fire Flow (psi)	Satisfies Fire Flow Constraints?
J-1	133	77	TRUE
J-2	133	74	TRUE
J-3	133	69	TRUE
J-4	133	70	TRUE
J-5	133	69	TRUE
J-6	133	69	TRUE
J-7	133	65	TRUE
J-8	133	66	TRUE
J-9	133	67	TRUE
J-11	133	66	TRUE
J-12	133	63	TRUE
J-14	133	63	TRUE
J-16	133	61	TRUE
J-17	133	60	TRUE
J-21	133	61	TRUE
J-24	133	71	TRUE
J-28	133	69	TRUE
J-32	133	61	TRUE
J-33	133	70	TRUE
J-37	133	71	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 1B 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.

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

Hydrant Node	Required Fire Flow (L/sec)	Modeled Residual Pressure at Required Fire Flow (psi)	Satisfies Fire Flow Constraints?
J-1	133	79	TRUE
J-2	133	73	TRUE
J-3	133	55	TRUE
J-4	133	41	TRUE
J-5	133	39	TRUE
J-6	133	50	TRUE
J-7	133	43	TRUE
J-8	133	51	TRUE
J-9	133	52	TRUE
J-11	133	51	TRUE
J-12	133	48	TRUE
J-14	133	48	TRUE
J-16	133	45	TRUE
J-17	133	44	TRUE
J-21	133	43	TRUE
J-24	133	68	TRUE
J-28	133	55	TRUE
J-32	133	44	TRUE
J-33	133	55	TRUE
J-37	133	70	TRUE

The calculated required fire flows for the proposed development range from approximately 5,000 L/min to 8,000 L/min for the six tower buildings. The previous water system boundary conditions obtained from the City were based on an estimated fire flow of 7,000 L/min. The fire flow analysis presented herein was completed using the previously provided 7,000 L/min boundary conditions. The modeling results demonstrate that the proposed water distribution system is capable of supplying the maximum required fire flow of 8,000 L/min under maximum demand conditions while maintaining system residual pressure above 60 psi for Scenario 1A and above 39 psi for Scenario 1B. We acknowledge that the existing boundary conditions are outdated, and EXP will submit a request to the City for updated boundary conditions based on the revised required fire flow of 8,000 L/min. A supplemental technical memorandum will be provided to summarize the updated water system capacity analysis once the new boundary condition information becomes available.

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
#6	3,800	3,800	0	0	5,700
#7 (384040H003)	3,800	0	0	0	3,800
Total (L/min)	17,100	20,900	15,200	15,200	15,200
FUS RFF in L/min or (L/sec)	5,000	5,000	5,000	5,000	8,000
	(83)	(83)	(83)	(83)	(133)
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 use 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	=	141
1-bedroom / 1-bedroom + den apartment units	=	740
2-bedroom / 2-bedroom + den apartment units	=	368
3-bedroom / 3-bedroom + den apartment units	=	14
Total units	=	1263

Population

141 Studio / Bachelor units (@ 1.4 persons per unit)	=	197.4
740 1-bedroom / 1-bedroom + den units (@ 1.4 persons per unit)	=	1036
368 2-bedroom / 2-bedroom + den units (@ 2.1 persons per unit)	=	772.8
14 3-bedroom / 3-bedroom + den units (@ 3.1 persons per unit)	=	43.4
Total Population	=	2049.6

Residential Peaking Factor

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

Peak Factor = $1 + 14 / (4 + (2049.6/1000)^{0.5}) \times 0.8$ = 3.06

Domestic Sewage Flow

Average Domestic Flow (2049.6 x 280 L/cap/day x (1/86,400 sec/day) = 6.64 L/sec

Peak Domestic Flow (3.06 x 6.64)	=	20.34 L/sec

Commercial Area & Amenities

Ground Floor Commercial + amenities (Ex. Tower 5, 6)	=	450 m^2 + 624 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 (6.278 ha x 28,000 L/gross ha/day x 1.5 x (1/86,400 sec/day)	=	3.05 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 = 20.34 + 3.05 + 3.33	**=**	**26.72 L/sec**

The estimated peak sanitary flow rate from the proposed property is **26.7 L/sec** based on City of Ottawa Design Guidelines.

The minimum reserve capacity in the sanitary sewer system is estimated at 12.3 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 with controls	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	14	1118	724	36.2
Tower 6 – High Roof	14	1015	724	36.2
Tower 5, 6 Podium & Green Roof*	6	1000	600	76.3
Total		6595	4367	264.7
**Available Volume in Green Roof provided via Zinco retention spacer with retention volume of 142.5 L/m2.*				

The total ponding volume available on the roofs is estimated at 264.7 m^3. This would supplement the current pond volume of 708 m^3 to yield a total volume of 972.7 m^3. This total available storage volume of 972.7 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.

The storm sewers servicing Phase 5 (Tower 5 and Tower 6) have been installed during the Phases 3 & 4 of the development. A new 300 mm diameter storm lateral is proposed to discharge runoff collected by the roof drains from Tower 6 and podium to storm sewer manhole MHST76833.

The next section will outline the storm sewer servicing requirements for Phase 5 of this development and confirm that the previously installed storm sewer infrastructure is appropriate to service the next phase.

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 (Tower 5 and Tower 6)	1.1668	0.66
Total =	3.9188	0.56

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 0.56 for the overall site.

The Storm Drainage Plan is illustrated on Drawing C400. A total ninety-seven (97) 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, 4 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 illustrates 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	20.9	2.297	1	22.6	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	0.1546	84.3	18.339	0.5	85.4	0.8
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_1	MHST76833	0.0352	41.4	8.502	1	94.3	0.86
S38_2	MHST54409	0.0312	40.9	7.628	1	94.3	0.86
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	0.1786	110.7	16.134	1	80.1	0.76
S42A	SP36	0.0874	66.9	13.064	1	66.1	0.66
S42B	CB10-MAJ	0.0731	69.2	10.564	1	91.3	0.84
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
S58	206	0.0211	16.8	12.56	1	20.8	0.35
S59	SP99	0.2551	317	8.047	0.5	14.4	0.3
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_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
S67A	Commercial_Roof_Green	0.0742	63.3	11.719	1	100	0.9
S67B	Commercial_Roof_General2	0.0099	27	3.667	1	100	0.9
S67C	Commercial_Roof_General1	0.0033	28.7	1.15	1	100	0.9
S67D	Commercial_Roof_General3	0.0123	34.6	3.56	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
S77A	T5_Terrace_4	0.0125	27.8	4.496	1	100	0.9
S77B	T5_Terrace_2	0.01	22.2	4.505	1	100	0.9
S78A	T5_Terrace_3	0.0116	25.8	4.496	1	100	0.9
S78B	T5_Terrace_1	0.0098	21.8	4.495	1	100	0.9
S79A	T5_Elevator_Roof	0.0149	28.5	5.228	1	100	0.9
S79B	T5_Amenity_1	0.0153	28	5.464	1	100	0.9
S79C	T5_Amenity_2	0.0071	17.1	4.152	1	100	0.9
S79D	T5_Amenity_3	0.0147	26.9	5.465	1	100	0.9
S79E	T5_Amenity_4	0.0071	17.1	4.152	1	100	0.9
S80A	T6_Terrace_4	0.0094	40.7	2.31	1	100	0.9
S80B	T6_Terrace_2	0.0093	33.5	2.776	1	100	0.9
S81A	T6_Terrace_3	0.0115	46.9	2.452	1	100	0.9
S81B	T6_Terrace_1	0.0095	30.4	3.125	1	100	0.9
S82A	T6_Elevator_Roof	0.0147	27.6	5.326	0.5	100	0.9
S82B	T6_Amenity_3	0.0153	32	4.781	0.5	100	0.9
S82C	T6_Amenity_2	0.0071	29	2.448	0.5	100	0.9
S82D	T6_Amenity_1	0.0142	30.9	4.595	0.5	100	0.9
S82E	T6_Amenity_4	0.0071	27.7	2.563	0.5	100	0.9
S83	T5_2nd_Floor	0.0067	53.6	1.25	0.5	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.

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.

A green roof stormwater retention system is proposed within the podium area between Tower 5 and Tower 6 to provide on-site retention storage. The system utilizes ZinCo RSX 150 Retention Spacers, which provides a total storage depth of 150mm and a cavity volume exceeding 95%. The corresponding retention volume is approximately 142.5 L/m^2 (i.e., 95% x 150 mm). Based on the architectural drawings, the total green roof area is approximately 500 m^2, resulting in a estimated total storage volume of about 71.3 m^3.

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	53.65	53.8	0.15	TABULAR	SP35-STORAGE	AREA_DRAINS	3
SP36	54.2	54.4	0.2	TABULAR	SP36-STORAGE	AREA_DRAINS	1
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	4
T3-ROOF-3-STORAGE	60	60.15	0.15	TABULAR	TOWER3-ROOF3-STORAGE	ROOF_DRAINS	4
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	1
T4-ROOF1-STORAGE	60	60.15	0.15	TABULAR	TOWER4-HIGHROOF-STORAGE	ROOF_DRAINS	13
T4-ROOF2-NOSTORAGE	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	9
T5_2nd_Floor	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T5_Amenity_1	60	60.15	0.15	TABULAR	TOWER5-AMENITY-1	ROOF_DRAINS	2
T5_Amenity_2	60	60.15	0.15	TABULAR	TOWER5-AMENITY-2	ROOF_DRAINS	2
T5_Amenity_3	60	60.15	0.15	TABULAR	TOWER5-AMENITY-3	ROOF_DRAINS	2
T5_Amenity_4	60	60.15	0.15	TABULAR	TOWER5-AMENITY-4	ROOF_DRAINS	2
T5_Elevator_Roof	60	60.15	0.15	TABULAR	TOWER5-ELEVATOR-ROOF	ROOF_DRAINS	2
T5_Terrace_1	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T5_Terrace_2	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T5_Terrace_3	60	60.15	0.15	TABULAR	TOWER5-TERRACE3	ROOF_DRAINS	2
T5_Terrace_4	60	60.15	0.15	TABULAR	TOWER5-TERRACE4	ROOF_DRAINS	2
T6_Amenity_1	60	60.15	0.15	TABULAR	TOWER6-AMENITY1	ROOF_DRAINS	2
T6_Amenity_2	60	60.15	0.15	TABULAR	TOWER6-AMENITY2	ROOF_DRAINS	2
T6_Amenity_3	60	60.15	0.15	TABULAR	TOWER6-AMENITY3	ROOF_DRAINS	2
T6_Amenity_4	60	60.15	0.15	TABULAR	TOWER6-AMENITY4	ROOF_DRAINS	2
T6_Elevator_Roof	60	60.15	0.15	TABULAR	TOWER6-ELEVATOR-ROOF	ROOF_DRAINS	2
T6_Terrace_1	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T6_Terrace_2	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T6_Terrace_3	60	60.15	0.15	TABULAR	TOWER6-TERRACE3	ROOF_DRAINS	2
T6_Terrace_4	60	60.15	0.15	TABULAR	TOWER6-TERRACE4	ROOF_DRAINS	2
Commercial_Roof_General1	60	60.15	0.15	TABULAR	Commercial_G1	ROOF_DRAINS	1
Commercial_Roof_General2	60	60.15	0.15	TABULAR	commercial_g2	ROOF_DRAINS	3

Commercial_Roof _General3	60	60.15	0.15	TABULAR	TOWER5&6-PODIUM-GRANULAR	ROOF_DRAINS	2
Commercial_Roof _Green	60	60.3	0.3	TABULAR	TOWER5&6-GREEROOF-RETENTION	ROOF_DRAINS	4

6.5.3 Storage Cistern at Tower 6 Parking Structure

Runoffs collected from the roof drainage systems of Tower 6 and the podium area between Tower 5 and Tower 6 will be conveyed to a proposed underground storage cistern located within the Tower 6 parking structure. The stored stormwater will be pumped to the existing onsite storm sewer system at a controlled release rate of 10 L/s. The cistern is designed to provide sufficient stormwater detention storage to manage stormwater runoff generated under the 100-year design storm. Detailed mechanical design of the cistern system, including pump configuration and control settings, will be provided by the mechanical engineer as part of building design package. Refer to Appendix L for a schematic detail of the cistern provided by mechanical engineer.

6.5.4 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.

6.5.5 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) Watts ACCUTROL (50% position)
- Flow Controlled Roof Drains (Towers 5 - Amenities Terraces) No Flow Control
- Flow Controlled Roof Drains (Towers 6 - High Roof) Watts ACCUTROL (50% position)
- Flow Controlled Roof Drains (Towers 6 - Amenities Roof) Watts ACCUTROL (50% position)
- Flow Controlled Roof Drains (Towers 6 - Amenities Terraces) No Flow Control
- Flow Controlled Roof Drains (Towers 5 & 6 Podium Green roof) Watts ACCUTROL (Closed position)
- Flow Controlled Roof Drains (Towers 5 & 6 Podium roof) Watts ACCUTROL (50% position)
- Flow Controlled Roof Drains (Towers 5 & 6 Podium roof Terrace) 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.

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)
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	18.24
IN141918-IC	IN141918	CB-INLET_CONTROL	52.55	TABULAR/DEPTH	CB-IC	44.48
IN141919-IC	IN141919	CB-INLET_CONTROL	53.32	TABULAR/DEPTH	CB-IC	49.88
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	TOWER5-CONN	AREA_DRAINS	53.35	TABULAR/DEPTH	Tower3/4/5_AreaDrains_8Drains	36.55
SP36-OULTET	TOWER6-CONN	AREA_DRAINS	54.15	TABULAR/DEPTH	TOWER5&6_AreaDrain_5Drains	21.15
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_GreenRoof	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower6_GreenRoof_4Drains_Closed	1.26
T5&6_Podium_C	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrain_1Drain	0.8

T5&6_PodiumB	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrain_3Drains	2.4
T5&6_Podium D	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.67
T5_2nd_Floor	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	3.32
T5_Amenity_1	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.91
T5_Amenity_2	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.66
T5_Amenity_3	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.88
T5_Amenity_4	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.66
T5_Elevator_Roof	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.9
T5_Terrace_1	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	4.85
T5_Terrace_2	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	4.95
T5_Terrace_3	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.75
T5_Terrace_4	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.77
T6_Amenity_1	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.87
T6_Amenity_2	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.64
T6_Amenity_3	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.89
T6_Amenity_4	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.64
T6_Elevator_Roof	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.88
T6_Terrace_1	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	4.7
T6_Terrace_2	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control	4.61
T6_Terrace_3	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.8
T6_Terrace_4	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains	1.74

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.

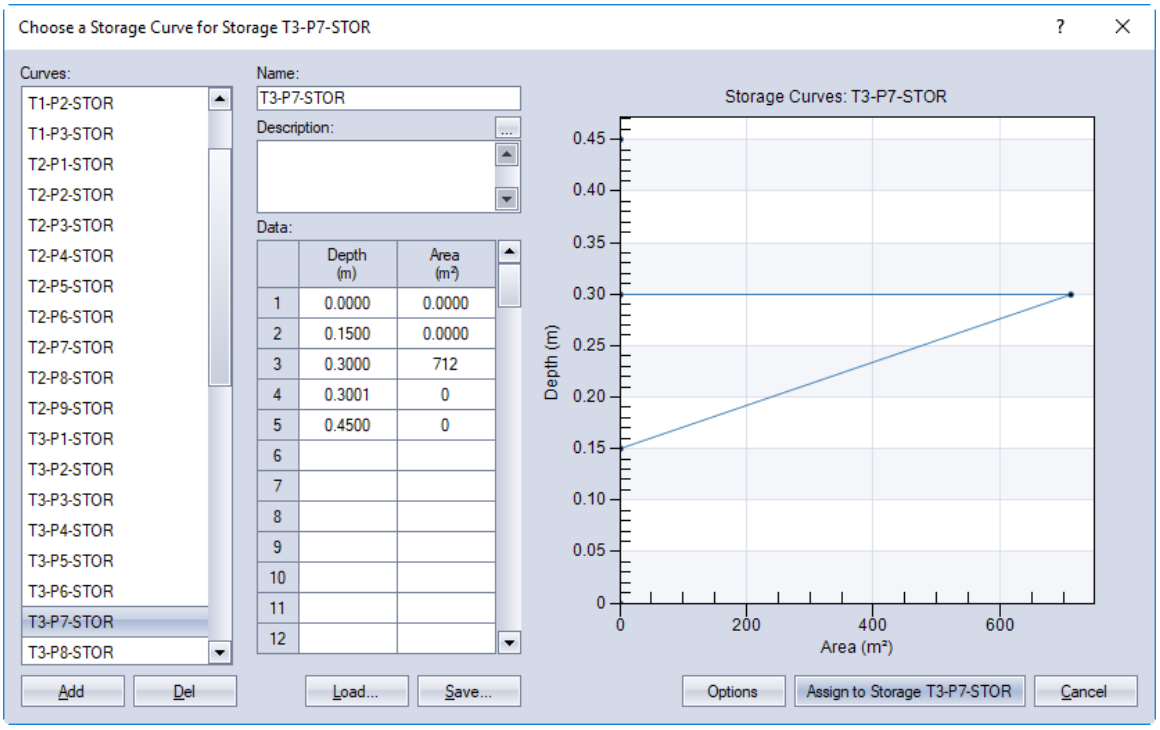
Figure 2 – Model Schematic Showing Minor and Major System Components



Figure 2 above presents a portion of the PCSWMM model which demonstrates the object connectivity. The subcatchment is illustrated 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	0.3	101.3	101.6	1.2
Chicago_3h_5yr	1.4	4.5	123.5	129.4	5.6
Chicago_3h_100yr	**46.6**	**20.1**	**176.9**	**243.6**	**14.2**
Chicago_3h_100yr + 20%	103.5	28.1	193.2	324.8	17.8
Historic_Jul1-79	41.7	14.8	193.1	249.6	8.6
Historic_Aug4-88	56.2	19.3	179.4	254.9	12.8
Historic_Aug8-96	14.5	9.6	141.5	165.6	7.7

From Table 6-10 above the 100-year peak flow under post-development conditions is 176.9 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 6-10 the 100-year peak flows under post-development conditions is 46.6 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 257.8 L/sec, as noted in the table above.

The total storage occurring during the 5-year and 100-year storm event is presented in 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	51.9	111.9
Surface Storage	9.4	61.4
SWM Facility Storage	383.8	876.3
Cistern	27.8	60.2
Totals	472.9	1109.8

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)

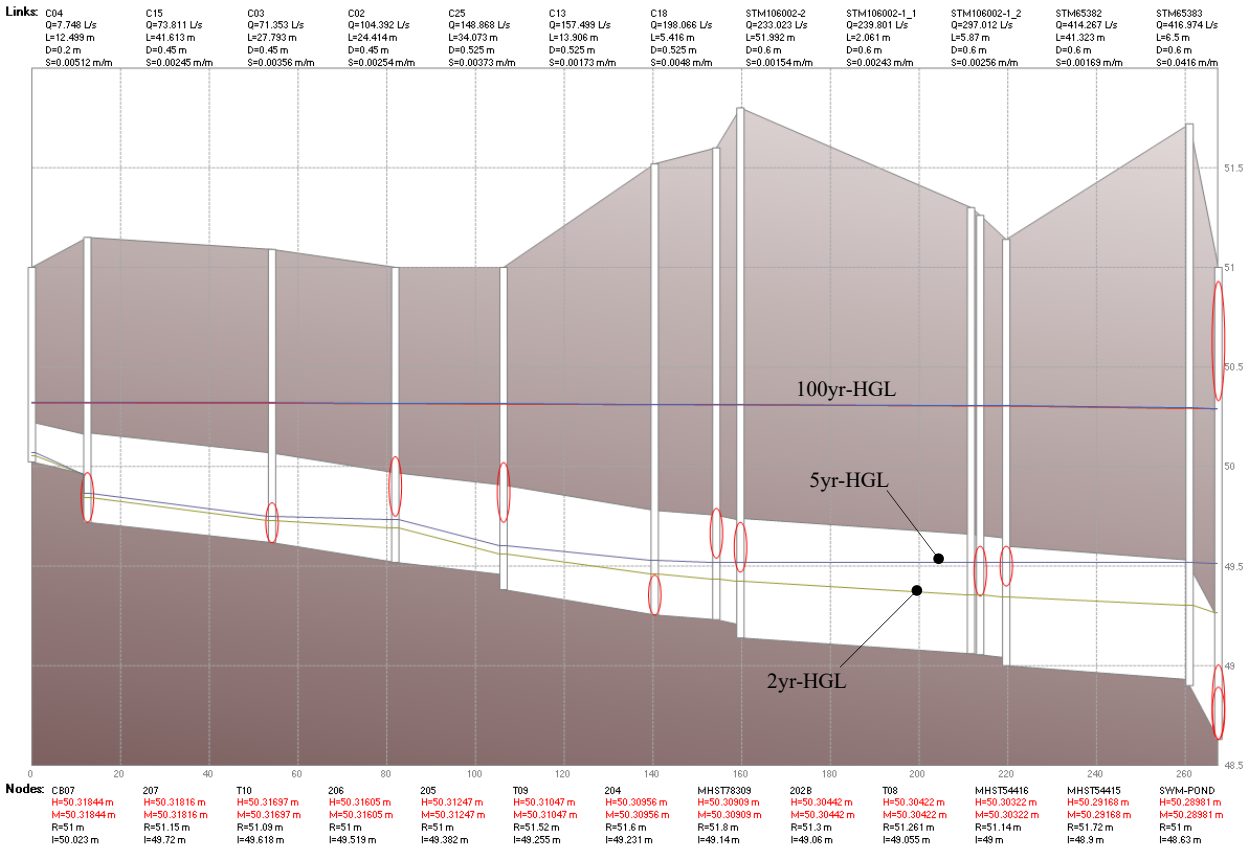
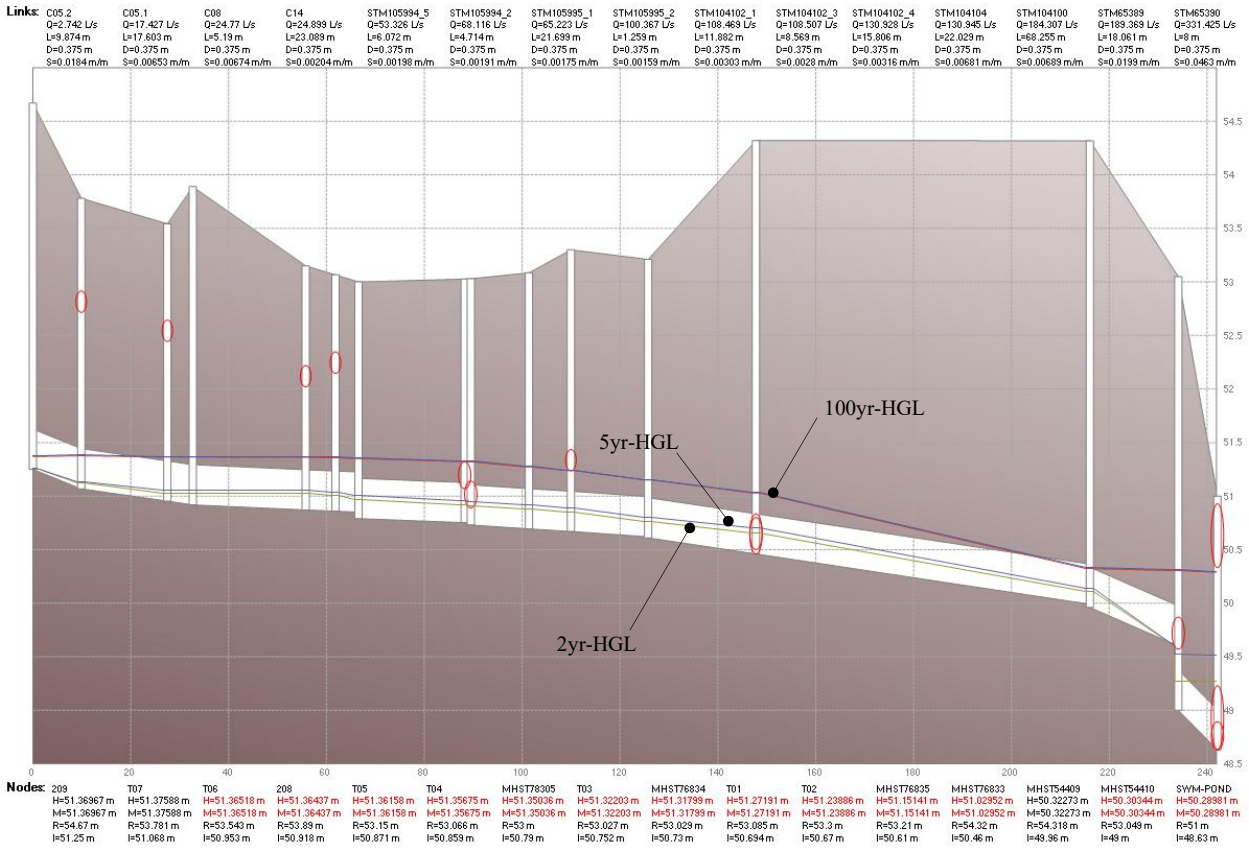


Figure 5 – 100-year HGL (South Storm Sewer)



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, Phase 5 (Tower 5 and Tower 6), along with information on the previous stormwater design of Phase 1 to Phase 4:

- New storm sewers have been installed within Phases 3, 4 and 5. These storm sewers were 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 storm sewer has been extended along the southern access roadway into Phases 3 and 4. This sewer consists 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 176.9 L/sec.

- The total 100-year peak flow from the entire Petrie's Landing development is 257.8 L/sec, of which 176.9 L/sec is from the SWM facility, 46.6 L/sec from uncontrolled areas discharging to the ravine west of Towers 5 and 6, 14.2 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 Phases 2, 3, & 4 were modelled as 75mm orifices. Going forward for Phase 5, 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 1,109.8 m^3, including 876.3 m^3 at the existing dry pond, 111.9 m^3 of roof storage, 61.4 m^3 of surface ponding, and 60.3 m^3 at the proposed cistern.

- 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 1,109.8 m^3 occurring based on modelling. This includes 61.4 m^3 of surface storage, 111.9 m^3 of roof storage, 60.2 of the proposed cistern, and 876.3 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 26.7 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 133 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 six fire hydrants are available to meet the required fire flows. The locations of the 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. However, the system pressures within the onsite distribution system based on the high-pressure HGL were estimated between 84 psi and 88 psi. Therefore, the use of pressure reducing valves should be considered by the mechanical consultant during the design of interior water systems of each new proposed tower.

- Erosion and sediment control methods will be used during construction to limit erosion potential.

Appendix A – Figures

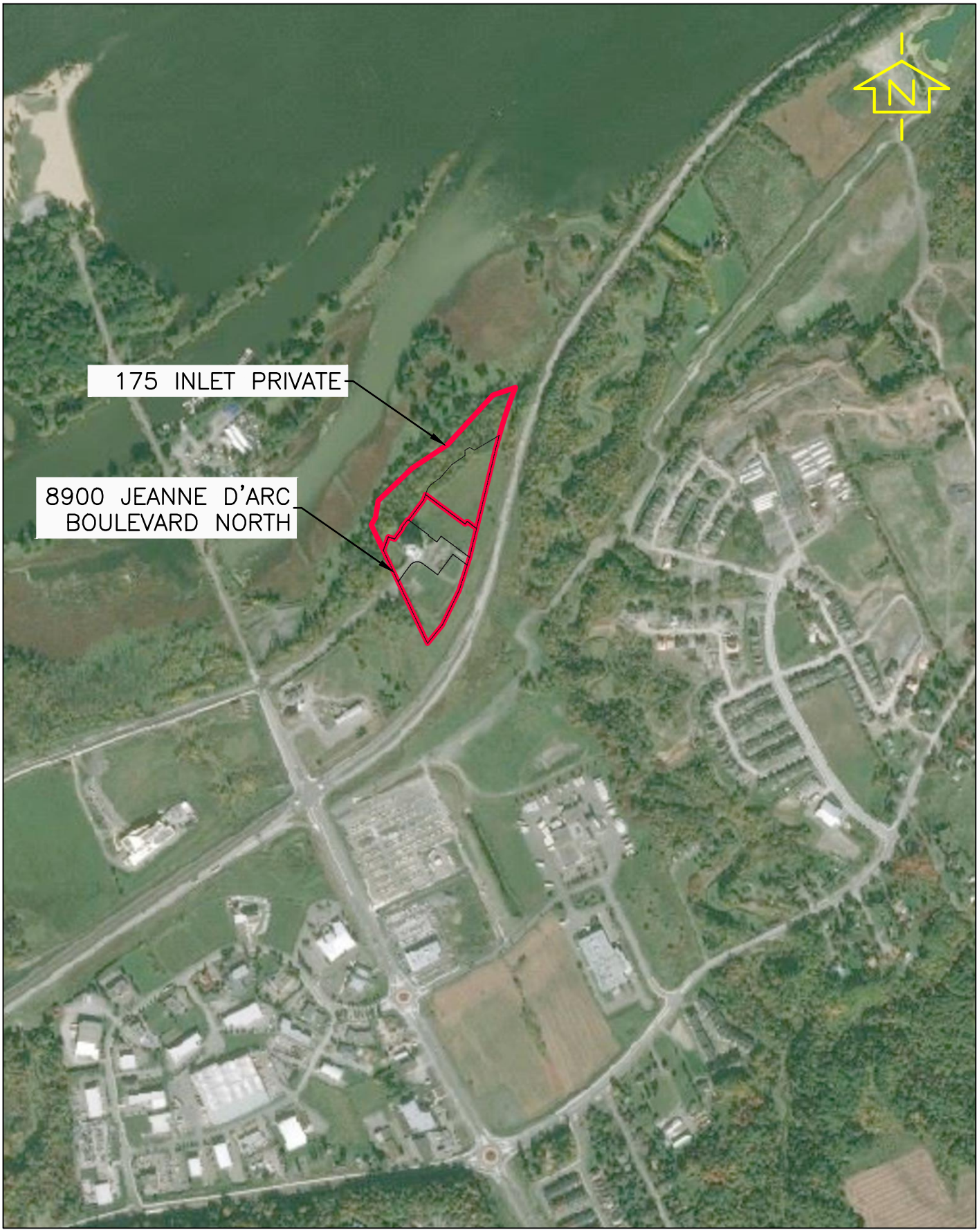
Figure A1: Site Location Plan

Figure A2: Phasing Plan

Figure A3: Water Distribution Plan

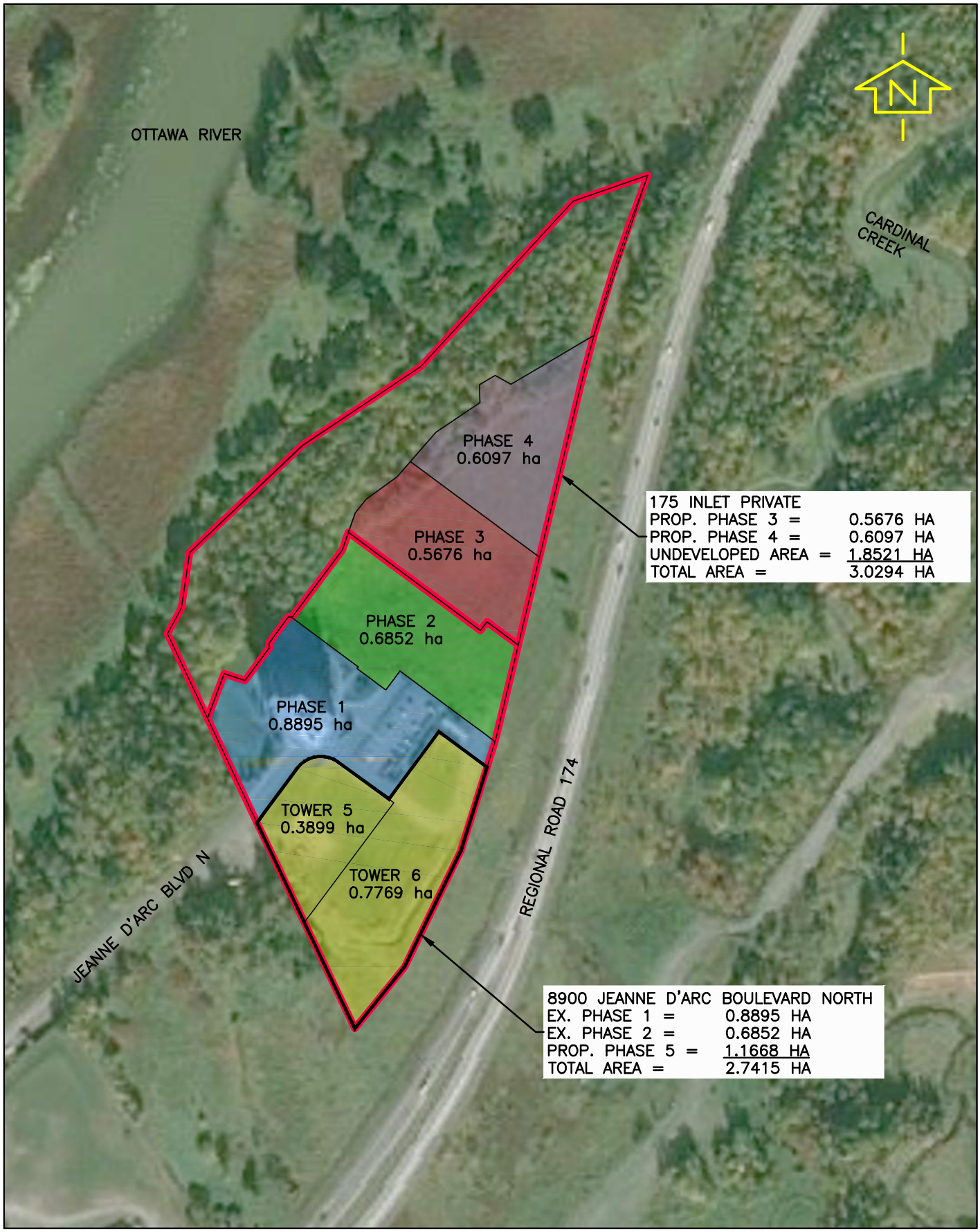
Figure A4: Sanitary Drainage Plan

Figure A5: Pre-Development Storm Drainage Plan



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DRAWN SAB		SKETCH NO
DATE JULY 2019	SITE LOCATION PLAN	FIG A1
FILE NO 247308		

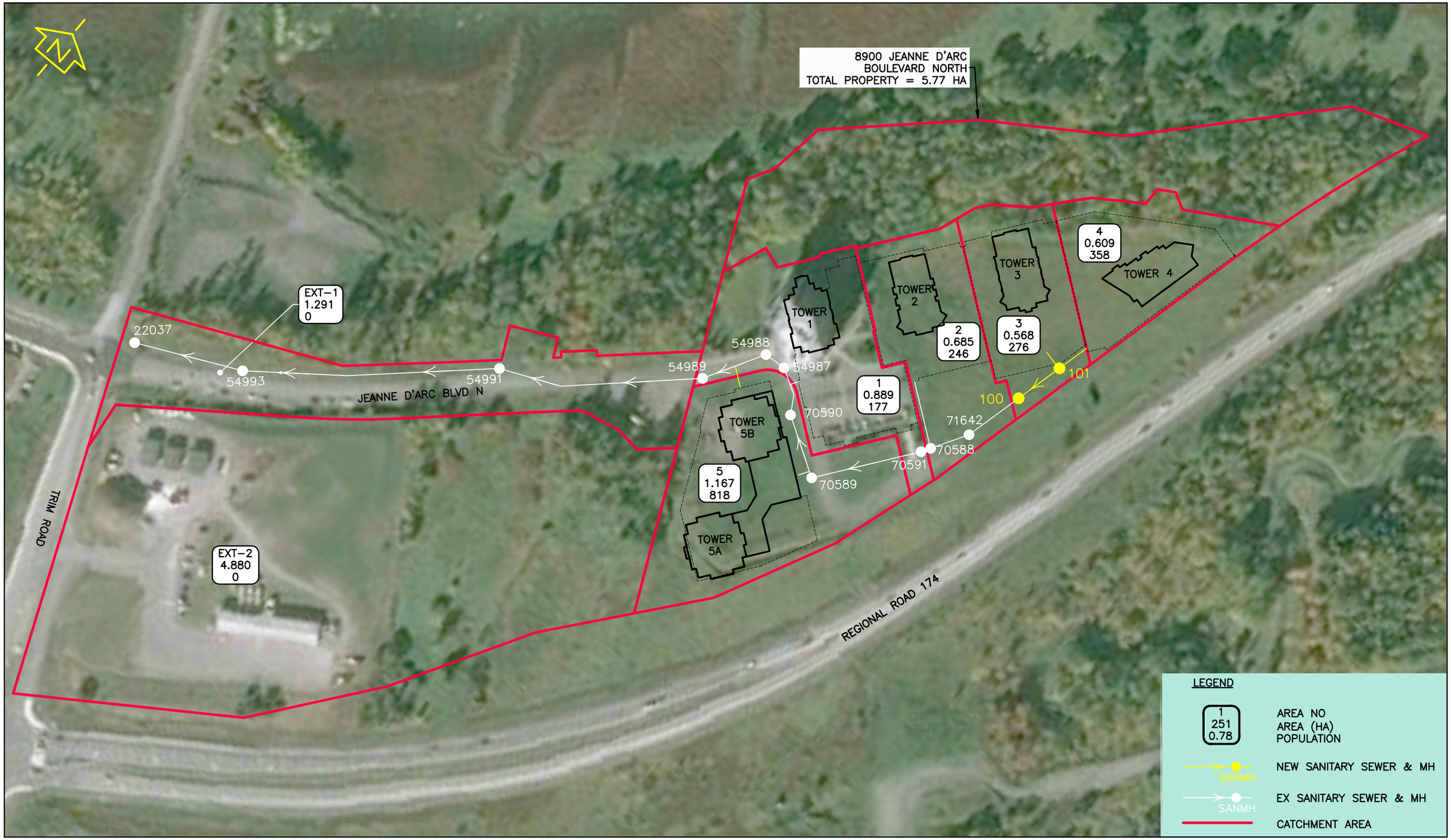


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DESIGN JLF	PETRIE'S LANDING I PHASES 3 TO 5	SCALE 1:3000	
DRAWN SAB		SKETCH NO	
DATE NOV 2025	PHASING PLAN	FIG A2	
FILE NO 247308			



exp Services Inc. 100-2650 Queensview Drive Ottawa, ON K2B 8H6 www.exp.com	DESIGN JLF DRAWN SAB DATE NOV 2025 FILE NO 247308	PETRIE'S LANDING I PHASES 3 TO 5 WATER SYSTEM MODEL LAYOUT	SCALE N/A SKETCH NO FIG A3



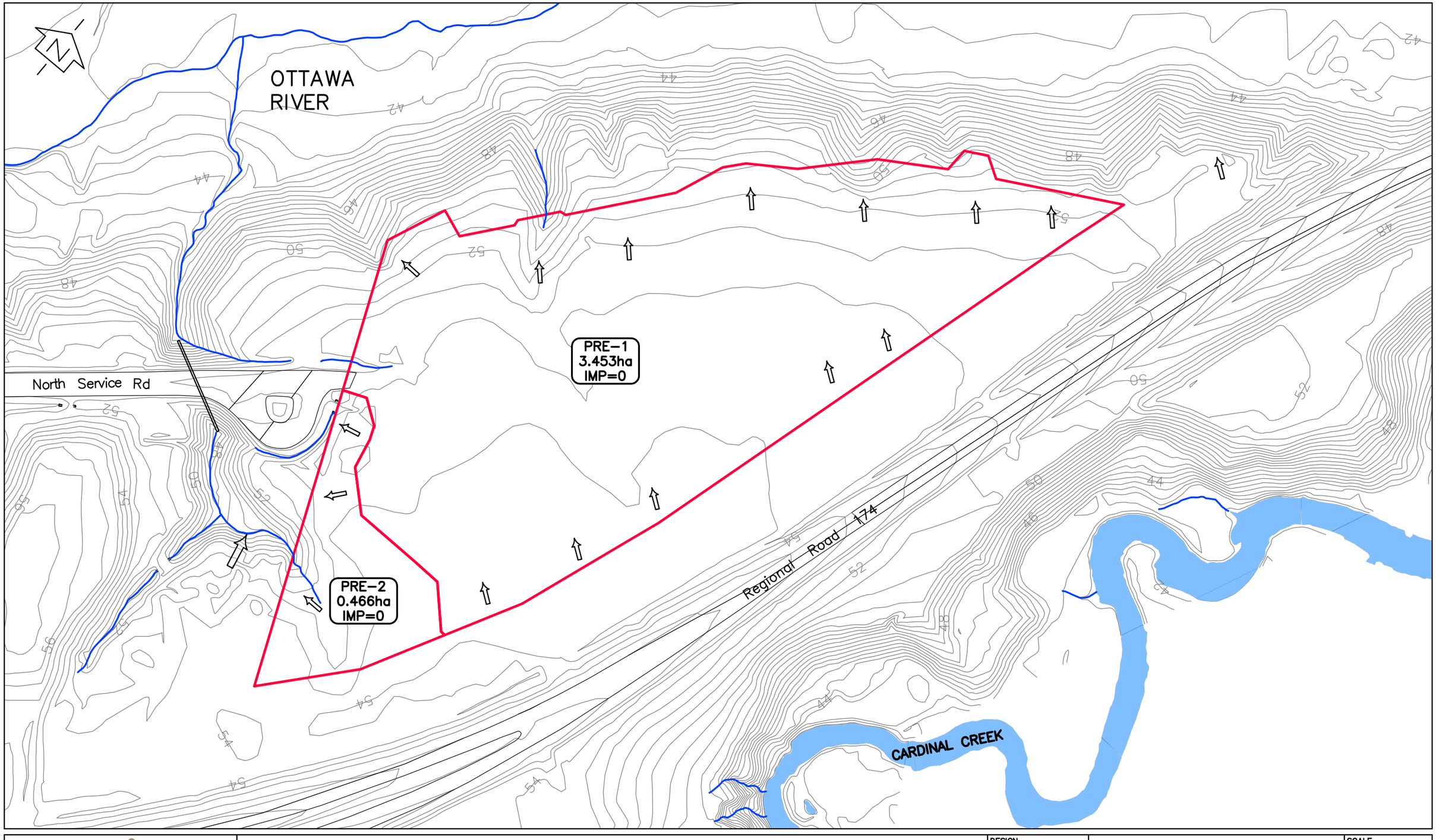
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DATE	JULY 2019
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PETRIE'S LANDING I
PHASES 3 TO 5

SANITARY DRAINAGE PLAN

SCALE	1:2000
FIGURE NO	FIG A4



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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 B1: Water Demand Chart

Table B2: Summary of Required Fireflows

Table B3: Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 1999 (Tower 1)

Table B4: Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 1999 (Tower 2)

Table B5: Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 1999 (Tower 3)

Table B6: Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 1999 (Tower 4)

Table B7: Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 1999 (Towers 5&6)

Table B8: Fire Flow Requirements Based on Hydrant Spacing

Table B9: Required Fire Flow (RFF) Based on Proximity to Asset

TABLE B1: Water Demand Chart

Junction Number (Building)	No. of Units									Total Pop	Residential Demands					Commercial						Total 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 (Ex.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-7 (Tower 5)					41	152	39	4		364.5	102,060	2.5	5.5	255,150	561,330	0.0624	1,747	1.5	1.8	2,621	3,145	1.20	2.98	6.53
J-2 (Tower 6)					59	246	62	4		569.6	159,488	2.5	5.5	398,720	877,184	0.0450	1,260	1.5	1.8	1,890	2,268	1.86	4.64	10.18
Totals =					141	740	368	14		2049.6	573,888			1,434,720	3,156,384					4,511	5,413	6.68	16.66	36.59

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: J. Fitzpatrick, P.Eng.	Location: Ottawa, Ontario
Checked: B. Thomas, P.Eng.	
File Reference: 247308 Water Demand Chart, Sept 2025.xlsx	Page No: 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
Existing 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
Towers 5 & 6 - Combined Fire Area (22 & 32 storeys)	19,000	0.80	-15%	-50%	0%	8,000	133

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 = 133

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%	Reductlon due to Community Sprinklers	0%	0	5,100

Choose Structure Exposure Distance	Exposures	Separation 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 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	Value Used	Fire Flow Total (L/min)
Floor 8	950	50%	475	Two largest adjoining floors+ 50% of floors above (up to eight)	4750.0 m²	
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%	Reductlon 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: **Existing 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 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	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%	Reductlon 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 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	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%	Reductlon 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

Towers 5&6
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020

Building No: **Towers 5 & 6 - Combined Fire Area (22 & 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 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	12243.7 m²	
	Floor 8		2034.6	50%	1017	Two largest adjoining floors+ 50% of floors above (up to eight)		
	Floor 7		2034.6	50%	1017			
	Floor 6		2034.6	50%	1017			
	Floor 5		2034.6	50%	1017			
	Floor 4		2034.6	50%	1017			
	Floor 3		2034.1	50%	1017			
	Floor 2		3025.8	100%	3026			
	Floor 1 (Main Level)		3114.4	100%	3114			
	Basement (At least 50% below grade, not included)		0.0	0%	0			
Fire Flow (F)	F = 220 * C * SQRT(A)							19,475
Fire Flow (F)	Rounded to nearest 1,000							**19,000**

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%	-2,850	16,150
	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%	-4,845	11,305
	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%	-1,615	9,690
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,615	8,075
	Not Fully Supervised or N/A	0%				
	Reduction for Community Sprinklers	-25%	Reduction due to Community Sprinklers	0%	0	8,075

Choose Structure Exposure Distance	Exposures	Separation 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	8,075
	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 =		**8,000**
											Total Required Fire Flow, L/s =		**133**

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

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-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	120	3,800	> 14000	> 233
Total (L/min)		17,100		20,900		15,200		15,200		15,200		
FUS RFF in L/min or (L/sec)		5,000 (83)		5,000 (83)		5,000 (83)		5,000 (83)		8,000 (133)		
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			133	133
FH-2	83	83		83		83
FH-3		83	83	83		83
FH-4		83		83		83
FH-6	83	83			133	133
FH-7 (384040H003)	83	83	83	83	133	133

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

Scenario Summary Report
Scenario: Scenario1A - Max Day Plus FF (FF=8,000)

Scenario Summary

ID	97
Label	Scenario1A - Max Day Plus FF (FF=8,000)
Notes	
Active Topology	<I> Base Active Topology
Physical	Max Day. HGL 107.2m (RFF=7,000)
Demand	Max Day Demand
Initial Settings	<I> Base Initial Settings
Operational	<I> Base Operational
Age	<I> Base Age
Constituent	<I> Base Constituent
Trace	<I> Base Trace
Fire Flow	Fire Flow Req
Energy Cost	<I> Base Energy Cost
Transient	<I> Base Transient
Pressure Dependent Demand	<I> Base Pressure Dependent Demand
Failure History	<I> Base Failure History
SCADA	<I> Base SCADA
User Data Extensions	<I> Base User Data Extensions
Steady State/EPS Solver Calculation Options	Fire Flow
Transient Solver Calculation Options	<I> Base Calculation Options

Hydraulic Summary

Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Fire Flow

FlexTable: Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (Calculated Residual) (psi)	Fire Flow (Total Upper Limit) (L/s)	Pressure (Calculated Zone Lower Limit @ Total Flow Needed) (psi)
J-1	52.70	0.00	107.20	77	133.33	74
J-2	53.53	4.64	107.18	74	137.97	73
J-3	54.30	0.00	107.16	69	133.33	70
J-4	54.80	0.00	107.18	70	133.33	72
J-5	54.80	1.43	107.18	69	134.76	72
J-6	54.30	0.00	107.16	69	133.33	71
J-7	54.30	2.98	107.15	65	136.31	70
J-8	53.30	0.00	107.14	66	133.33	68
J-9	52.62	0.00	107.15	67	133.33	68
J-11	53.30	0.00	107.14	66	133.33	68
J-12	52.15	1.98	107.14	63	135.31	68
J-14	54.18	0.00	107.14	63	133.33	67
J-16	54.70	0.00	107.14	61	133.33	66
J-17	54.80	2.25	107.14	60	135.58	66
J-21	54.70	3.37	107.14	61	136.70	66
J-24	54.30	0.00	107.17	71	133.33	72
J-28	54.03	0.00	107.16	69	133.33	70
J-32	55.00	0.00	107.14	61	133.33	66
J-33	53.86	0.00	107.16	70	133.33	70
J-37	54.60	0.00	107.18	71	133.33	73

FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Length (m)
P-26	J-24	FH-1	155.0	100.0	0.00	0.00	2.82
P-38	J-32	FH-4	155.0	100.0	0.00	0.00	2.62
P-47	FH-6	J-3	155.0	100.0	0.00	0.00	3.53
P-49	384040H003	J-1	155.0	100.0	0.00	0.00	7.50
P-4	J-4	J-5	204.0	110.0	1.43	0.04	12.72
P-5	J-4	J-6	204.0	110.0	5.58	0.17	59.98
P-10	J-9	FH-2	204.0	110.0	0.00	0.00	32.33
P-11	J-9	J-11	204.0	110.0	3.81	0.12	27.19
P-12	J-11	J-12	204.0	110.0	1.98	0.06	34.22
P-13	J-8	J-11	204.0	110.0	1.04	0.03	1.28
P-15	J-11	J-14	204.0	110.0	2.87	0.09	22.35
P-16	J-14	FH-3	204.0	110.0	0.00	0.00	9.36
P-17	J-14	J-16	204.0	110.0	2.87	0.09	35.91
P-18	J-16	J-17	204.0	110.0	2.25	0.07	5.95
P-25	J-24	J-3	204.0	110.0	5.00	0.15	80.95
P-6	J-3	J-28	204.0	110.0	5.00	0.15	5.00
P-33	J-28	J-8	204.0	110.0	3.79	0.12	103.79
P-3	J-1	J-4	204.0	110.0	7.01	0.21	49.16
P-7	J-6	J-33	204.0	110.0	5.58	0.17	27.29
P-8	J-33	J-9	204.0	110.0	3.81	0.12	76.29
P-40	J-33	J-28	204.0	110.0	1.77	0.05	0.99
P-41	J-7	J-28	204.0	110.0	-2.98	0.09	26.06
P-45	J-8	J-32	204.0	110.0	2.75	0.08	63.27
P-46	J-32	J-21	204.0	110.0	3.37	0.10	4.45
P-48	J-16	J-32	204.0	110.0	0.62	0.02	5.99
P-1	J-1	J-2	204.0	110.0	9.64	0.30	26.29
P-2	J-2	J-24	204.0	110.0	5.00	0.15	23.95
P-9	J-2	J-37	204.0	110.0	0.00	0.00	9.56
P-21	R-1	J-1	600.0	130.0	16.65	0.06	1.00

FlexTable: Reservoir Table

ID	Label	Elevation (m)	Hydraulic Grade (m)	Is Active?
68	R-1	107.20	107.20	True

Scenario Summary Report
Scenario: Scenario1B - Max Day Plus FF (RFF=8,000) with P-3 Not in service

Scenario Summary	
ID	128
Label	Scenario1B - Max Day Plus FF (RFF=8,000) with P-3 Not in service
Notes	
Active Topology	<I> Base Active Topology
Physical	Max Day. HGL 107.2m (FF=7,000)
Demand	<I> Max Day Demand
Initial Settings	Max Day + FF with P-3 not in service
Operational	<I> Base Operational
Age	<I> Base Age
Constituent	<I> Base Constituent
Trace	<I> Base Trace
Fire Flow	<I> Fire Flow Req
Energy Cost	<I> Base Energy Cost
Transient	<I> Base Transient
Pressure Dependent Demand	<I> Base Pressure Dependent Demand
Failure History	<I> Base Failure History
SCADA	<I> Base SCADA
User Data Extensions	<I> Base User Data Extensions
Steady State/EPS Solver Calculation Options	<I> Fire Flow
Transient Solver Calculation Options	<I> Base Calculation Options

Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Fire Flow

FlexTable: Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (Calculated Residual) (psi)	Fire Flow (Total Upper Limit) (L/s)	Pressure (Calculated Zone Lower Limit @ Total Flow Needed) (psi)
J-1	52.70	0.00	108.30	79	133.33	75
J-2	53.53	4.64	108.25	73	137.97	73
J-3	54.30	0.00	108.13	55	133.33	62
J-4	54.80	0.00	108.12	41	133.33	55
J-5	54.80	1.43	108.12	39	134.76	55
J-6	54.30	0.00	108.12	50	133.33	60
J-7	54.30	2.98	108.11	43	136.31	62
J-8	53.30	0.00	108.11	51	133.33	59
J-9	52.62	0.00	108.11	52	133.33	60
J-11	53.30	0.00	108.11	51	133.33	59
J-12	52.15	1.98	108.11	48	135.31	59
J-14	54.18	0.00	108.10	48	133.33	58
J-16	54.70	0.00	108.10	45	133.33	57
J-17	54.80	2.25	108.10	44	135.58	57
J-21	54.70	3.37	108.10	43	136.70	56
J-24	54.30	0.00	108.22	68	133.33	70
J-28	54.03	0.00	108.12	55	133.33	62
J-32	55.00	0.00	108.10	44	133.33	56
J-33	53.86	0.00	108.12	55	133.33	62
J-37	54.60	0.00	108.25	70	133.33	73

FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Length (m)
P-38	J-32	FH-4	152.4	130.0	0.00	0.00	2.62
P-3	J-1	J-4	152.4	130.0	0.00	0.00	49.16
P-40	J-33	J-28	152.4	130.0	-5.18	0.28	0.99
P-41	J-7	J-28	152.4	130.0	-2.98	0.16	26.06
P-45	J-8	J-32	152.4	130.0	1.97	0.11	63.27
P-46	J-32	J-21	152.4	130.0	3.37	0.18	4.45
P-47	FH-6	J-3	152.4	130.0	0.00	0.00	3.53
P-48	J-16	J-32	152.4	130.0	1.40	0.08	5.99
P-49	384040H003	J-1	152.4	130.0	0.00	0.00	7.50
P-26	J-24	FH-1	155.0	100.0	0.00	0.00	2.82
P-4	J-4	J-5	204.0	110.0	1.43	0.04	12.72
P-5	J-4	J-6	204.0	110.0	-1.43	0.04	59.98
P-10	J-9	FH-2	204.0	110.0	0.00	0.00	32.33
P-11	J-9	J-11	204.0	110.0	3.75	0.11	27.19
P-12	J-11	J-12	204.0	110.0	1.98	0.06	34.22
P-13	J-8	J-11	204.0	110.0	1.87	0.06	1.28
P-15	J-11	J-14	204.0	110.0	3.65	0.11	22.35
P-16	J-14	FH-3	204.0	110.0	0.00	0.00	9.36
P-17	J-14	J-16	204.0	110.0	3.65	0.11	35.91
P-18	J-16	J-17	204.0	110.0	2.25	0.07	5.95
P-25	J-24	J-3	204.0	110.0	12.01	0.37	80.95
P-6	J-3	J-28	204.0	110.0	12.01	0.37	5.00
P-33	J-28	J-8	204.0	110.0	3.85	0.12	103.79
P-7	J-6	J-33	204.0	110.0	-1.43	0.04	27.29
P-8	J-33	J-9	204.0	110.0	3.75	0.11	76.29
P-1	J-1	J-2	204.0	110.0	16.65	0.51	26.29
P-2	J-2	J-24	204.0	110.0	12.01	0.37	23.95
P-9	J-2	J-37	204.0	110.0	0.00	0.00	9.56
P-21	R-1	J-1	600.0	130.0	16.65	0.06	1.00

FlexTable: Reservoir Table

ID	Label	Elevation (m)	Hydraulic Grade (m)	Is Active?
68	R-1	108.30	108.30	True

Scenario Summary Report
Scenario: Scenario2 - Peak Hour

Scenario Summary

ID	98
Label	Scenario2 - Peak Hour
Notes	
Active Topology	<I> Base Active Topology
Physical	Peak Hour. HGL = 106.4m
Demand	Peak Hour Demand
Initial Settings	<I> Base Initial Settings
Operational	<I> Base Operational
Age	<I> Base Age
Constituent	<I> Base Constituent
Trace	<I> Base Trace
Fire Flow	<I> Base Fire Flow
Energy Cost	<I> Base Energy Cost
Transient	<I> Base Transient
Pressure Dependent Demand	<I> Base Pressure Dependent Demand
Failure History	<I> Base Failure History
SCADA	<I> Base SCADA
User Data Extensions	<I> Base User Data Extensions
Steady State/EPS Solver Calculation Options	<I> Base Calculation Options
Transient Solver Calculation Options	<I> Base Calculation Options

Hydraulic Summary

Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

FlexTable: Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-1	52.70	0.00	106.40	76
J-2	53.53	10.18	106.31	75
J-3	54.30	0.00	106.21	74
J-4	54.80	0.00	106.31	73
J-5	54.80	3.16	106.31	73
J-6	54.30	0.00	106.24	74
J-7	54.30	6.53	106.20	74
J-8	53.30	0.00	106.15	75
J-9	52.62	0.00	106.16	76
J-11	53.30	0.00	106.15	75
J-12	52.15	4.37	106.14	77
J-14	54.18	0.00	106.14	74
J-16	54.70	0.00	106.13	73
J-17	54.80	4.95	106.13	73
J-21	54.70	7.41	106.13	73
J-24	54.30	0.00	106.29	74
J-28	54.03	0.00	106.21	74
J-32	55.00	0.00	106.13	73
J-33	53.86	0.00	106.21	74
J-37	54.60	0.00	106.31	73

FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Length (m)
P-26	J-24	FH-1	155.0	100.0	0.00	0.00	2.82
P-38	J-32	FH-4	155.0	100.0	0.00	0.00	2.62
P-47	FH-6	J-3	155.0	100.0	0.00	0.00	3.53
P-49	384040H003	J-1	155.0	100.0	0.00	0.00	7.50
P-4	J-4	J-5	204.0	110.0	3.16	0.10	12.72
P-5	J-4	J-6	204.0	110.0	12.25	0.37	59.98
P-10	J-9	FH-2	204.0	110.0	0.00	0.00	32.33
P-11	J-9	J-11	204.0	110.0	8.38	0.26	27.19
P-12	J-11	J-12	204.0	110.0	4.37	0.13	34.22
P-13	J-8	J-11	204.0	110.0	2.29	0.07	1.28
P-15	J-11	J-14	204.0	110.0	6.30	0.19	22.35
P-16	J-14	FH-3	204.0	110.0	0.00	0.00	9.36
P-17	J-14	J-16	204.0	110.0	6.30	0.19	35.91
P-18	J-16	J-17	204.0	110.0	4.95	0.15	5.95
P-25	J-24	J-3	204.0	110.0	11.01	0.34	80.95
P-6	J-3	J-28	204.0	110.0	11.01	0.34	5.00
P-33	J-28	J-8	204.0	110.0	8.35	0.26	103.79
P-3	J-1	J-4	204.0	110.0	15.41	0.47	49.16
P-7	J-6	J-33	204.0	110.0	12.25	0.37	27.29
P-8	J-33	J-9	204.0	110.0	8.38	0.26	76.29
P-40	J-33	J-28	204.0	110.0	3.87	0.12	0.99
P-41	J-7	J-28	204.0	110.0	-6.53	0.20	26.06
P-45	J-8	J-32	204.0	110.0	6.06	0.19	63.27
P-46	J-32	J-21	204.0	110.0	7.41	0.23	4.45
P-48	J-16	J-32	204.0	110.0	1.35	0.04	5.99
P-1	J-1	J-2	204.0	110.0	21.19	0.65	26.29
P-2	J-2	J-24	204.0	110.0	11.01	0.34	23.95
P-9	J-2	J-37	204.0	110.0	0.00	0.00	9.56
P-21	R-1	J-1	600.0	130.0	36.60	0.13	1.00

FlexTable: Reservoir Table

ID	Label	Elevation (m)	Hydraulic Grade (m)	Is Active?
68	R-1	106.40	106.40	True

Scenario Summary Report
Scenario: Scenario 3 - High Pressure Check

Scenario Summary

ID	122
Label	Scenario 3 - High Pressure Check
Notes	
Active Topology	<I> Base Active Topology
Physical	High Pressure. HGL = 113.9.0m
Demand	Average Day Demand
Initial Settings	<I> Base Initial Settings
Operational	<I> Base Operational
Age	<I> Base Age
Constituent	<I> Base Constituent
Trace	<I> Base Trace
Fire Flow	<I> Base Fire Flow
Energy Cost	<I> Base Energy Cost
Transient	<I> Base Transient
Pressure Dependent Demand	<I> Base Pressure Dependent Demand
Failure History	<I> Base Failure History
SCADA	<I> Base SCADA
User Data Extensions	<I> Base User Data Extensions
Steady State/EPS Solver Calculation Options	<I> Base Calculation Options
Transient Solver Calculation Options	<I> Base Calculation Options

Hydraulic Summary

Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

FlexTable: Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-1	52.70	0.00	113.90	87
J-2	53.53	1.86	113.90	86
J-3	54.30	0.00	113.89	85
J-4	54.80	0.00	113.90	84
J-5	54.80	0.57	113.90	84
J-6	54.30	0.00	113.89	85
J-7	54.30	1.20	113.89	85
J-8	53.30	0.00	113.89	86
J-9	52.62	0.00	113.89	87
J-11	53.30	0.00	113.89	86
J-12	52.15	0.79	113.89	88
J-14	54.18	0.00	113.89	85
J-16	54.70	0.00	113.89	84
J-17	54.80	0.90	113.89	84
J-21	54.70	1.35	113.89	84
J-24	54.30	0.00	113.90	85
J-28	54.03	0.00	113.89	85
J-32	55.00	0.00	113.89	84
J-33	53.86	0.00	113.89	85
J-37	54.60	0.00	113.90	84

FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Length (m)
P-26	J-24	FH-1	155.0	100.0	0.00	0.00	2.82
P-38	J-32	FH-4	155.0	100.0	0.00	0.00	2.62
P-47	FH-6	J-3	155.0	100.0	0.00	0.00	3.53
P-49	384040H003	J-1	155.0	100.0	0.00	0.00	7.50
P-4	J-4	J-5	204.0	110.0	0.57	0.02	12.72
P-5	J-4	J-6	204.0	110.0	2.24	0.07	59.98
P-10	J-9	FH-2	204.0	110.0	0.00	0.00	32.33
P-11	J-9	J-11	204.0	110.0	1.52	0.05	27.19
P-12	J-11	J-12	204.0	110.0	0.79	0.02	34.22
P-13	J-8	J-11	204.0	110.0	0.41	0.01	1.28
P-15	J-11	J-14	204.0	110.0	1.15	0.04	22.35
P-16	J-14	FH-3	204.0	110.0	0.00	0.00	9.36
P-17	J-14	J-16	204.0	110.0	1.15	0.04	35.91
P-18	J-16	J-17	204.0	110.0	0.90	0.03	5.95
P-25	J-24	J-3	204.0	110.0	2.01	0.06	80.95
P-6	J-3	J-28	204.0	110.0	2.01	0.06	5.00
P-33	J-28	J-8	204.0	110.0	1.52	0.05	103.79
P-3	J-1	J-4	204.0	110.0	2.81	0.09	49.16
P-7	J-6	J-33	204.0	110.0	2.24	0.07	27.29
P-8	J-33	J-9	204.0	110.0	1.52	0.05	76.29
P-40	J-33	J-28	204.0	110.0	0.72	0.02	0.99
P-41	J-7	J-28	204.0	110.0	-1.20	0.04	26.06
P-45	J-8	J-32	204.0	110.0	1.10	0.03	63.27
P-46	J-32	J-21	204.0	110.0	1.35	0.04	4.45
P-48	J-16	J-32	204.0	110.0	0.25	0.01	5.99
P-1	J-1	J-2	204.0	110.0	3.87	0.12	26.29
P-2	J-2	J-24	204.0	110.0	2.01	0.06	23.95
P-9	J-2	J-37	204.0	110.0	0.00	0.00	9.56
P-21	R-1	J-1	600.0	130.0	6.68	0.02	1.00

FlexTable: Reservoir Table

ID	Label	Elevation (m)	Hydraulic Grade (m)	Is Active?
68	R-1	113.90	113.90	True

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	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)	TOTAL 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***	***3.41***	**4.60**										**0.610**	**0.610**	**0.20**	**4.80**							
			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**	**7.84**	**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*	*7.84*	*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*	*7.84*	*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*	*9.90*										*0.685*	*1.863*	*0.61*	*10.51*	*250*	*251.46*	*0.35*	*5.79*	*35.50*	*0.30*	*0.71*
	MHSA70591	*MHSA70589*			*1.863*										*938.4*	*3.25*	*9.90*											*1.863*	*0.61*	*10.51*	*250*	*251.46*	*0.29*	*62.68*	*32.37*	*0.32*	*0.65*
	MHSA70589	*MHSA70590*	**Towers 5**	*0.7769*	**2.639**				***41***	***152***	***39***	***4***	**236**	**364.5**	**1302.9**	***3.18***	**13.42**	**0.0624**	**0.0624**	**2.4%**	**0.02**							*0.777*	*2.639*	*0.87*	*14.31*	*250*	*251.46*	*0.24*	*38.01*	*29.39*	*0.49*	*0.59*
	MHSA70590	*MHSA54986*			*2.639*										*1302.9*	*3.18*	*13.42*		*0.0624*		*0.03*							*2.639*	*0.87*	*14.32*	*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**	*1480*	*3.15*	*15.09*		*0.0624*		*0.03*							*0.890*	*3.529*	*1.16*	*16.29*	*250*	*251.46*	*0.51*	*15.66*	*43.17*	*0.38*	*0.86*
	MHSA54987	*MHSA54988*			*3.529*										*1480*	*3.15*	*15.09*		*0.0624*		*0.03*							*3.529*	*1.16*	*16.29*	*250*	*251.46*	*0.56*	*12.56*	*45.09*	*0.36*	*0.90*
	MHSA54988	*MHSA54989*	**Towers 6**	**0.3899**	*3.919*				***59***	***246***	***62***	***4***	**371**	**569.6**	**2049.6**	***3.06***	**20.34**	**0.045**	**0.1074**	**1.1%**	**0.03**							*0.390*	*3.919*	*1.29*	*21.67*	*250*	*251.46*	*0.33*	*33.03*	*34.86*	*0.62*	*0.70*
Jeane D'Arc	*MHSA54989*	*MHSA54990*			*3.919*										*2049.6*	*3.06*	*20.34*		*0.1074*		*0.05*							*3.919*	*1.29*	*21.68*	*300*	*299.36*	*0.15*	*79.36*	*37.39*	*0.58*	*0.53*
	MHSA54990	*MHSA54991*	*Ext-1, Ext-2*	*6.1710*	*10.090*										*2049.6*	*3.06*	*20.34*	*6.171*	*6.2784*	**61.2%**	*3.05*							*6.171*	*10.090*	*3.33*	*26.72*	*300*	*299.36*	*0.29*	*34.70*	*51.62*	*0.52*	*0.73*
	MHSA54991	*MHSA54992*			*10.090*										*2049.6*	*3.06*	*20.34*		*6.2784*		*3.05*							*10.090*	*3.33*	*26.72*	*300*	*299.36*	*0.16*	*85.00*	*39.02*	*0.68*	*0.55*
	MHSA54992	*MHSA54993*			*10.090*										*2049.6*	*3.06*	*20.34*		*6.2784*		*3.05*							*10.090*	*3.33*	*26.72*	*300*	*299.36*	*0.24*	*55.13*	*46.69*	*0.57*	*0.66*
	MHSA54993	*MHSA22037*			*10.090*										*2049.6*	*3.06*	*20.34*		*6.2784*		*3.05*							*10.090*	*3.33*	*26.72*	*300*	*299.36*	*0.20*	*66.40*	*42.54*	*0.63*	*0.60*
				10.090					**141**	**740**	**368**	**14**	**1263**	**2049.6**					**6.278**									**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 - Sewer Design Sheet, Sept 25.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									
Tower 6 & Podium				S42A	0.0874	0.1244	0.66	0.160	0.1820	10.00	76.81	2-year	12.3	14.0									
				S42B	0.0731	0.1975	0.84	0.171	0.3527	11.00	73.17	2-year	12.5	25.8									
				S67A/B/C/D	0.0997	0.2241	0.90	0.249	0.4314	10.00	76.81	2-year	19.2	33.1									
				S80A/B	0.0187	0.2428	0.90	0.047	0.4782	10.00	76.81	2-year	3.6	36.7									
				S81A/B	0.0210	0.2638	0.90	0.053	0.5307	10.00	76.81	2-year	4.0	40.8									
				S82A/B/C/D/E/	0.0584	0.3222	0.90	0.146	0.6769	10.00	76.81	2-year	11.2	52.0	375	366.40	PVC	1.50	26.24	201.85	1.91	0.23	0.26
	76833	54409		S38_1 & S38_2	0.0664	0.8783	0.86	0.159	1.6216	12.74	67.68	2-year	10.7	109.8	375	366.40	PVC	0.87	68.10	153.73	1.46	0.78	0.71
	54409	54410				0.8783			1.6216	13.52	65.51	2-year		106.2	375	366.40	PVC	2.01	18.10	233.66	2.22	0.14	0.45
	210	54411		S07	0.1546	0.1546	0.80	0.344	0.3438	10.00	76.81	2-year	26.4	26.4									
Tower 5				S77A/B	0.0225	0.1771	0.90	0.056	0.4001	10.00	76.81	2-year	4.3	30.7									
				S78A/B	0.0214	0.1985	0.90	0.054	0.4537	10.00	76.81	2-year	4.1	34.8									
				S79A/B/C/D/E	0.0591	0.2576	0.90	0.148	0.6015	10.00	76.81	2-year	11.4	46.2									
				S83	0.0067	0.2643	0.90	0.017	0.6183	10.00	76.81	2-year	1.3	47.5	300	299.40	PVC	1.00	13.17	96.19	1.37	0.16	0.49
	54411	54410		S41	0.1786	0.4429	0.76	0.377	0.9956	11.37	71.93	2-year	27.1	71.6	300	299.40	PVC	1.40	35.70	113.81	1.62	0.37	0.63
	54410	POND-IN 2				1.3212			2.6172	13.65	65.14	2-year		170.5	375	366.40	PVC	1.60	8.00	208.47	1.98	0.07	0.82
Vortex	Pond-Out	54412		S23	0.1972	3.4854	0.20	0.110	5.8176	16.08	59.32	2-year	6.5	345.1	525	533.40	CONC	1.56	20.50	560.37	2.51	0.14	0.62
	54412	54413				3.4854			5.8176	16.22	59.03	2-year		343.4	525	533.40	CONC	1.31	13.10	513.51	2.30	0.10	0.67
	54413	54414				3.4854			5.8176	16.31	58.83	2-year		342.3	525	533.40	CONC	1.37	59.30	525.14	2.35	0.42	0.65
	54414	Headwall				3.4854			5.8176	16.73	57.96	2-year		337.2	525	533.40	CONC	1.00	15.00	448.66	2.01	0.12	0.75
					3.5585			**5.9883**					**425.8**						**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, Oct 2025.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
												5-year											
	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	0.26	0.032	1.4153	12.72	91.74	5-year	2.9	129.8									
				S56	0.0223	0.9651	0.51	0.032	1.4469	12.72	91.74	5-year	2.9	132.7									
				S60	0.0205	0.9856	0.37	0.021	1.4680	12.72	91.74	5-year	1.9	134.7									
				S61	0.0213	1.0069	0.44	0.026	1.4941	12.72	91.74	5-year	2.4	137.1	525	533.40	CONC	0.21	5.40	205.60	0.92	0.10	0.67
												5-year											
	78309	202B		S12	0.0293	1.0362	0.90	0.073	1.5674	12.81	91.36	5-year	6.7	143.2									
				S13	0.0096	1.0458	0.90	0.024	1.5914	12.81	91.36	5-year	2.2	145.4									
				S17	0.0246	1.0704	0.38	0.026	1.6174	12.81	91.36	5-year	2.4	147.8									
				S18	0.0168	1.0872	0.36	0.017	1.6342	12.81	91.36	5-year	1.5	149.3									
				S19	0.0366	1.1238	0.37	0.038	1.6719	12.81	91.36	5-year	3.4	152.7									
				S29	0.0376	1.1614	0.36	0.038	1.7095	12.81	91.36	5-year	3.4	156.2	525	533.40	CONC	0.14	52.00	167.87	0.75	1.15	0.93

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	1.7325	13.97	87.05	5-year	2.0	150.8									
				S14	0.0359	1.2065	0.90	0.090	1.8223	13.97	87.05	5-year	7.8	158.6									
				S15	0.0066	1.2131	0.90	0.017	1.8388	13.97	87.05	5-year	1.4	160.1									
				S20	0.0411	1.2542	0.33	0.038	1.8765	13.97	87.05	5-year	3.3	163.4									
				S22	0.0299	1.2841	0.68	0.057	1.9331	13.97	87.05	5-year	4.9	168.3									
				S24	0.0602	1.3443	0.28	0.047	1.9799	13.97	87.05	5-year	4.1	172.3									
				S26	0.0662	1.4105	0.27	0.050	2.0296	13.97	87.05	5-year	4.3	176.7									
				S27	0.0552	1.4657	0.77	0.118	2.1478	13.97	87.05	5-year	10.3	187.0									
				S28	0.0328	1.4985	0.70	0.064	2.2116	13.97	87.05	5-year	5.6	192.5									
				S32	0.0197	1.5182	0.90	0.049	2.2609	13.97	87.05	5-year	4.3	196.8									
				S43	0.0290	1.5472	0.90	0.073	2.3334	13.97	87.05	5-year	6.3	203.1									
				S72	0.0050	1.5522	0.90	0.013	2.3460	13.97	87.05	5-year	1.1	204.2	525	533.40	CONC	0.22	8.90	210.44	0.94	0.16	0.97
	54416	54415		S21	0.0849	1.6371	0.90	0.212	2.5584	14.12	86.50	5-year	18.4	221.3									
				S37	0.0870	1.7241	0.90	0.218	2.7761	14.12	86.50	5-year	18.8	240.1									
				S39	0.0951	1.8192	0.34	0.090	2.8659	14.12	86.50	5-year	7.8	247.9									
				S40	0.1140	1.9332	0.65	0.206	3.0719	14.12	86.50	5-year	17.8	265.7	600	600.00	CONC	0.17	41.20	253.16	0.90	0.77	1.05
POND	54415	POND-IN 1		S25	0.0338	1.9670	0.20	0.019	3.0907	14.89	83.91	5-year	1.6	259.3	600	600.00	CONC	0.20	69.40	274.59	0.97	1.19	0.94
												5-year											
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	0.67	0.043	0.1231	10.00	104.19	5-year	4.5	12.8	375	366.40	PVC	1.00	32.60	164.81	1.56	0.35	0.08
SEWER												5-year											
	208	78305		S34	0.0543	0.1134	0.73	0.110	0.2333	10.35	102.39	5-year	11.3	23.9									
				S75	0.0982	0.2116	0.72	0.197	0.4298	10.35	102.39	5-year	20.1	44.0	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	0.5135	11.12	98.62	5-year	8.3	50.6	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	0.6653	11.61	96.38	5-year	14.6	64.1									
				S31	0.0372	0.4401	0.90	0.093	0.7584	11.61	96.38	5-year	9.0	73.1									
				S44	0.0496	0.4897	0.20	0.028	0.7859	11.61	96.38	5-year	2.7	75.8	375	366.40	PVC	0.21	36.20	75.53	0.72	0.84	1.00
												5-year											
	76835	76833				0.4897			0.7859	12.45	92.80	5-year		72.9	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									
				S42A	0.0874	0.1244	0.66	0.160	0.1820	10.00	104.19	5-year	16.7	19.0									
				S42B	0.0731	0.1975	0.84	0.171	0.3527	11.00	99.19	5-year	16.9	35.0									
Tower 6 & Podium				S67A/B/C/D	0.0997	0.2241	0.90	0.249	0.4314	10.00	104.19	5-year	26.0	45.0									
				S80A/B	0.0187	0.2428	0.90	0.047	0.4782	10.00	104.19	5-year	4.9	49.8									
				S81A/B	0.0210	0.2638	0.90	0.053	0.5307	10.00	104.19	5-year	5.5	55.3									
				S82A/B/C/D/E/	0.0584	0.3222	0.90	0.146	0.6769	10.00	104.19	5-year	15.2	70.5	375	366.40	PVC	1.50	26.24	201.85	1.91	0.23	0.35
												5-year											
	76833	54409		S38_1 & S38_2	0.0664	0.8783	0.86	0.159	1.6216	12.74	91.66	5-year	14.6	148.6	375	366.40	PVC	0.87	68.10	153.73	1.46	0.78	0.97
	54409	54410				0.8783			1.6216	13.52	88.68	5-year		143.8	375	366.40	PVC	2.01	18.10	233.66	2.22	0.14	0.62
	210	54411		S07	0.1546	0.1546	0.80	0.344	0.3438	10.00	104.19	5-year	35.8	35.8									
				S77A/B	0.0225	0.1771	0.90	0.056	0.4001	10.00	104.19	5-year	5.9	41.7									
				S78A/B	0.0214	0.1985	0.90	0.054	0.4537	10.00	104.19	5-year	5.6	47.3									
Tower 5				S79A/B/C/D/E	0.0591	0.2576	0.90	0.148	0.6015	10.00	104.19	5-year	15.4	62.7									
				S83	0.0067	0.2643	0.90	0.017	0.6183	10.00	104.19	5-year	1.7	64.4	300	299.40	PVC	1.00	13.17	96.19	1.37	0.16	0.67
	54411	54410		S41	0.1786	0.4429	0.76	0.377	0.9956	11.37	97.49	5-year	36.8	97.1	300	299.40	PVC	1.40	35.70	113.81	1.62	0.37	0.85
	54410	POND-IN 2				1.3212			2.6172	13.65	88.18	5-year		230.8	375	366.40	PVC	1.60	8.00	208.47	1.98	0.07	1.11
Vortex	Pond-Out	54412		S23	0.1972	3.4854	0.20	0.110	5.8176	16.08	80.21	5-year	8.8	466.7	525	533.40	CONC	1.56	20.50	560.37	2.51	0.14	0.83
	54412	54413				3.4854			5.8176	16.22	79.81	5-year		464.3	525	533.40	CONC	1.31	13.10	513.51	2.30	0.10	0.90
	54413	54414				3.4854			5.8176	16.31	79.54	5-year		462.7	525	533.40	CONC	1.37	59.30	525.14	2.35	0.42	0.88
	54414	Headwall				3.4854			5.8176	16.73	78.34	5-year		455.8	525	533.40	CONC	1.00	15.00	448.66	2.01	0.12	1.02
					3.5585			**5.9883**					**577.1**						**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, Oct 2025.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 (75mm)
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		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(s)	WATTS RD-100	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
Tower 6	AMMENITITES ROOF - Terrace	WATTS RD-CP-85	None	None		
Tower 7	AMMENITITES ROOF	WATTS RD-CP-85	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
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(s)	WATTS RD-100	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
Tower 5	AMMENITITES ROOF - Terrace	WATTS RD-CP-85	None	None		
Tower 6	AMMENITITES ROOF	WATTS RD-CP-85	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
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	Green Roof	WATTS RD-CP-85	YES	ACCUTROL ADJ	CLOSED	MAX 5 GPM AT 150mm DEPTH (Closed Position)
Tower 5/6 Podium	Commercial Roof -Ballast	WATTS RD-CP-85	YES	ACCUTROL ADJ	50% Open	MAX 20 GPM AT 150mm DEPTH (50% Position)
Tower 5/6 Podium	Terraces	WATTS RD-CP-85	NONE	NONE		

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	S79A	150	0.015	16%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	87	130
		151	0.0151	16%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	89	134
	S79C	68	0.0068	7%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	90	61
	S79D	148	0.0148	16%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	91	134
	S79E	73	0.0073	8%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	84	61
	S77A	122	0.0122	13%	Ammenities	WATTS	RD-100	Yes	ACCUTROL	Yes	2	84	102
	S77B	90	0.0090	10%	Ammenities	WATTS	RD100-CP-85	No		No	1		
	S78A	127	0.0127	14%	Ammenities	WATTS	RD-100	Yes	ACCUTROL	Yes	2	80	102
	S78B	97	0.0097	10%	Ammenities	WATTS	RD100-CP-85	No		No	1		
	S83	92			3rd Floor Terraces	WATTS	RD100-CP-85	No		No	4		
Tower 6	S82A	150	0.015	16%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	87	130
	S82B	151	0.0151	16%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	89	134
	S82C	68	0.0068	7%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	90	61
	S82D	148	0.0148	16%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	91	134
	S82E	73	0.0073	8%	High Roof	WATTS	RD-100	Yes	ACCUTROL	Yes	2	84	61
	S80A	117	0.0117	13%	Ammenities	WATTS	RD-100	Yes	ACCUTROL	Yes	2	87	102
	S80B	91	0.0091	10%	Ammenities	WATTS	RD100-CP-85	No		No	1		
	S81A	119	0.0119	13%	Ammenities	WATTS	RD-100	Yes	ACCUTROL	Yes	2	86	102
	S81B	98	0.0098	11%	Ammenities	WATTS	RD100-CP-85	No		No	1		
Tower 5, 6 Podium	S67A	767	0.0767	77%	Podium /Comm Roof	WATTS	RD100-CP-85	Yes	ACCUTROL	Yes	4	65	500
	S67B	87	0.0087	9%	Podium /Comm Roof	WATTS	RD100-CP-85	No		No	3		
	S67C	21	0.0021	2%	Podium /Comm Roof	WATTS	RD100-CP-85	No		No	1		
	S67D	125	0.0125	13%	Podium /Comm Roof	WATTS	RD100-CP-85	Yes	ACCUTROL	Yes	2	80	100

Notes
1) Area Number matches PCSWMM subcatchment Number

BUILDING ROOF INFORMATION: **TOWER1**

Subcatchment Number	**S37**	
Total Roof Area (m2)	**870**	
Minimum 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 Rate from Roof (L/sec)	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

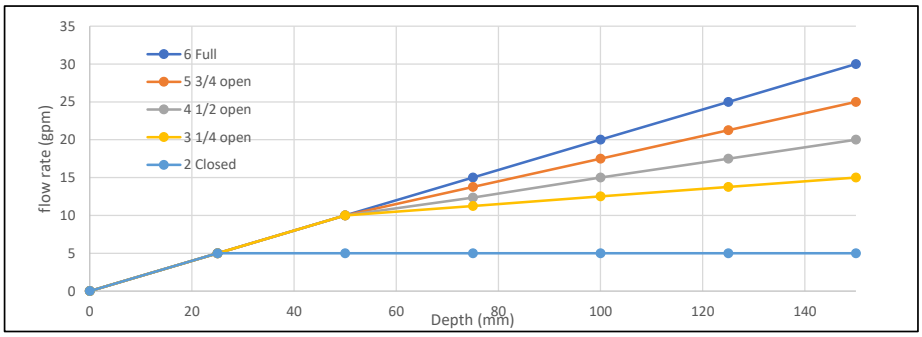
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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**	
Minimum 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 Rate from Roof (L/sec)	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

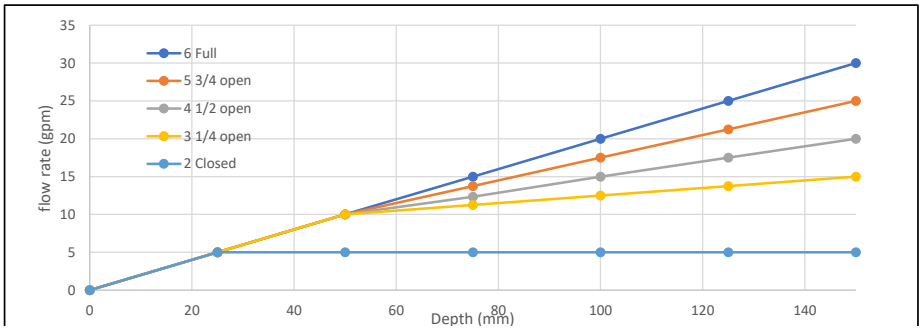
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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**	
Minimum 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 Rate from Roof (L/sec)	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

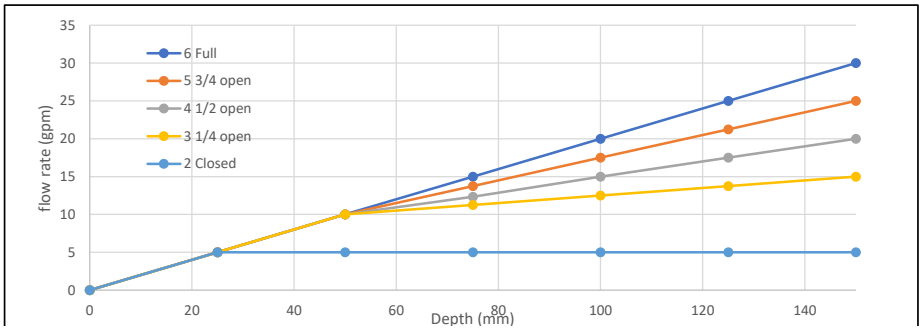
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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**	
Minimum 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 Rate from Roof (L/sec)	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

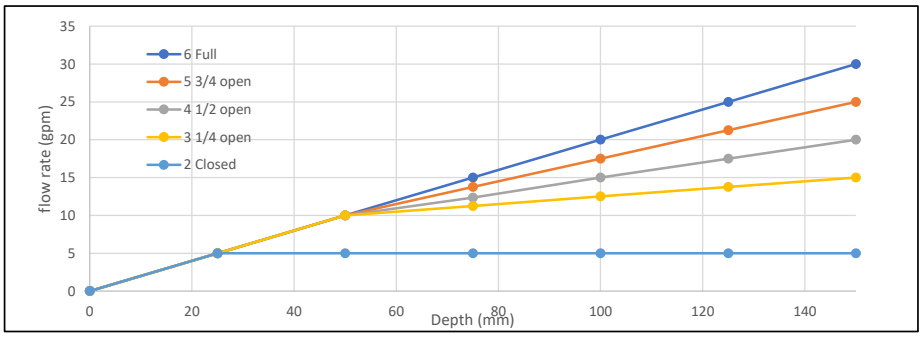
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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**	
Minimum 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 Rate from Roof (L/sec)	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

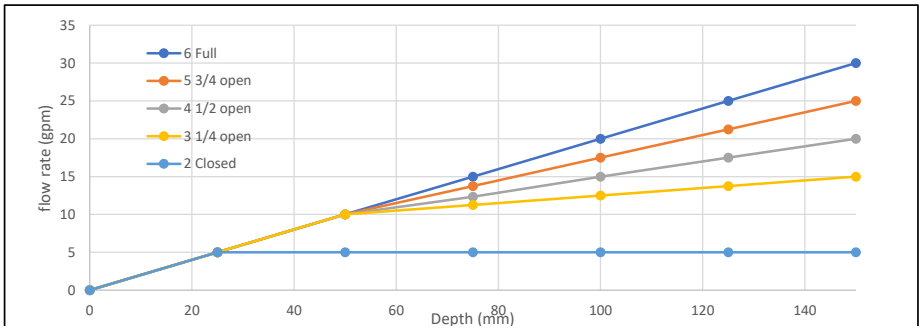
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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**	
Minimum 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 Rate from Roof (L/sec)	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

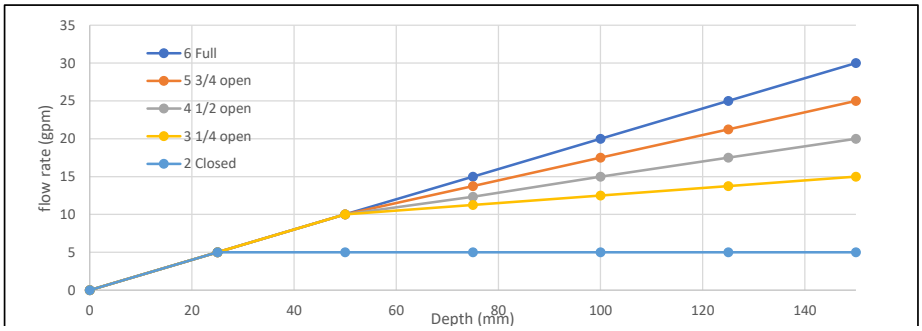
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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**	
Minimum 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 Rate from Roof (L/sec)	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

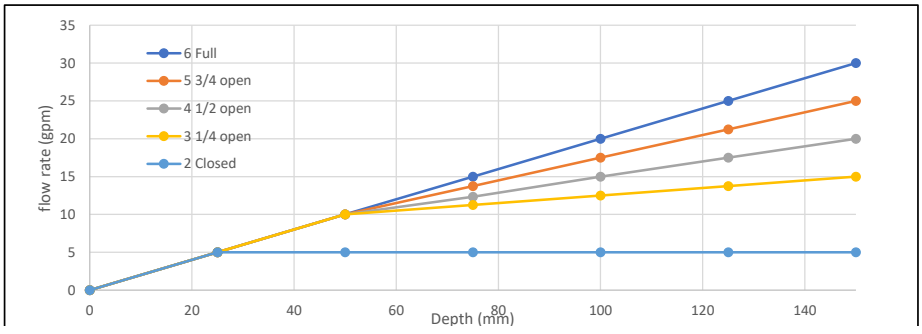
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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 Rate from Roof (L/sec)	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

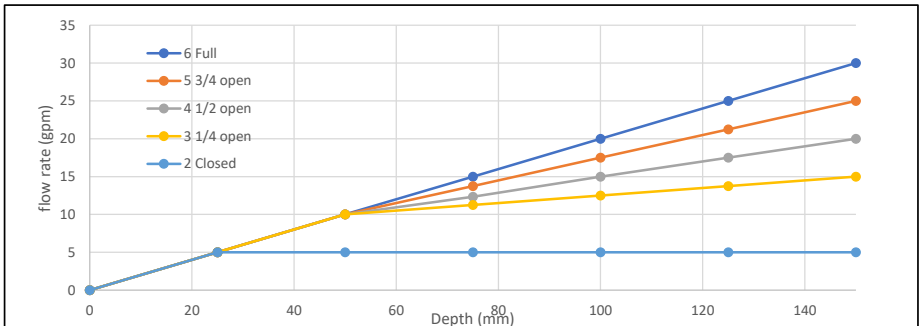
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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

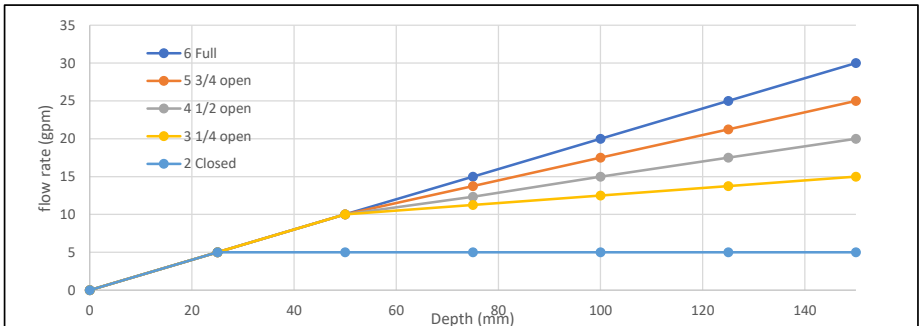
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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) TYPICAL**

Subcatchment Number	**S79A**	
Total Roof Area (m2)	**150**	
Minimum 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)	3,450	
Max Permitted Load from All Drains (L/sec)	3.8	*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	1	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**2**	*Use if known*
Effecive Roof Percentage (%)	**87%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	130	
Area per Drain (m2)	65	*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)	7.5	*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 Rate from Roof (L/sec)	2.5	*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	0.00063	0.025	1.8	3.6	0.0	0.0
0.050	10	0.63	0.00126	0.050	7.2	14.4	0.1	0.2
0.075	12.35	0.78	0.00156	0.075	16.3	32.5	0.4	0.8
0.100	15	0.95	0.00189	0.100	28.9	57.8	1.0	1.9
0.125	17.5	1.10	0.00221	0.125	45.1	90.3	1.9	3.8
0.150	20	1.26	0.00252	0.150	65.0	130.0	3.3	6.5
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	0.63
0.050	1.26
0.075	1.56
0.100	1.89
0.125	2.21
0.150	2.52

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	4
0.050	14
0.075	33
0.100	58
0.125	90
0.150	130

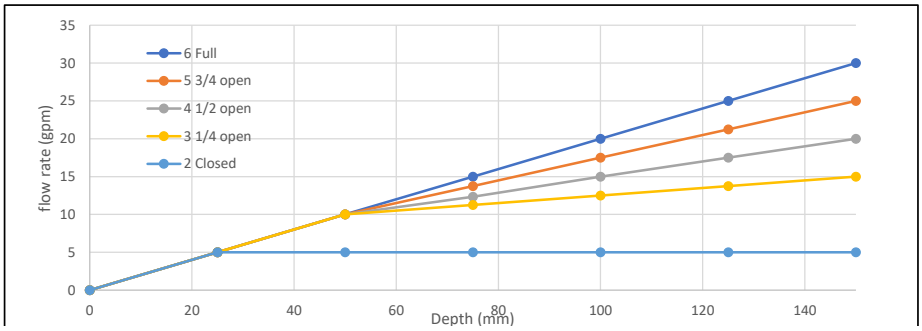
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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 (Amenities)**

Subcatchment Number	**S77A**	
Total Roof Area (m2)	**122**	
Minimum 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)	2,806	
Max Permitted Load from All Drains (L/sec)	3.1	*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	1	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**2**	*Use if known*
Effecive Roof Percentage (%)	**83.6%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	102	
Area per Drain (m2)	51	*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)	6.1	*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 Rate from Roof (L/sec)	2.5	*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	0.00063	0.025	1.4	2.8	0.0	0.0
0.050	10	0.63	0.00126	0.050	5.7	11.3	0.1	0.2
0.075	12.35	0.78	0.00156	0.075	12.8	25.5	0.3	0.6
0.100	15	0.95	0.00189	0.100	22.7	45.3	0.8	1.5
0.125	17.5	1.10	0.00221	0.125	35.4	70.8	1.5	3.0
0.150	20	1.26	0.00252	0.150	51.0	102.0	2.6	5.1
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	0.63
0.050	1.26
0.075	1.56
0.100	1.89
0.125	2.21
0.150	2.52

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	3
0.050	11
0.075	26
0.100	45
0.125	71
0.150	102

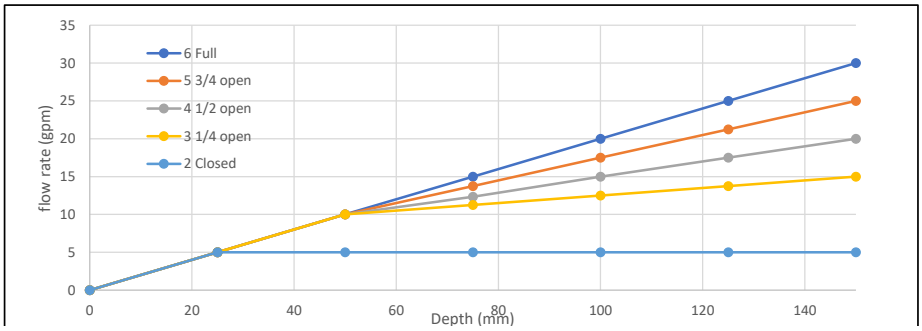
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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) TYPICAL**

Subcatchment Number	**S82A**	
Total Roof Area (m2)	**150**	
Minimum 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)	3,450	
Max Permitted Load from All Drains (L/sec)	3.8	*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	1	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**2**	*Use if known*
Effecive Roof Percentage (%)	**86.7%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	130	
Area per Drain (m2)	65	*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)	7.5	*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 Rate from Roof (L/sec)	2.5	*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	0.00063	0.025	1.8	3.6	0.0	0.0
0.050	10	0.63	0.00126	0.050	7.2	14.4	0.1	0.2
0.075	12.35	0.78	0.00156	0.075	16.3	32.5	0.4	0.8
0.100	15	0.95	0.00189	0.100	28.9	57.8	1.0	1.9
0.125	17.5	1.10	0.00221	0.125	45.1	90.3	1.9	3.8
0.150	20	1.26	0.00252	0.150	65.0	130.0	3.3	6.5
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	0.63
0.050	1.26
0.075	1.56
0.100	1.89
0.125	2.21
0.150	2.52

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	4
0.050	14
0.075	33
0.100	58
0.125	90
0.150	130

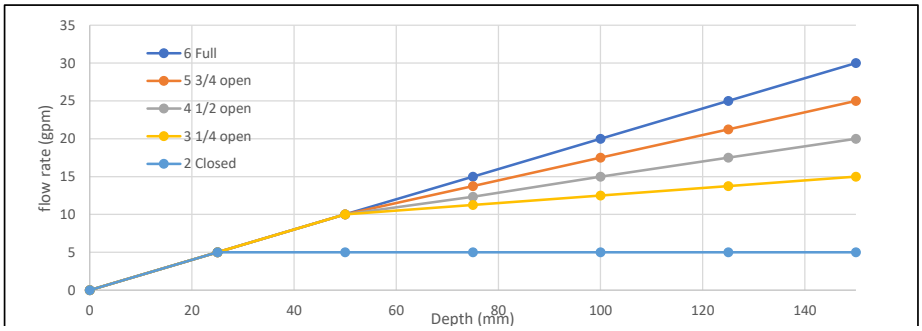
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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 (Amenities)**

Subcatchment Number	**S80A**	
Total Roof Area (m2)	**117**	
Minimum 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)	2,691	
Max Permitted Load from All Drains (L/sec)	3.0	*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	1	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**2**	*Use if known*
Effecive Roof Percentage (%)	**87.2%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	102	
Area per Drain (m2)	51	*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)	5.9	*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 Rate from Roof (L/sec)	2.5	*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	0.00063	0.025	1.4	2.8	0.0	0.0
0.050	10	0.63	0.00126	0.050	5.7	11.3	0.1	0.2
0.075	12.35	0.78	0.00156	0.075	12.8	25.5	0.3	0.6
0.100	15	0.95	0.00189	0.100	22.7	45.3	0.8	1.5
0.125	17.5	1.10	0.00221	0.125	35.4	70.8	1.5	3.0
0.150	20	1.26	0.00252	0.150	51.0	102.0	2.6	5.1
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	0.63
0.050	1.26
0.075	1.56
0.100	1.89
0.125	2.21
0.150	2.52

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	3
0.050	11
0.075	26
0.100	45
0.125	71
0.150	102

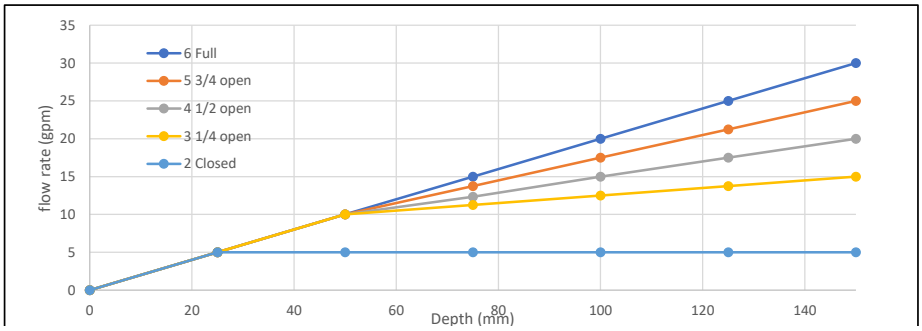
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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	**S67A**	**Green Roof**
Total Roof Area (m2)	**767**	
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)	17,641	
Max Permitted Load from All Drains (L/sec)	19.6	*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	3	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	**4**	*Use if known*
Effective Roof Percentage (%)	**65.2%**	*Allowance for Mechanical units on roof*
Effective Total Roof Area (m2)	500	
Area per Drain (m2)	125	*Based on Effective Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding within Green Roof (m3)	*71.3*	*Based on: ZINCO RETENTION SPACER RSX 150 with DEPTH=150mm, CAVITY VOLUME>95*
Maximium release rate per drain at 150mm (usgpm)	**20**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Roof (L/sec)	5.0	*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	0.00	0.0
0.025	5	0.32	0.00126	0.025	3.5	13.9	0.03	0.1
0.050	10	0.63	0.00252	0.050	13.9	55.6	0.23	0.9
0.075	12.35	0.78	0.00312	0.075	31.3	125.0	0.78	3.1
0.100	15	0.95	0.00379	0.100	55.6	222.2	1.85	7.4
0.125	17.5	1.10	0.00442	0.125	86.8	347.2	3.62	14.5
0.150	20	1.26	0.00505	0.150	125.0	500.0	6.25	25.0
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	1.26
0.050	2.52
0.075	3.12
0.100	3.79
0.125	4.42
0.150	5.05

RATING CURVE FOR MODELLING ROOF STORAGE	
Head or Ponding Depth (m)	Ponding Area (m2)
0.000	0
0.025	0.0
0.050	0.0
0.075	125.0
0.100	222
0.125	347
0.150	500

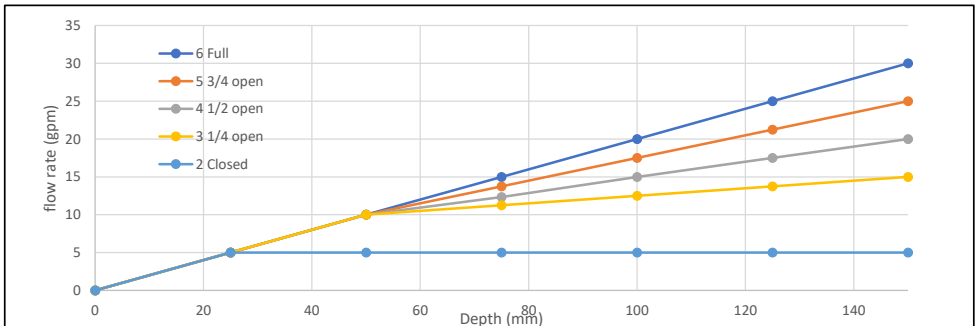
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

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)

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	**Catcbasin**
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)			

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

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)

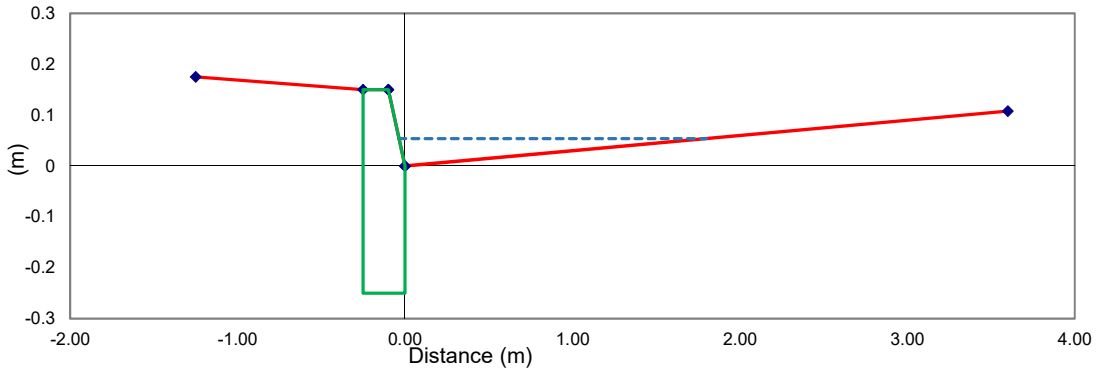
Table H2c: Orifice Flows for Area Drains (Phases 3,4,5)

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

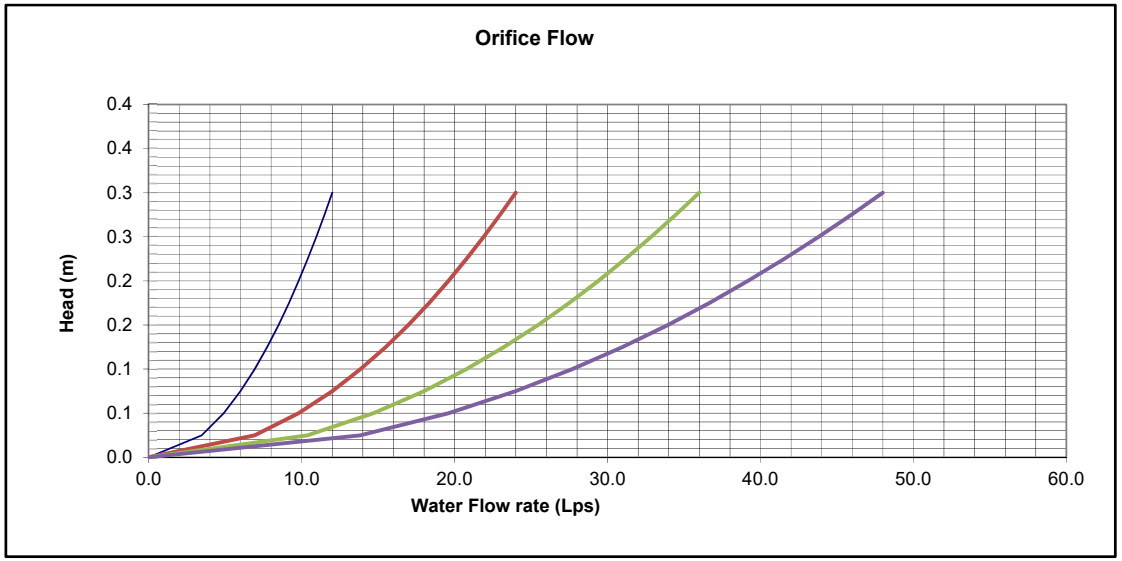


Table H2b: Orifice Flows for Area Drains (Phase 2)

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

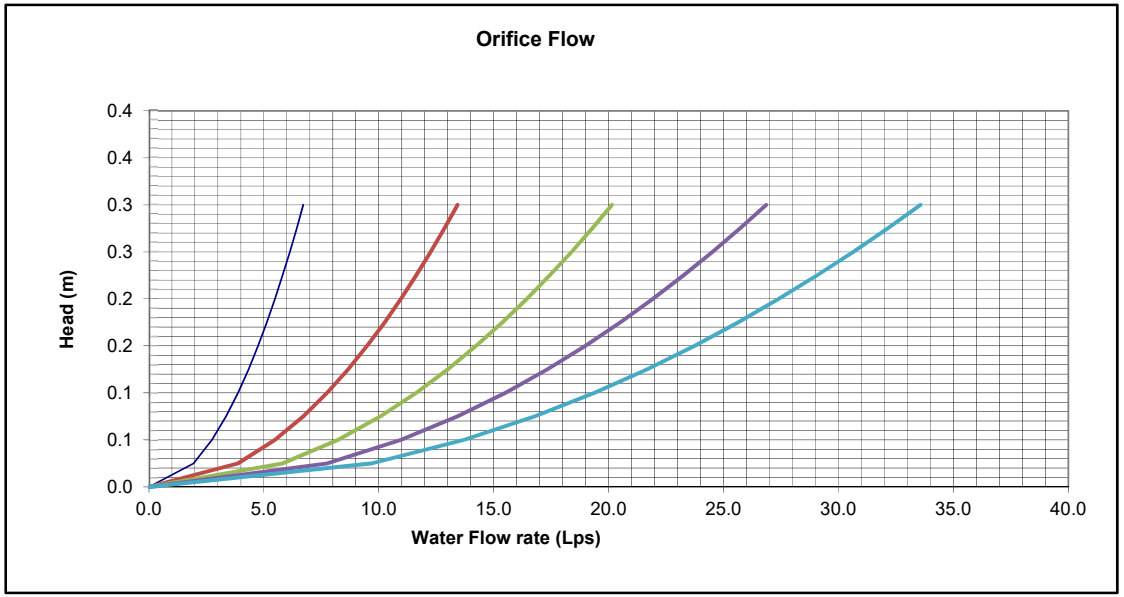


Table H2b: Orifice Flows for Area Drains (Phases 3, 4, 5)

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

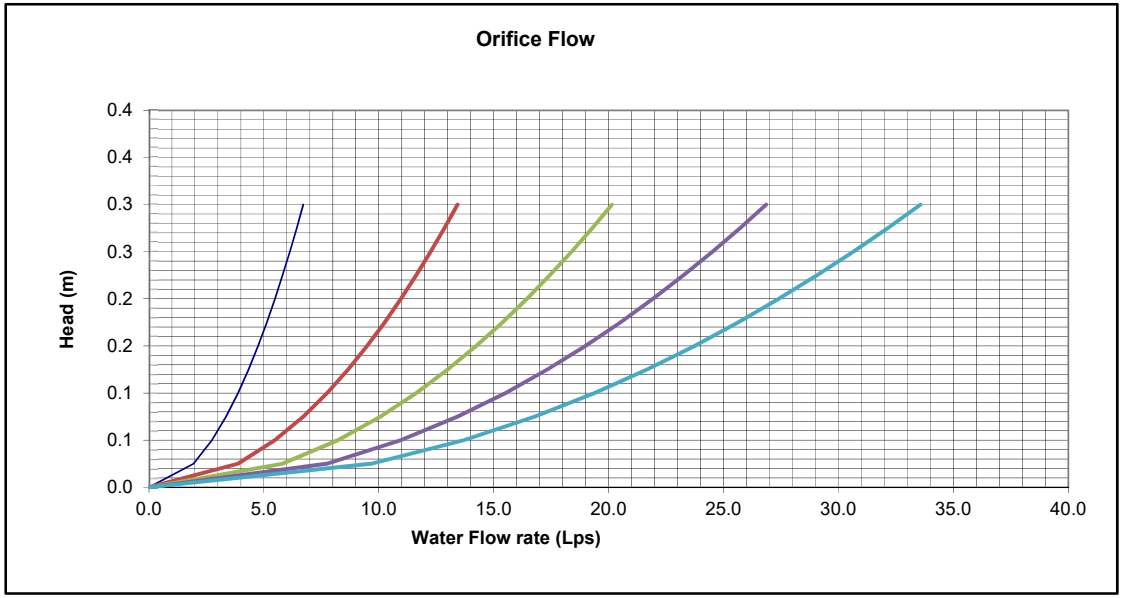
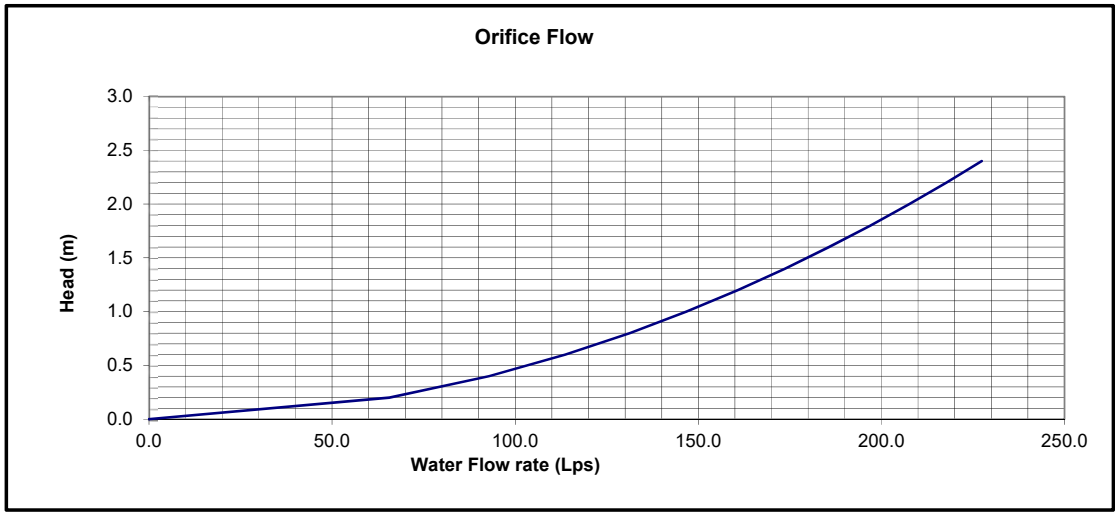


Table H3
Orifice Flows for SWM Pond (All Phases)

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 Report: Petries_Landing_Phase305_Rev7_100yr

PCSWMM Report

Petries_Landing_Phase3-5_Rev7_100yr

Model Petries_Landing_Phase3-5-Rev7.inp

exp Services Inc.

November 17, 2025

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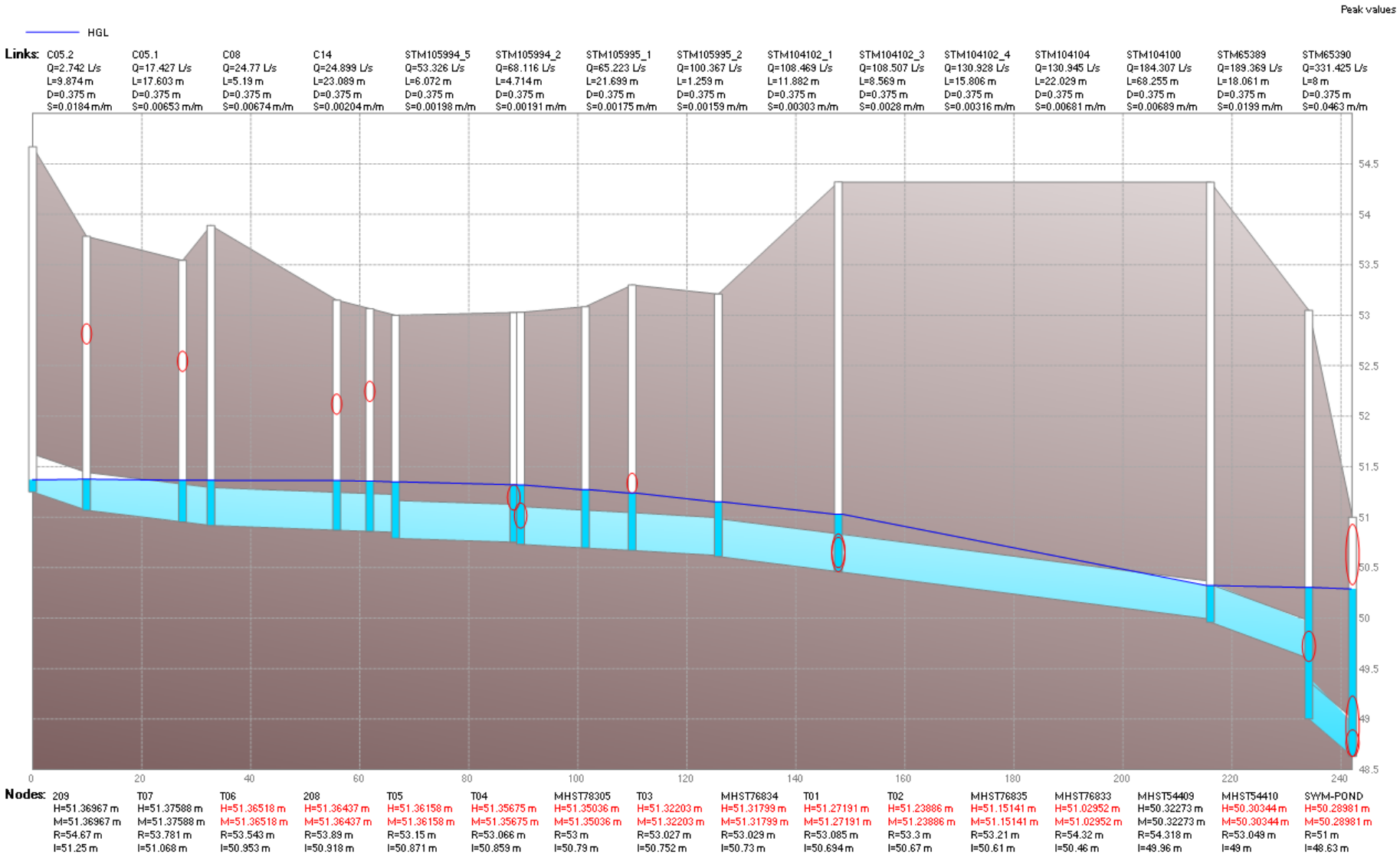


Figure 1: Node 209 to Node SWM-POND (South)

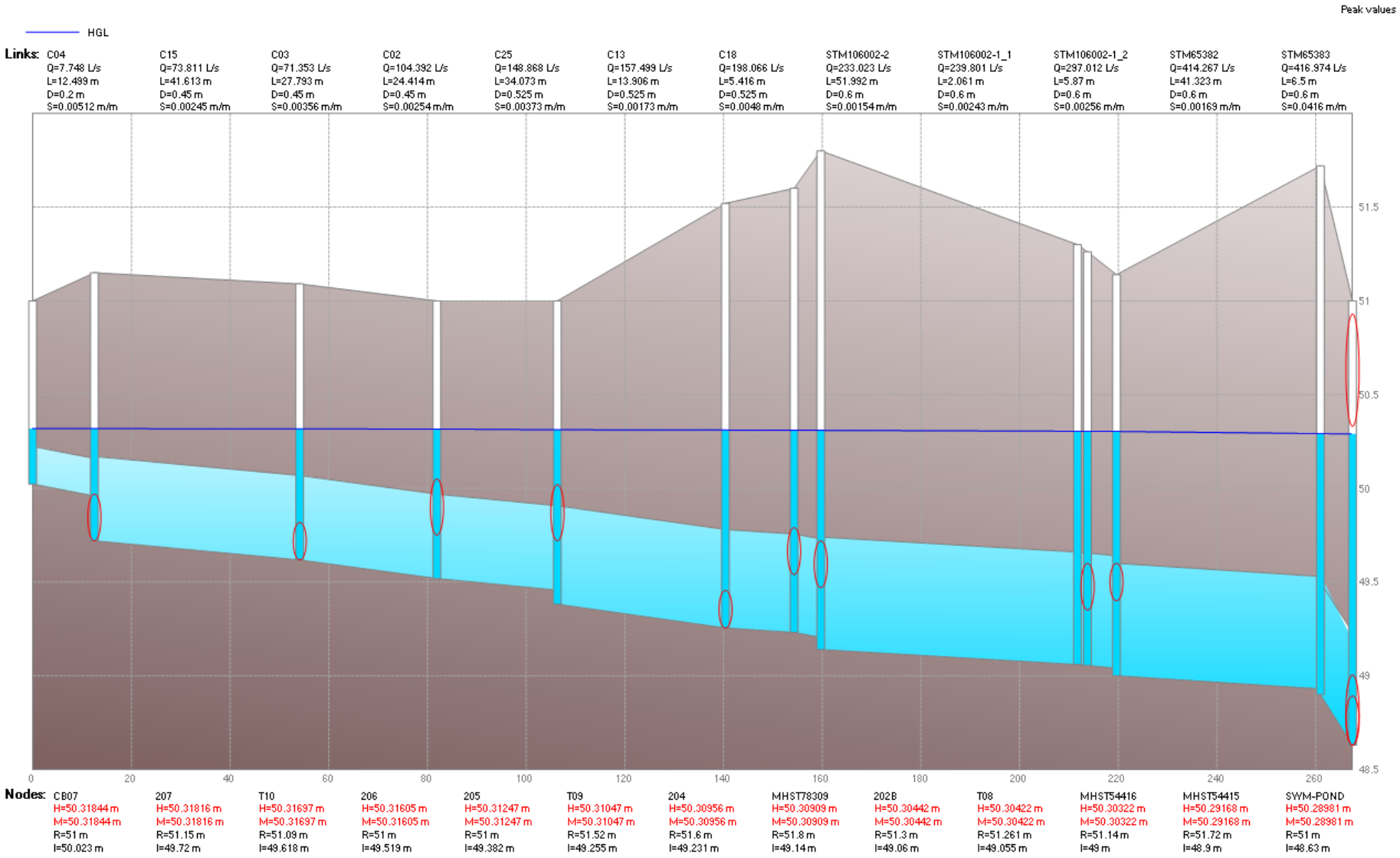


Figure 2: Node CB07 to Node SWM-POND (nortM storm)

Table 1: Storages

Name	Invert Elev. (m)	Rim Elev. (m)	Depth (m)	Storage Curve	Curve Name	TYPE	NO_INLETS
Commercial_Roof_General1	60	60.15	0.15	TABULAR	Commercial_G1	ROOF_DRAINS	1
Commercial_Roof_General2	60	60.15	0.15	TABULAR	commercial_g2	ROOF_DRAINS	3
Commercial_Roof_General3	60	60.15	0.15	TABULAR	TOWER5&6-PODIUM-GRANULAR	ROOF_DRAINS	2
Commercial_Roof_Green	60	60.3	0.3	TABULAR	TOWER5&6-GREEROOF-RETENTION	ROOF_DRAINS	4
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

Table 1: Storages (continued...)

Name	Invert Elev. (m)	Rim Elev. (m)	Depth (m)	Storage Curve	Curve Name	TYPE	NO_INLETS
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	53.65	53.8	0.15	TABULAR	SP35-STORAGE	AREA_DRAINS	3
SP36	54.2	54.4	0.2	TABULAR	SP36-STORAGE	AREA_DRAINS	1
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	4
T3-ROOF-3-STORAGE	60	60.15	0.15	TABULAR	TOWER3-ROOF3-STORAGE	ROOF_DRAINS	4
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	1
T4-ROOF1-STORAGE	60	60.15	0.15	TABULAR	TOWER4-HIGHROOF-STORAGE	ROOF_DRAINS	13
T4-ROOF2-NOSTORAGE	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	9
T5_2nd_Floor	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T5_Amenity_1	60	60.15	0.15	TABULAR	TOWER5-AMENITY-1	ROOF_DRAINS	2
T5_Amenity_2	60	60.15	0.15	TABULAR	TOWER5-AMENITY-2	ROOF_DRAINS	2

Table 1: Storages (continued...)

Name	Invert Elev. (m)	Rim Elev. (m)	Depth (m)	Storage Curve	Curve Name	TYPE	NO_INLETS
T5_Amenity_3	60	60.15	0.15	TABULAR	TOWER5-AMENITY-3	ROOF_DRAINS	2
T5_Amenity_4	60	60.15	0.15	TABULAR	TOWER5-AMENITY-4	ROOF_DRAINS	2
T5_Elevator_Roof	60	60.15	0.15	TABULAR	TOWER5-ELEVATOR-ROOF	ROOF_DRAINS	2
T5_Terrace_1	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T5_Terrace_2	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T5_Terrace_3	60	60.15	0.15	TABULAR	TOWER5-TERRACE3	ROOF_DRAINS	2
T5_Terrace_4	60	60.15	0.15	TABULAR	TOWER5-TERRACE4	ROOF_DRAINS	2
T6_Amenity_1	60	60.15	0.15	TABULAR	TOWER6-AMENITY1	ROOF_DRAINS	2
T6_Amenity_2	60	60.15	0.15	TABULAR	TOWER6-AMENITY2	ROOF_DRAINS	2
T6_Amenity_3	60	60.15	0.15	TABULAR	TOWER6-AMENITY3	ROOF_DRAINS	2
T6_Amenity_4	60	60.15	0.15	TABULAR	TOWER6-AMENITY4	ROOF_DRAINS	2
T6_Elevator_Roof	60	60.15	0.15	TABULAR	TOWER6-ELEVATOR-ROOF	ROOF_DRAINS	2
T6_Terrace_1	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T6_Terrace_2	60	60.15	0.15	FUNCTIONAL	*	ROOF_DRAINS	1
T6_Terrace_3	60	60.15	0.15	TABULAR	TOWER6-TERRACE3	ROOF_DRAINS	2
T6_Terrace_4	60	60.15	0.15	TABULAR	TOWER6-TERRACE4	ROOF_DRAINS	2
TOWER6-CONN	50.8	54.5	3.7	TABULAR	TOWER6-CONN		0

Table 2A: Outlets

Name	Inlet Node	Outlet Node	Tag	Inlet Elev. (m)	Rating Curve	Curve Name
CB4-IC	CB04-MAJ	CB04	CB-INLET_CONTROL	53.97	TABULAR/DEPTH	CB-IC
CB5-IC	CB05-MAJ	CB05	CB-INLET_CONTROL	54.53	TABULAR/DEPTH	CB-IC
CB9-IC	CB10-MAJ	CB10	CB-INLET_CONTROL	53.32	TABULAR/DEPTH	CB-IC
IN141918-IC	IN141918-MAJ	IN141918	CB-INLET_CONTROL	52.55	TABULAR/DEPTH	CB-IC
IN141919-IC	IN141919-MAJ	IN141919	CB-INLET_CONTROL	53.32	TABULAR/DEPTH	CB-IC
SP01-OUTLET	SP01	TOWER1-CONN	AREA_DRAINS	54.45	TABULAR/DEPTH	Tower1_AreaDrains_4Drains
SP02-OUTLET	SP02	TOWER1-CONN	AREA_DRAINS	54.31	TABULAR/DEPTH	Tower1_AreaDrains_2Drains
SP04-OUTLET	SP04	TOWER2-CONN-1	AREA_DRAINS	54.35	TABULAR/DEPTH	Tower2_AreaDrains_1Drain
SP05-OUTLET	SP05	TOWER2-CONN-1	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_2Drains
SP06-OUTLET	SP06	TOWER2-CONN-1	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_1Drain
SP07-OUTLET	SP07	TOWER2-CONN-1	AREA_DRAINS	54.45	TABULAR/DEPTH	Tower2_AreaDrains_1Drain
SP09-OUTLET	SP09	TOWER2-CONN-2	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_1Drain
SP10-OUTLET	SP10	TOWER2-CONN-2	AREA_DRAINS	54.47	TABULAR/DEPTH	Tower2_AreaDrains_1Drain
SP11-OUTLET	SP11	TOWER2-CONN-2	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_1Drain
SP12-OUTLET	SP12	TOWER2-CONN-2	AREA_DRAINS	54.4	TABULAR/DEPTH	Tower2_AreaDrains_1Drain
SP13-OUTLET	SP13	TOWER3-CONN-1	AREA_DRAINS	54.53	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains
SP14-OUTLET	SP14	TOWER3-CONN-1	AREA_DRAINS	54.51	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP15-OUTLET	SP15	TOWER3-CONN-1	AREA_DRAINS	54.51	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP16-OUTLET	SP16	TOWER3-CONN-1	AREA_DRAINS	54.51	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP17-OUTLET	SP17	TOWER3-CONN-1	AREA_DRAINS	54.51	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP18-OUTLET	SP18	TOWER3-CONN-1	AREA_DRAINS	54.6	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP19-OUTLET	SP19	TOWER3-CONN-1	AREA_DRAINS	54.45	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains
SP20-OUTLET	SP20	TOWER3-CONN-2	AREA_DRAINS	54.5	TABULAR/DEPTH	Tower3/4/5_AreaDrains_3Drains
SP21-OUTLET	SP21	TOWER4-CONN-1	AREA_DRAINS	54.5	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP22-OUTLET	SP22	TOWER4-CONN-1	AREA_DRAINS	54.5	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains
SP23-OUTLET	SP23	TOWER3-CONN-2	AREA_DRAINS	54.6	TABULAR/DEPTH	Tower3/4/5_AreaDrains_4Drains
SP24-OUTLET	SP24	TOWER3-CONN-2	AREA_DRAINS	54.65	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains

Table 2A: Outlets (continued...)

Name	Inlet Node	Outlet Node	Tag	Inlet Elev. (m)	Rating Curve	Curve Name
SP25-OUTLET	SP25	TOWER4-CONN-1	AREA_DRAINS	54.75	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains
SP26-OUTLET	SP26	TOWER4-CONN-1	AREA_DRAINS	54.6	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP27-OUTLET	SP27	TOWER4-CONN-1	AREA_DRAINS	54.75	TABULAR/DEPTH	Tower3/4/5_AreaDrains_3Drains
SP28-OUTLET	SP28	TOWER4-CONN-2	AREA_DRAINS	54.75	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP29-OUTLET	SP29	TOWER4-CONN-2	AREA_DRAINS	54.75	TABULAR/DEPTH	Tower3/4/5_AreaDrains_1Drain
SP30-OUTLET	SP30	TOWER4-CONN-2	AREA_DRAINS	54.85	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains
SP31,SP32-OUTLET	SP31,SP32	TOWER3-CONN-2	AREA_DRAINS	54.76	TABULAR/DEPTH	Tower3/4/5_AreaDrains_2Drains
SP35-OUTLET	SP35	TOWER5-CONN	AREA_DRAINS	53.35	TABULAR/DEPTH	Tower3/4/5_AreaDrains_8Drains
SP36-OULTET	SP36	TOWER6-CONN	AREA_DRAINS	54.15	TABULAR/DEPTH	TOWER5&6_AreaDrain_5Drains
T1-ROOF-OUTLET	T1-ROOF-STORAGE	TOWER1-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower1_RoofDrains_5Drains
T2-ROOF-1-OUTLET	T2-ROOF1-STORAGE	TOWER2-CONN-1	ROOF_DRAINS	60	TABULAR/DEPTH	Tower2_RoofDrains_5Drains
T2-ROOF-2-OUTLET	T2-ROOF2-STORAGE	TOWER2-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	Tower2_Roof_Drains_4Drains
T2-ROOF-3-OUTLET	T2-ROOF3-STORAGE	TOWER2-CONN-1	ROOF_DRAINS	60	TABULAR/DEPTH	Tower2_Roof_Drains_4Drains
T2-ROOF-4-OUTLET	T2-ROOF-4-NOSTORAGE	TOWER2-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control
T2-ROOF-5-OUTLET	T2-ROOF-5-NOSTORAGE	TOWER2-CONN-1	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control
T3-ROOF-1-OUTLET	T3-ROOF-1-STORAGE	TOWER3-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	Tower3_RoofDrains_5Drains
T3-ROOF-2-OUTLET	T3-ROOF-2-STORAGE	TOWER3-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	Tower3_RoofDrains_4Drains
T3-ROOF-3-OUTLET	T3-ROOF-3-STORAGE	TOWER3-CONN-1	ROOF_DRAINS	60	TABULAR/DEPTH	Tower3_RoofDrains_4Drains
T3-ROOF-4-OUTLET	T3-ROOF-4-NOSTORAGE	TOWER3-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control
T3-ROOF-5-OUTLET	T3-ROOF-5-NOSTORAGE	TOWER3-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control
T4-AMENITYROOF-OUTLET	T4-ROOF2-NOSTORAGE	TOWER4-CONN-2	ROOF_DRAINS	60	TABULAR/HEAD	No_Flow_Control
T4-HIGHROOF-OUTLET	T4-ROOF1-STORAGE	TOWER4-CONN-2	ROOF_DRAINS	60	TABULAR/DEPTH	Tower4_RoofDrains_13Drains
T5&6_GreenRoof	Commercial_Roof_Green	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower6_GreenRoof_4Drains_Closed
T5&6_Podium_C	Commercial_Roof_General1	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrain_1Drain
T5&6_PodiumB	Commercial_Roof_General2	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrain_3Drains
T5&6_PodiumD	Commercial_Roof_General3	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T5_2nd_Floor	T5_2nd_Floor	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control

Table 2A: Outlets (continued...)

Name	Inlet Node	Outlet Node	Tag	Inlet Elev. (m)	Rating Curve	Curve Name
T5_Amenity_1	T5_Amenity_1	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T5_Amenity_2	T5_Amenity_2	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T5_Amenity_3	T5_Amenity_3	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T5_Amenity_4	T5_Amenity_4	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T5_Elevator_Roof	T5_Elevator_Roof	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T5_Terrace_1	T5_Terrace_1	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control
T5_Terrace_2	T5_Terrace_2	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control
T5_Terrace_3	T5_Terrace_3	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T5_Terrace_4	T5_Terrace_4	TOWER5-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T6_Amenity_1	T6_Amenity_1	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T6_Amenity_2	T6_Amenity_2	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T6_Amenity_3	T6_Amenity_3	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T6_Amenity_4	T6_Amenity_4	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T6_Elevator_Roof	T6_Elevator_Roof	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T6_Terrace_1	T6_Terrace_1	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control
T6_Terrace_2	T6_Terrace_2	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	No_Flow_Control
T6_Terrace_3	T6_Terrace_3	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains
T6_Terrace_4	T6_Terrace_4	TOWER6-CONN	ROOF_DRAINS	60	TABULAR/DEPTH	Tower5&6_RoofDrains_2Drains

Table 2B: Outlets

Name	Max. |Flow| (L/s)
CB4-IC	10.83
CB5-IC	10.53
CB9-IC	18.24
IN141918-IC	44.48
IN141919-IC	49.88
SP01-OUTLET	38.78
SP02-OUTLET	21.28
SP04-OUTLET	6.12
SP05-OUTLET	9.81
SP06-OUTLET	6.08
SP07-OUTLET	5.47
SP09-OUTLET	5.35
SP10-OUTLET	4.93
SP11-OUTLET	5.47
SP12-OUTLET	5.6
SP13-OUTLET	8.09
SP14-OUTLET	5.73
SP15-OUTLET	5.78
SP16-OUTLET	5.3
SP17-OUTLET	5.13
SP18-OUTLET	6.13
SP19-OUTLET	9.98
SP20-OUTLET	19.17
SP21-OUTLET	6.71
SP22-OUTLET	11.15
SP23-OUTLET	21.08
SP24-OUTLET	7.26

Table 2B: Outlets (continued...)

Name	Max. |Flow| (L/s)
SP25-OUTLET	9.94
SP26-OUTLET	5.7
SP27-OUTLET	15.23
SP28-OUTLET	3.94
SP29-OUTLET	5.19
SP30-OUTLET	9.75
SP31,SP32-OUTLET	2.38
SP35-OUTLET	36.55
SP36-OULTET	21.15
T1-ROOF-OUTLET	8.54
T2-ROOF-1-OUTLET	7.51
T2-ROOF-2-OUTLET	4.19
T2-ROOF-3-OUTLET	4.06
T2-ROOF-4-OUTLET	14.51
T2-ROOF-5-OUTLET	3.27
T3-ROOF-1-OUTLET	6.07
T3-ROOF-2-OUTLET	1.26
T3-ROOF-3-OUTLET	1.26
T3-ROOF-4-OUTLET	14.56
T3-ROOF-5-OUTLET	3.66
T4-AMENITYROOF-OUTLET	25.31
T4-HIGHROOF-OUTLET	11.19
T5&6_GreenRoof	1.26
T5&6_Podium_C	0.8
T5&6_PodiumB	2.4
T5&6_PodiumD	1.67
T5_2nd_Floor	3.32

Table 2B: Outlets (continued...)

Name	Max. |Flow| (L/s)
T5_Amenity_1	1.91
T5_Amenity_2	1.66
T5_Amenity_3	1.88
T5_Amenity_4	1.66
T5_Elevator_Roof	1.9
T5_Terrace_1	4.85
T5_Terrace_2	4.95
T5_Terrace_3	1.75
T5_Terrace_4	1.77
T6_Amenity_1	1.87
T6_Amenity_2	1.64
T6_Amenity_3	1.89
T6_Amenity_4	1.64
T6_Elevator_Roof	1.88
T6_Terrace_1	4.7
T6_Terrace_2	4.61
T6_Terrace_3	1.8
T6_Terrace_4	1.74

Table 3: Conduits

Name	Inlet Node	Outlet Node	Length (m)	Roughness	Inlet Elev. (m)	Outlet Elev. (m)	Cross-Section	Geom1 (m)	Max. |Flow| (L/s)
C01	CB04-MAJ	IN141919-MAJ	29.092	0.01	53.97	53.32	IRREGULAR	0	5.8
C01_1	J01	SP99	99.814	0.025	52.48	52.22	TRAPEZOIDAL	0.6	31.45
C01_5	SP99	DITCH-OUT	14.625	0.013	52.22	52.45	TRAPEZOIDAL	0.6	39.95
C02	206	205	24.414	0.013	49.519	49.457	CIRCULAR	0.45	121.84
C03	T10	206	27.793	0.01	49.618	49.519	CIRCULAR	0.45	73.28
C030	IN141918	T03	11.259	0.013	51.35	51.07	CIRCULAR	0.25	44.95
C04	CB07	207	12.499	0.013	50.023	49.959	CIRCULAR	0.2	11.19
C05	TOWER5-CONN	210	1.252	0.013	50.8	50.74	CIRCULAR	0.3	62.06
C05.1	T07	T06	17.603	0.013	51.068	50.953	CIRCULAR	0.375	18.8
C05.2	209	T07	9.874	0.013	51.25	51.068	CIRCULAR	0.375	10.74
C06	CB04	T06	4.619	0.013	52.49	52.444	CIRCULAR	0.2	10.83
C060	SP08	T04	9.35	0.013	52.24	52.146	CIRCULAR	0.2	24.12
C07	CB05	T07	4.441	0.013	52.76	52.716	CIRCULAR	0.2	10.53
C08	T06	208	5.19	0.013	50.953	50.918	CIRCULAR	0.375	26.54
C080	IN141919	T05	4.94	0.013	52.12	52.02	CIRCULAR	0.2	49.87
C09	CB11	T02	6.459	0.013	51.3	51.235	CIRCULAR	0.2	32.06
C10	CB10	MHST78307	1.325	0.013	52.95	52.56	CIRCULAR	0.2	18.24
C11	SWM-POND	OUTFALL_SWMPOND	29.932	0.4	50.33	49.77	TRAPEZOIDAL	0.6	0
C12	210	MHST54411	13.551	0.013	50.74	50.48	CIRCULAR	0.3	62.03
C13	T09	204	13.906	0.01	49.255	49.231	CIRCULAR	0.525	188.92
C14	208	T05	23.089	0.013	50.918	50.871	CIRCULAR	0.375	28.43
C15	207	T10	41.613	0.01	49.72	49.618	CIRCULAR	0.45	74.57
C16	TOWER3-CONN-1	204	5.614	0.01	49.65	49.54	CIRCULAR	0.25	53.25
C17	CB05-MAJ	CB04-MAJ	17.615	0.013	54.53	53.97	IRREGULAR	0	6.57
C18	204	MHST78309	5.416	0.01	49.231	49.205	CIRCULAR	0.525	232.14
C19	IN141919-MAJ	IN141918-MAJ	34.856	0.013	54.05	52.53	IRREGULAR	0	0
C20	CB10-MAJ	SP03	44.258	0.013	52.55	52.38	IRREGULAR	0	17.47

Table 3: Conduits (continued...)

Name	Inlet Node	Outlet Node	Length (m)	Roughness	Inlet Elev. (m)	Outlet Elev. (m)	Cross-Section	Geom1 (m)	Max. |Flow| (L/s)
C21	DITCH-OUT	OUTFALL_RAVINE	11.412	0.1	50.35	52.45	IRREGULAR	0	64.03
C22	SP07	SP06	16.205	0.013	54.45	54.4	CIRCULAR	0.2	7.9
C23	SP06	SP01	37.321	0.013	54.4	54.45	TRAPEZOIDAL	0.15	18.4
C24	CB08	T10	2.611	0.01	49.297	49.618	CIRCULAR	0.2	4.57
C25	205	T09	34.073	0.01	49.382	49.255	CIRCULAR	0.525	185.36
C26	SP35	DITCH-OUT	34.918	0.013	53.75	52.45	TRAPEZOIDAL	0.15	36.47
C27	SP22	CB05-MAJ	38.051	0.013	54.76	54.53	IRREGULAR	0	0
C28	CB09	T09	6.798	0.01	49.7	49.255	CIRCULAR	0.2	16.78
C29	TOWER4-CONN-2	207	1.004	0.01	49.94	49.72	CIRCULAR	0.25	66.59
C30	TOWER6-CONN	MHST76833	15.1	0.013	50.8	50.5	CIRCULAR	0.3	10
C31	IN138478	J01	31.224	0.025	52.48	52.42	TRAPEZOIDAL	0.6	16.2
C37	IN138478	MHST78307	11.21	0.013	51.08	50.98	CIRCULAR	0.25	23.86
OL4	SP03	IN141918-MAJ	16.305	0.013	52.55	52.53	IRREGULAR	0	30.07
STM104099	MHST78307	MHST76833	26.105	0.013	50.85	50.46	CIRCULAR	0.375	39.49
STM104100	MHST76833	MHST54409	68.255	0.013	50.46	49.99	CIRCULAR	0.375	191.55
STM104102_1	MHST76834	T01	11.882	0.013	50.73	50.694	CIRCULAR	0.375	112.81
STM104102_3	T01	T02	8.569	0.013	50.694	50.67	CIRCULAR	0.375	112.83
STM104102_4	T02	MHST76835	15.806	0.013	50.67	50.62	CIRCULAR	0.375	136.07
STM104104	MHST76835	MHST76833	22.029	0.013	50.61	50.46	CIRCULAR	0.375	136.03
STM105994_2	T04	MHST78305	4.714	0.013	50.859	50.85	CIRCULAR	0.375	83.68
STM105994_5	T05	T04	6.072	0.013	50.871	50.859	CIRCULAR	0.375	61.73
STM105995_1	MHST78305	T03	21.699	0.013	50.79	50.752	CIRCULAR	0.375	81.68
STM105995_2	T03	MHST76834	1.259	0.013	50.752	50.75	CIRCULAR	0.375	109.82
STM105997	TOWER2-CONN-3	MHST76834	41.319	0.013	51.09	50.89	CIRCULAR	0.25	9.91
STM106002-1_1	202B	T08	2.061	0.013	49.06	49.055	CIRCULAR	0.6	271.89
STM106002-1_2	T08	MHST54416	5.87	0.013	49.055	49.04	CIRCULAR	0.6	321.29
STM106002-2	MHST78309	202B	51.992	0.013	49.14	49.06	CIRCULAR	0.6	265.37

Table 3: Conduits (continued...)

Name	Inlet Node	Outlet Node	Length (m)	Roughness	Inlet Elev. (m)	Outlet Elev. (m)	Cross-Section	Geom1 (m)	Max. |Flow| (L/s)
STM65382	MHST54416	MHST54415	41.323	0.013	49	48.93	CIRCULAR	0.6	422.95
STM65383	MHST54415	SWM-POND	6.5	0.013	48.9	48.63	CIRCULAR	0.6	426.78
STM65384	MHST54412	MHST54413	12.721	0.013	48.31	48.12	CIRCULAR	0.525	176.96
STM65386	MHST54413	MHST54414	59.288	0.013	48	47.19	CIRCULAR	0.525	176.96
STM65387	MHST54414	OUTFALL_OTT_RIVER_1	14.337	0.013	47.16	46.96	CIRCULAR	0.525	176.96
STM65388	MHST54411	MHST54410	34.501	0.013	50.06	49.57	CIRCULAR	0.3	144.93
STM65389	MHST54409	MHST54410	18.061	0.013	49.96	49.6	CIRCULAR	0.375	199.68
STM65390	MHST54410	SWM-POND	8	0.013	49	48.63	CIRCULAR	0.375	332.47
STMH65384	POND-OUTLET	MHST54412	20.597	0.013	48.63	48.31	CIRCULAR	0.525	176.96
STM-LAT-T1	TOWER1-CONN	MHST54416	2.821	0.013	49.45	49.4	CIRCULAR	0.2	118.66
STM-LAT-T2(1)	TOWER2-CONN-1	T08	6.308	0.013	49.48	49.35	CIRCULAR	0.25	58.81
STM-LAT-T2(2)	TOWER2-CONN-2	MHST78309	2.083	0.013	49.51	49.47	CIRCULAR	0.25	40.32
STM-LAT-T3	TOWER3-CONN-2	205	3.198	0.013	49.663	49.72	CIRCULAR	0.3	78.98
STM-LAT-T4	TOWER4-CONN-1	206	0.986	0.013	49.77	49.75	CIRCULAR	0.3	51.94

Table 4: Outfalls

Name	Invert Elev. (m)	Max. Total Inflow (L/s)
OUTFALL_174	53.05	14.21
OUTFALL_OTT_RIVER_1	46.96	176.96
OUTFALL_OTT_RIVER_2	48	20.14
OUTFALL_RAVINE	50.25	64.03
OUTFALL_SWMPOND	49.77	0

Table 5: Junctions

Name	Tag	Invert Elev. (m)	Rim Elev. (m)	Depth (m)	Max. HGL (m)
202B	STORM_MH	49.06	51.3	2.24	50.3
204	STORM_MH	49.231	51.6	2.369	50.31
205	STORM_MH	49.382	51	1.618	50.42
206	STORM_MH	49.519	51	1.481	50.35
207	STORM_MH	49.72	51.15	1.43	50.43
208	STORM_MH	50.918	53.89	2.972	51.47
209	STORM_MH	51.25	54.67	3.42	51.47
210	STORM_MH	50.74	53.2	2.46	50.88
CB04	CB	52.57	53.97	1.4	52.63
CB04-MAJ	MAJOR_SYSTEM	53.97	54.12	0.15	53.99
CB05	CB	52.5	54.53	2.03	52.84
CB05-MAJ	MAJOR_SYSTEM	54.53	54.68	0.15	54.55
CB07	CB	50.023	51	0.977	50.75
CB08	CB	49.297	50.95	1.653	50.81
CB09	CB	49.7	50.65	0.95	50.31
CB10	CB	52.35	53.32	0.97	52.99
CB10-MAJ	MAJOR_SYSTEM	53.32	53.47	0.15	53.35
CB11	CB	50.7	52.72	2.02	51.46
DITCH-OUT		52.45	53	0.55	52.54
IN138478	CB	51.08	52.48	1.4	51.2
IN141918	CB	50.75	52.55	1.8	51.48
IN141918-MAJ	MAJOR_SYSTEM	52.55	52.7	0.15	52.62
IN141919	CB	51.52	53.32	1.8	52.3
IN141919-MAJ	MAJOR_SYSTEM	53.32	53.47	0.15	53.39
J01		52.42	52.42	0	52.54
MHST54409	STORM_MH	49.96	54.318	4.358	50.36

Table 5: Junctions (continued...)

Name	Tag	Invert Elev. (m)	Rim Elev. (m)	Depth (m)	Max. HGL (m)
MHST54410	STORM_MH	49	53.049	4.049	50.3
MHST54411	STORM_MH	50.06	52.48	2.42	50.6
MHST54412	STORM_MH	48.31	52.681	4.371	48.52
MHST54413	STORM_MH	48	52.528	4.528	48.22
MHST54414	STORM_MH	47.16	52.271	5.111	47.37
MHST54415	STORM_MH	48.9	51.72	2.82	50.29
MHST54416	STORM_MH	49	51.14	2.14	50.3
MHST76833	STORM_MH	50.46	54.32	3.86	51.16
MHST76834	STORM_MH	50.73	53.029	2.299	51.42
MHST76835	STORM_MH	50.61	53.21	2.6	51.24
MHST78305	STORM_MH	50.79	53	2.21	51.45
MHST78307	STORM_MH	50.85	54.1	3.25	51.11
MHST78309	STORM_MH	49.14	51.8	2.66	50.31
POND-OUTLET	HEADWALL	48.63	50.25	1.62	48.84
SP99		52.2	53.52	1.32	52.54
T01	TEE	50.694	53.085	2.391	51.37
T02	TEE	50.67	53.3	2.63	51.33
T03	TEE	50.752	53.027	2.275	51.42
T04	TEE	50.859	53.066	2.207	51.45
T05	TEE	50.871	53.15	2.279	51.46
T06	TEE	50.953	53.543	2.59	51.47
T07	TEE	51.068	53.781	2.713	51.47
T08	TEE	49.055	51.261	2.206	50.3
T09	TEE	49.255	51.52	2.265	50.31
T10	TEE	49.618	51.09	1.472	50.83
TOWER1-CONN	BLDG_CONN	49.45	54.84	5.39	50.4
TOWER2-CONN-1	BLDG_CONN	49.48	54.84	5.36	50.31
TOWER2-CONN-2	BLDG_CONN	49.51	54.84	5.33	50.31
TOWER2-CONN-3	BLDG_CONN	51.09	54.84	3.75	52.28
TOWER3-CONN-1	BLDG_CONN	49.51	54.84	5.33	50.31
TOWER3-CONN-2	BLDG_CONN	49.663	54.84	5.177	50.49
TOWER4-CONN-1	BLDG_CONN	49.59	54.84	5.25	50.35
TOWER4-CONN-2	BLDG_CONN	49.94	54.84	4.9	50.43
TOWER5-CONN	BLDG_CONN	50.8	54.6	3.8	50.92

Table 6: Subcatchments

Name	Outlet	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv. (%)	Average Runoff Coeff
S01	T3-ROOF-5-NOSTORAGE	0.0074	24.7	2.996	1	100	0.9
S02	OUTFALL_174	0.0048	20.9	2.297	1	22.6	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	0.1546	84.3	18.339	0.5	85.4	0.8
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_1	MHST76833	0.0352	41.4	8.502	1	94.3	0.86
S38_2	MHST54409	0.0312	40.9	7.628	1	94.3	0.86
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

Table 6: Subcatchments (continued...)

Name	Outlet	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv. (%)	Average Runoff Coeff
S41	MHST54411	0.1786	110.7	16.134	1	80.1	0.76
S42A	SP36	0.0874	66.9	13.064	1	66.1	0.66
S42B	CB10-MAJ	0.0731	69.2	10.564	1	91.3	0.84
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
S58	206	0.0211	16.8	12.56	1	20.8	0.35
S59	SP99	0.2551	317	8.047	0.5	14.4	0.3
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_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
S67A	Commercial_Roof_Green	0.0742	63.3	11.722	1	100	0.9
S67B	Commercial_Roof_General2	0.0099	27	3.667	1	100	0.9
S67C	Commercial_Roof_General1	0.0033	28.7	1.15	1	100	0.9
S67D	Commercial_Roof_General3	0.0123	34.6	3.555	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

Table 6: Subcatchments (continued...)

Name	Outlet	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv. (%)	Average Runoff Coeff
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
S77A	T5_Terrace_4	0.0125	27.8	4.496	1	100	0.9
S77B	T5_Terrace_2	0.01	22.2	4.505	1	100	0.9
S78A	T5_Terrace_3	0.0116	25.8	4.496	1	100	0.9
S78B	T5_Terrace_1	0.0098	21.8	4.495	1	100	0.9
S79A	T5_Elevator_Roof	0.0149	28.5	5.228	1	100	0.9
S79B	T5_Amenity_1	0.0153	28	5.464	1	100	0.9
S79C	T5_Amenity_2	0.0071	17.1	4.152	1	100	0.9
S79D	T5_Amenity_3	0.0147	26.9	5.465	1	100	0.9
S79E	T5_Amenity_4	0.0071	17.1	4.152	1	100	0.9
S80A	T6_Terrace_4	0.0094	40.7	2.31	1	100	0.9
S80B	T6_Terrace_2	0.0093	33.5	2.776	1	100	0.9
S81A	T6_Terrace_3	0.0115	46.9	2.452	1	100	0.9
S81B	T6_Terrace_1	0.0095	30.4	3.125	1	100	0.9
S82A	T6_Elevator_Roof	0.0147	27.6	5.326	0.5	100	0.9
S82B	T6_Amenity_3	0.0153	32	4.781	0.5	100	0.9
S82C	T6_Amenity_2	0.0071	29	2.448	0.5	100	0.9
S82D	T6_Amenity_1	0.0142	30.9	4.595	0.5	100	0.9
S82E	T6_Amenity_4	0.0071	27.7	2.563	0.5	100	0.9
S83	T5_2nd_Floor	0.0067	53.6	1.25	0.5	100	0.9

Table 7: Orifices

Name	Inlet Node	Outlet Node	Type	Cross-Section	Height (m)	Width (m)	Inlet Elev. (m)	Discharge Coeff.
SWM-CONTROL	SWM-POND	POND-OUTLET	SIDE	CIRCULAR	0.263	0	48.63	0.61

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

CONTENT COPY OF ORIGINAL

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;

CONTENT COPY OF ORIGINAL

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.

CONTENT COPY OF ORIGINAL

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.

CONTENT COPY OF ORIGINAL

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

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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**

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NEUF ARCHITECT(E)S

INFORMATION SUR LE PROJET - *PROJECT INFORMATION*

2025-09-17

11597 **Petrie's Landing I** **Tour 5b / Tower 5b** **(Tower 5)**

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*	**41**
1 Chambre / *1 Bedroom*	**152**
2 Chambres / *2 Bedrooms*	**39**
3 Chambres / 3 *Bedrooms*	**4**
TOTAL	**236**

STATIONNEMENT RÉSIDENTIEL / *RESIDENTIAL PARKING*

TOUR 5b / TOWER 5b (Tower 5)	**EXIGÉ / *REQUIRED***		**FOURNIS / *PROVIDED***	
	#/Unit / *#/Unité*		**Ratio (stat /unité) / *Ratio (parking/unit)***	
Tour 5b - Résidentiel / *Tower 5b - Residential*	**0,5/unit**	118	0,43	101
Tour 5b - Visiteurs / *Tower 5b - Visitors*	**0,2/unit**	47	0,19	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)**	2		2
TOTAL		**165**	**0,62**	**147**

STATIONNEMENT COMMERCIAL / *COMMERCIAL PARKING*

TOUR 5b / TOWER 5b (Tower 5)	**Aire (m²) / *Area (m²)***	**EXIGÉ / *REQUIRED***		**FOURNIS / *PROVIDED***	
		Ratio (stat /m²) / *Ratio (parking/m²)*		**Ratio (stat /m²) / *Ratio (parking/m²)***	
Commercial / *Commercial*	**611,12**	**3,4/100**	**0**	**0,000**	**0** ☆
Stationnement Accessible (inclus dans le compte commercial) / Accessible parking (included in commercial count)			**1**		**0** ☆ T5a &T5b commercial parking requires Total 2 accessible parking.
TOTAL ☆*Parking spaces located in Tower 5a*			**0**		**0** ☆

STATIONNEMENT POUR VÉLOS / *BICYCLE PARKING*

TOUR 5b / TOWER 5b (Tower 5)	**EXIGÉ / *REQUIRED***				**FOURNIS / *PROVIDED***
	Unités / *Units*	**Aire (m²) / *Area (m²)***	**Ratio / *Ratio***		
Résidentiel / *Residential*	**236**		**0,5/unit**	**118**	**190**
Commercial / *Commercial*		**611,12**	**1/250**	**2**	**4**
TOTAL				**121**	**194**

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NEUF ARCHITECT(E)S

INFORMATION SUR LE PROJET - *PROJECT INFORMATION*

2025-09-17

12191 **Petrie's Landing I** **Tour 5a / Tower 5a** **(Tower 6)**

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*	59
2 Chambre / *1 Bedroom*	246
2 Chambres / *2 Bedrooms*	62
3 Chambres / 3 *Bedrooms*	4
TOTAL	371

STATIONNEMENT RÉSIDENTIEL / *RESIDENTIAL PARKING*

TOUR 5a / *TOWER 5a* (Tower 6)	EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
	#/Unit / *#/Unité*		Ratio (stat /unité) / *Ratio (parking/unit)*	
Tour 5a - Résidentiel / *Tower 5a - Résidential*	0,5/unit	186	0,33	121 ★
Tour 5a - Visiteurs / *Tower 5a - Visitors*	0,2/unit	74	0,19	70
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)	3		6
TOTAL ★11 parking spaces located in Tower 5b (Phase area)		260	0,51	191 ★

STATIONNEMENT COMMERCIAL / *COMMERCIAL PARKING*

TOUR 5a / TOWER 5a (Tower 6)	Aire (m²) / *Area (m²)*	EXIGÉ / *REQUIRED*		FOURNIS / *PROVIDED*	
		Ratio (stat /m²) / *Ratio (parking/m²)*		Ratio (stat /m²) / *Ratio (parking/m²)*	
Commercial / *Commercial*	0,00	3,4/100	21	3,4/100	21 ☆
Stationnement Accessible (inclus dans le compte commercial) / Accessible parking (included in commercial count)			1		1 ☆
TOTAL ☆ Parking for T5b (Phase area) commercial included in count			21		21 ☆

STATIONNEMENT POUR VÉLOS / *BICYCLE PARKING*

TOUR 5a / TOWER 5a (Tower 6)	EXIGÉ / *REQUIRED*				FOURNIS / *PROVIDED*
	Unités / *Units*	Aire (m²) / *Area (m²)*	Ratio / *Ratio*		
Résidentiel / *Residential*	371		0,5/unit	186	216
Commercial / *Commercial*		0,00	1/250	0	2
TOTAL				186	218

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

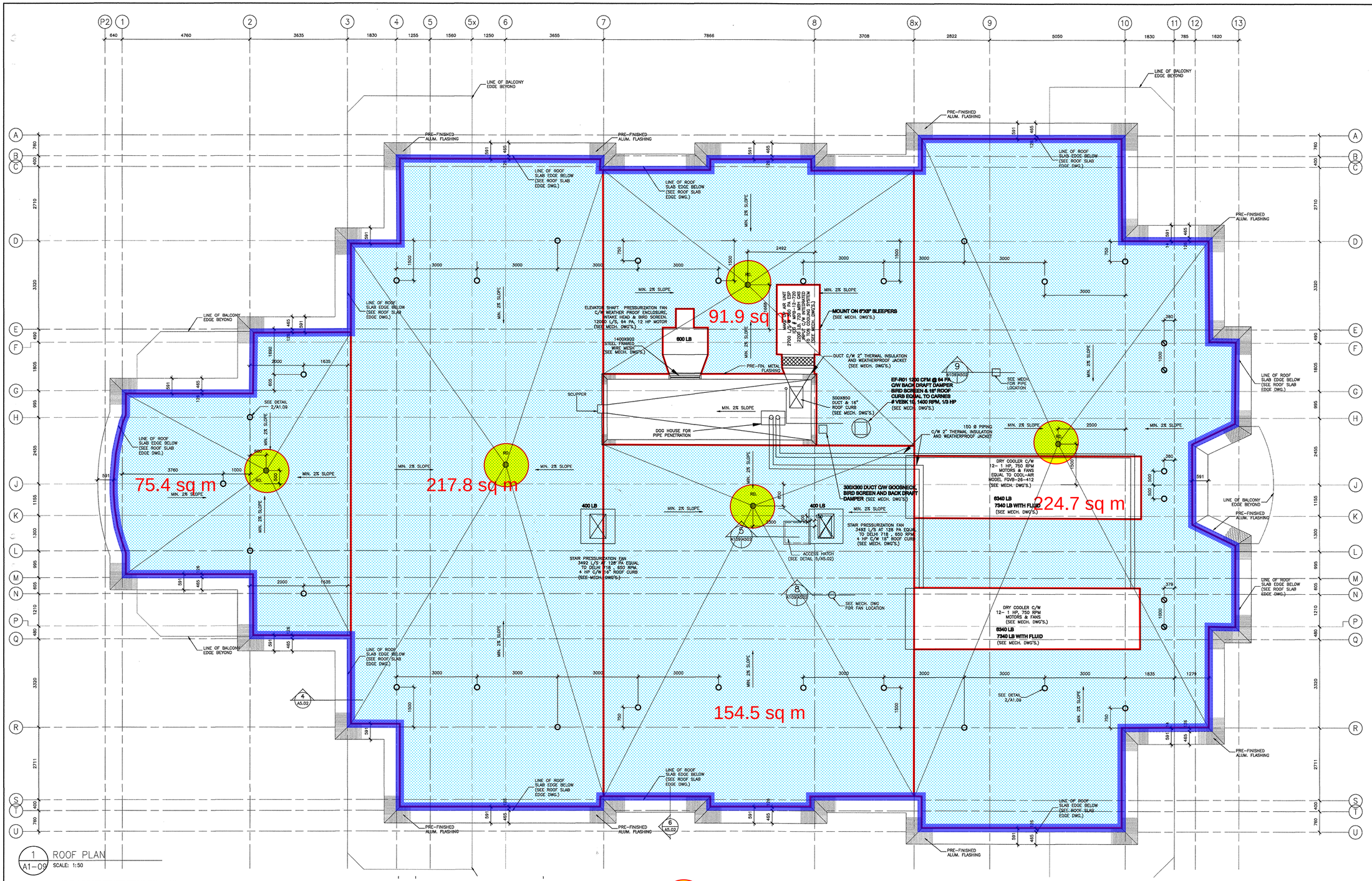
Tower 5/6 - Podium Roof Plan

Tower 5 - Amenities and High Roof Plan

Tower 6 - Amenities and High Roof Plan

Zinco Retention Spacer Factsheet

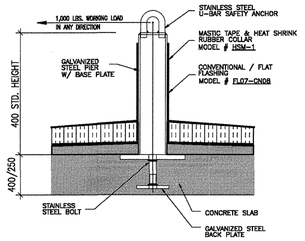
Cistern Detail by GWAL



1 ROOF PLAN
A1-09 SCALE: 1:50

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 ANCHOR DETAIL
A1-09 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
- DRAWING TITLE
- DETAIL FOUND ON PAGE
- INDICATES REFERENCE PAGE
- (D00) INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON 800 SERIES.
- (W0) INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON 800 SERIES.
- (P1) 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 DIFFERENTLY.
G. ALL INTERIOR PARTITIONS IN SUITES ARE PARTITION TYPE 'P18' 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. ROD & 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.

THIS DRAWING MUST NOT BE SCALED.

THE CONTRACTOR SHALL VERIFY ALL LEVELS, DATUMS AND DIMENSIONS PRIOR TO COMMENCEMENT OF WORK. ALL ERRORS AND OMISSIONS MUST BE REPORTED TO VINCENT COLIZZA ARCHITECT INC. IMMEDIATELY.

ANY REVISIONS TO THE DOCUMENTS OR CHANGES PRIOR TO, DURING, OR AFTER CONSTRUCTION THAT ARE DONE WITHOUT WRITTEN AUTHORIZATION FROM VINCENT COLIZZA ARCHITECT INC. WILL NOT BE THE RESPONSIBILITY OF VINCENT COLIZZA ARCHITECT INC.

THIS DRAWING, IN ALL FORMS, ELECTRONIC OR HARD COPY IS THE SOLE PROPERTY OF VINCENT COLIZZA ARCHITECT INC. AND MUST NOT BE REPRODUCED WITHOUT WRITTEN PERMISSION. COPYRIGHT ©

No.	DESCRIPTION	DATE	CHD
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

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED BY THE ARCHITECT.

DATE 07/11/07

NORTH — TRUE NORTH / PROJECT NORTH

DRAWN K.S
DATE 07/11/09
CHECKED V.P.C.
DATE PRINTED

CLIENT
BRIGIL

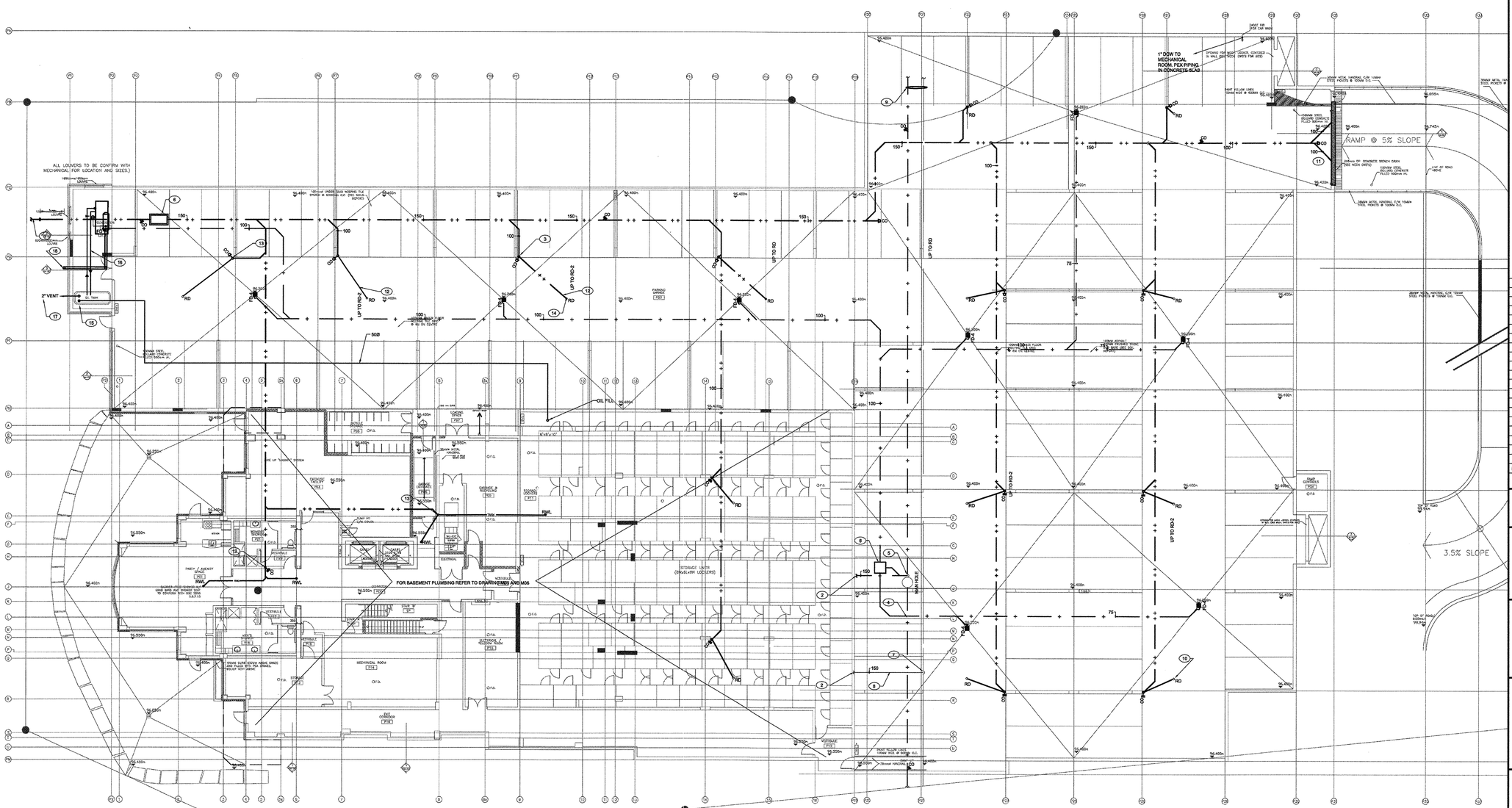
CONSULTANT

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



1 M04 PARKING GARAGE PLUMBING LAYOUT

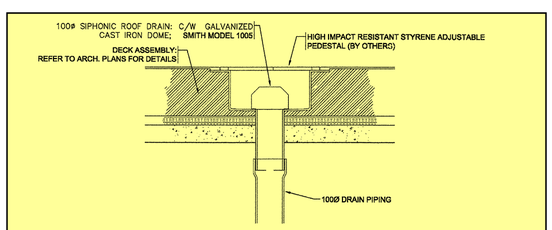
Scale: 1/100

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 M08. (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.

DO NOT SCALE THE DRAWNGS

STAMP: LICENSED PROFESSIONAL ENGINEER M. YAZDANI DEC. 19, 07 PROVINCE OF ONTARIO

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED BY THE ARCHITECT.

DATE

NORTH

DRAWN S.Y.

DATE

CHECKED M.Y.

DATE PRINTED

CLIENT: BRIGIL

CONSULTANT: M&E ENGINEERING
Division of 1435668 Ontario Ltd.
205 Kheyardbut Drive Kanata, Ontario, K2V1C5
Tel: (613) 836-3430 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

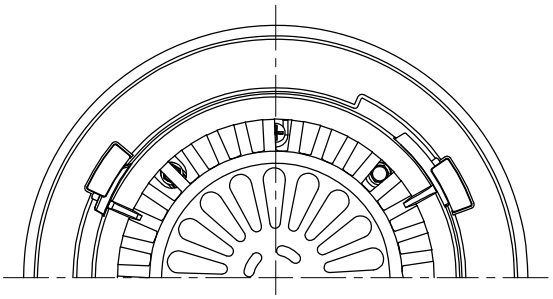
SMITH® JAY R. SMITH MFG. CO.®
MEMBER OF MORRIS GROUP INTERNATIONAL
POST OFFICE BOX 3237
MONTGOMERY, ALABAMA 36109-0237 (USA)
TEL: 334-277-8520 FAX: 334-272-7396 www.jrsmith.com
CUSTOMER DRIVEN SINCE 1926
MEMBER OF:

LOCATION

SIPHONIC ROOF DRAIN

15 1/4"(390) DIAMETER - LOW PROFILE DOME WITH WATER DAM

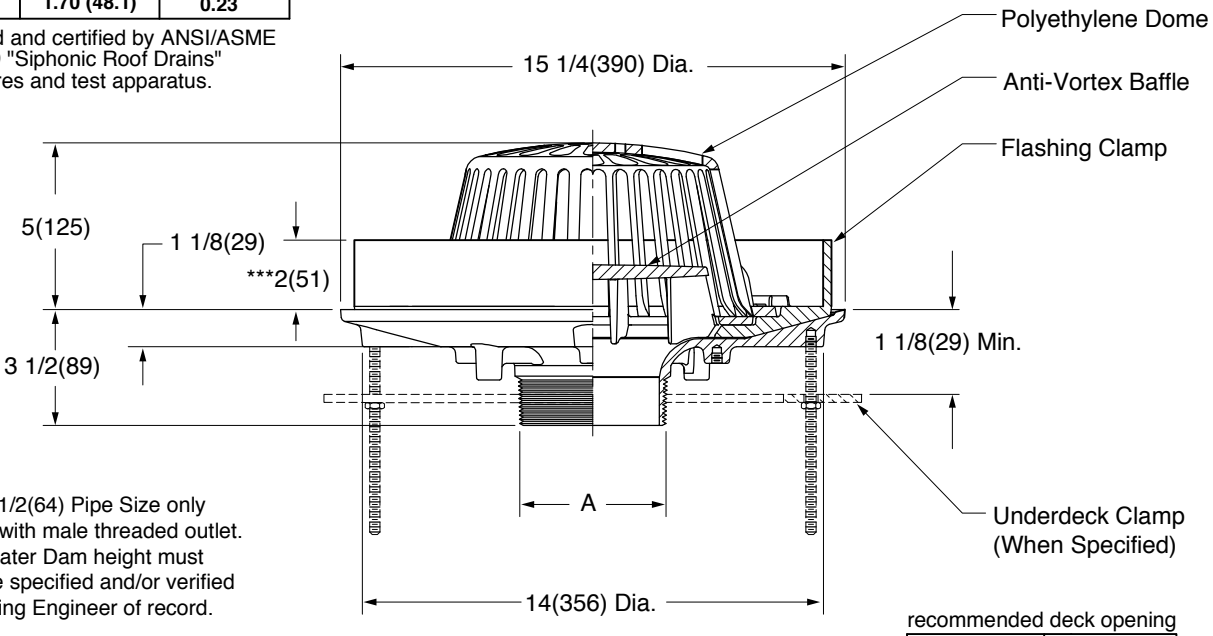
FUNCTION: Used in flat roofs of any construction as an overflow drain. Internal anti-vortex baffle creates siphonic drainage action producing more efficient drainage than conventional roof drains.



Free Area
102.5 Sq. In.
(661) Sq. Cm.

**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.



***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

DIMENSIONS ARE SUBJECT TO MANUFACTURERS TOLERANCE AND CHANGE WITHOUT NOTICE
WE CAN ASSUME NO RESPONSIBILITY FOR USE OF SUPERSEDED OR VOID DATA

⚠ **WARNING:** Cancer and Reproductive Harm - www.P65Warnings.ca.gov

SMITH®
CUSTOMER DRIVEN

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

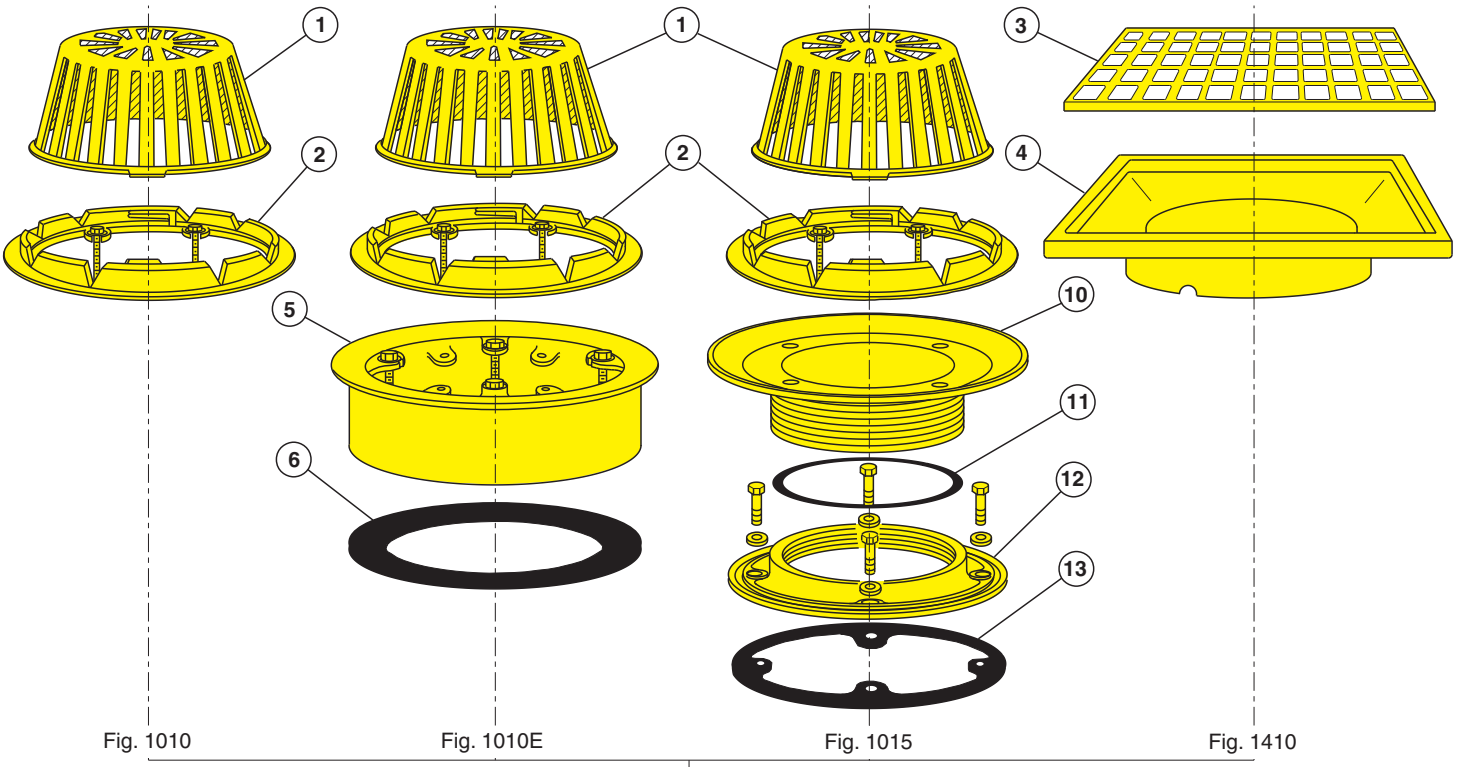
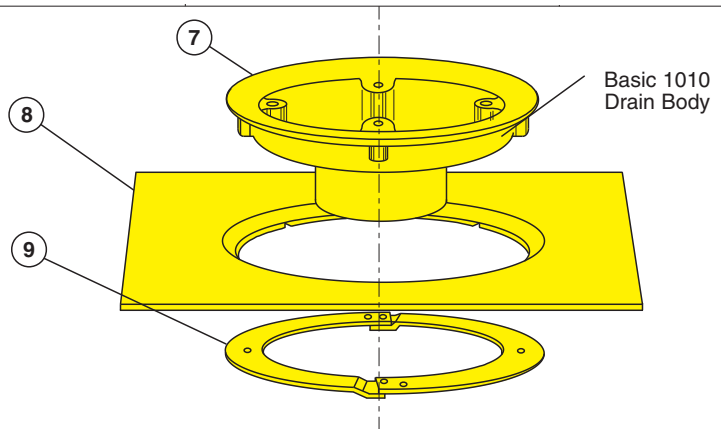


Fig. 1010 Fig. 1010E Fig. 1015 Fig. 1410



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:

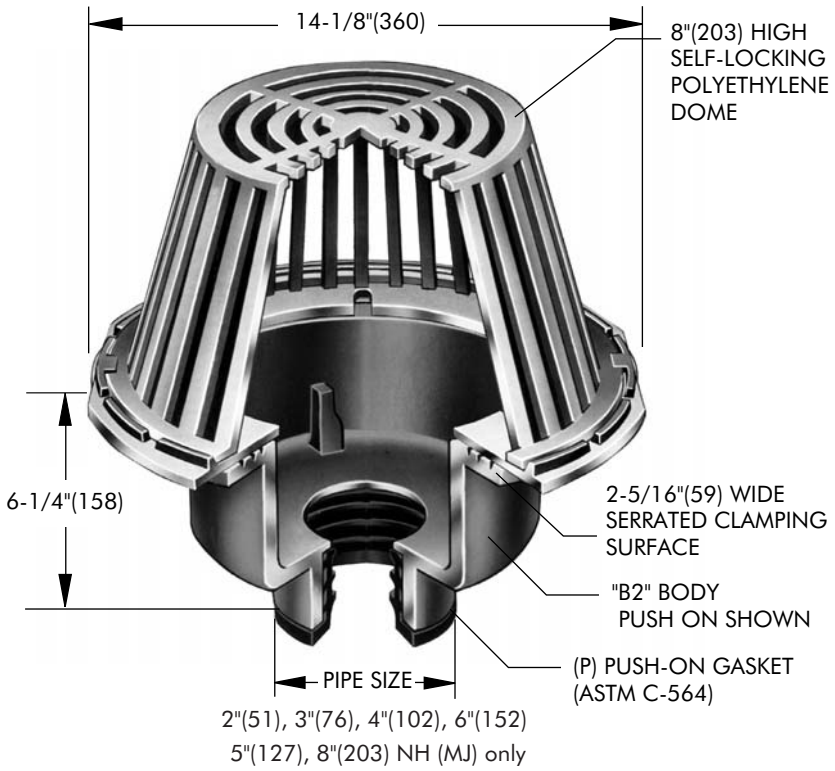

B2


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 _____

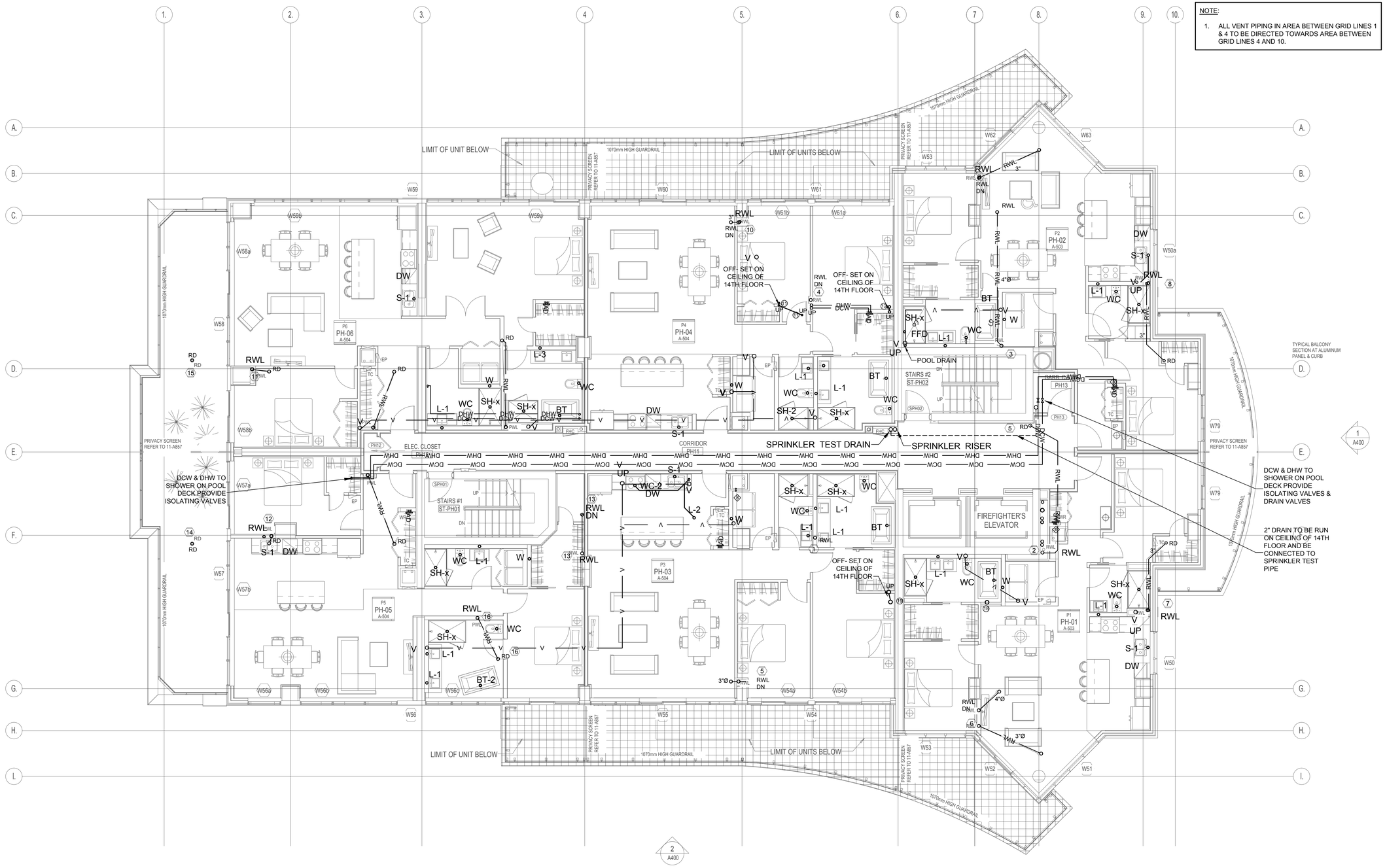
Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

WATTS Drainage reserves the right to modify or change product design or construction without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your WATTS Drainage representative for any clarification. Dimensions are subject to manufacturing tolerances.

CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca

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NOTE:

1. ALL VENT PIPING IN AREA BETWEEN GRID LINES 1 & 4 TO BE DIRECTED TOWARDS AREA BETWEEN GRID LINES 4 AND 10.

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

BRIGIL

98 Lois Street, Gatineau QC J8Y 3R7
T: 819-243-7392 Email: JLRvard@brigil.com; mchenier@brigil.com

M&E ENGINEERING
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PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER
M. YAZDANI
MARCH 6, 2018
PROVINCE OF ONTARIO

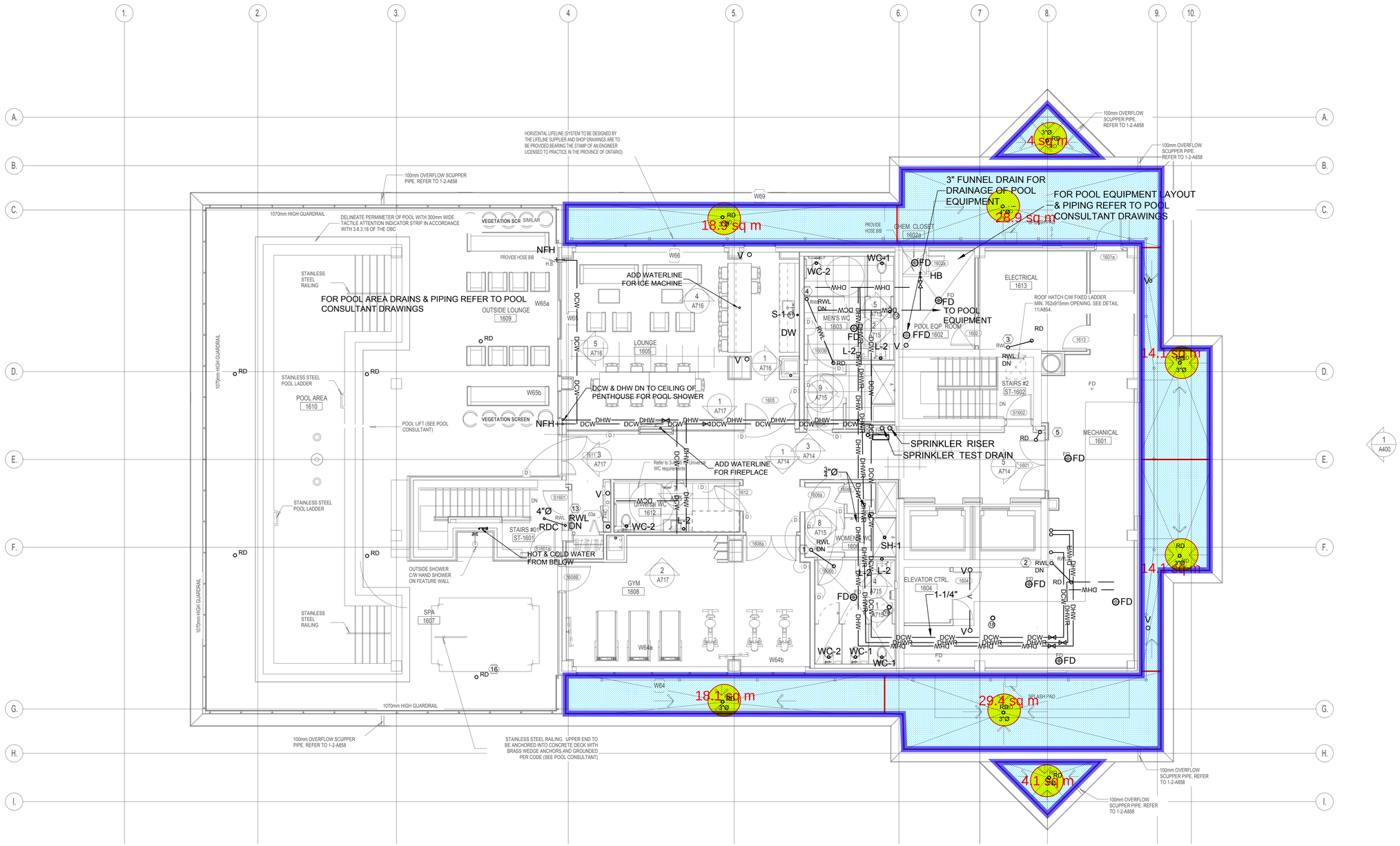
NORTH

PROJECT
PETRIES LANDING PHASE 2

DRAWING
PLUMBING LAYOUT 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

CLIENT
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98 Lois Street, Gatineau QC J8Y 3R7
T: 819-243-7392 Email: JLRivard@brigil.com; mchenier@brigil.com

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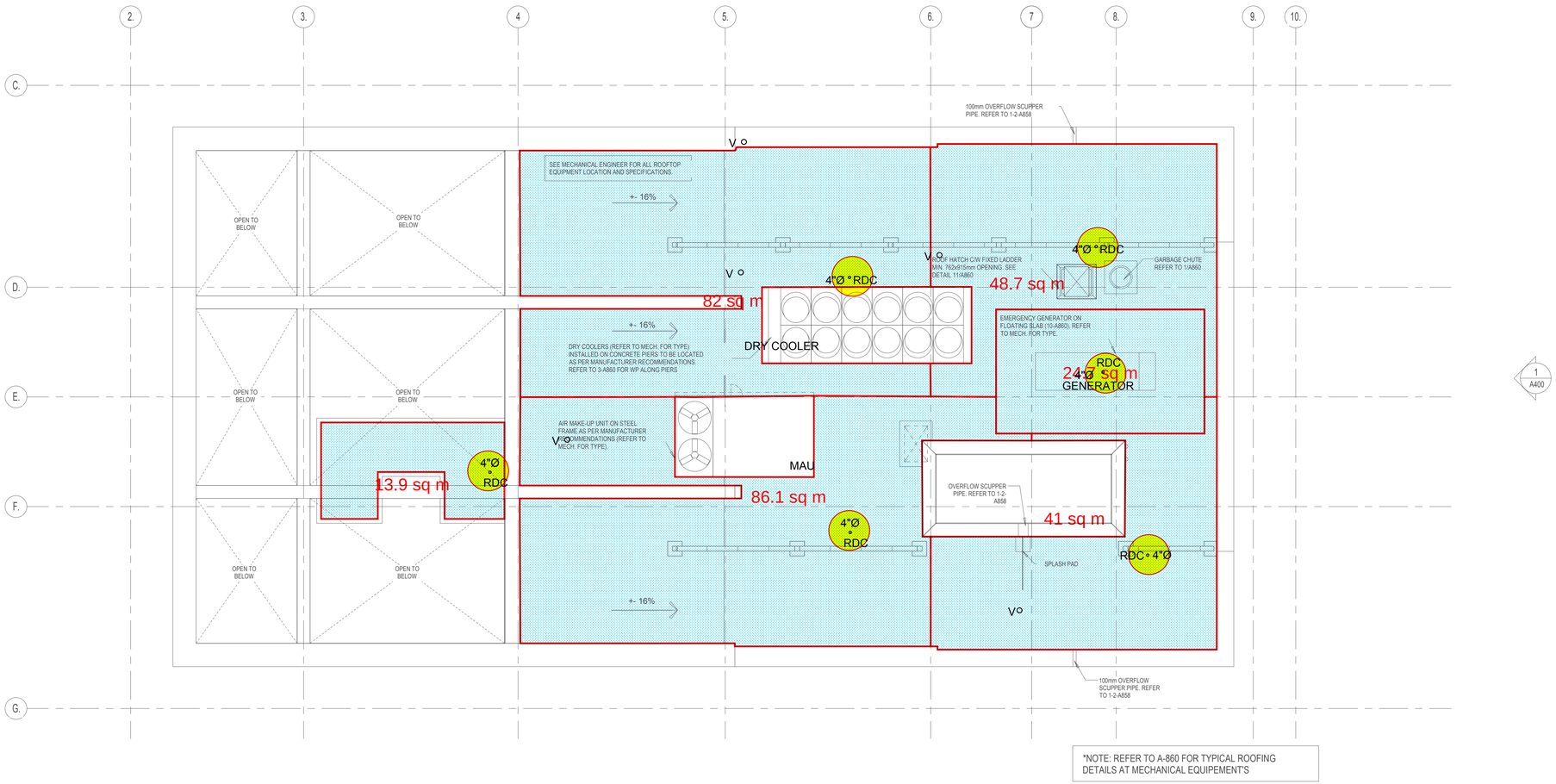
NORTH

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

CLIENT

BRIGIL

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

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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

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:

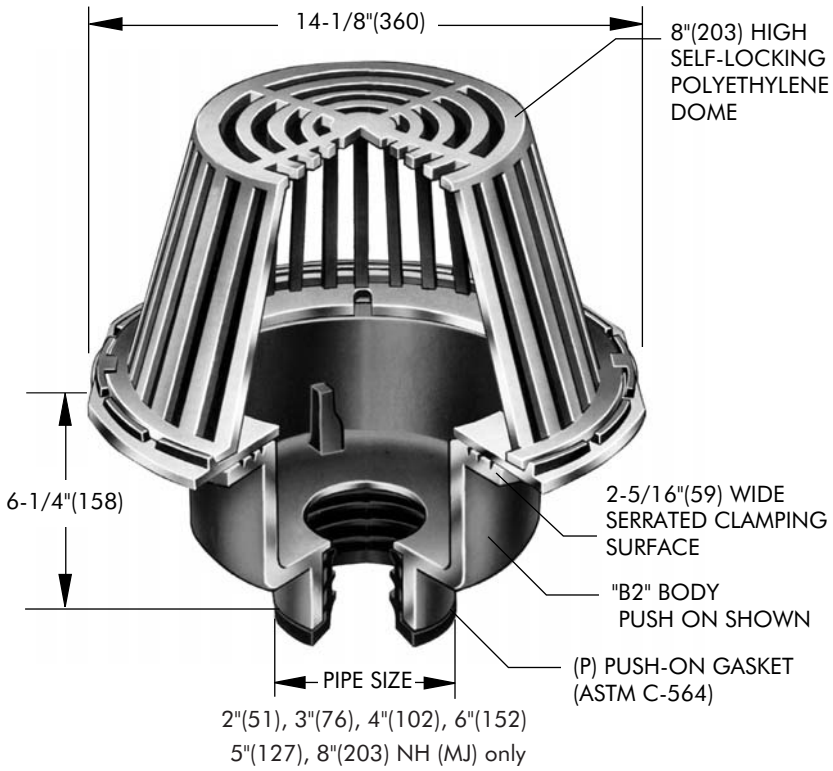

B2


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

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CANADA

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TOWER 2 - INVERTED ROOF

WATTS DRAINAGE

RD-100-CH

Tag: _____

Large Area IRMA Roof Drain with Adjustable Ballast Guard

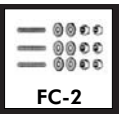
Components:


B2

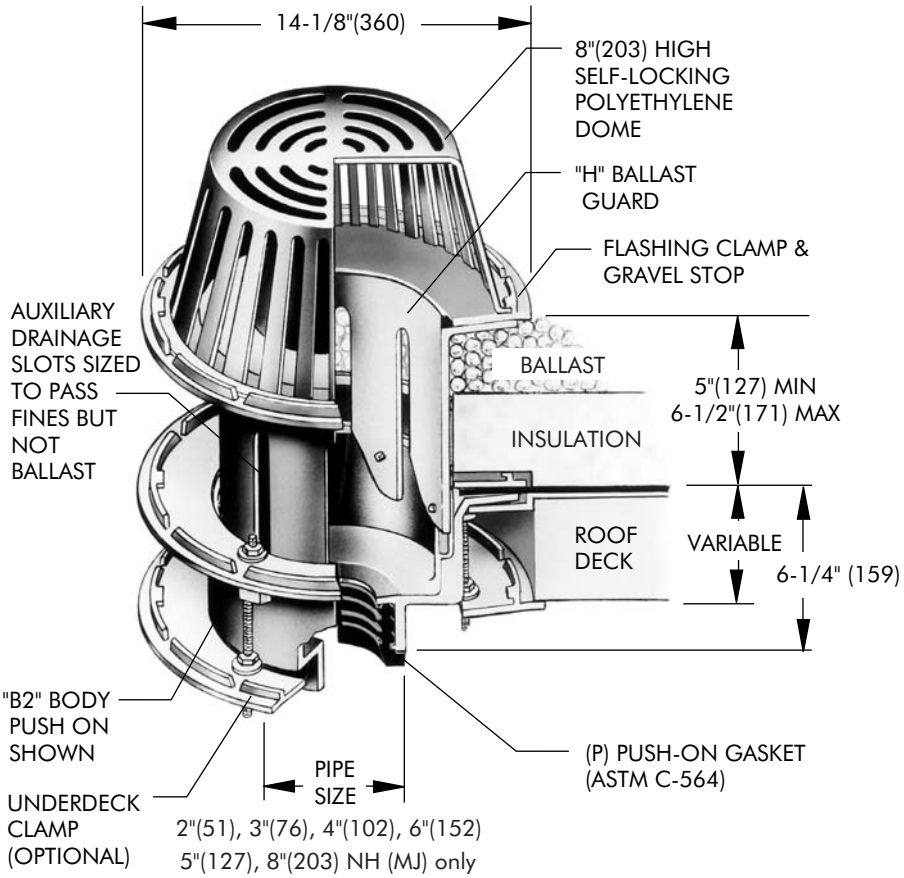

B2-FIG


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 _____

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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

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TOWER 2 - EXTERIOR PARKING AREAS

WATTS® DRAINAGE

RD-100-CP

Tag: _____

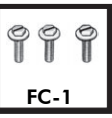
Large Area IRMA Roof Drain with 12"x12" Promenade Top

Components:

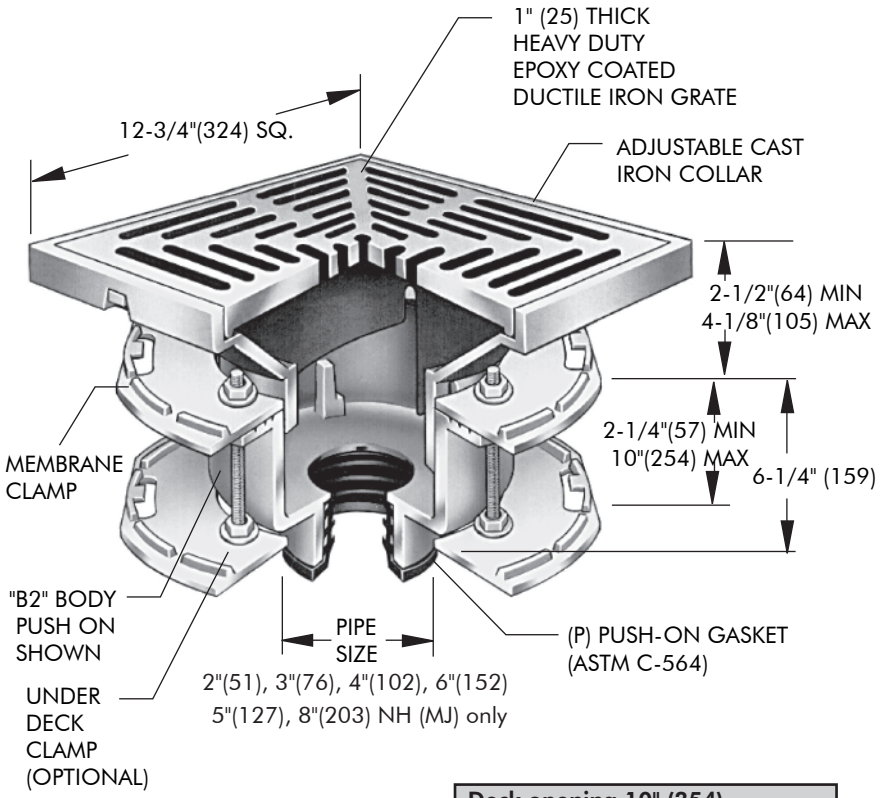

B2


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	☐

Grade (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 _____

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CANADA

© Watts Drainage 2003

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.

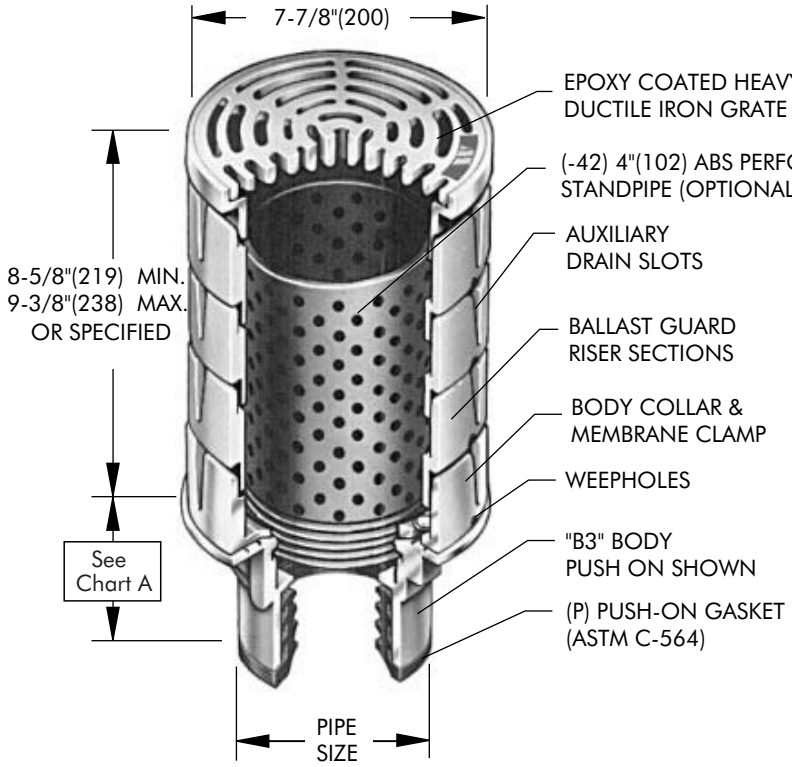


Chart A

	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

WATTS®

Adjustable Accutrol Weir

Tag: _____

Adjustable Flow Control for Roof Drains

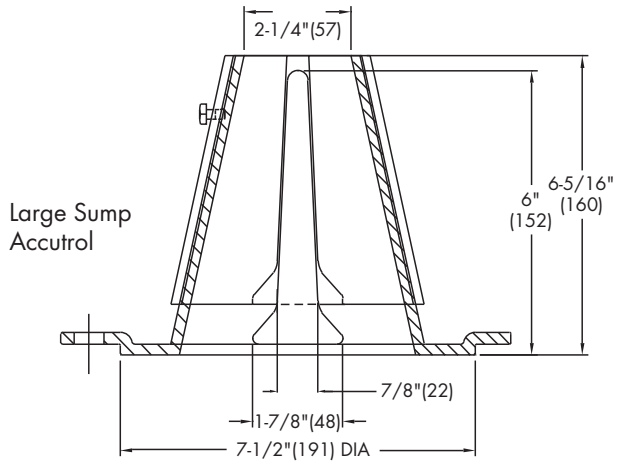
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

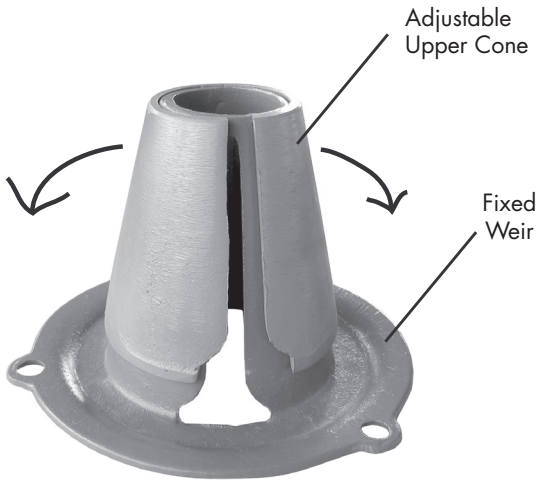
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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 _____

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

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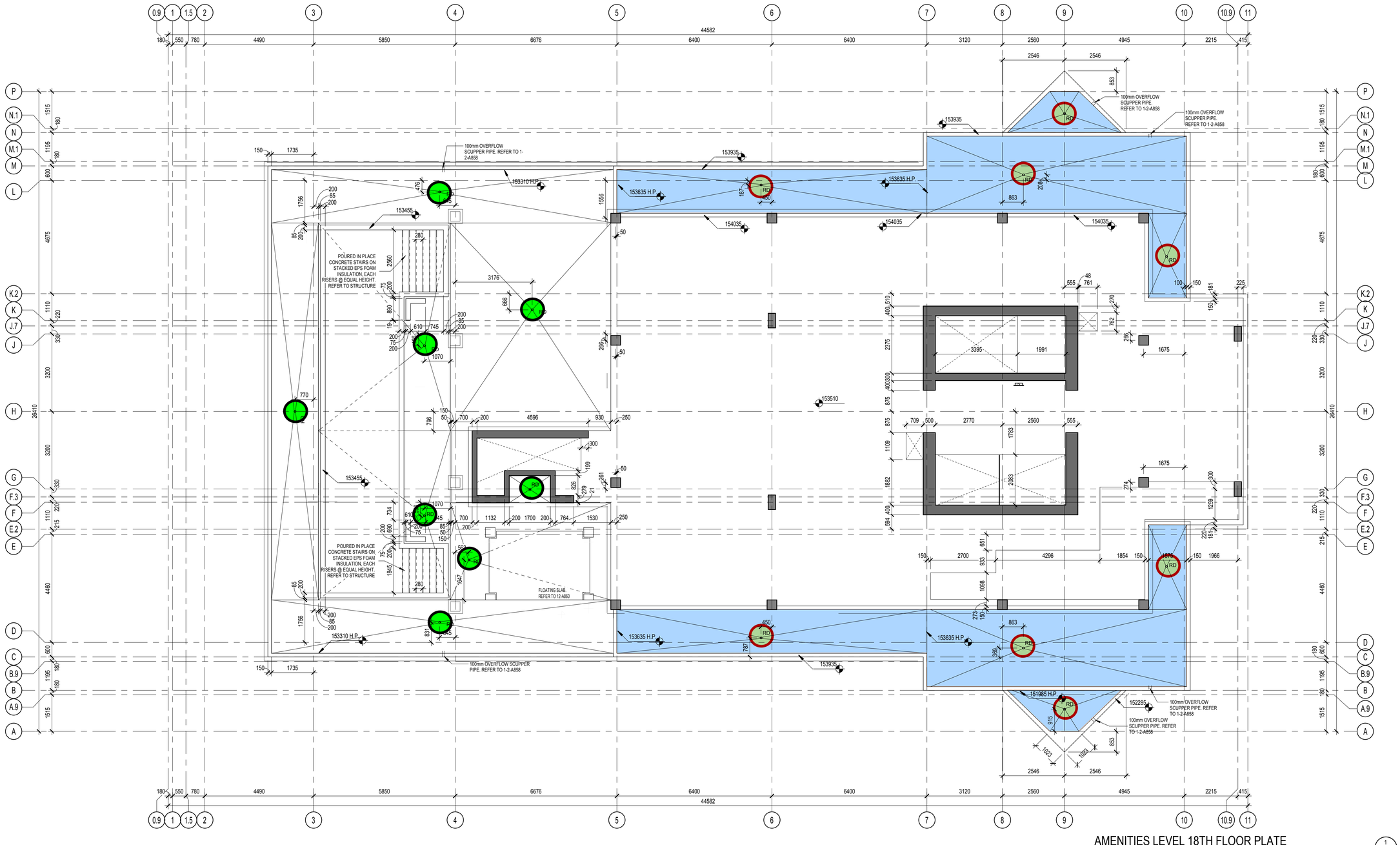
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AREAS WHERE PONDING CAN OCCUR

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)



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exp Services Inc.
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T: 613-733-0332 Email: bruce.thomas@exp.com; jason.fitzpatrick@exp.com

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CLIENT Client

BRIGIL
98 Lois Street, Gatineau QC J8Y 3R7
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

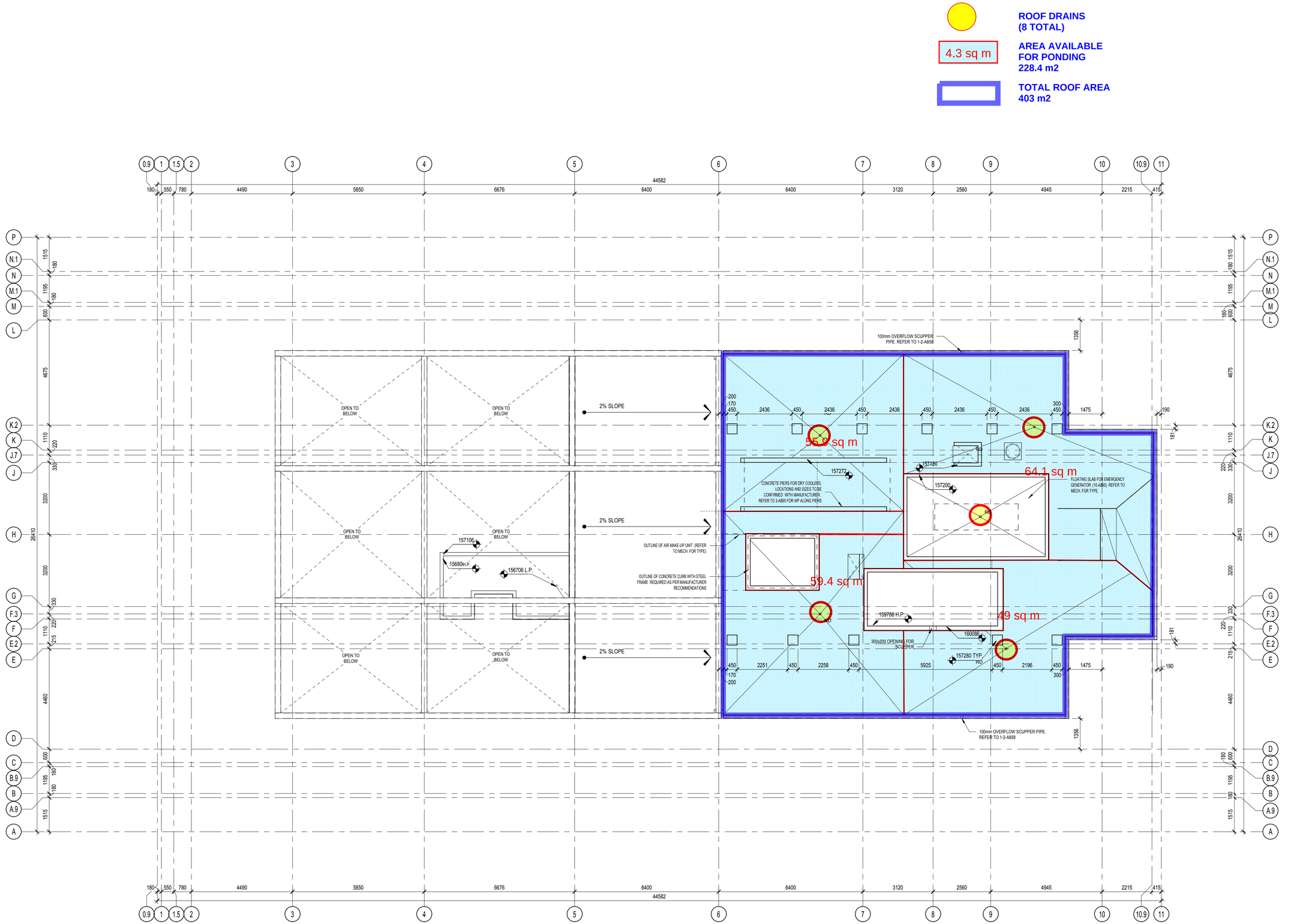
TITRE DU DESSIN Drawing Title

AMENITIES LEVEL 18TH FLOOR PLATE

RÉVISION Revision
1

NO. DESSIN Dwg Number
A257

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HIGH ROOF PLATE

1 : 75

1 / A 258

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CLIENT Client

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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

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TITRE DU DESSIN Drawing Title

HIGH ROOF FLOOR PLATE

RÉVISION Revision
1

NO. DESSIN Dwg Number
A 258

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WATTS DRAINAGE

RD-100

Tag: _____

Large Capacity Roof Drain

Components:

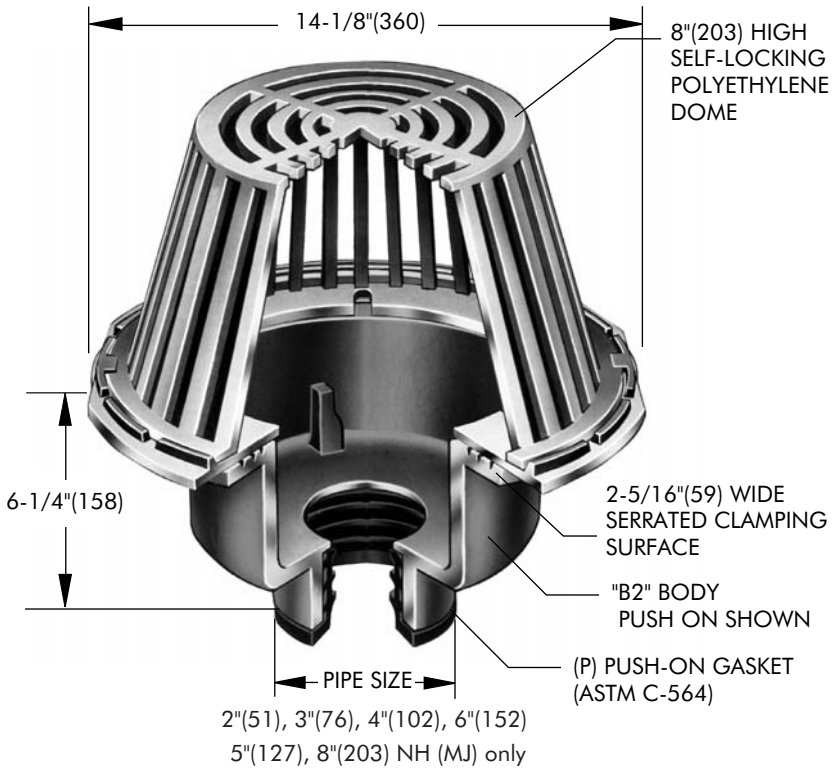

B2


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 reserves the right to modify or change product design or construction without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your WATTS Drainage representative for any clarification. Dimensions are subject to manufacturing tolerances.

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

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TOWER 3 - AMMENTITIES ROOF

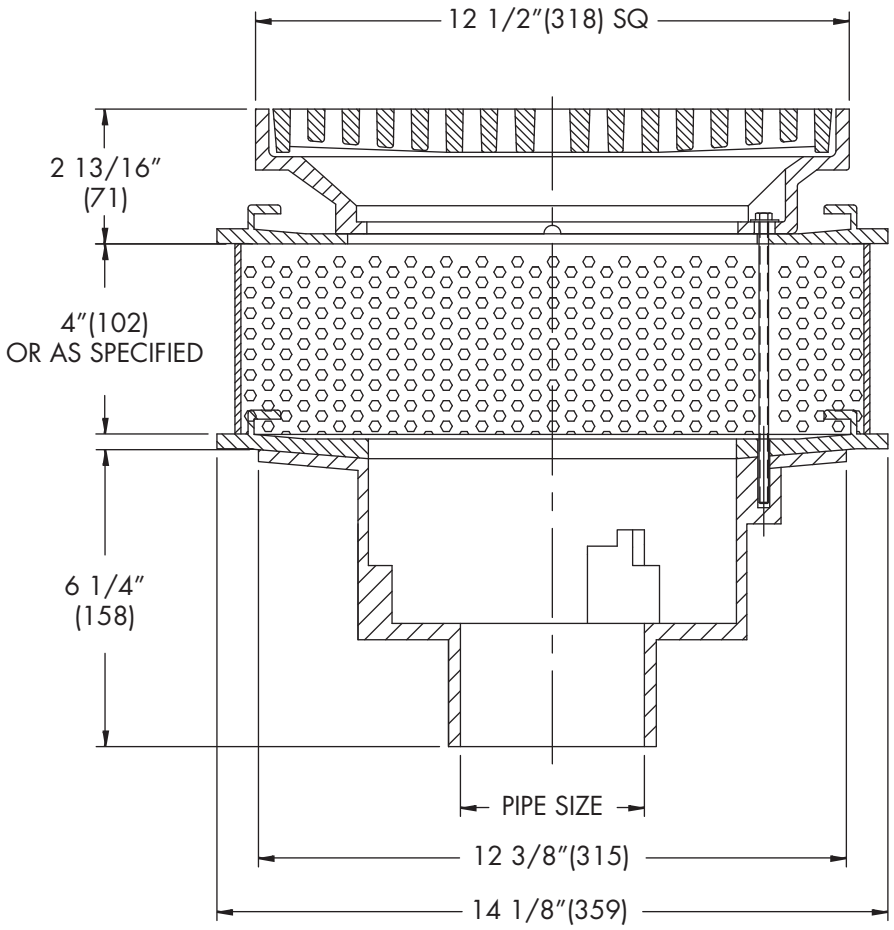
WATTS®

Tag: _____

RD-100-CP-85

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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WATTS DRAINAGE

FD-460-AF

Tag: _____

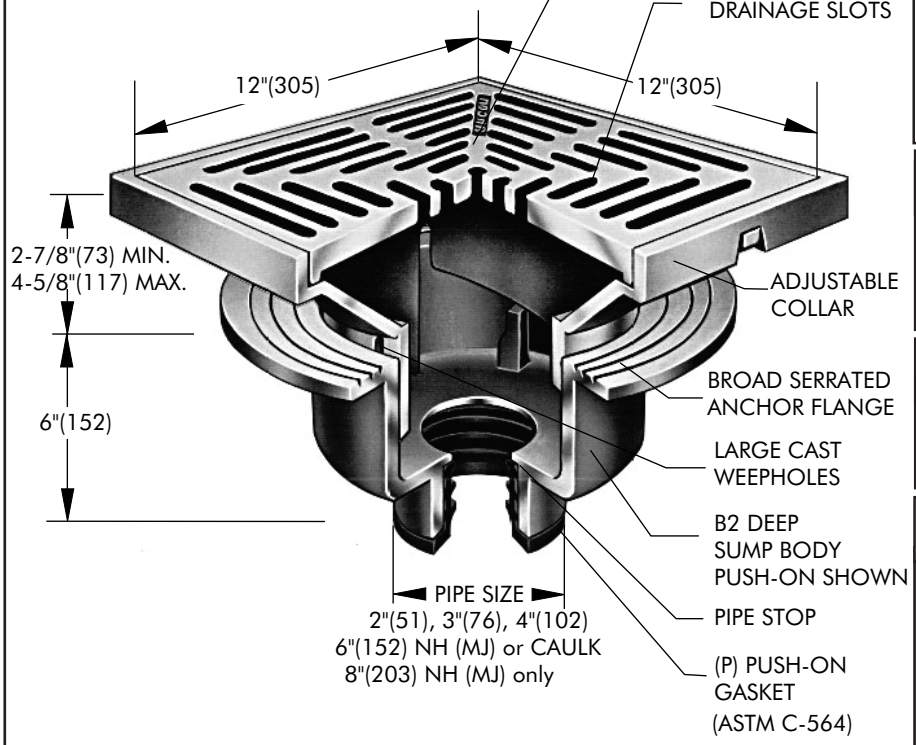
Area Drain with 12" Square Adjustable Top

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 _____

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TOWER 3 - USED WITH RD-100 (CONVENTIONAL ROOF) & GRD-620 (EXTERIOR PARKING AND LANDSCAPING AREAS)

Adjustable Accutrol Weir

Tag: _____

Adjustable Flow Control for Roof Drains

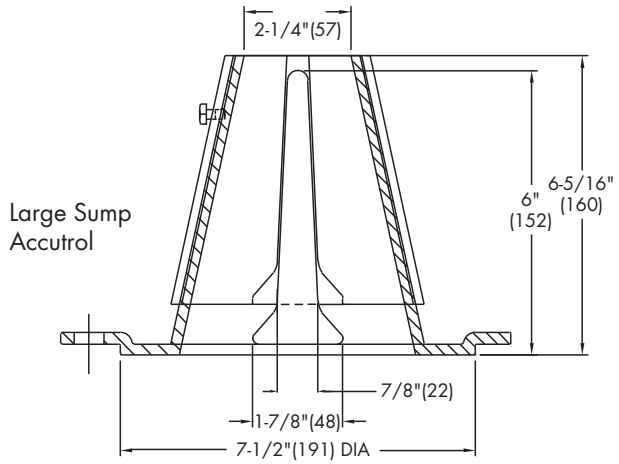
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

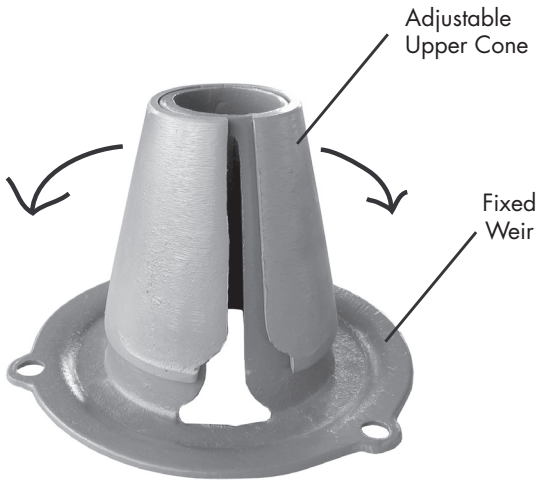
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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. _____

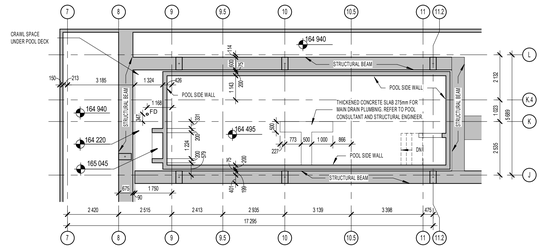
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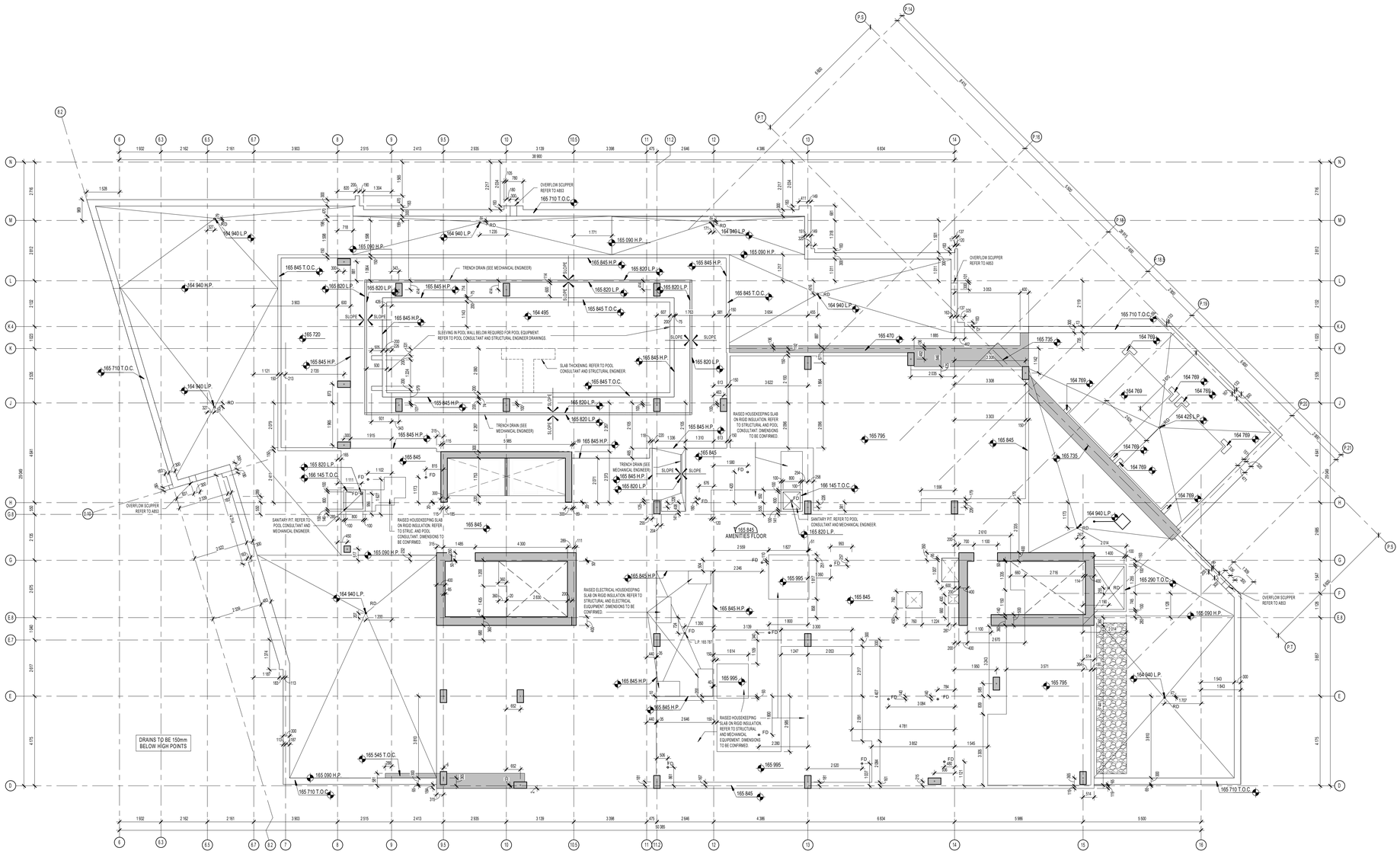
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LOWER POOL SLAB FLOOR PLATE

1 : 100

2 / A257



AMENITIES FLOOR PLATE

1 : 75

1 / A257

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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

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MU

DATE (aa.mm.jj)
10/15/2019

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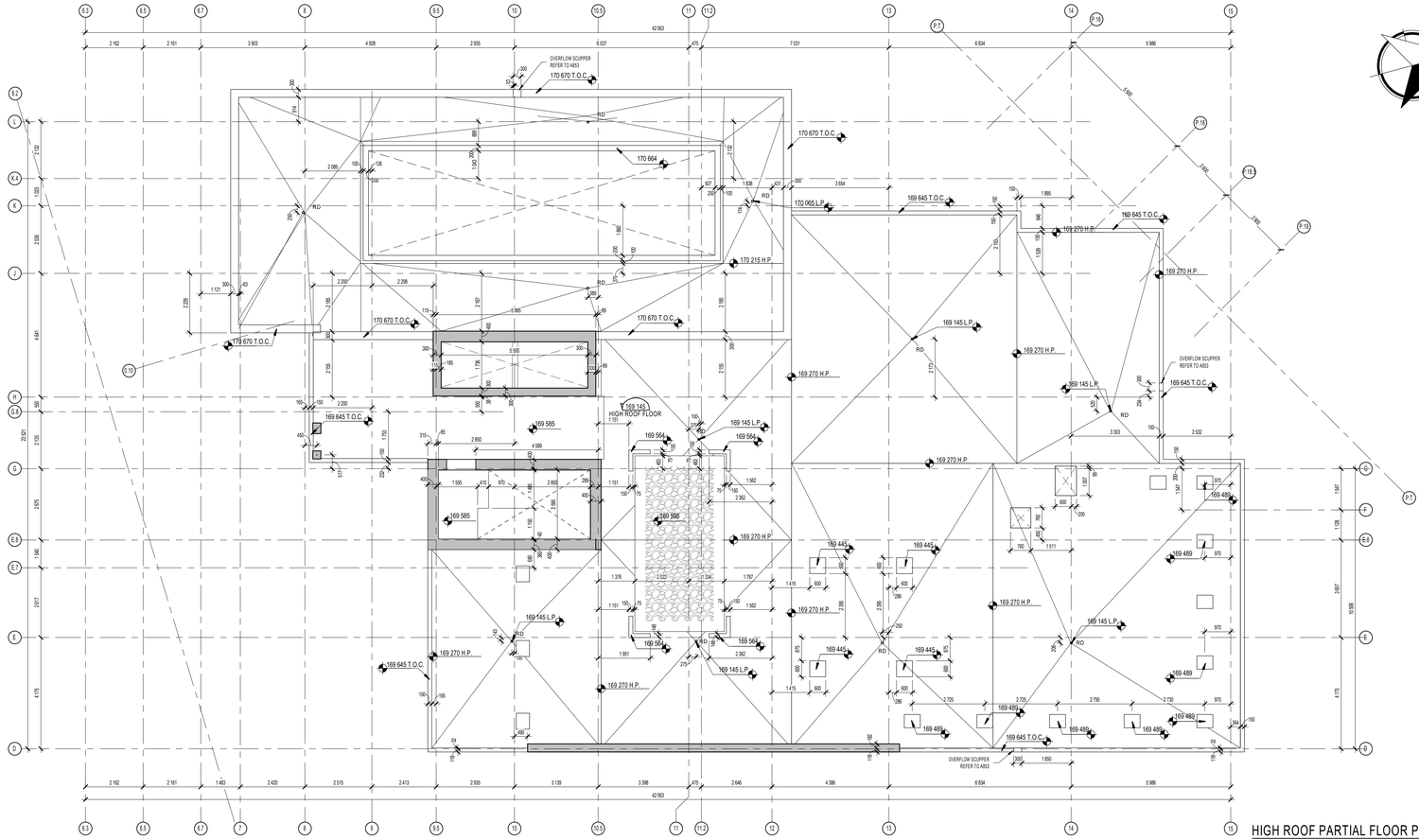
TITRE DU DESSIN Drawing Title
AMENITIES & LOWER POOL SLAB FLOOR PLATE

RÉVISION Revision
14

NO. DESSIN Dwg Number
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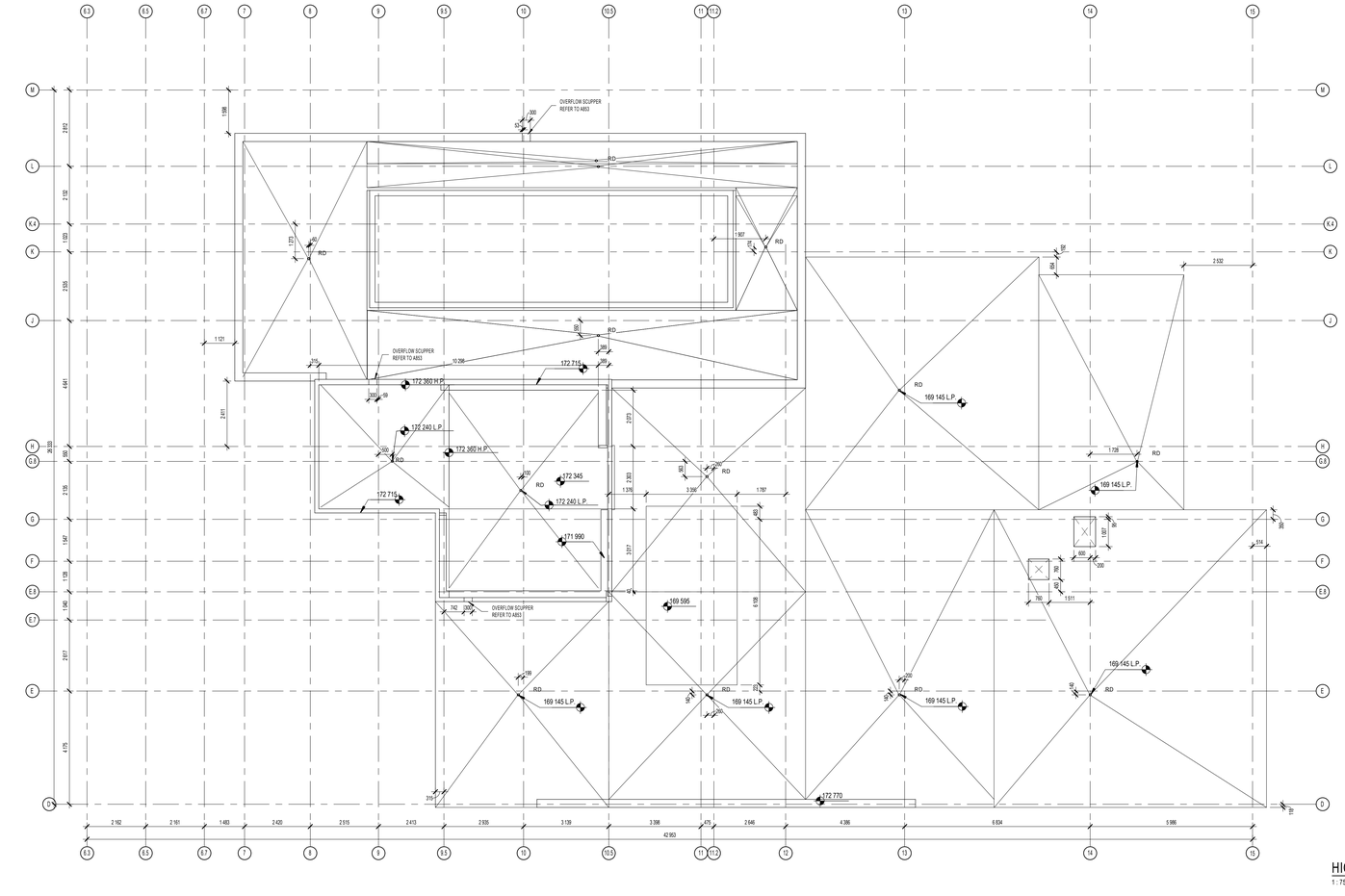
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HIGH ROOF PARTIAL FLOOR PLATE
1 : 75

2 / A258



HIGH ROOF FLOOR PLATE
1 : 75

1 / A258

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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

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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

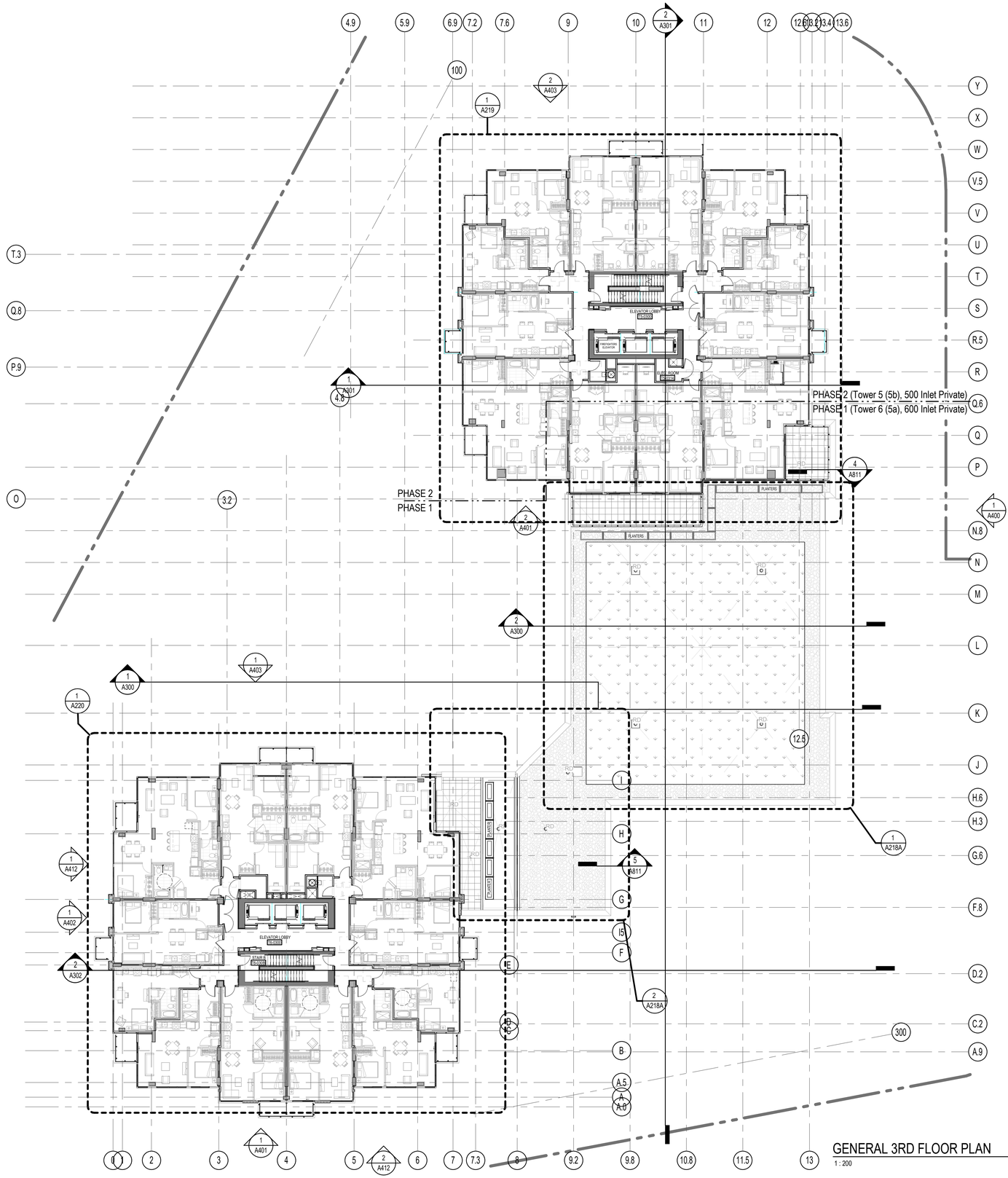
RÉVISION Revision
15

NO. DESSIN Dwg Number
A258

D07-12-21-0085

14602

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NEUF ARCHITECTES INC.

CLIENT Client
brigil

OUVRAGE Project
PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location
8910 & 8920
JEANNE-D'ARC BLVD
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 60% COORD.	2024-03-22
H	ISSUED FOR 80% COORD.	2024-04-19
I	ISSUED FOR INTERNAL AUDIT A3.2	2024-04-30
J	ISSUED FOR 95% TENDER	2024-05-31
K	ISSUED FOR 95% TENDER R1	2024-07-05
L	ISSUED FOR 30%	2025-01-31
M	ISSUED FOR COORDINATION	2025-08-22
N	ISSUED FOR COORDINATION 30%	2025-09-19
O	ISSUED FOR COORDINATION	2025-10-03
P	ISSUED FOR SHORING/EXCAVATION	2025-10-06
Q	FOR SPA REISSUE REV7	2025-10-07

DESSINÉ PAR Drawn by
AJ

VÉRIFIÉ PAR Checked
MU

DATE (aa.mm.jj)
11/16/21

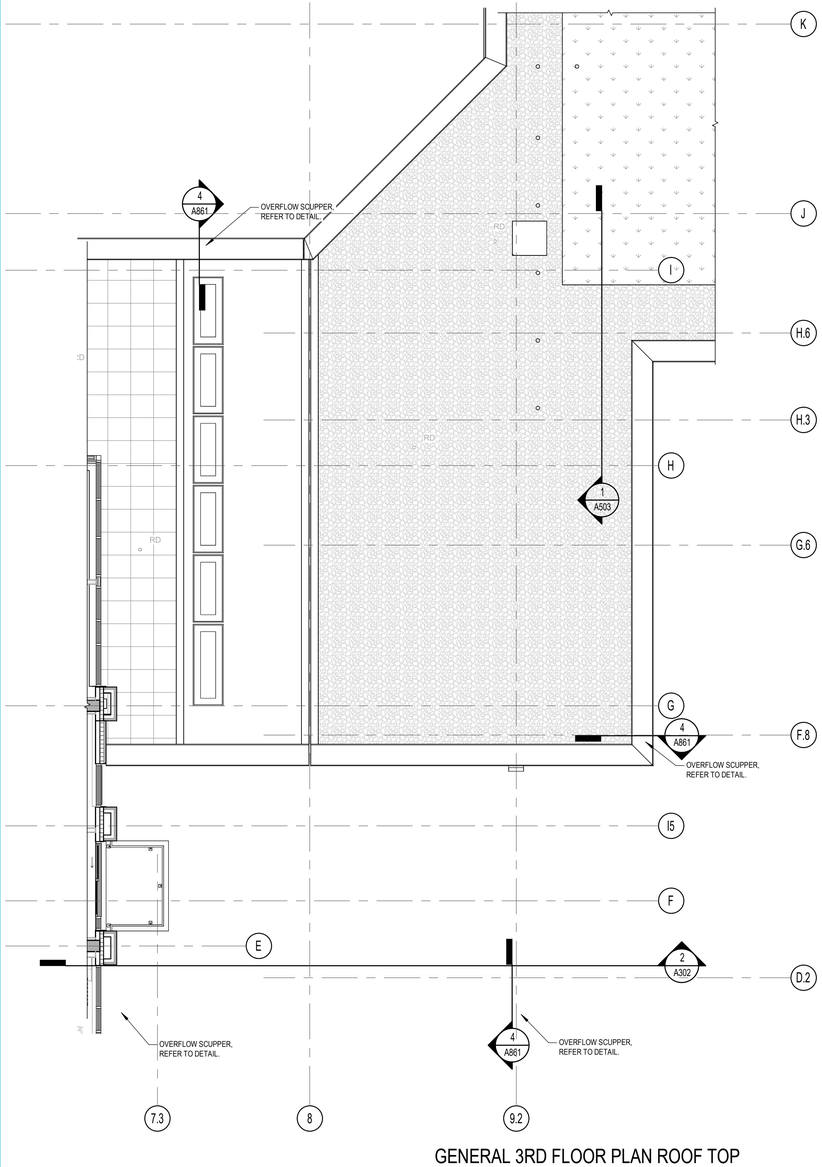
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TITRE DU DESSIN Drawing Title
GENERAL 3RD FLOOR PLAN

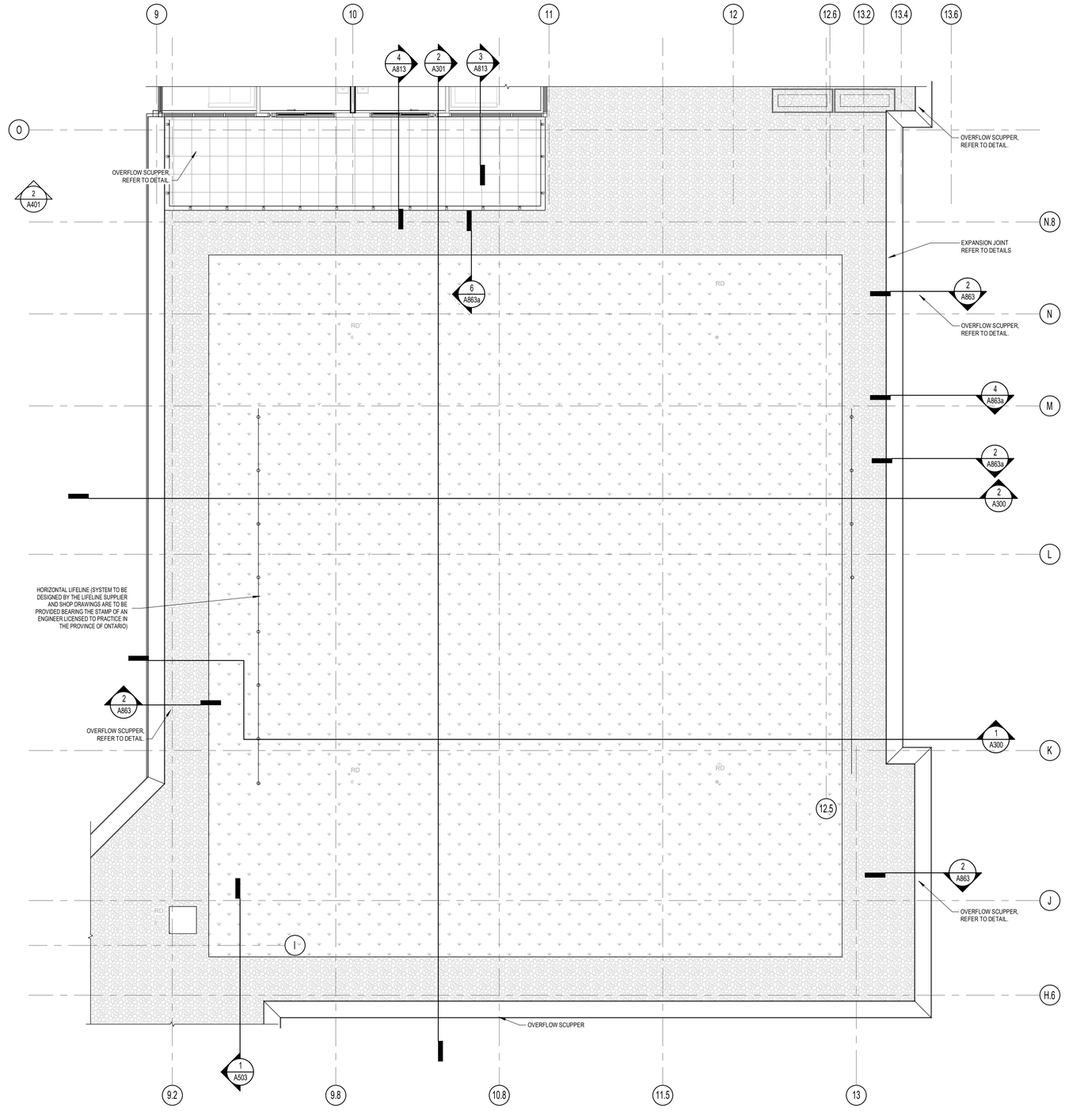
RÉVISION Revision
Q

NO. DESSIN Dwg Number
A218

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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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OUVRAGE Project
PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location
8910 & 8920
JEANNE-D'ARC BLVD
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
F	ISSUED FOR 95% TENDER R1	2024-07-05
G	ISSUED FOR COORDINATION	2025-08-22
H	ISSUED FOR COORDINATION 30%	2025-09-19
I	ISSUED FOR COORDINATION	2025-10-03
J	FOR SPA REISSUE REV7	2025-10-07

DESSINÉ PAR Drawn by
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VÉRIFIÉ PAR Checked
MU

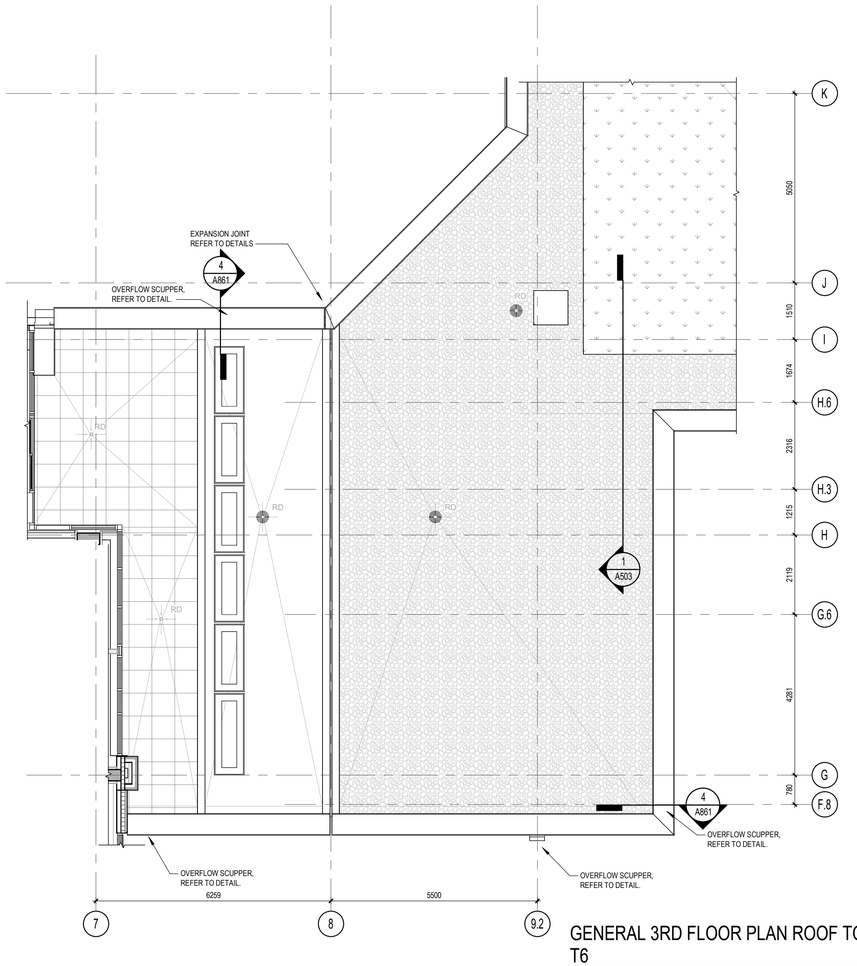
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03/03/23

ÉCHELLE Scale
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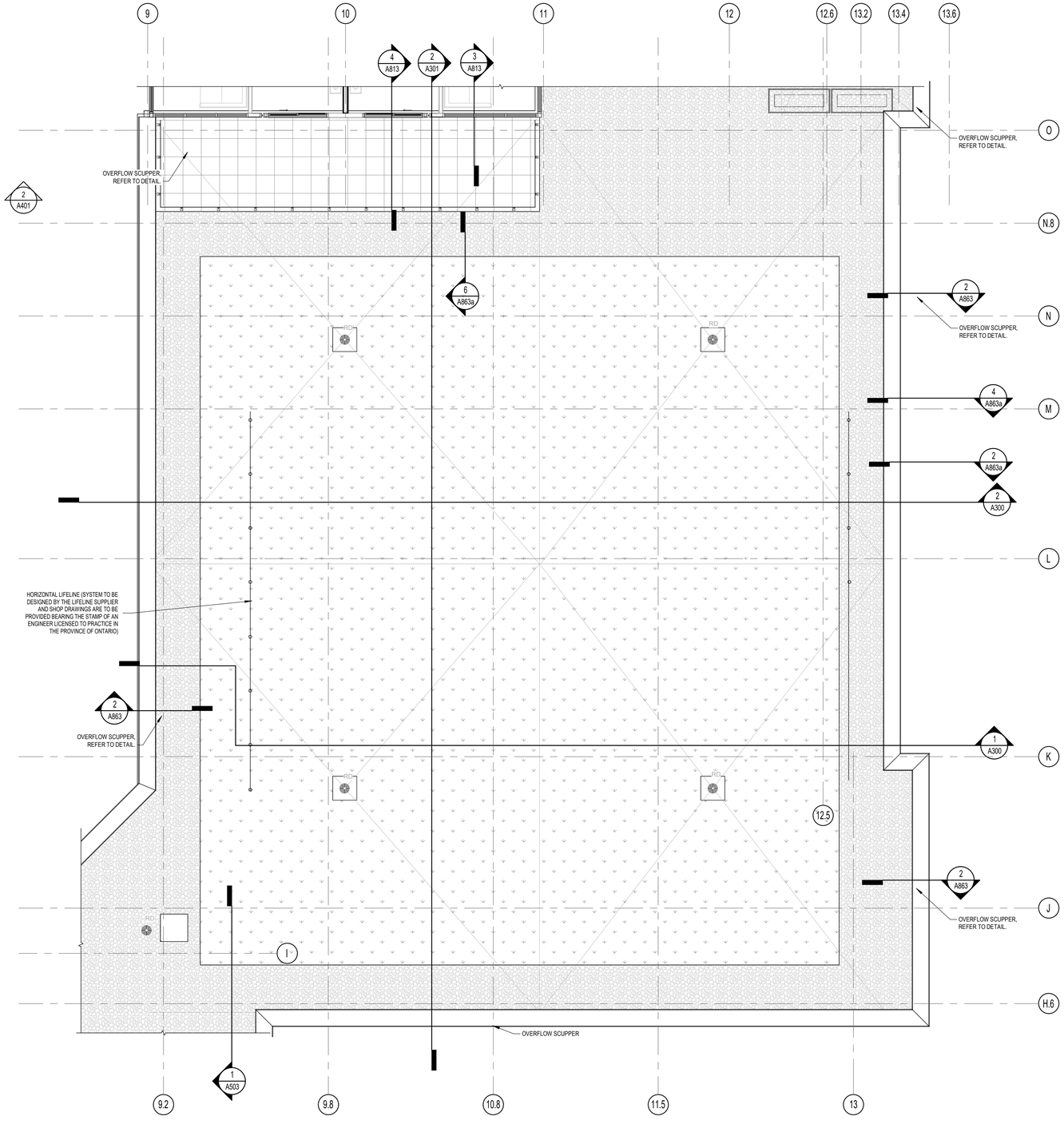
TITRE DU DESSIN Drawing Title
3RD FLOOR COMMERCIAL ROOF PLAN

RÉVISION Revision
J

NO. DESSIN Dwg Number
A218A



GENERAL 3RD FLOOR PLAN ROOF TOP
T6
1 : 75



GENERAL 3RD FLOOR PLAN ROOF TOP
T5
1 : 75

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brigil

OUVRAGE Project
PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location
8910 & 8920
JEANNE-D'ARC BLVD
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
F	ISSUED FOR 95% TENDER R1	2024-07-05
G	ISSUED FOR COORDINATION	2025-08-22
H	ISSUED FOR COORDINATION 30%	2025-09-19
I	ISSUED FOR COORDINATION	2025-10-03
J	FOR SPA REISSUE REV7	2025-10-07

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 LINK ROOF PLAN

RÉVISION Revision
J

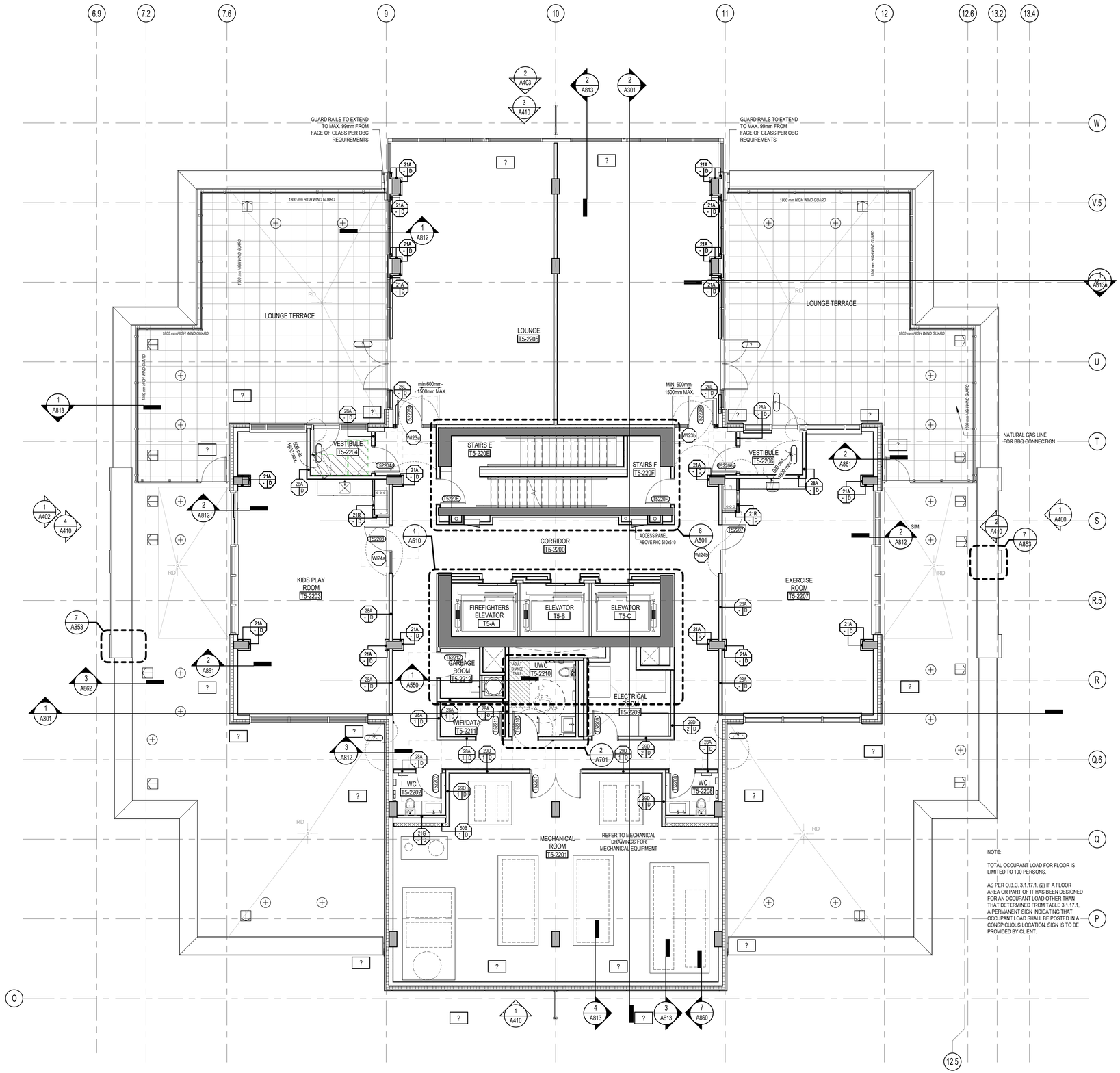
NO. DESSIN Dwg Number
A218A

C:\Fichiers Revit Locaux\PT56_11597_ARC_INT_STUDY_R24_muyeyamaQ8PCR.rvt

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:

TOTAL OCCUPANT LOAD FOR FLOOR IS LIMITED TO 100 PERSONS.

AS PER O.B.C. 3.1.17.1. (2) IF A FLOOR AREA OR PART OF IT HAS BEEN DESIGNED FOR AN OCCUPANT LOAD OTHER THAN THAT DETERMINED FROM TABLE 3.1.17.1, A PERMANENT SIGN INDICATING THAT OCCUPANT LOAD SHALL BE POSTED IN A CONSPICUOUS LOCATION. SIGN IS TO BE PROVIDED BY CLIENT.

TOWER 5 - AMENITY FLOOR PLAN

1 : 75

1 A225

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OUVRAGE Project

PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location
8910 & 8920
JEANNE-D'ARC BLVD
ORLEANS, ON

NO PROJET No.
11597/12191

NO	RÉVISION	DATE (aa-mm-jj)
A	ISSUED FOR 30%	2021-10-29
B	ISSUED FOR SPA REV6	2021-11-02
C	ISSUED FOR 60%	2021-12-16
D	ISSUED FOR 80% REVIEW	2022-04-21
E	ISSUED FOR PERMIT	2022-07-15
F	ISSUED FOR TENDER	2022-12-02
G	RE-ISSUED FOR TENDER	2023-03-10
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J	ISSUED FOR INTERNAL AUDIT A3.2	2024-04-30
K	ISSUED FOR 95% TENDER	2024-05-31
L	ISSUED FOR 95% TENDER R1	2024-07-05
M	ISSUED FOR 30%	2025-01-31
N	ISSUED FOR COORDINATION	2025-08-22
O	ISSUED FOR COORDINATION 30%	2025-09-19
P	ISSUED FOR SHORING/EXCAVATION	2025-10-06
Q	FOR SPA REISSUE REV7	2025-10-07

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 - AMENITY FLOOR PLAN (22ND)

RÉVISION Revision
Q

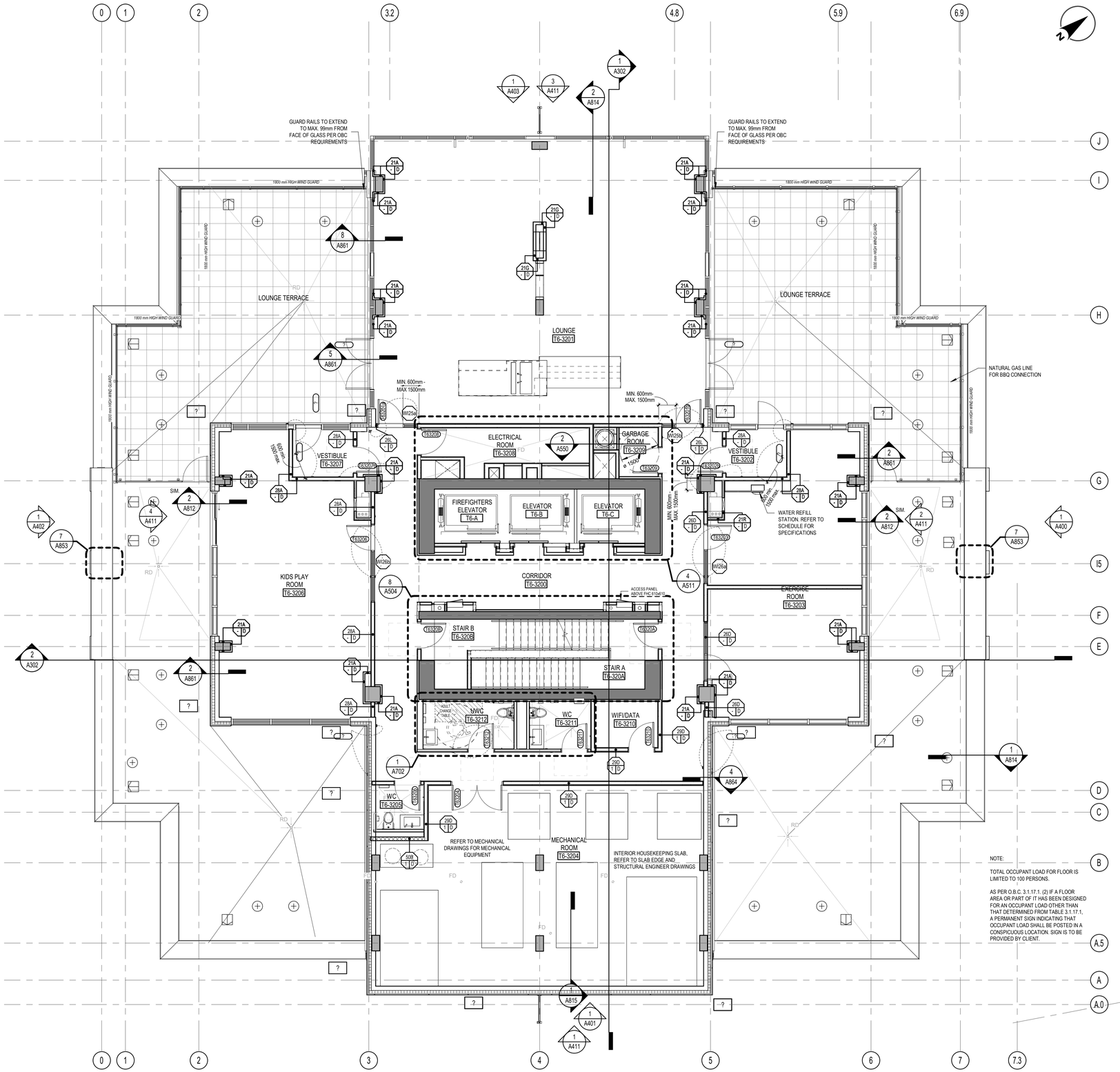
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A225

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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 6 - AMENITY FLOOR PLAN

1 : 75

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OUVRAGE Project

PETRIE'S LANDING I - TOWER 5/6

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ORLEANS, ON

NO PROJET No.
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NO	RÉVISION	DATE (aa-mm-jj)
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DESSINÉ PAR Drawn by
AJ

VÉRIFIÉ PAR Checked
MU

DATE (aa-mm-jj)
10/29/21

ÉCHELLE Scale
As indicated

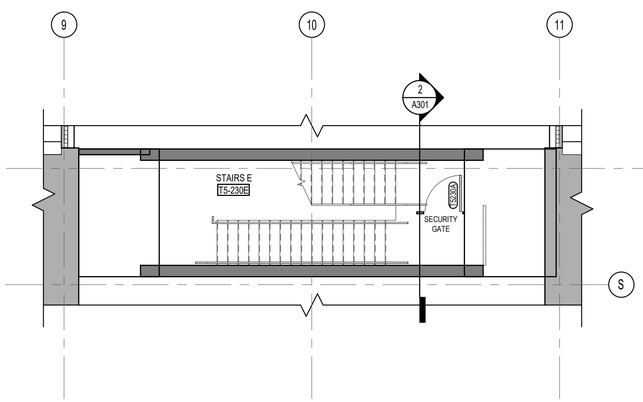
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TOWER 6 - AMENITY FLOOR PLAN (32ND)

RÉVISION Revision
Q

NO. DESSIN Dwg Number
A226

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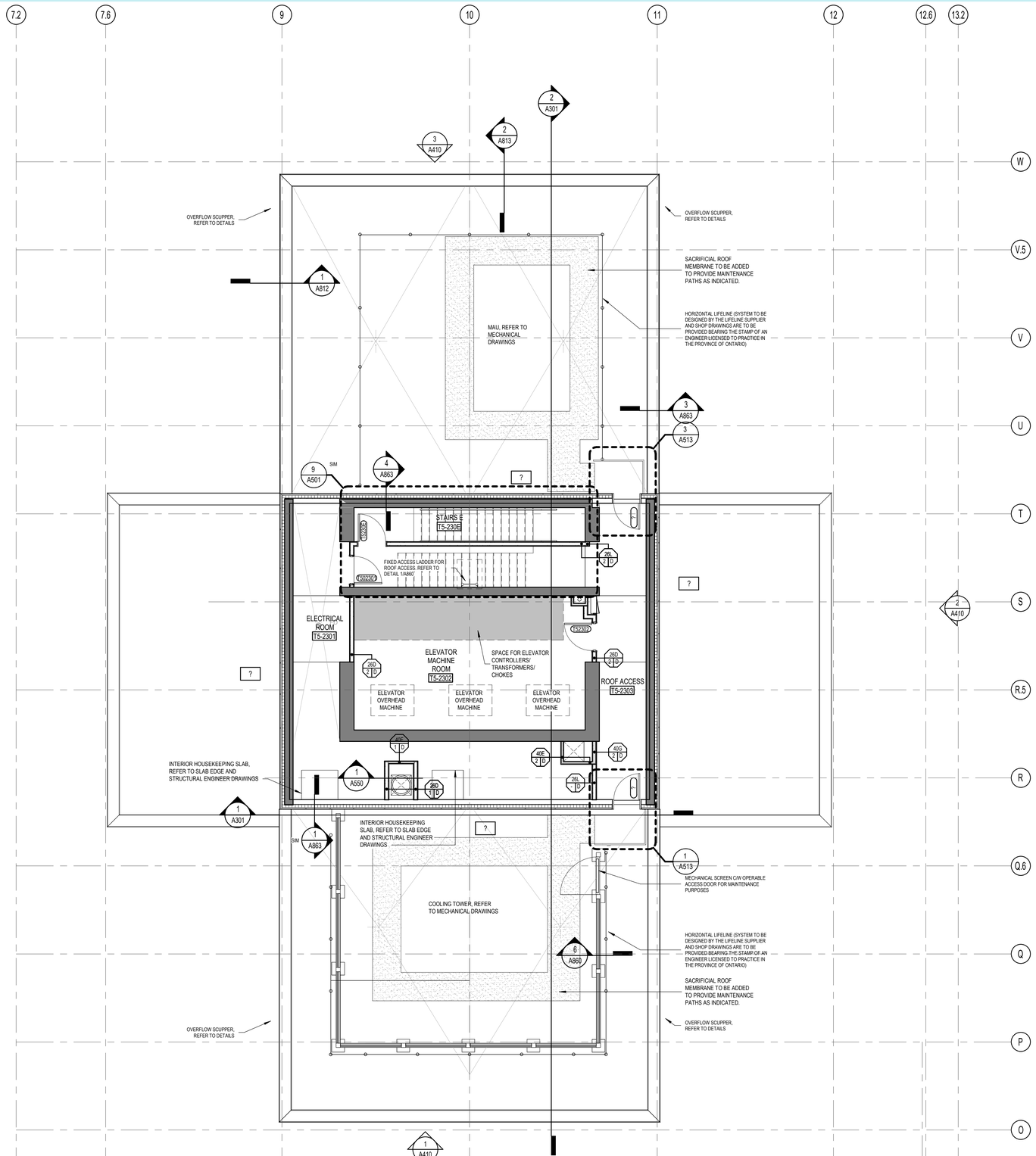
TOWER 5 - ELEVATOR MACHINE
FLOOR STAIR LANDING

2
A227

1 : 75

GENERAL NOTE:

OPENINGS FOR ELEVATOR OVERHEAD MACHIENERY TO BE COORDINATED WITH ELEVATOR CONSULTANT.



TOWER 5 - ELEVATOR MACHINE
FLOOR

1
A227

1 : 75

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NEUF ARCHITECTES INC.

CLIENT Client

brigil

OUVRAGE Project

PETRIE'S LANDING I - TOWER 5/6

EMPLACEMENT Location
8910 & 8920
JEANNE-D'ARC BLVD
ORLEANS, ON

NO PROJET No.
11597/12191

NO	RÉVISION	DATE (aa-mm-jj)
A	ISSUED FOR PERMIT	2022-07-15
B	ISSUED FOR TENDER	2022-12-02
C	RE-ISSUED FOR TENDER	2023-03-10
D	ISSUED FOR 60% COORD.	2024-03-22
E	ISSUED FOR 80% COORD.	2024-04-19
F	ISSUED FOR INTERNAL AUDIT A3.2	2024-04-30
G	ISSUED FOR 95% TENDER	2024-05-31
H	ISSUED FOR 95% TENDER R1	2024-07-05
I	ISSUED FOR 30%	2025-01-31
J	ISSUED FOR COORDINATION	2025-08-22
K	ISSUED FOR COORDINATION 30%	2025-09-19
L	ISSUED FOR SHORING/EXCAVATION	2025-10-06

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AJ

VÉRIFIÉ PAR Checked
MU

DATE (aa.mm.jj)
06/01/22

ÉCHELLE Scale
1 : 75

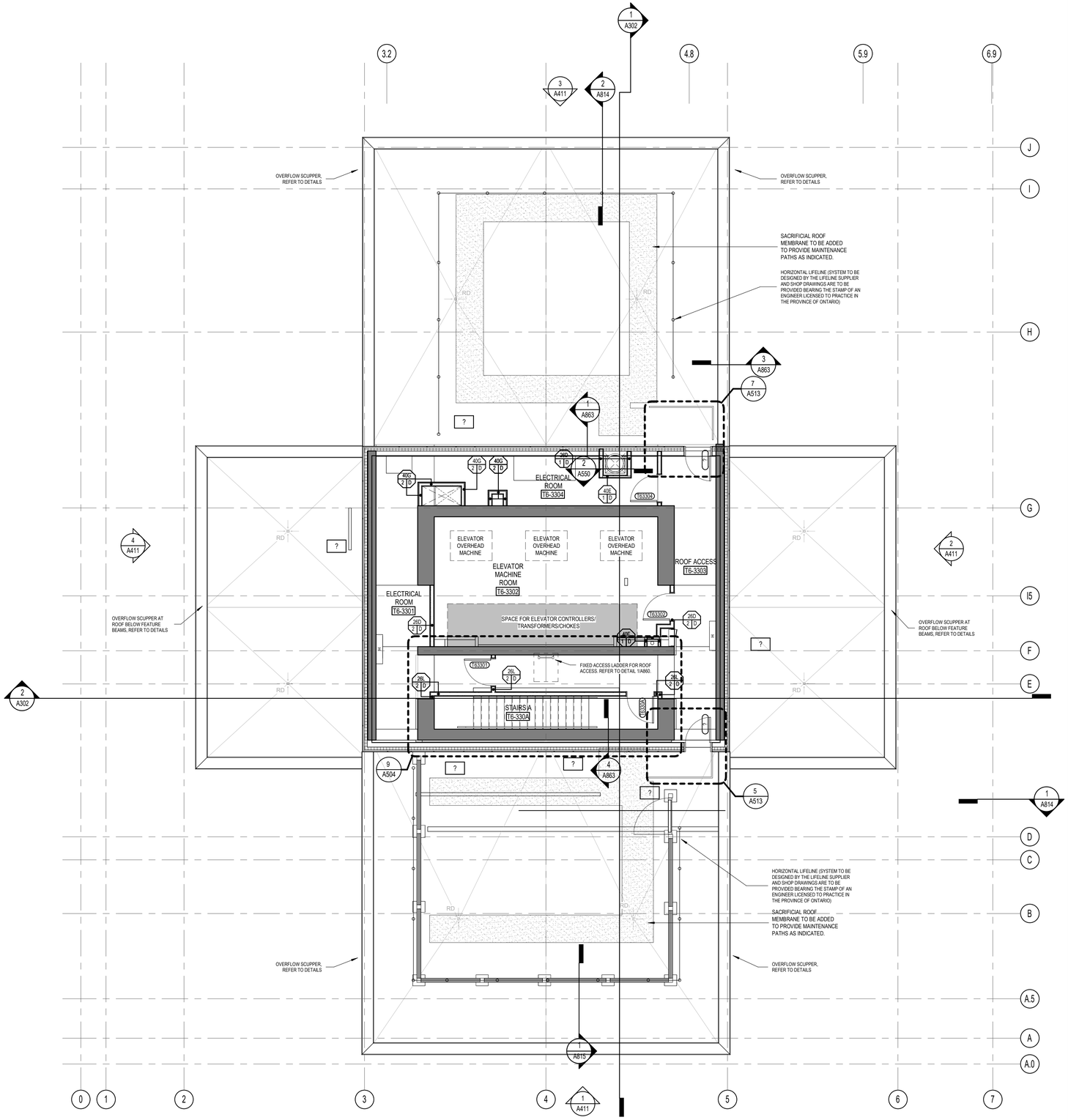
TITRE DU DESSIN Drawing Title

TOWER 5 - ELEVATOR MECH. ROOM

RÉVISION Revision
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NO. DESSIN Dwg Number
A227

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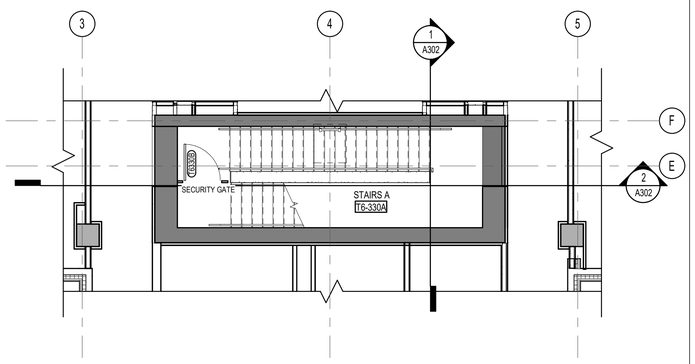


TOWER 6 - ELEVATOR MACHINE FLOOR

1 : 75

GENERAL NOTE:

OPENINGS FOR ELEVATOR OVERHEAD MACHIENERY TO BE COORDINATED WITH ELEVATOR CONSULTANT.



TOWER 6 - ELEVATOR MACHINE FLOOR STAIR LANDING

1 : 75

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I	ISSUED FOR SHORING/EXCAVATION	2025-10-06

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MU

DATE (aa.mm.jj)
06/01/22

ÉCHELLE Scale
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TITRE DU DESSIN Drawing Title

TOWER 6 - ELEVATOR MECH. ROOM

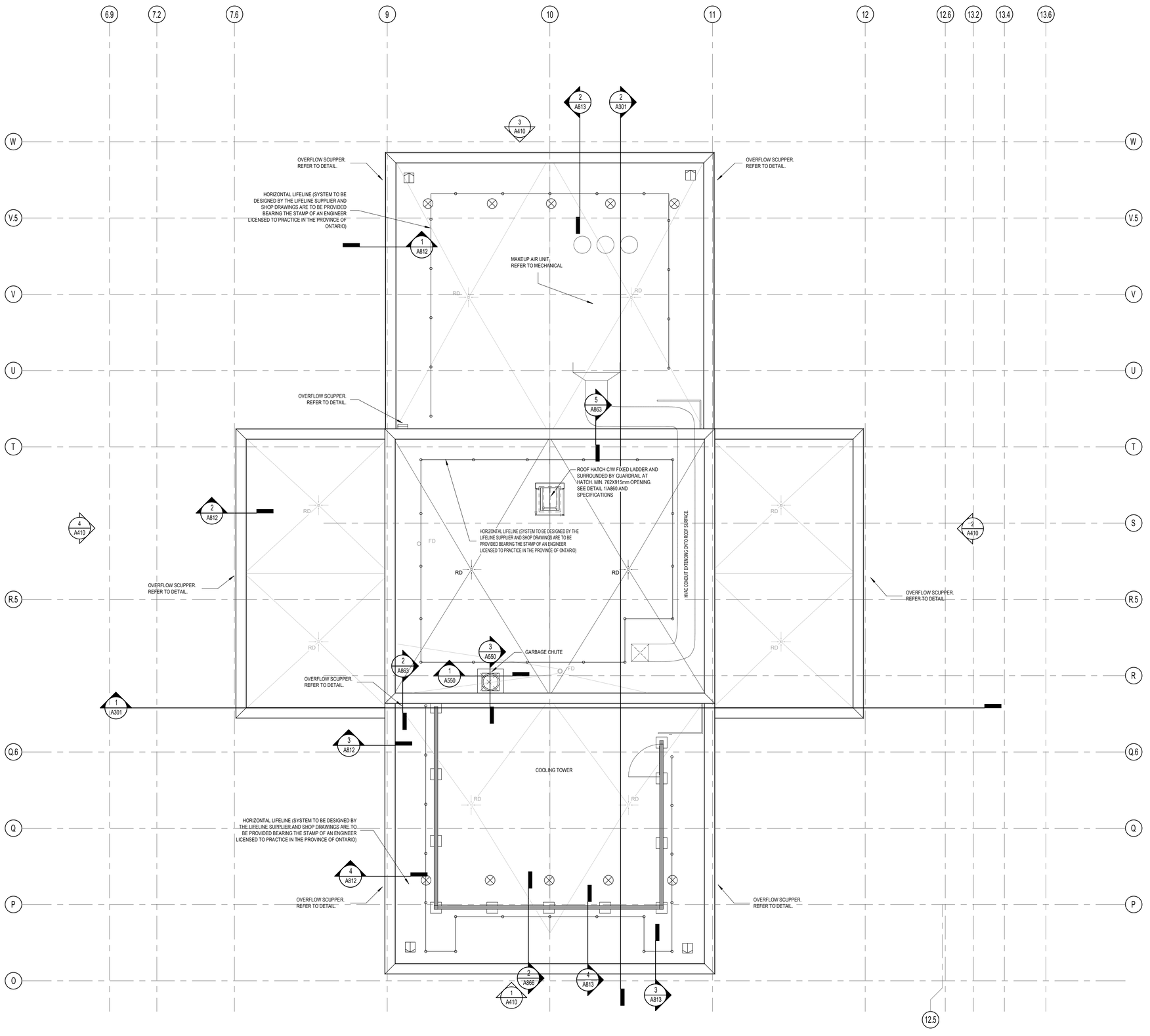
RÉVISION Revision
I

NO. DESSIN Dwg Number
A228

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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TOWER 5 - ROOF PLAN

RÉVISION Revision
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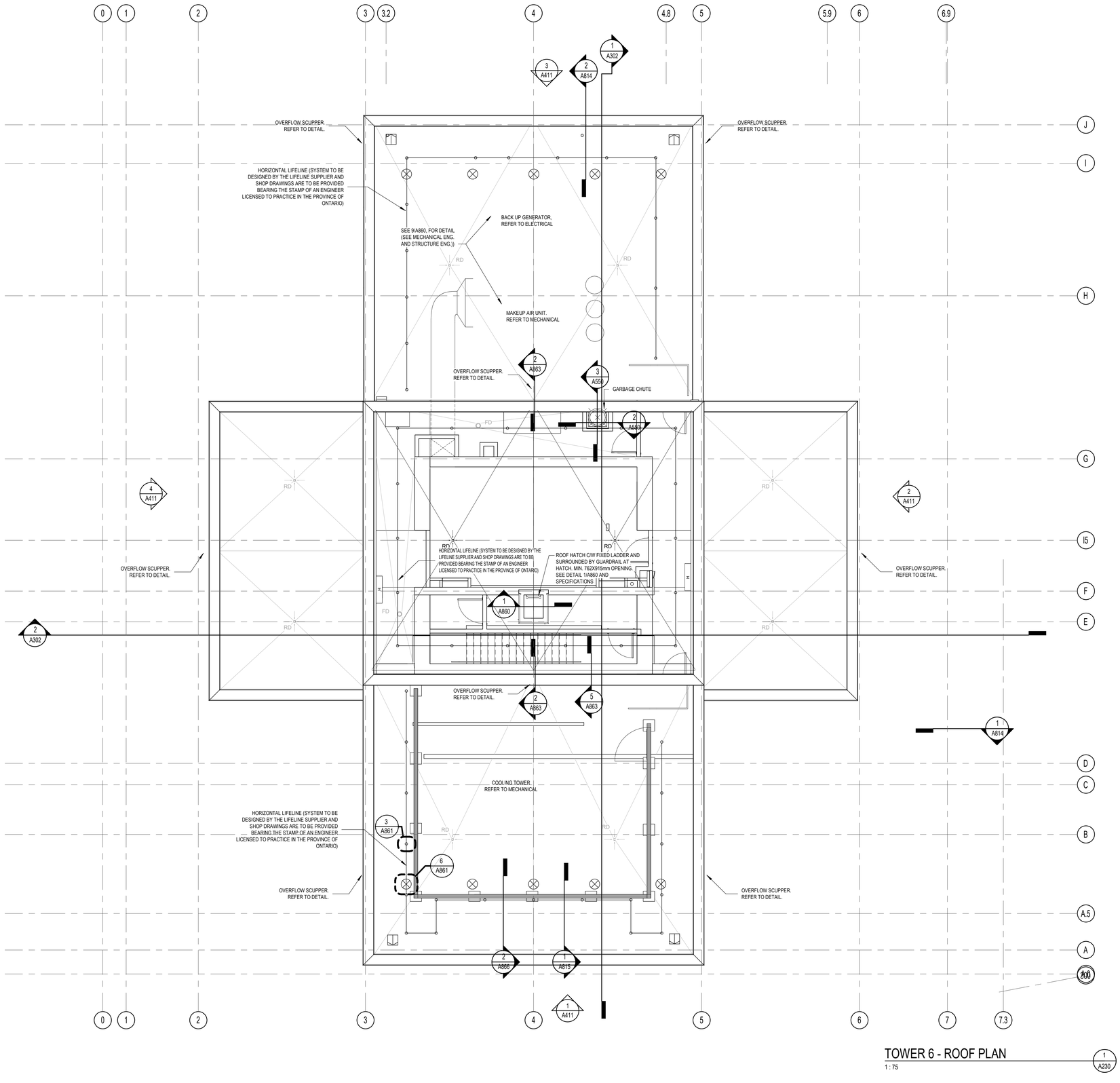
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TOWER 6 - ROOF PLAN

1 : 75

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MU

DATE (aa.mm.jj)
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ÉCHELLE Scale
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TITRE DU DESSIN Drawing Title

TOWER 6 - ROOF PLAN

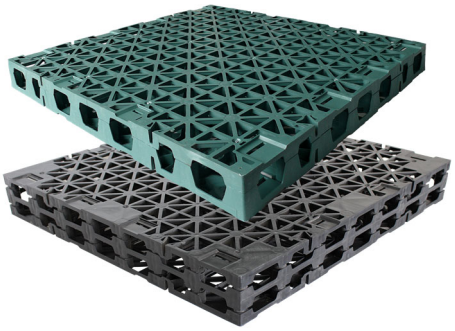
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A230

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Product Data Sheet
Retentions Spacer RSX 65 / RSX 80 / RSX 100 / RSX 150

Order No. 3402 / 3409
3403 / 3415



Powerful Spacer Elements made of polypropylene for their use on roof surfaces without any inclination, especially for retention build-ups meant for heavy load (e.g. in walkways and driveways).



The Spacer Elements can be connected with each other using special interlocks.

Technical Data

Retentions Spacer RSX 65 / RSX 80 / RSX 100 / RSX 150
Heavy duty Spacer Element made of polypropylene, cavity volume > 95 %.

Material:	100 % Polypropylene
Dimensions:	ca. 0.60 m x 0.60 m
Compressive strength according to EN ISO 17151:	up to 50 t/m²

	Order No.	Height	Weight	Maximum retention volume:
RSX 65	3402	ca. 65 mm	ca. 6.2 kg/m²	ca. 60 l/m²
RSX 80	3409	ca. 80 mm	ca. 6.3 kg/m²	ca. 76 l/m²
RSX 100	3403	ca. 100 mm	ca. 6.5 kg/m²	ca. 95 l/m²
RSX 150	3415	ca. 150 mm	ca. 8.0 kg/m²	ca. 142 l/m²

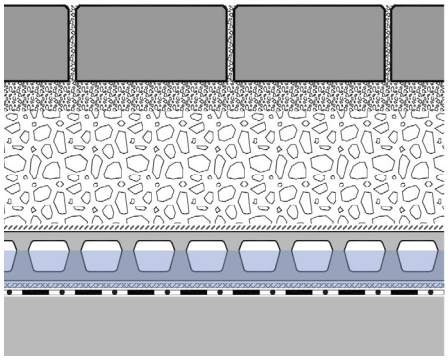
Accessories:
Plastic Connector **Order No. 9622**
(requirement: 4 pieces per element ≙ ca. 11 pcs./m²)

Features

- provides for additional water retention on roofs without inclination
- developed specially for its use under high loads (e.g. walkways and driveways)
- high retention volume
- spacious channel system for aeration and drainage
- biologically and chemically neutral
- on request also deliverable in greater heights

Application Example

"Driveway with Retention Spacer RSX 65"



Paving slabs in a bedding of stone chippings

Gravel base layer

Filter Sheet PV

Retention Spacer RSX 65

Filter Sheet PV

Roof construction with waterproofing / waterproof concrete

Specification Suggestion

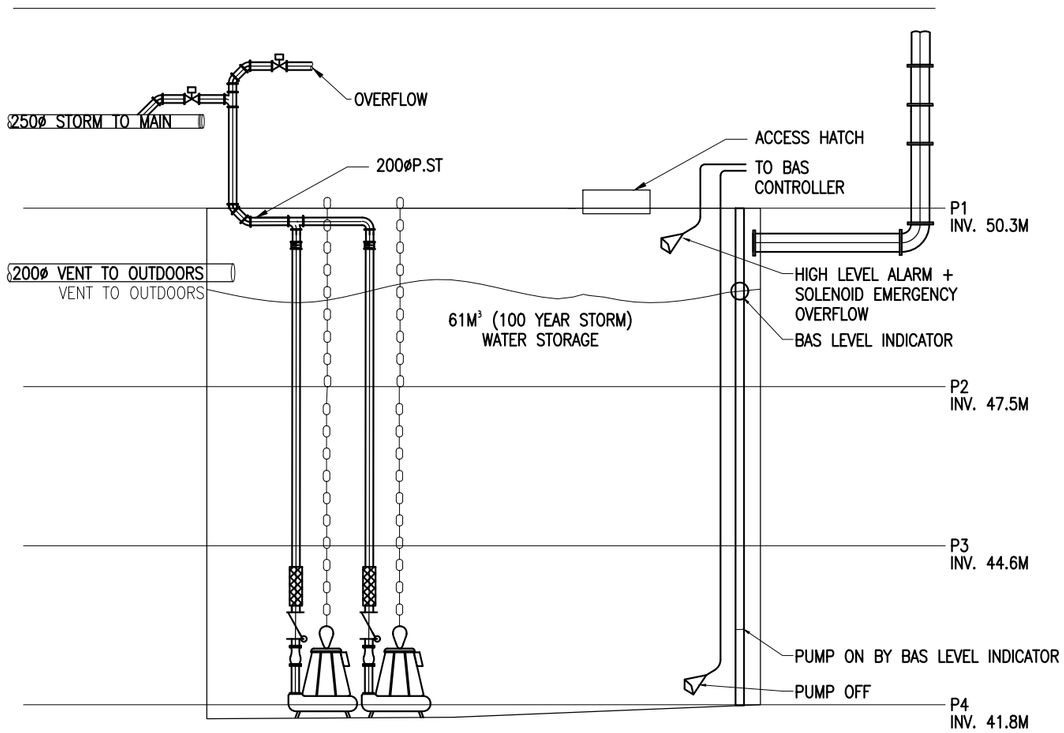
Spacer Elements made of polypropylene, height ca. 65 / 80 / 100 / 150 mm, with an integrated multidirectional channel system, cavity volume > 95 %, max. retention volume ca. 60 / 76 / 95 / 142 l/m², compressive strength up to 50 t/m², delivery and installation according to manufacturer's instructions.
Make: ZinCo Retention Spacer RSX 65 / RSX 80 / RSX 100 / RSX 150
Enquiries: ZinCo GmbH,
Phone: +49 7022 6003-0

Subject to technical alterations and printing errors • First edition 10/2017; Revised 08/2023

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P: 905-690-1661

Life on Roofs



DUPLEX STORM PUMP (10L/S EACH)
(DUTY/STANDBY) TO STORM MAIN.

STORM WATER CISTERN PUMP SYSTEM:
BAS SHALL ENERGIZE/DE-ENERGIZE CISTERN STORM WATER PUMP BASED ON LEVEL SENSORS AND THE FOLLOWING SEQUENCE OF OPERATION:
.1 BAS TO ACTIVATE PUMP AT "PUMP ON" LEVEL
.2 AT HIGH LEVEL ALARM, PUMP OUTLET SOLENOIDS TO DIRECT FLOW TO OVERFLOW PIPE.

DATE	REVISION	REF
14 NOV 2025	ISSUED FOR SITE PLAN	

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PROJECT/PROJET

PETRIES LANDING 1
TOWERS 5/6

TITLE/TITRE

MECHANICAL
CISTERN DETAIL

Scale / Échelle	NTS
Design by / Conçu par	S.FERGUSON
Drawn by / Dessiné par	S.FERGUSON
Reviewed by / Examiné par	M.SARASIN
Date	NOV 2025
GWAL No.	2021-481
DWG. No. / No. DESSIN	SK1

Appendix M – Correspondence

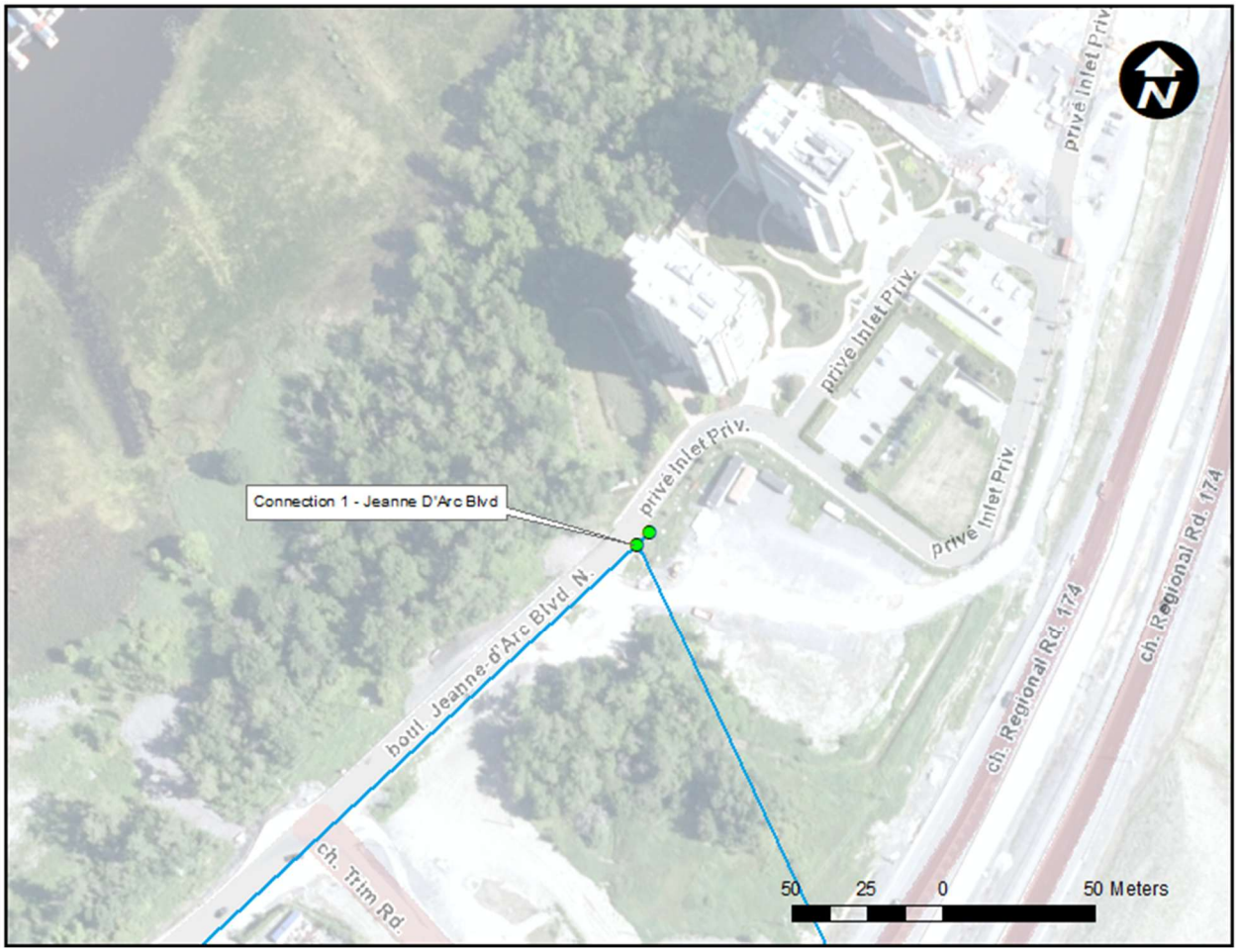
Correspondence from City of Ottawa – Boundary Conditions

Boundary Conditions
R1 Petrie's Landing

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	420	7.00
Maximum Daily Demand	1,032	17.20
Peak Hour	2,232	37.20
Fire Flow Demand #1	7,000	116.67

Location



Results

Connection 1 - Jeanne D'Arc Blvd

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	113.9	87.1
Peak Hour	106.4	76.4
Max Day plus Fire Flow	107.2	77.5

[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 Rreport*

☒ 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.*