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Site Servicing Report

Mixed-Use Site Plan (Block 15)

2983, 3053 and 3079 Navan Road & 2690 Pagé Road

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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1.0 INTRODUCTION

1.1 General

In 2023, J.L. Richards & Associates Limited (JLR) was retained by 12714001 Canada Inc. (the Owner) to prepare the detailed design of municipal infrastructure for Site Plan Approval (SPA) of the Mixed-Use Site Plan (Block 15). This Site Servicing Report (SSR) presents the servicing constraints and strategies for water, wastewater, stormwater servicing, and stormwater management in accordance with the City of Ottawa Design Guidelines, the associated technical bulletins and relevant design excerpts.

1.2 Site Description

The Mixed-Use Site Plan (Block 15) is located within the City of Ottawa's Official Plan boundary and consists of a 0.54 ha parcel bounded by Brian Coburn to the northwest and the proposed East Ridge Orleans Subdivision in the remaining directions (refer to the East Ridge Orleans Subdivision Site Servicing Report prepared by J.L. Richards and Associates, dated September 22, 2023). The legal description of the subject property can be found in the Draft Plan of Subdivision attached to Appendix A.

A topographical survey was completed by Stantec Inc. in August 2023 (Appendix A). The survey indicates that a portion of Block 15 adjacent to Brian Coburn conveys overland flow to existing ditch inlet catch basins along Brian Coburn. The remaining existing ground surface generally slopes in a southeasterly direction towards the future subdivision lands.

1.3 Proposed Development

The proposed development will consist of two (2) mid-rise residential condominiums with underground parking and one (1) storey of commercial space. One (1) of the condominium buildings consists of 47 units, and the second (2) consists of 36 units. Mixed-Use Site Plan (Block 15) has a total of 83 units. The Concept Plan for the Mixed-Use Site Plan (Block 15) is attached to Appendix A.

1.4 Proposed Connections to Existing Infrastructure

Block 15 is proposed to be serviced by the infrastructure that is part of the East Ridge Orleans Subdivision. One sanitary, storm and water service will extend to the parking garage footprint from the subdivision as shown in the servicing drawings.

1.5 Consultation and Permits

A pre-consultation meeting was held on September 13, 2023, to discuss the planning process, design criteria, and servicing constraints. A copy of the pre-consultation meeting notes and the site servicing checklist has been provided in Appendix B.

2.0 WATER SERVICING

2.1 Water Supply Design Criteria

A Hydraulic Network Analysis (HNA) was completed as part of the detailed design for the East Ridge Orleans subdivision to confirm that the proposed watermains could provide adequate supply while complying with both the Ottawa Design Guidelines for Water Distribution (July 2010) and Technical Bulletins ISDTB-2014-02, ISTB-2018-02 and ISTB-2021-03. These documents are herein referred to as the Design Guidelines and TB-2014-02, TB-2018-02, and TB-2021-03, respectively.

The HNA completed as part of the East Ridge Orleans Subdivision design included water demands for the Mixed Used Site Plan (Block 15). The HNA has since been updated to reflect the proposed water service lateral for Block 15 but is based on the same demands and the boundary conditions used in the original East Ridge Orleans Subdivision HNA (refer to Appendix C for a copy of City correspondence for boundary conditions).

Section 4.2.2 of the Design Guidelines states the following criteria for development additions to the public water distribution system:

- Under maximum hourly demand conditions (peak hour), the residual pressures shall not be less than 276 kPa (40 psi);
- During periods of maximum day and fire flow demand, the residual pressure at any point in the distribution system shall not be less than 140 kPa (20 psi);
- In accordance with the Ontario Building Code (OBC) in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi);
- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi); and
- Feedermains, which have been provided primarily for the purpose of redundancy, shall meet, at a minimum, the basic day plus fire flow demand.

2.2 Domestic Water Demands

The water demands presented in this section are based on the site layout and unit count shown in the Site Plan (Appendix A) and commercial flows. Domestic water demands were calculated for 83 apartment units with an average density of 1.8 persons per unit, giving a total population of 149 people. Commercial flows were calculated for a commercial area of 0.09 ha.

The residential and commercial consumption rates for average day, maximum day, and peak hour demand were set in accordance with Table 4-2 of the Design Guidelines. Table 1 summarizes the water consumption rates and peaking factors used in the HNA.

Table 1: Water Demands

Demand Scenario	Residential Water Consumption or Peaking Factor	Commercial Water Consumption of Peaking Factor	Total Demands (L/s)
Average Day Demand	280 L/c/d	28,000 L/ha/d	0.52
Maximum Day Demand	2.5 x Avg Day	1.5 x Avg Day	1.26
Peak Hour Demand	2.2 x Max Day	1.8 x Max Day	2.74

2.3 Fire Flow Requirements

The City has specified that the Fire Underwriters Survey (FUS) method shall be used for any public or private site where new fire hydrants are being designed. Specifically, the required fire flow (RFF) for each structure was calculated in accordance with TB-2018-02.

The required fire flow for the Mixed-Use Site Plan (Block 15) was calculated as 200 L/s for Building C and 217 L/s for Building D. Refer to Appendix C for the detailed RFF calculations for the critical fire area.

Both buildings within Block 15 will be equipped with a fully supervised automatic sprinkler designed and installed in accordance with NFPA 13. In the analysis, a sprinkler flow of 1500 L/min (25 L/s) was applied to each building as recommended by the Owner's Mechanical Engineer (refer to Appendix C).

2.4 Proposed Water Servicing, Boundary Conditions and Water Model

2.4.1 Proposed Water Servicing

Water will be supplied to the Mixed-Use Site Plan (Block 15) by a 150 mm diameter water service that will connect to the 200 mm diameter watermain loop within the East Ridge Orleans subdivision. Fire protection will be provided by each building's sprinkler system and the proposed hydrants within the East Ridge Orleans Subdivision. The Siamese connection for each building is shown on the Servicing Drawings and is located no more than 45 m away from a hydrant as required by the OBC (refer to hydrant coverage markup in Appendix C).

2.4.2 Boundary Conditions

Hydraulic boundary conditions were provided by the City at the two proposed connection locations for the East Ridge Orleans subdivision (Connection 1 and Connection 2). Table 2 summarizes the hydraulic boundary conditions received (refer to Appendix C for a copy of the City correspondence).

The boundary condition for 233 L/s was used in this analysis since this is above the maximum required fire flow for the site (refer to Section 2.3).

Table 2: Hydraulic Boundary Conditions

Demand Scenarios	Connection 1 Head (m)	Connection 2 Head (m)
Maximum HGL	130.7	130.7
Peak Hour	127.0	126.8
Max Day plus Fire Flow #3 13,980 L/min (233.00 L/s)	124.9	122.7

2.4.3 Water Model

A hydraulic water model within the WaterCAD® software platform was used to carry out the HNA (refer to the overall schematics presented in Appendix C). The water demands from Table 1 and the boundary conditions from Table 2 were input into the model for each demand scenario. Table 3 summarizes the watermain diameters and roughness coefficients used in the model, based on Sections 4.2.12 and 4.3.5 of the Design Guidelines.

Table 3: Watermain Internal Diameters and C-Factors

Nominal Diameter	Inside Diameter	C-Factor
150 mm	155 mm	100
200 mm	204 mm	110
300 mm	297 mm	120

2.5 Simulation Results

The HNA was carried out under steady-state peak hour, maximum day plus fire flow, and maximum pressure conditions to confirm that the proposed water servicing can meet the design criteria outlined in Section 2.1.

2.5.1 Peak Hour

The simulation results found the minimum pressure at the site (node J-23 in the model) during the peak hour condition to be 406 kPa (58.9 psi) (refer to Appendix C), which exceeds the minimum pressure criterion of 276 kPa (40 psi) per the Design Guidelines.

2.5.2 Maximum Day Plus Fire Flow

Fire water supply will be provided by the fully automatic sprinkler system and the hydrants within the East Ridge Orleans subdivision. To ensure adequate fire protection, the maximum day demand shown in Table 1 was analyzed simultaneously with the fire flow requirements. As mentioned in Section 2.3, a sprinkler system flow of 1500 L/min (25 L/s)

was assumed for Block 15 and it was assumed that only one (1) building would require fire flow at once.

Once the maximum day demands, the sprinkler system demands, and the 14,000 L/min (233 L/s) boundary condition provided by the City (refer to Table 2) were input in the model, the fire flow simulation was carried out by allowing WaterCAD® to calculate the available fire flow that can be drawn from a hydrant without allowing any part of the system to experience pressures less than 140 kPa (20 psi).

From the simulation results, the system is expected to deliver a minimum of 14,000 L/min (233 L/s) to the site through the contribution of the sprinkler system and the nearby hydrants. Attached to Appendix C is a map of the hydrant coverage for Block 15 which confirms that both buildings within the block meet the RFF of 233 L/s through the aggregate sum of hydrant flows. Based on Appendix I of TB-2018-02 hydrants within 75 m of a building can provide 95 L/s of fire flow and hydrants within 75 to 150 m of a building can provide 63 L/s of fire flow.

2.5.3 Maximum Pressure

Based on a zero (0 L/s) demand condition, the simulation results found the maximum pressure at the site to be 444 kPa (64.40 psi). This value is below the maximum pressure constraint of 552 kPa (80 psi), therefore pressure reducing valves (PRVs) are not anticipated to be required.

2.6 Summary and Conclusions

Based on the water simulation results, the proposed development can be serviced by the proposed 150 mm water service lateral connected to the 200 mm watermain loop within the East Ridge Orleans Subdivision. Furthermore, adequate fire water supply can be achieved with the proposed hydrants within the East Ridge Orleans Subdivision.

3.0 WASTEWATER SERVICING

3.1 Design Criteria

The sanitary sewer system within the Mixed-Use Site Plan (Block 15) is designed in accordance with the Ottawa Sewer Design Guidelines and subsequent technical bulletins. The design parameters are applied under two scenarios as per ISTB Technical Bulletin 2018-01. The key design parameters have been summarized in the table below.

Table 4: Wastewater Key Design Parameters

Design Parameter	Design Value
Commercial Average Flow	28,000 L/gross ha/Day
Residential Average Flow	280 L/Cap/Day
Residential Peaking Factor	Harmon's Formula
Commercial Peaking Factor	1.5
Harmon's Correction Factor (K)	0.8
Infiltration Allowance	0.33 L/s/ha

Design Parameter	Design Value
Manning's Roughness Coefficient (n)	0.013
Allowable Slopes	Varies (Refer to Section 6.1.2.2 of ODSG)
Allowable Velocities	0.6 m/s – 3.0 m/s
Allowable Freeboard	-

3.2 Proposed Sanitary Servicing and Design Flows

Wastewater generated from Block 15 will be conveyed via a proposed 200 mm diameter sanitary service lateral, which will then discharge into the East Ridge Orleans Subdivision. Based on the design criteria above and the site constraints, a total design peak flow of 1.95 L/s is calculated for the development. The table below summarizes the peak sanitary flow for the site plan. A detailed design sheet can be found in Appendix E.

Table 5: Sanitary Design Flow Summary

Area	Site Area	Unit Count	Unit Density	Pop.	Harmon's Peaking Factor	Res. Peak Flow	Comm. Peak Flow	Infilt. Flow	Total Flow
Block 15	0.54 ha	83	1.8 ppu	149 persons	3.55	1.72 L/s	0.05 L/s	0.18 L/s	1.95 L/s

A 200 mm diameter sanitary service lateral is expected to have sufficient capacity to convey the wastewater flows for the site. The flows from this block were already incorporated in the design of the sanitary sewer for the subdivision (refer to the East Ridge Orleans Subdivision Site Servicing Report prepared by J.L. Richards and Associates, dated February 16, 2024). As shown in this report, the subdivision will consist of 200 mm diameter pipes which will have, at minimum, 20.24 L/s of capacity. Furthermore, the overall subdivision inclusive of the Site Plan Blocks 14, 15 and 17 is expected to generate 12.98 L/s of wastewater flows which is less than the minimum expected capacity of the pipes by 35%. Therefore, it is anticipated that the sanitary sewer system downstream will have sufficient capacity for the 1.95 L/s of wastewater flows generated by Block 15.

Furthermore, it has been confirmed by the Mechanical Engineer on file that a 200mm diameter service will be sufficient to convey the flows generated by the mechanical fixtures (refer to Appendix E).

3.3 Summary and Conclusions

Wastewater servicing for Block 15 will be designed in accordance with the City of Ottawa Sewer Design Guidelines, the associated technical bulletins, and various background documents as highlighted throughout this section. Wastewater will be conveyed via a proposed 200 mm diameter sanitary service lateral which will then discharge into the East Ridge Orleans Subdivision.

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

4.1 Design Criteria

Storm and stormwater management servicing for the Mixed-Use Site Plan (Block 15) was developed in accordance with the City of Ottawa 2012 Sewer Design Guidelines (OSDG) and the more recent Technical Bulletin PIEDTB-2016-01 (September 6, 2016). These two documents are herein referred to as the Design Guidelines in this section. A summary of the key storm and stormwater management criteria follows:

- Control minor system flows to the allowable release rates of 44 L/s as identified in Table 5-4 Site Servicing Report 2983, 3053 and 3079 Navan Road & 2690 Pagé Road, Ottawa, Ontario (JLR 2024);
- The runoff coefficients (C-factors) to be calculated based on the ratio of pervious and impervious surfaces depicted on proposed site plans;
- Minimum roadway slope of 0.1% from crest-to-crest for overland flow route;
- Minimum rear yard slope in the absence of perforated pipe system of 1.5% along with swale side slopes of 3 horizontal to 1 vertical;
- Maximum parking ponding depth of 350 mm (static and dynamic) as per the Design Guidelines and maximum depth of surface flow to be 300 mm;
- Minimum vertical clearance of 0.15 m between the spill elevation on the street and the finished grade (garage elevation);
- Minimum vertical clearance of 0.30 m between the surface spill elevation and the ground elevation at the building in the rear yards;
- Major system flows, up to and including the 1:100-year design storm event, are contained within the site using the parking lot area and surface drainage.
- Quality control will be accommodated by Pond #3 to meet an MECP Enhanced Level of Protection (80% TSS removal) as identified in Site Servicing Report 2983, 3053 and 3079 Navan Road & 2690 Pagé Road, Ottawa, Ontario (JLR 2024).
- Provide measures to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

4.2 Proposed Stormwater Management Approach

In order to achieve the allowable release rates, the stormwater management of the site will include:

- Rooftop control with rooftop storage and released at a cumulative controlled release rate of 2 L/s for each building; per WATTS RD-200 detail for Small Area Roof Drain (Appendix D) and as recommended by the landowner's mechanical engineer.
- Surface storage within the parking lots in greater than a 1:2-year event with captured flows conveyed to the building plumbing system and internal cistern;
- Ramp runoff captured and conveyed to the building plumbing system and internal cistern;
- Storage in the building cistern with flows pumped at a controlled rate to the minor system with a backwater valve at the connection; and,
- Controlled release of the flows captured in the ditch drainage system for the surrounding landscaped areas.

Foundation drains will be connected to the internal building plumbing system therefore no HGL analysis is required.

4.3 Proposed Minor System Servicing

4.3.1 Runoff Coefficient

A minor system connection will be provided from the building envelope to the minor system within the subdivision. The connection will be sized based on the 1:2-year release from the site. The runoff coefficient is based on the ratio of impervious surfaces and grassed or landscaped areas. The breakdown between pervious and impervious surfaces is shown on the figure entitled Overall Site Imperviousness in Appendix D.

4.4 Stormwater Management Modelling Approach

4.4.1 Dual Drainage Model

The analysis of both major and minor drainage systems was carried out to demonstrate their compliance with respect to the design criteria described in Section 4.1. The performance of the major overland system and minor storm sewer system was analyzed with PCSWMM. This software is a dynamic model which allows both hydrologic and hydraulic components to be simulated in the same platform and also allows the simulation of the interaction between the major and minor systems. The PCSWMM software platform was used to:

- Generate the surface runoff hydrograph for each sub-area under various recurrences.
- Subdivide each inflow hydrograph into its minor and major system components based on the proposed inlet capture rates and roadway sag storage.
- Assess cascading, if any, and carry out dynamic routing of storm flows to determine flow depths along the roadways. As previously stated, the maximum major overland flow depths within the parking lot areas are to be limited to 350 mm or less, as per Technical Bulletin PIEDTB-2016-01.

PCSWMM was set-up to evaluate the proposed servicing as detailed on Drawing C01 and C02. Subcatchments were delineated for the structure roof areas, parking lot low points and landscaped low points. Model schematics are prepared in Appendix D.

4.4.2 Boundary Conditions

Boundary conditions are taken from the downstream subdivision model issued as part of the Site Servicing Report 2983, 3053 and 3079 Navan Road & 2690 Pagé Road, Ottawa, Ontario (JLR 2024).

The downstream 1:100-year HGL at the connection to the Subdivision at MH514 is identified as 81.07 m which is lower than any minor system within the site and therefore there is no backflow from the boundary condition and no impacts on HGL.

The rear-yard outlet connection into the subdivision connects directly into the pipe from STM STUB 16 to EXST MH514. The downstream 1:100-year HGL at STM STUB 16 is 81.28 m which is below the catch basin invert of 83.28 m at CB112.

4.4.3 Hydrological Modelling Parameters

The following parameters were used in the hydrologic component of PCSWMM:

- **Areas and Imperviousness**: Catchment ID and drainage areas used by PCSWMM match those shown on either Drawing DST or Figure 1 (Appendix D).
- **Catchment Width**: The catchment width is estimated at the width of overland sheet flow based on the grading of the catchment and slope direction.
- **Manning's Roughness Coefficient**: Manning's Roughness Coefficients of 0.013 and 0.25 were used for the impervious and pervious surfaces, respectively.
- **Horton Infiltration parameters**: City of Ottawa OSDG Horton Infiltration Parameters have been used in the modelling.
- **Initial Abstraction**: Initial abstraction of 4.67 mm and 1.57 mm was used for the pervious and impervious surfaces respectively, consistent with the OSDG.

4.4.4 Simulation of Storm Distributions

To assess peak flow rates and peak volume storage requirements the 3-hour Chicago storm has been simulated for the site for the 1:2-year event and 1:100-year event and the 24-hour SCS storms for the 1:100-year event.

4.5 Simulation Results

4.5.1 Low Point Ponding Analysis

Ponding depths in the low points in the parking area and landscaped areas are shown in Table 6.

Table 6: Catchbasin Ponding Depths

Low Point ID	Top of Grate (m)	Maximum Static Depth (mm)	3-hour Chicago 1:2 year Depth (mm)	3-hour Chicago 1:100 year Depth (mm)	24-hour SCS 1:100 year Depth (mm)
1	85.30	200	10*	30	30
2	85.25	200	20*	50	40
3	85.20	150	20*	30	30
4	85.15	150	20*	40	30
5	85.22	180	0*	10	10
6	85.30	300	0	0	0
7	85.20	180	0	0	0
8	85.15	100	0	0	0

Those values marked with * are greater than 0 mm in the 2-year event due to the model setup. In order to represent the Zurn inlet control device, the orifice has been set at the top of grate elevation as the control is at the surface. Therefore, the model requires a head buildup over the structure for simulation of flows.

The simulation results compiled in Table 6 shows that:

- No ponding nor dynamic flow will occur in the 1:2-year event;
- Maximum ponding depth of 50 mm during the 1:100-year event; and,
- There is no spill from the site in the 1:100-year event.

4.5.2 Roof Drainage

The roof drainage system is to be designed by the Mechanical Engineer to achieve a flow rate of 2 L/s from each roof structure. The maximum depth of ponding required, assuming storage across 66% of the rooftop area, is 80 mm.

4.5.3 Parking Lot Drainage

The parking lot drainage system connects to the building cistern and is controlled by the ZURN_Z150F-6NH (detail provided in Appendix D) to allow the 1:2-year event to drain and for the surface to provide storage during greater events up to the 1:100 year. Capture rates are shown in **Error! Reference source not found.**.

Table 7: Parking Area ICD Capture Analysis

Low Point	ICD Type	1:2 year Rational Flow (l/s)	1:100 year 3-hour Chicago Flow (l/s)	1:100 year 3-hour Chicago Head (m)
1	ZURN_Z150F-6NH	3	20	30
2		11	36	50

Low Point	ICD Type	1:2 year Rational Flow (l/s)	1:100 year 3-hour Chicago Flow (l/s)	1:100 year 3-hour Chicago Head (m)
3		7	20	30
4		10	27	40
5		1	6	10

The table shows that the parking lot ICDs capture the 1:2-year design flow.

4.5.4 Landscaped Drainage

The landscaped drainage consists of typical rear yard system of swales and perforated pipes. At the downstream end the Vortex ICD 95 provides flow control to 10 L/s in the 1:100-year event with a head of 1.63m. The release is greater than the rational method 1:2-year design flow of 4 L/s for the combined upstream catchments. The Vortex ICD sizing ensures that there is no spill from Low Point 8 in the 1:100 year event.

4.5.5 Building Release Rates

To maintain overall release rate from the site at the allowable flow rate of 44 L/s, the building drainage system must be controlled to 29 L/s. Based on a pumped rate of 29 L/s a cistern size of 49 m^3 is required in the building basement.

4.6 Summary and Conclusions

The stormwater servicing achieves a release rate from the site to the minor system limited to the allowable release rate and contains up to the 1:100 year on site.

5.0 Erosion and Sedimentation Control

Erosion and sediment control measures, as outlined in the Ontario Ministry of Natural Resources (MNR) Guidelines on Erosion and Sediment Control for Urban Construction Sites, will be implemented to trap sediment on site. The following erosion and sediment control measures can be implemented during construction as shown on the Erosion and Sediment Control Plan (Drawing ESC):

- Supply and installation of a silt fence barrier, as per OPSD 219.110.
- Supply and installation of siltsack or sentinel CB inserts between the frame and cover of catch basins and maintenance holes adjacent to the project area during construction, to prevent sediment from entering the sewer system.
- Stockpiling of material during construction is to be located along flat areas away from drainage paths. For material placed on sloped areas, stockpiles are to be enclosed with a silt fence to protect watercourses.
- All catch basins are to be equipped with sumps, inspected frequently, and cleaned as required.
- Temporary ICD to be placed blocking part of the sanitary sewer pipe in the connecting maintenance holes to eliminate construction debris from entering the existing sanitary sewer system. The ICDs are to be removed after the proposed sanitary sewers have been fully cleaned.

The proposed removal and reinstatement measures as well as the erosion control measures shall conform to the following documents:

- "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs, and Transportation & Communication, Association of Construction Authorities of Ontario and Urban Development Institute, Ontario, May 1987.
- "MTO Drainage Manual", Chapter F: "Erosion of Materials and Sediment Control", Ministry of Transportation & Communications, 1985.
- "Erosion and Sediment Control" Training Manual by Ministry of Environment, Spring 1998.
- Applicable Regulations and Guidelines of the Ministry of Natural Resources.

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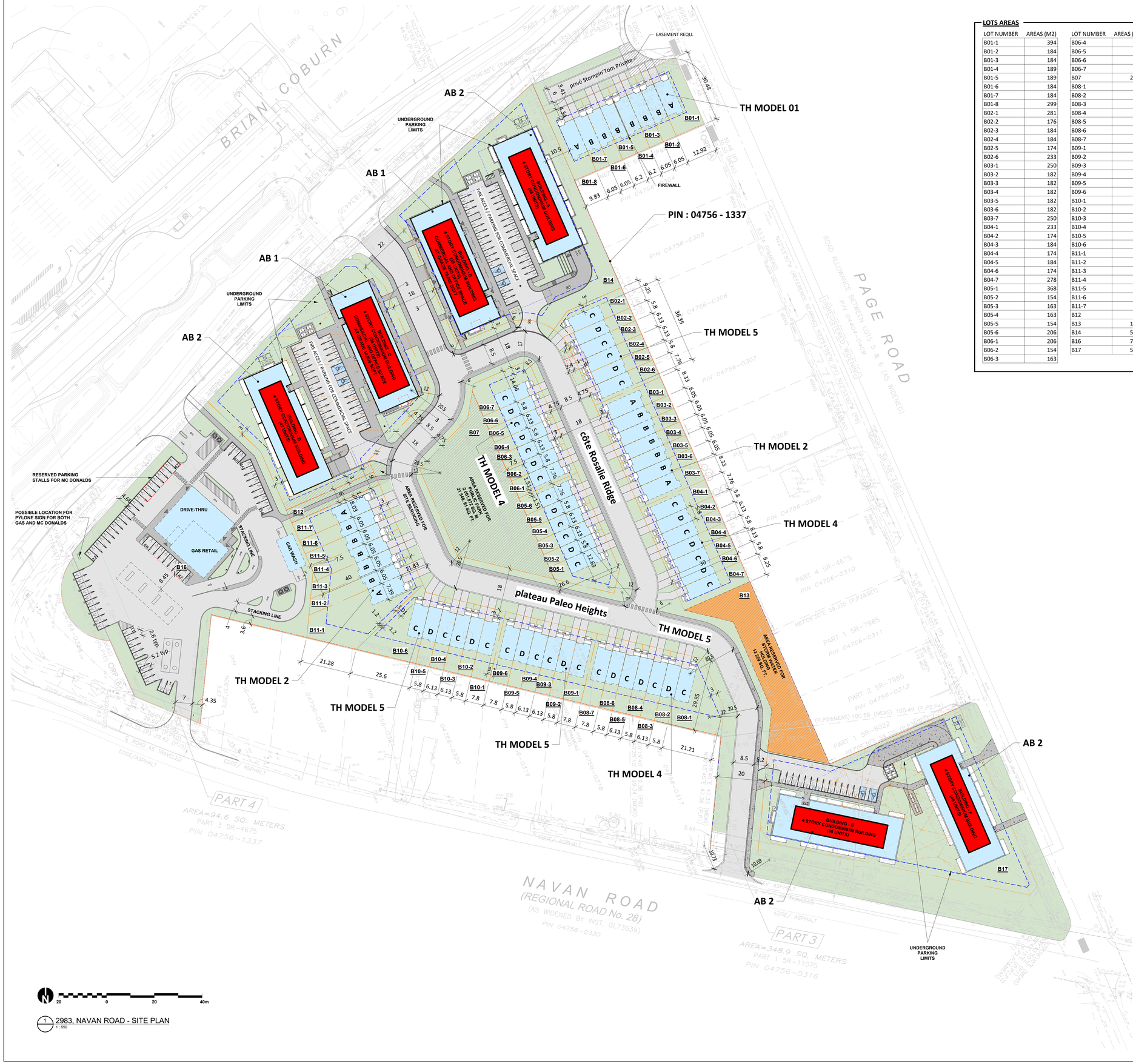
Appendix A

Concept Plan, Draft Plan of Subdivision and Topographical Survey



LOTS AREAS

LOT NUMBER	AREAS (M2)	LOT NUMBER	AREAS (M2)
B01-1	394	B06-4	154
B01-2	184	B06-5	163
B01-3	184	B06-6	154
B01-4	189	B06-7	369
B01-5	189	B07	2,002
B01-6	184	B08-1	525
B01-7	184	B08-2	174
B01-8	299	B08-3	184
B02-1	281	B08-4	174
B02-2	176	B08-5	184
B02-3	184	B08-6	174
B02-4	184	B08-7	234
B02-5	174	B09-1	234
B02-6	233	B09-2	174
B03-1	250	B09-3	184
B03-2	182	B09-4	184
B03-3	182	B09-5	174
B03-4	182	B09-6	234
B03-5	182	B10-1	234
B03-6	182	B10-2	174
B03-7	250	B10-3	184
B04-1	233	B10-4	184
B04-2	174	B10-5	174
B04-3	184	B10-6	487
B04-4	174	B11-1	748
B04-5	184	B11-2	286
B04-6	174	B11-3	265
B04-7	278	B11-4	246
B05-1	368	B11-5	242
B05-2	154	B11-6	242
B05-3	163	B11-7	321
B05-4	163	B12	240
B05-5	154	B13	1,232
B05-6	206	B14	5,728
B06-1	206	B16	7,811
B06-2	154	B17	5,312
B06-3	163		

SITE PLAN LEGEND

- EXISTING BUILDING
- NEW BUILDING
- NEW BUILDING WITH COMMERCIAL SPACE AT-GRADE
- GRASS
- ASPHALT
- LOT LINE
- SETBACKS
- NEW TREE
- FIREWALL
- SIDEWALK

SITE INFORMATION & DEVELOPMENT STATISTICS

LOTS		PIN
		04756 - 0303
		04756 - 0315
		04756 - 0316
		04756 - 1337
ZONING		GM[2546] H(14.5)
SITE AREA		
TOTAL SITE AREA:		~53,441.14 m² (5.34ha)
TOTAL DEVELOPABLE AREA:		~45,956.28 m² (4.59ha)
NET SITE AREA:		~38,956.28 m² (3.89ha)
UNITS		
TOWNHOUSES:		67 UNITS
BLOCK 01:		
1 X RESIDENTIAL APARTMENT BUILDING		48 UNITS
1 X MIXED USE BUILDING		
RESIDENTIAL:		36 UNITS
COMMERCIAL SPACES:		~899 m²
BLOCK 02:		
1 X RESIDENTIAL APARTMENT BUILDING		47 UNITS
1 X MIXED USE BUILDING		
RESIDENTIAL:		36 UNITS
COMMERCIAL SPACES:		~899 m²
BLOCK 03:		
2 X RESIDENTIAL APARTMENT BUILDING		96 UNITS
TOTAL NUMBER OF UNITS:		330 UNITS
TOTAL COMMERCIAL SPACES:		~1,798 m²
	REQUIRED	PROVIDED
MAXIMUM DENSITY	NO MAX.	84.8 units/net ha
MINIMUM LOT WIDTH	NO MIN.	5.8 m
MINIMUM LOT AREA	NO MIN.	174 m²
MAXIMUM BUILDING HEIGHT	14.5 m	14.5 m
SETBACKS		
MINIMUM FRONT YARD:	3 m	3 m
MINIMUM CORNER SIDE YARD:	3 m	3 m
MINIMUM INTERIOR SIDE YARD:		
NON-RESIDENTIAL OR MIXED-USE:	5 m	5 m
LOW-RISE RESIDENTIAL :	1.2 m	1.2 m
MID-RISE RESIDENTIAL :	3 m	3 m
MINIMIM REAR YARD:		
ABUTTING A STREET:	3 m	3 m
FROM A RESIDENTIAL ZONE:	7.5 m	7.5 m
FOR A RESIDENTIAL BUILDING:	7.5 m	7.5 m
PARKING RATES		
R9 - TOWNHOUSES:	1 p/unit = 67	67 (GARAGES)
VISITOR:	0	67 DRIVE AISLES
BLOCK 14:		
R12 - APARTEMENTS	1.0 p/unit = 84	84 (UNDERGROUND)
VISITOR:	0.2 p/unit = 17	18 (UNDERGROUND)
N79 - RETAIL STORE:	3.4 p/100 m² GFA = 30.6	32 (EXTERIOR)
		TOTAL: 134
BLOCK 15:		
R12 - APARTEMENTS	1.0 p/unit = 83	83 (UNDERGROUND)
VISITOR:	0.2 p/unit = 16.6	16 (UNDERGROUND)
N79 - RETAIL STORE:	3.4 p/100 m² GFA = 30.6	32 (EXTERIOR)
		TOTAL: 131
BLOCK 17:		
R12 - APARTEMENTS	1.0 p/unit = 96	96 (UNDERGROUND)
VISITOR:	0.2 p/unit = 19.2	19 (15 EXT. + 4 UND.)
		TOTAL: 115
GROSS FLOOR AREA		
TOWNHOUSE A:		267 m²
TOWNHOUSE B:		239 m²
TOWNHOUSE C:		232 m²
TOWNHOUSE C (CORNER UNIT):		236 m²
TOWNHOUSE D:		225 m²
TOTAL MODEL 01 (ABBBBBBA)		1,968 m²
TOTAL MODEL 02 (ABBBBBA)		1,729 m²
TOTAL MODEL 03 (ABBBBA)		1,490 m²
TOTAL MODEL 04 (CDCDCDC)		1,611 m²
TOTAL MODEL 05 (CDCCDC)		1,386 m²
MIXED USE BUILDING (TOTAL OF 2 BUILDINGS):		TOTAL: 3,926 m²
RESIDENTIAL:		3,027 m²
COMMERCIAL:		899 m²
RESIDENTIAL APARTMENT BUILDING (TOTAL OF 4 BUILDINGS) :		TOTAL: 3,927 m²
RESIDENTIAL:		3,927 m²

NOTE

1. ASSUMES TYPICAL RESIDENTIAL FLOOR HEIGHT OF 3m.
2. THE BASE PLAN (LOT LINES, EXISTING ROADS AND SURROUNDING AREAS) IS BASED ON THE TOPOGRAPHICAL PLAN OF SURVEY, SURVEYED STANTEC GEOMATICS LTD.
3. DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0,3048.

20 0 20 40m

1 2983, NAVAN ROAD - SITE PLAN
1 : 550

PROJECT

NAVAN ROAD DEVELOPMENT

2983, Navan Road, Orleans, ON K1C 7G4

OWNER

GROUPE Heafey GROUP
768, BOUL. SAINT-JOSEPH, SUITE 100
GATINEAU, QC J8Y 4B8

ARCHITECTURAL

PMA ARCHITECTES
(418) 651-8959
INFO@PMAARCHITECTES.COM
3070, CHEMIN DES QUATRE-BOURGEOIS QUÉBEC (QC) G1W 2K4
PMAARCHITECTES.COM

L'Atelier architectes
53, BOUL. SAINT-RAYMOND, GATINEAU, QC J8Y 1R8

ENGINEERS / PLANNER

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
1565 CARLING AVENUE, SUITE 700, OTTAWA, ON K1Z 8R1

SURVEYOR

Stantec
1331 CLYDE AVENUE, SUITE 400, OTTAWA, ON K2C 3G4

KEY PLAN

ARCHITECT SEAL

REVISIONS

NO	DESCRIPTION	DATE
11	FOR CITY REVIEW	2024-07-17
10	FOR CITY REVIEW	2024-03-25
9	FOR CITY REVIEW	2024-03-04
8	FOR CITY REVIEW	2022-11-28
7	FOR COORDINATION	2022-11-08
6	FOR COORDINATION	2022-11-01
5	FOR COORDINATION	2022-04-14
4	FOR COORDINATION	2021-11-03
3	FOR COORDINATION	2021-09-30
2	FOR COORDINATION	2021-08-26
1	FOR COORDINATION	2021-08-18

NOTE

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT. ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS. DO NOT SCALE DRAWINGS.

DO NOT USE FOR CONSTRUCTION

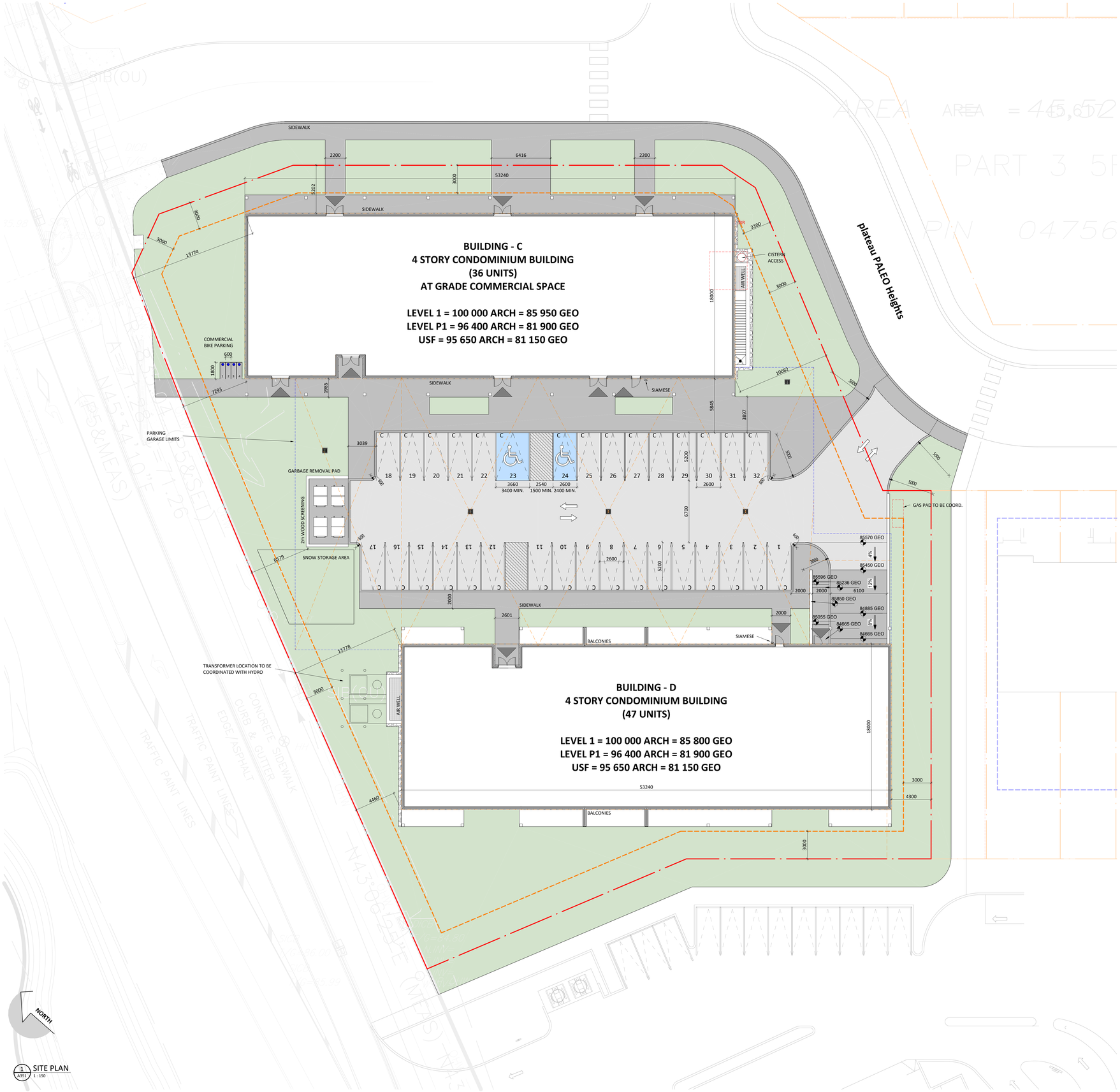
DATE	DESIGNED
2024-07-17	P.POMERLEAU
	DRAWN
	P.POMERLEAU
PROJECT No	CHECKED
20054	P.MARTIN

SHEET TITLE

GLOBAL SITE PLAN

SHEET No

A100



1 A351 SITE PLAN
1 : 150

LEGEND - SITE PLAN

- LOT LINE
- SETBACKS
- ELECTRICAL LINE
- EASEMENTS
- 0000 GEO — ÉLÉVATION GÉODÉSIQUE
- EXISTING BUILDING
- DEMOLISHED BUILDING
- EXISTING TREE
- DEMOLISHED TREE
- NEW TREE
- NEW PLANT
- GRASS
- PEA GRAVEL
- SIDEWALK
- ASPHALT
- RADIANT ZONE
- LANDSCAPED AREA

PROJECT

NAVAN ROAD DEVELOPMENT

2983, Navan Road, Orleans, ON K1C 7G4

OWNER

Groupe Heafey Group

768, BOUL. SAINT-JOSEPH, SUITE 100
GATINEAU, QC J8Y 4B8

ARCHITECTURAL

PMA ARCHITECTES

(418) 651-8954
INFO@PMAARCHITECTES.COM
—
3070, CHEMIN DES QUATRE-BOURGEOIS
QUÉBEC (QC) G1W 2K4
PMAARCHITECTES.COM

L'Atelier architectes

53, BOUL. SAINT-RAYMOND,
GATINEAU, QC J8Y 1R8

CIVIL ENGINEERS / PLANNER

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

1565 CARLING AVENUE, SUITE 700,
OTTAWA, ON K1Z 8R1

MECHANICAL & ELECTRICAL ENGINEERS

Q|M&E ENGINEERING

9 GURDWARA ROAD, UNIT 200,
OTTAWA, ON K2E 7X6

SURVEYOR

Stantec

1331 CLYDE AVENUE, SUITE 400,
OTTAWA, ON K2C 3G4

ARCHITECT SEAL

REVISIONS

NO	DESCRIPTION	DATE
2	FOR CITY REVIEW	2024-07-17
1	FOR CITY REVIEW	2024-09-25

NOTE

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT. ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS. DO NOT SCALE DRAWINGS.

DO NOT USE FOR CONSTRUCTION

DATE 2024-07-17
DESIGNED P.POMERLEAU
DRAWN P.POMERLEAU
PROJECT No 20054
CHECKED P.MARTIN

SHEET TITLE

SITE PLAN - BLOCK 15

SHEET No

A101

Autodesk Docs://NAVAN ROAD/20054_DEV-NAVAN_CONDO_15_R24.rvt

APPROVED UNDER SECTION 51 OF THE PLANNING ACT BY THE CITY OF OTTAWA THIS ____ DAY OF __________________ ,20___

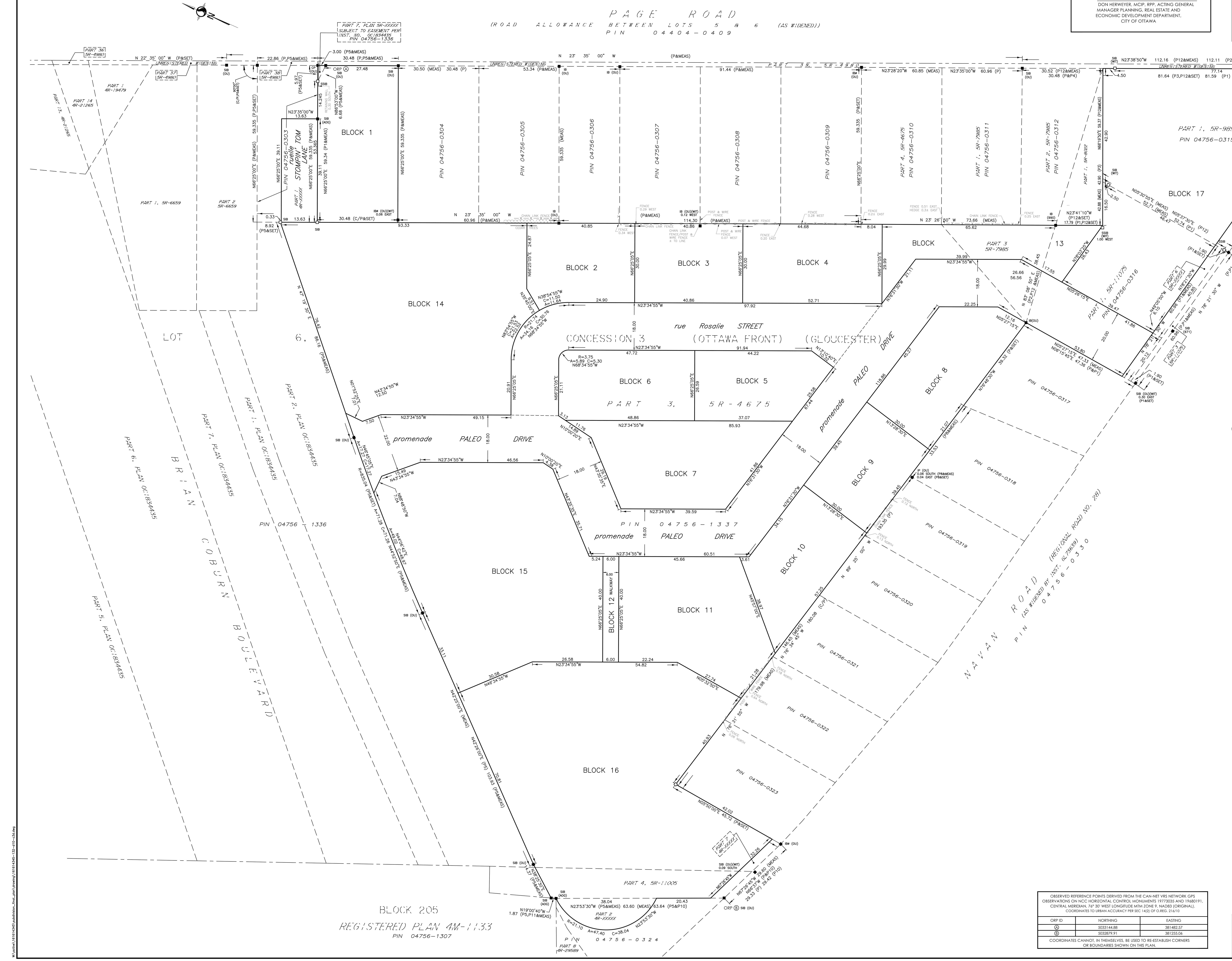
DON HERWEYER, MCIP, RPP, ACTING GENERAL MANAGER PLANNING, REAL ESTATE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

PLAN 4M-

I HEREBY CERTIFY THAT THIS PLAN 4M-______ IS REGISTERED IN THE LAND REGISTRY OFFICE FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON (No.4) AT_____ O'CLOCK ON THE______ DAY OF _____________, 2023 AND ENTERED IN THE REGISTER FOR P.I.N.'s 04756-0303, 04756-0315, 04756-0316 & 04756-1337, AND THE REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT NUMBER OC-____________.

REPRESENTATIVE FOR LAND REGISTRAR

THIS PLAN COMPRISES OF ALL OF PINS 04756-0303, 04756-0315, 04756-0316 & 04756-1337.



OBSERVED REFERENCE POINTS DERIVED FROM THE CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL). COORDINATES TO URBAN ACCURACY PER SEC 14(2) OF O.REG. 216/10		
ORP ID	NORTHING	EASTING
(A)	5033144.88	381482.57
(B)	5032879.91	381255.06
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		

DRAFT PLAN OF SUBDIVISION OF

PART OF LOT 6
CONCESSION 3 (OTTAWA FRONT)

(GEOGRAPHIC TOWNSHIP OF GLOUCESTER)

CITY OF OTTAWA

Scale 1:500

10 0 10 20 30 METRES

METRIC CONVERSION

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

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999964

BEARING NOTE

BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).

FOR BEARING COMPARISONS, BEARINGS ON PLANS P, P1, P2 & P3 HAVE BEEN ROTATED 0°41'30" COUNTERCLOCKWISE.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS (IB) UNLESS OTHERWISE NOTED
IB	"	IRON BAR
IBØ	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLAN 5R-4675
P1	"	PLAN 5R-11075
P2	"	PLAN 5R-7985
P3	"	PLAN 5R-9893
P4		PLAN 5R-8022
P5	"	PLAN OC183445
P6	"	PLAN 5R-4980
P7	"	PLAN 5R-6659
P8		PLAN BY FMW DATED SEPTEMBER 9, 2015
P9	"	PLAN BY 1175 DATED SEPTEMBER 30, 1987
P10	"	PLAN 5R-11005
P11	"	REGISTERED PLAN 4M-1133
P12	"	PLAN BY 1465 DATED DECEMBER 10, 2020
C/P	"	CALCULATION PER

NOTES

1. ALL PLANTED MONUMENTS SHOWN HEREON ARE IRON BARS (IB) UNLESS OTHERWISE NOTED.

OWNER'S CERTIFICATE ALL OF PINS 04756-0303, 04756-0315, 04756-0316 & 04756-1337.

THIS IS TO CERTIFY THAT :

1. BLOCKS 1 TO 11, BOTH INCLUSIVE, BLOCKS 13 TO 17, BOTH INCLUSIVE, THE STREETS, NAMELY promenade PALEO DRIVE, rue Rosalie STREET AND ruelle STOMPIN' TOM LANE AND LANE, NAMELY BLOCK 12, HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.
2. THE STREETS ARE DEDICATED TO CITY OF OTTAWA AS PUBLIC HIGHWAYS.

DATE

*,PRESIDENT
####### ONTARIO LIMITED
I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE -th DAY OF ,2023

DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 300
OTTAWA, ONTARIO, K2C 3G4
TEL. 613.722.4420 FAX. 613.722.2799
stantec.com

DRAWN: ME/TMT	CHECKED: -	PM:	FIELD: ES/LG	PROJECT No.: 161614345-132

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2048683

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY
ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3)

PAGE ROAD
PIN 04404-0409

NAVAN ROAD
(REGIONAL ROAD No. 28)
PIN 04756-0330

RENAUD ROAD

PART 1
AREA = 45,617 SQ. METERS
PIN 04756 - 1337

PART 2
AREA=3,070.7 SQ. METERS
PIN 04756-0316

PIN 04756-1336
PIN 04756-0303
PIN 04756-0304
PIN 04756-0305
PIN 04756-0306
PIN 04756-0307
PIN 04756-0308
PIN 04756-0309
PIN 04756-0310
PIN 04756-0311
PIN 04756-0312
PIN 04756-0315
PIN 04756-0317
PIN 04756-0318
PIN 04756-0319
PIN 04756-0320
PIN 04756-0321
PIN 04756-0322
PIN 04756-0324
PIN 04756-1307
PIN 04756-1336

No. 2738
No. 2742
No. 3015
No. 3007

TOPOGRAPHIC SKETCH OF
PART OF LOT 6
CONCESSION 3 (OTTAWA FRONT)
(GEOGRAPHIC TOWNSHIP OF GLOUCESTER)
CITY OF OTTAWA

Scale 1:500
0 5 10 20 30 METRES

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

GRID SCALE CONVERSION
DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999964

BEARING NOTE
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE WESTERLY LIMIT OF PAGE ROAD, AS SHOWN ON PLAN SR-4980, HAVING A BEARING OF N22°53'30"W.

A BEARING ROTATION CLOCKWISE OF 0°41'20" HAVE BEEN APPLIED TO BEARINGS SHOWN ON P5, P6, AND P7.

ELEVATION NOTE
ELEVATIONS SHOWN HEREON ARE GEODETIC (COVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK.

LEGEND (IF APPLICABLE)

■	DENOTES	FOUND MONUMENTS
□	-	SET MONUMENTS
IB	-	IRON BAR
IBØ	-	ROUND IRON BAR
SIB	-	STANDARD IRON BAR
SSIB	-	SHORT STANDARD IRON BAR
CC	-	CUT CROSS
CP	-	CONCRETE PIN
WIT	-	WITNESS
PIN	-	PROPERTY IDENTIFICATION NUMBER
MEAS	-	MEASURED
PROP	-	PROPORTIONED
OU	-	ORIGIN UNKNOWN
SG	-	STANTEC GEOMATICS LTD.
ORP	-	OBSERVED REFERENCE POINT
P	-	PLAN SR-4675
P1	-	PLAN SR-11075
P2	-	PLAN SR-7985
P3	-	PLAN SR-9893
P4	-	PLAN SR-8022
P5	-	PLAN OC1183445
P6	-	PLAN SR-4980
P7	-	PLAN SR-6659
P8	-	PLAN BY: FMW DATED SEPTEMBER 9, 2015
P9	-	PLAN BY 1175 DATED SEPTEMBER 30, 1987
P10	-	PLAN SR-11005
P11	-	REGISTERED PLAN 4M-1133
C/P	-	CALCULATION PER
ACU	-	AIR CONDITIONING UNIT
AN	-	ANCHOR
AP	-	AIR PUMP
ANT	-	ANTENNA
BH	-	BOREHOLE
HB	-	HOSE BIB
BKR	-	BIKE RACK
BENCH	-	BENCH
BOL	-	BOLLARD
BOUL	-	BOULDER
CB	-	CATCH BASIN
DCB	-	DOUBLE CB
DICB	-	DITCH CB
CBMH	-	CB MANHOLE
DCBMH	-	DOUBLE CB MANHOLE
CBSI	-	SIDE INLET CB
CHM	-	CHIMNEY
CSV	-	VALVE CURB STOP
DRN	-	DRAIN
EPOST	-	ELECTRICAL OUTLET
FP	-	FLAG POLE
FL	-	FLOOD LIGHT
FTF	-	FUEL TANK FILLER CAP
GC	-	GARBAGE CAN
GFL	-	PIPE FLANGE (GAS)
GFP	-	GAS FUEL PUMP
GP	-	POLE GUYWIRE
GSR	-	GAS SERVICE REGULATOR
GV	-	GAS VALVE
HIC	-	HICKENBOTTOM
HDS	-	HEADSTONE
HLS	-	LIGHT STANDARD HYDRO
HM	-	HYDRO METER
HTN	-	HYDRO TRANSFORMER
HW	-	HAND WELL
HYD	-	FIRE HYDRANT
JBX	-	JUNCTION BOX
MB	-	MAILBOX
MP	-	MONITORING PIN
MH	-	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	-	MAINTENANCE HOLE BELL
MHF	-	MAINTENANCE HOLE FIBRE OPTIC
MHH	-	MAINTENANCE HOLE HYDRO
MHI	-	MAINTENANCE HOLE INVERT
MHSAN	-	MAINTENANCE HOLE SANITARY
MHSTM	-	MAINTENANCE HOLE STORM
MHT	-	MAINTENANCE HOLE TRAFFIC
MW	-	MONITORING WELL
NPB	-	NEWS PAPER BOX
OLP	-	LIGHT STANDARD ORNAMENTAL
OW	-	OBSERVATION WELL
PKM	-	PARKING METER
PLBX	-	PULL BOX
PLQ	-	PLAQUE
PLR	-	PILLAR
PZ	-	PIEZOMETER
RLC	-	RED LIGHT CAMERA
RWSL	-	RAILWAY SIGNAL LIGHT
RWSS	-	RAILWAY SWITCH STAND
SAT	-	SATELLITE DISH
SCLP	-	SCULPTURE
SCP	-	SUMPSCATCH PIT
SCV	-	SPRINKLER CONTROL VALVE
SH	-	SPRINKLER HEAD
SIA	-	SIAMESE CONNECTION
SN	-	SIGN
SPAN	-	SOLAR PANEL
SPT	-	SEPTIC TANK LID
TBL	-	TABLE
TB BELL	-	TERMINAL BOX - BELL
TB CATV	-	TERMINAL BOX - CABLE
TCB	-	TRAFFIC CONTROL BOX
TPIT	-	TEST PIT
TSL	-	TRAFFIC SIGNAL LIGHT
UMB	-	MARKER BELL UNDERGROUND
UMC	-	MARKER CABLE UNDERGROUND
G	-	NATURAL GAS LOCATE
UMO	-	MARKER OIL UNDERGROUND
UP	-	UTILITY POLE
VB	-	VALVE BOX
VC	-	VALVE CHAMBER
WV	-	WATER VALVE
_cm	-	TREE CONIFEROUS Ø _centimetres
_cm	-	TREE DECIDUOUS Ø _centimetres

SURVEYOR'S CERTIFICATE
I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 14th DAY OF DECEMBER, 2020.

DATE — FRANCIS LAU, ONTARIO LAND SURVEYOR

UPDATE NOTE:
1. TOPOGRAPHIC INFORMATION SHOWN HEREON UPDATED PER FIELD SURVEY DATED AUGUST 1, 2023.

DATE — FRANCIS LAU, ONTARIO LAND SURVEYOR

UPDATE NOTE:
1. TOPOGRAPHIC INFORMATION SHOWN HEREON UPDATED PER FIELD SURVEY DATED MARCH 29, 2022.

DATE — FRANCIS LAU, ONTARIO LAND SURVEYOR

SRO COORDS: X= 381388 Y= 5032979

Stantec Geomatics Ltd.
CANADA LAND SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL: 613.722.4420 FAX: 613.722.2799
stantec.com

DRAWN: ME | CHECKED: KJ | PM: AB | FIELD: CA\SJ | PROJECT No.: 161614345-111A

Appendix B

Pre Consultation Meeting Notes and Site Servicing Report Checklist

File No.: PC2023-0226

Carmine Zayoun
12714001 Canada Inc (Zayoun Group)
Via email: carmine@zayoungroup.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Site Plan Application – 2983 Navan Road
Four residential and two mixed-use buildings – PC2023-0226

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on September 13, 2023.

Pre-Consultation Preliminary Assessment

1 ☐	2 ☐	3 ☐	4 ☒	5 ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Please proceed to complete a Phase 2 / Phase 3 Pre-consultation Application Form and submit it together with the necessary studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density before the Phase 3 pre-consultation, you may be required to complete or repeat the Phase 2 pre-consultation process.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

   a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline

the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

Comments:

1. In the Official Plan the subject site is designated as Neighbourhood is modified with the Evolving Neighbourhood overlay. Brian Coburn Boulevard is also designated as a Minor Corridor. The property is further identifed as Low-density residential in the EUC – Phases 1 Community Design Plans (CDP). The subject lands are currently zoned GM[2546]H(14.5) General Mixed-Use, Exception and DR Development Reserve.

2. Committee of Adjustment

No variances have been identified at this point. I would be supportive of reducing the parking requirement for the residential units if it will result in addition landscaping and tree cover. Staff will set up a meeting with a Committee of Adjustment Plan if any required.

3. Design guidelines

The following guidelines are meant as a starting place to help guide the design. I realize that they are specifically related to your project. Urban Design Guidelines for Low-rise Infill Housing

4. Landscape requirements

All required yards are to be landscaped with parking located between the buildings. Green spaces and tree canopy needs to be maximized.

5. Parking requirements

Parking should comply with Sections 100, 101, 106, 109 and 111

Vehicle and bicycle parking should be situated with easily access while minimizing pavement.

6. Easements

Will there be any easements required?

7. Commercial units should be orientated to the streets as much as possible.

8. Provide locations of signage and ensure that space is made available for tree planting

Urban Design

9. This proposal does not run along or does not meet the threshold in one of the City's Design Priority Areas and need not attend the City's UDRP. Staff will be responsible for evaluating the Urban Design Brief and providing design direction.

10. An Urban Design Brief is a required submittal Re-zoning applications. The Urban Design Brief should be structured by generally following the headings highlighted under Section 3 – Contents of these Terms of Reference. Please see the Urban Design Brief Terms of Reference provided.

11. We recommend further detail be provided about the low-rise apartments to better understand their relationship to the surrounding buildings and properties.

12. If this site is located outside the greenbelt, a shadow analysis will be required.

13. We recommend the low-rise buildings fronting City streets consider grade related units accessed from the street to further 'fit-in' with the surrounding low-rise residential community where feasible.

14. We recommend additional landscaping detail be provided around the low-rise apartments to better understand how the buildings relate to their context.

15. We recommend additional detail be provided of the front yards of the townhouse units facing City streets to better understand how they will integrate with the public realm.

16. We recommend tree planting in front yards facing public right-of-way.

17. When a wind and/or shadow studies are required please refer to the Terms of Reference for the wind analysis and shadow analysis to conduct the studies and evaluate the impacts.

18. Note. The Urban Design Brief submittal should have a section which addresses these pre-consultation comments.

This is an exciting project in an area full of potential. We look forward to helping you achieve its goals with the highest level of design resolution. We are happy to assist and answer any questions regarding the above. Feel free to contact the Urban Design Planner, Christopher Moise, at Christoper.Moise@ottawa.ca , for follow-up questions

Engineering

Comments:

19. The Stormwater Management Criteria, for the subject site, is to be based on the following:

    a. The 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.

    b. For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.

    c. The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).

    d. A calculated time of concentration (Cannot be less than 10 minutes).

    e. Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.

    f. For a combined sewer system the maximum C= 0.4 or the pre-development C value, whichever is less. In the absence of other information the allowable release rate shall be based on a 2 year storm event.

20. Deep Services (Storm, Sanitary & Water Supply)

    a. Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.

    b. Connections to trunk sewers and easement sewers are typically not permitted.

    c. Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).

    d. Review provision of a high-level sewer.

e. Sewer connections to be made above the springline of the sewermain as per:

   i. Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.

   ii. Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain,

   iii. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,

   iv. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

   v. No submerged outlet connections.

21. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

    no BCR will be requested for res site plans, no watermains built, navan connection already provided as part of subdivision

    a. Location of service

    b. Type of development and the amount of fire flow required (as per FUS).

    c. Average daily demand: ___ l/s.

    d. Maximum daily demand: ___l/s.

    e. Maximum hourly daily demand: ___ l/s.

22. An MECP Environmental Compliance Approval **[Industrial Sewage Works or Municipal/Private Sewage Works]** will be required for the proposed development. Please contact the Ministry of the Environment, Conservation and Parks, Ottawa District Office to arrange a pre-submission consultation:

    a. Charlie Primeau at (613) 521-3450, ext. 251 or Charlie.Primeau@ontario.ca

    b. Emily Diamond at (613) 521-3450, ext. 238 or Emily.Diamond@ontario.ca

General Comments:

23. Review of the Phase 3 submission for this application will not occur until the detailed design of the subdivision that it is within (D07-16-21-0027) is approved.

24. At the stage of site plan approval, a condition will be imposed detailing that a commence work notification will not be issued until the subdivision's infrastructure is in-service.

25. Engineering Studies:

26. All engineering studies (detailed in the Study and Plan Identification List form) are to follow the to be approved draft plan of subdivision D07-16-21-0027

Feel free to contact Derek Unrau, Infrastructure Project Manager, for follow-up questions.

Noise

Comments:

27. Noise report is required to identify and mitigate traffic noise from Brian Coburn Boulevard and Navan Road

Feel free to contact the Senior Transportation Engineer, Mike Giampa, at Mike.Giampa@ottawa.ca , for follow-up questions.

Transportation

Comments:

a. A full TIA is not required as this site is covered under the recent subdivision TIA.

b. A memo including the pertinent subdivision trips is sufficient.

c. The right of way protection on Brian Coburn and Navan Roads is 40m and 37.5m, respectively

Feel free to contact the Senior Transportation Engineer, Mike Giampa, at Mike.Giampa@ottawa.ca , for follow-up questions.

Planning Forestry

Comments:

28. A Tree Conservation Report and Landscape Plan must be submitted with both SPC applications

29. A permit is required prior to any tree removal on site. The tree permit will be released upon site plan approval. Please contact the File Lead or the Planning Forester, Hayley Murray (hayley.murray@ottawa.ca) for information on obtaining the tree permit.

30. If marine clay soils are present, setbacks on City properties must adhere to the 2017 SMC guidelines (attached). The Geotechnical report must address the implications of these soils, if present, on tree planting in relation to private land.

31. If underground parking is planned, a design must be provided for the site to support tree planting

32. We expect a very strong landscape plan to re-establish canopy cover across the properties. Tree planting and protecting existing urban forest canopy is imperative to reach the City's target of 40% canopy cover.

Feel free to contact Hayley Murray, Planning Forester, for follow-up questions.

Parkland

Comments:

33. Parkland contributions were made through the Subdivision process.

Feel free to contact Jessica Button, Parks Planner, for follow-up questions

Conservation Authority

Comments:

34. The Rideau Valley Conservation authority will be commenting on this application

Feel free to contact RVCA, for follow-up questions.
.

Other

35. The High Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design. The HPDS was passed by Council on April 13, 2022.

a. At this time, the HPDS is not in effect and Council has referred the 2023 HPDS Update Report back to staff with direction to bring forward an updated report to Committee with recommendations for revised phasing timelines, resource requirements and associated amendments to the Site Plan Control By-law by no later than Q1 2024.

b. Please refer to the HPDS information attached and ottawa.ca/HPDS for more information.

Submission Requirements and Fees

1. Outlines the application type/subtype required and the associated fees
    a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.
3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Steve Belan

cc.
Tim Chadder
Raad Akrawi
Madelen Fellows
Karla Ferrey
Tatyana Roumie
Christopher Moise
Derek Unrau
Mike Giampa
Haley Murray
Jessica Button

12714001 Canada Inc – Mixed Use Site Plan (Block 15)

2983, 3053 and 3079 Navan Road & 2690 Pagé Road

SITE SERVICING REPORT CHECKLIST

REFERENCED STUDIES AND REPORTS	REFERENCE
Site Servicing Report for 12714001 Canada Inc, Mixed Used Site Plan (Block 15) 2983, 3053 and 3079 Navan Road & 2690 Pagé Road (J.L. Richards & Associates Limited, December 8, 2023)	Site Servicing Report

4.1	GENERAL CONTENT	REFERENCE
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Site Servicing Report
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Site Servicing Report (Appendix A) All Drawings
☒	Plan showing the site and location of all existing services.	Servicing Plan
☒	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.	Site Servicing Report
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Site Servicing Report (Appendix 'A')
☒	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.	Reference made to Stantec 2005 EUC ISSU
☒	Statement of objectives and servicing criteria.	Site Servicing Report
☒	Identification of existing and proposed infrastructure available in the immediate area.	Site Servicing Report Servicing Plan
☐	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).	N/A

☒	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.	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.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Site Servicing 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	All Drawings

4.2	**SITE SERVICING REPORT: WATER**	**REFERENCE**
☐	Confirm consistency with Master Servicing Study, if available.	N/A
☒	Availability of public infrastructure to service proposed development.	Site Servicing Report (Section 2.0) Servicing Plan
☒	Identification of system constraints.	Site Servicing Report (Section 2.0) Servicing Plan
☒	Identify boundary conditions.	Site Servicing Report (Section 2.0)
☒	Confirmation of adequate domestic supply and pressure.	Site Servicing Report (Section 2.0)
☒	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.	Site Servicing Report (Section 2.0)
☒	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.	Site Servicing Report (Section 2.0)

☐	Definition of phasing constraints. Hydraulic modelling is required to confirm servicing for all defined phases of the project, including the ultimate design.	N/A
☒	Address reliability requirements, such as appropriate location of shutoff valves.	Site Servicing Report (Section 2.0)
☐	Check on the necessity of a pressure zone boundary modification.	N/A
☒	Reference to water supply analysis to show that major infrastructure can deliver 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.	Site Servicing Report (Section 2.0)
☒	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.	Site Servicing Report (Section 2.0) Servicing Plan
☐	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.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Site Servicing Report (Section 2.0)
☒	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Site Servicing Report (Section 2.0)

4.3	**SITE SERVICING REPORT: WASTEWATER**	**REFERENCE**
☒	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).	Site Servicing Report (Section 3.0,
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	Stantec 2005 EUC ISSU
☐	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.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Site Servicing Report (Section 3.0) Servicing Plan

☒	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.)	Site Servicing Report (Section 3.0)
☒	Calculations related to dry weather and wet weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Site Servicing Report (Section 3.0)
☒	Description of proposed sewer network, including sewers, pumping stations and forcemains.	Site Servicing Report (Section 3.0) Servicing Plan
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations, such as contamination, corrosive environment, etc.	N/A

4.4	**SITE SERVICING REPORT: STORMWATER**	**REFERENCE**
☒	Description of drainage outlets and downstream constraints, including legality of outlets (i.e., municipal drain, right-of-way, watercourse, or private property).	Site Servicing Report (Section 4.0)
☒	Analysis of available capacity in existing public infrastructure.	Site Servicing Report (Section 4.0)
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Servicing, Grading and Drainage Plans
☒	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.	Site Servicing Report (Section 4.0)

☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Site Servicing Report (Section 4.0)
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Site Servicing Report (Section 4.0) Servicing, Grading and Drainage Plans
☐	Setback from private sewage disposal systems.	N/A
☐	Watercourse and hazard lands setbacks.	N/A
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Site Servicing Report (Appendix 'A')
☐	Confirm consistency with subwatershed and Master Servicing Study, if applicable study exists.	Stantec 2005 EUC ISSU
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:2 year return period) and major events (1:100 year return period).	Site Servicing Report (Section 4.0)
☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	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.	Site Servicing Report (Section 4.0)
☒	Any proposed diversion of drainage catchment areas from one outlet to another.	Site Servicing Report (Section 4.0)
☒	Proposed minor and major systems, including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Servicing, Grading and Drainage Plans
☐	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.	Quantity control proposed per Site Servicing Report (Section 4.0)
☐	Identification of potential impacts to receiving watercourses.	N/A
☐	Identification of municipal drains and related approval requirements.	N/A
☒	Description of how the conveyance and storage capacity will be achieved for the development.	Site Servicing Report (Section 4.0)

☒	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Site Servicing Report (Section 4.0) Servicing, Grading and Drainage Plans
☒	Inclusion of hydraulic analysis, including hydraulic grade line elevations.	Site Servicing Report (Section 4.0)
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Site Servicing Report (Section 5.0) Servicing 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.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5	**APPROVAL AND PERMIT REQUIREMENTS**	**REFERENCE**
The Site Servicing Report shall provide a list of applicable permits and regulatory approvals necessary for the proposed development, as well as the relevant issues affecting such 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.	N/A
☐	Application for Environmental Compliance Approval (ECA) under the Ontario Water Resources Act.	As part of future submission
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation, etc.).	N/A

4.6	**CONCLUSION CHECKLIST**	**REFERENCE**
☒	Clearly stated conclusions and recommendations.	Site Servicing Report
☒	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.	Not yet applicable

☒	All draft and final reports shall be signed and stamped by a Professional Engineer registered in Ontario.	Site Servicing Report All Drawings

Appendix C

Water Servicing

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : NAVAN ROAD DEVELOPMENT PROJECT
LOCATION : CITY OF OTTAWA
DEVELOPER : 12714001 Canada Inc.

NODE	RESIDENTIAL UNITS Townhouses (TH)	RESIDENTIAL UNITS Condo Units (CU)	RESIDENTIAL POP'N	NON-RESIDENTIAL COMM (ha.)	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Total	PEAK HOUR DEMAND (l/s) Res.	PEAK HOUR DEMAND (l/s) Non-res.	PEAK HOUR DEMAND (l/s) Total
J-23	0	83	149	0.09	0.48	0.03	0.52	1.21	0.05	1.26	2.66	0.08	2.74
TOTALS	0	83	149	0.09	**0.48**	**0.03**	**0.52**	**1.21**	**0.05**	**1.26**	**2.66**	**0.08**	**2.74**

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Townhouse (TH) 2.7 p / p / u
- Condo Units (CU) 1.8 p / p / u

AVG. DAILY DEMAND

- Residential 280 l / cap / day
- Institutional 28,000 l / ha / day
- Commercial 28,000 l / ha / day

MAX. DAILY DEMAND

- Residential 700 l / cap / day
- Institutional 42,000 l / ha / day
- Commercial 42,000 l / ha / day

MAX. HOURLY DEMAND

- Residential 1,540 l / cap / day
- Institutional 75,600 l / ha / day
- Commercial 75,600 l / ha / day

FUS Fire Flow Calculations

NAVAN ROAD DEVELOPMENT PROJECT - Commercial Building
(JLR 29899-002)

Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		Building C (4 Story Mixed Use Condominium Building)
	Coefficient (C)	1.5		
B	Ground Floor Area	929	m^2	
C	Height in storeys	4	storeys	Basements are excluded.
	Total Floor Area	3716	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	20116	L/min	
	Rounded Fire Flow	20000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Limited Combustible		Residential buildings have a limited combustible occupancy.
	Occupancy Charge	-15%		
	Occupancy Increase or Decrease	-3000		
	Fire Flow	17000	L/min	No rounding applied.
F	Sprinkler Protection	Automatic Fully Supervised		
	Sprinkler Credit	-50%		
	Decrease for Sprinkler	-8500	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	35.7	m	
	Height of Exposed Wall:	4	storeys	
	Length-Height Factor	142.9	m-storeys	
	Separation Distance	26	m	
	North Side Exposure Charge	10%		
	East Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	50	m	
	East Side Exposure Charge	0%		
	South Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	35.9	m	
	Height of Exposed Wall:	4	storeys	
	Length-Height Factor	143.5	m-storeys	
	Separation Distance	26.89	m	
	South Side Exposure Charge	10%		
	West Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	50	m	
	West Side Exposure Charge	0%		
	Total Exposure Charge	20%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	3400	L/min	
H	Fire Flow	11900	L/min	
	Rounded Fire Flow	12000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**12000**	**L/min**	
		200	**L/s**	

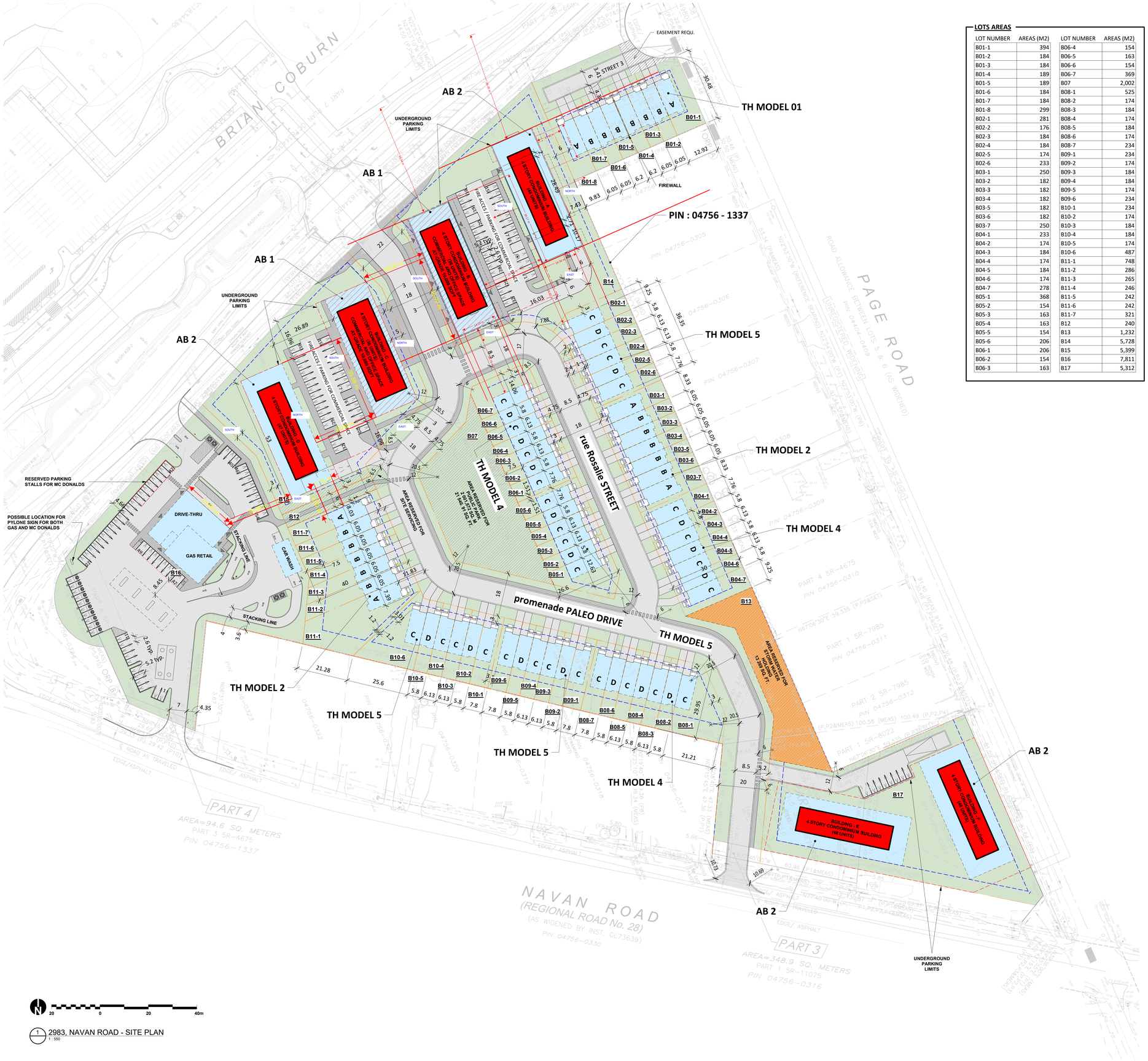
Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

FUS Fire Flow Calculations

NAVAN ROAD DEVELOPMENT PROJECT - Commercial Building
(JLR 29899-002)

Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		Building D (4 Story Mixed Use Condominium Building)
	Coefficient (C)	1.5		
B	Ground Floor Area	929	m^2	
C	Height in storeys	4	storeys	Basements are excluded.
	Total Floor Area	3716	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	20116	L/min	
	Rounded Fire Flow	20000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Limited Combustible		Residential buildings have a limited combustible occupancy.
	Occupancy Charge	-15%		
	Occupancy Increase or Decrease	-3000		
	Fire Flow	17000	L/min	No rounding applied.
F	Sprinkler Protection	Automatic Fully Supervised		
	Sprinkler Credit	-50%		
	Decrease for Sprinkler	-8500	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	35.9	m	
	Height of Exposed Wall:	4	storeys	
	Length-Height Factor	143.5	m-storeys	
	Separation Distance	26.89	m	
	North Side Exposure Charge	10%		
	East Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	7.8	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	15.5	m-storeys	
	Separation Distance	11.5	m	
	East Side Exposure Charge	12%		
	South Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Non-combustible		
	Length of Exposed Wall:	23.9	m	
	Height of Exposed Wall:	1	storeys	
	Length-Height Factor	23.9	m-storeys	
	Separation Distance	32.28	m	
	South Side Exposure Charge	5%		
	West Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	50	m	
	West Side Exposure Charge	0%		
	Total Exposure Charge	27%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	4590	L/min	
H	Fire Flow	13090	L/min	
	Rounded Fire Flow	13000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**13000**	**L/min**	
		217	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018



1 2983, NAVAN ROAD - SITE PLAN
1 : 550

Autodesk Docs://NAVAN ROAD/20054_DEV-NAVAN_SITE_PLAN_R24.rvt

LOTS AREAS

LOT NUMBER	AREAS (M2)	LOT NUMBER	AREAS (M2)
B01-1	394	B06-4	154
B01-2	184	B06-5	163
B01-3	184	B06-6	154
B01-4	189	B06-7	369
B01-5	189	B07	2,002
B01-6	184	B08-1	525
B01-7	184	B08-2	174
B01-8	299	B08-3	184
B02-1	281	B08-4	174
B02-2	176	B08-5	184
B02-3	184	B08-6	174
B02-4	184	B08-7	234
B02-5	174	B09-1	234
B02-6	233	B09-2	174
B03-1	250	B09-3	184
B03-2	182	B09-4	184
B03-3	182	B09-5	174
B03-4	182	B09-6	234
B03-5	182	B10-1	234
B03-6	182	B10-2	174
B03-7	250	B10-3	184
B04-1	233	B10-4	184
B04-2	174	B10-5	174
B04-3	184	B10-6	487
B04-4	174	B11-1	748
B04-5	184	B11-2	286
B04-6	174	B11-3	265
B04-7	278	B11-4	246
B05-1	368	B11-5	242
B05-2	154	B11-6	242
B05-3	163	B11-7	321
B05-4	163	B12	240
B05-5	154	B13	1,232
B05-6	206	B14	5,728
B06-1	206	B15	5,399
B06-2	154	B16	7,811
B06-3	163	B17	5,312

SITE PLAN LEGEND

- EXISTING BUILDING
- NEW BUILDING
- NEW BUILDING WITH COMMERCIAL SPACE AT-GRADE
- GRASS
- ASPHALT
- LOT LINE
- SETBACKS
- NEW TREE
- FIREWALL
- SIDEWALK

SITE INFORMATION & DEVELOPMENT STATISTICS

LOTS		PIN
		04756 - 0303
		04756 - 0315
		04756 - 0316
		04756 - 1337
ZONING		GM[2546] H(14.5)
SITE AREA		
TOTAL SITE AREA:		~53,441.14 m² (5.34ha)
TOTAL DEVELOPABLE AREA:		~45,956.28 m² (4.59ha)
NET SITE AREA:		~38,956.28 m² (3.89ha)
UNITS		
TOWNHOUSES:		67 UNITS
BLOCK 01:		
1 X RESIDENTIAL APARTMENT BUILDING		48 UNITS
1 X MIXED USE BUILDING		
RESIDENTIAL:		36 UNITS
COMMERCIAL SPACES:		~929 m²
BLOCK 02:		
1 X RESIDENTIAL APARTMENT BUILDING		47 UNITS
1 X MIXED USE BUILDING		
RESIDENTIAL:		36 UNITS
COMMERCIAL SPACES:		~929 m²
BLOCK 03:		
2 X RESIDENTIAL APARTMENT BUILDING		96 UNITS
TOTAL NUMBER OF UNITS:		330 UNITS
TOTAL COMMERCIAL SPACES:		~1,858 m²
	REQUIRED	PROVIDED
MAXIMUM DENSITY	NO MAX.	84.8 units/net ha
MINIMUM LOT WIDTH	NO MIN.	5.8 m
MINIMUM LOT AREA	NO MIN.	174 m²
MAXIMUM BUILDING HEIGHT	14.5 m	14.5 m
SETBACKS		
MINIMUM FRONT YARD:	3 m	3 m
MINIMUM CORNER SIDE YARD:	3 m	3 m
MINIMUM INTERIOR SIDE YARD:		
NON-RESIDENTIAL OR MIXED-USE:	5 m	5 m
LOW-RISE RESIDENTIAL :	1.2 m	1.2 m
MID-RISE RESIDENTIAL :	3 m	3 m
MINIMIM REAR YARD:		
ABUTTING A STREET:	3 m	3 m
FROM A RESIDENTIAL ZONE:	7.5 m	7.5 m
FOR A RESIDENTIAL BUILDING:	7.5 m	7.5 m
PARKING RATES		
R9 - TOWNHOUSES:	1 p/unit = 67	67 (GARAGES)
VISITOR:	0	67 DRIVE AISLES
BLOCK 14:		
R12 - APARTEMENTS	1.2 p/unit = 101	101 (UNDERGROUND)
VISITOR:	0.2 p/unit = 17	17 (UNDERGROUND)
N79 - RETAIL STORE:	3.4 p/100 m² GFA = 32	32 (EXTERIOR)
		TOTAL: 150
BLOCK 15:		
R12 - APARTEMENTS	1.2 p/unit = 100	100 (UNDERGROUND)
VISITOR:	0.2 p/unit = 17	17 (UNDERGROUND)
N79 - RETAIL STORE:	3.4 p/100 m² GFA = 32	32 (EXTERIOR)
		TOTAL: 150
BLOCK 18:		
R12 - APARTEMENTS	1.2 p/unit = 116	145 (UNDERGROUND)
VISITOR:	0.2 p/unit = 17	17 (8 EXT. + 12 UND.)
		TOTAL: 162
GROSS FLOOR AREA		
TOWNHOUSE A:		267 m²
TOWNHOUSE B:		239 m²
TOWNHOUSE C:		232 m²
TOWNHOUSE C (CORNER UNIT):		236 m²
TOWNHOUSE D:		225 m²
TOTAL MODEL 01 (ABBBBBBA)		1,968 m²
TOTAL MODEL 02 (ABBBBBA)		1,729 m²
TOTAL MODEL 03 (ABBBBA)		1,490 m²
TOTAL MODEL 04 (CDCDCDC)		1,611 m²
TOTAL MODEL 05 (CDCCDC)		1,386 m²
MIXED USE BUILDING (TOTAL OF 2 BUILDINGS):		TOTAL: 4,130 m²
RESIDENTIAL:		3,201 m²
COMMERCIAL:		929 m²
RESIDENTIAL APARTMENT BUILDING (TOTAL OF 4 BUILDINGS) :		TOTAL: 4,130 m²
RESIDENTIAL:		4,130 m²

NOTE

1. ASSUMES TYPICAL RESIDENTIAL FLOOR HEIGHT OF 3m.
2. THE BASE PLAN (LOT LINES, EXISTING ROADS AND SURROUNDING AREAS) IS BASED ON THE TOPOGRAPHICAL PLAN OF SURVEY, SURVEYED STANTEC GEOMATICS LTD.
3. DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0,3048.

PROJECT

NAVAN ROAD DEVELOPMENT

2983, Navan Road, Orleans, ON K1C 7G4

OWNER

GROUPE Heafey GROUP
768, BOUL. SAINT-JOSEPH, SUITE 100
GATINEAU, QC J8Y 4B8

ARCHITECTURAL

PMA ARCHITECTES
(418) 651-8954
INFO@PMAARCHITECTES.COM
3070, CHEMIN DES QUATRE-BOURGEOIS QUÉBEC (QC) G1W 2K4
PMAARCHITECTES.COM

LAPALME RHEAULT ARCHITECTES | ASSOCIÉS
53, BOUL. SAINT-RAYMOND, GATINEAU, QC J8Y 1R8

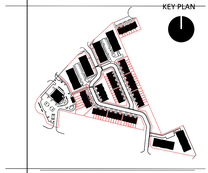
ENGINEERS / PLANNER

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
1565 CARLING AVENUE, SUITE 700, OTTAWA, ON K1Z 8R1

SURVEYOR

Stantec
1331 CLYDE AVENUE, SUITE 400, OTTAWA, ON K2C 3G4

KEY PLAN



ARCHITECT SEAL

REVISIONS

NO	DESCRIPTION	DATE
8	FOR CITY REVIEW	2022-11-28
7	FOR COORDINATION	2022-11-08
6	FOR COORDINATION	2022-11-01
5	FOR COORDINATION	2022-06-14
4	FOR COORDINATION	2021-11-01
3	FOR COORDINATION	2021-08-30
2	FOR COORDINATION	2021-08-26
1	FOR COORDINATION	2021-08-18

NOTE

DO NOT USE FOR CONSTRUCTION

DATE 2023-11-29	DESIGNED PP
	DRAWN PP
PROJECT No 20054	CHECKED PM

SHEET TITLE

SITE PLAN

SHEET No

A100

Table 1. Maximum flow to be considered from a given hydrant

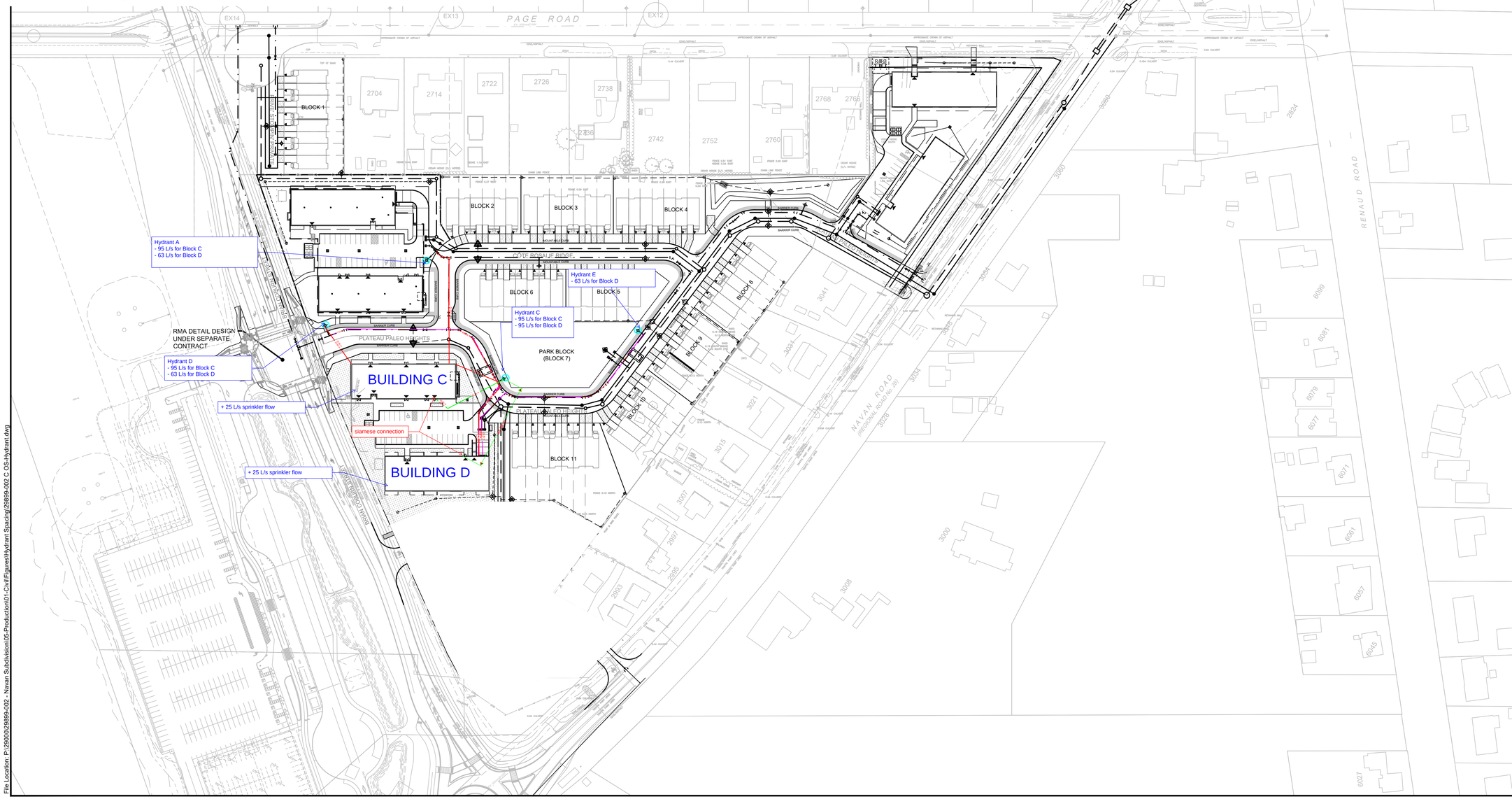
Hydrant Class	Distance to asset/structure/building (m)[a]	Contribution to required fire flow (L/min)[b]
AA	≤ 75	5,700
	> 75 and ≤ 150	3,800
A	≤ 75	3,800
	> 75 and ≤ 150	2,850
B	≤ 75	1,900
	> 75 and ≤ 150	1,500
C	≤ 75	800
	> 75 and ≤ 150	800

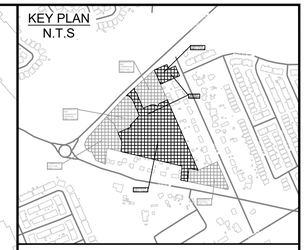
[a] Distance of contributing hydrant from the structure, measured in accordance with NFPA 1 (Appendix A).

[b] Maximum flow contribution to be considered for a given asset/structure/building, at a residual pressure of 20 psi, measured at the location of the main, at ground level.

Block 15

Required Fire Flow Building C = 200 L/s (
Required Fire Flow Building D = 233 L/s





LEGEND

- PROPOSED WATERMAIN, VALVE & HYDRANT
- EXISTING WATERMAIN, VALVE & HYDRANT
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED STORM SEWER & MANHOLE
- STEPPED FOOTING
- FIREWALL
- PROPOSED CULVERT
- DRAWING NUMBER
- RIP-RAP TO OPSD 810.010 (TYPE B)
- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN c/w ICD
- PROPOSED CATCH BASIN & LEAD
- PROPOSED TEE CATCHBASIN
- PROPOSED 3-WAY CATCHBASIN
- CONC. SIDEWALK
- ASPHALT
- INFILTRATION TRENCH
- TACTILE WALKING SURFACE INDICATOR (TWSI)
- SPEED HUMP PER CITY DETAIL R19

Draft Print

2024-06-20 8:32:39 AM

No.	ISSUE / REVISION	DD/MM/YY
04	RE-ISSUED TO CITY FOR ENGINEERING REVIEW (SECOND SUBMISSION)	04/03/24
03	RE-ISSUED TO CITY FOR ENGINEERING REVIEW (SECOND SUBMISSION)	16/02/24
02	ISSUED FOR MUNICIPAL CONSENT	09/02/24
01	ISSUED TO CITY FOR ENGINEERING REVIEW	22/09/23

VERIFY SHEET SIZE AND SCALES. THE BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:1000

CLIENT: Groupe Heafey

CONSULTANT: www.jlrichards.ca

J.L.Richards ENGINEERS • ARCHITECTS • PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

PROJECT NORTH

PROJECT:

NAVAN SUBDIVISION

2983, 3053, & 3079 NAVAN ROAD & 2690 PAGE ROAD
OTTAWA, ONTARIO

DRAWING:

OVERALL SERVICING

DESIGN: TR	
DRAWN: KT	DRAWING #: OS
CHECKED: KF	
JLR #: 29899-002	

File Location: P:\29000\29899-002 - Navan Subdivision\05-Production\01-Civil\Figures\Hydrant Spacing\29899-002 C OS-Hydrant.dwg

PLOT DATE: July 24, 2024 8:08:48 AM
CITY PLAN No. 18572 CITY FILE No. D07-16-21-0027

William Rugamba

From: William Rugamba
Sent: July 22, 2024 8:18 AM
To: William Rugamba
Subject: FW: Re-confirmation of Mechanical Items for Servicing Report

William Rugamba, M.Eng., B.A.Sc., EIT
Civil Engineering Graduate
Ottawa, ON
Work: 343-804-4374

From: Sarith Lopez <slopez@qmeengineering.com>
Sent: Wednesday, July 17, 2024 8:07 PM
To: Mahad Musse <mmusse@jlrichards.ca>; Chuck Clark <CWC@qmeengineering.com>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>
Subject: RE: Re-confirmation of Mechanical Items for Servicing Report

Hi Mahad,

All items below confirmed

Regards

Sarith López
Project Manager

9 Gurdwara Road, Unit 200
Ottawa, ON K2E 7X6
T: 613-366-4763 ext. 129
slopez@qmeengineering.com

From: Mahad Musse <mmusse@jlrichards.ca>
Sent: Tuesday, July 16, 2024 3:08 PM
To: Sarith Lopez <slopez@qmeengineering.com>; Chuck Clark <CWC@qmeengineering.com>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>
Subject: Re-confirmation of Mechanical Items for Servicing Report

Hi Sarith/Chuck,

Thank you for the information below and in our meetings. I understand all these items have been discussed before but we need to submit something as part of our report. Can you just re-confirm the following questions below and then we will attach your confirmation to the Report.

1. Please confirm that the sanitary service size of 200mm diameter for the Site Plan Blocks (Block 14, 15 and 17) is preferred by the mechanical engineer on file;

2. Please confirm that a sprinkler flow of 25 L/s can be assumed for the Site Plan Blocks (Block 14, 15 and 17) at this stage.

Thanks
Mahad

Mahad Musse, B.Eng., EIT
Civil Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-633-1501
mmusse@jlrichards.ca

William Rugamba

From: William Rugamba
Sent: July 15, 2024 4:00 PM
To: William Rugamba
Subject: FW: Navan Subdivision - Boundary Condition Request
Attachments: NavanSubdivision_Boundary Condition(4july2024).docx

William Rugamba, M.Eng., B.A.Sc., EIT
Civil Engineering Graduate
Ottawa, ON
Work: 343-804-4374

From: Polyak, Alex <alex.polyak@ottawa.ca>
Sent: Monday, July 15, 2024 10:12 AM
To: Mahad Musse <mmusse@jlrichards.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Armstrong, Justin <justin.armstrong@ottawa.ca>; Tatyana Roumie <troumie@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Good morning Mahad,

Please find the boundary conditions attached.

Regards,

Oleksandr (Alex) Polyak, B.Eng., C.E.T., P.Eng.
Project Manager, Infrastructure Approvals, Development Review East Branch | Gestionnaire de projet, Direction de l'examen des projets d'aménagement – Est.
Planning, Development and Building Services Department (PDBS) | Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB

City of Ottawa | Ville d'Ottawa
110 Laurier Ave., 4th Fl East, Ottawa ON K1P 1J1
Email: alex.polyak@ottawa.ca
Cell : 613-857-4380
www.Ottawa.ca

From: Mahad Musse <mmusse@jlrichards.ca>
Sent: July 12, 2024 1:31 PM
To: Polyak, Alex <alex.polyak@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Armstrong, Justin <justin.armstrong@ottawa.ca>; Tatyana Roumie <troumie@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Hi Alex,

Just wondering if you have a status update for the boundary conditions for Navan.

Thanks
Mahad

Mahad Musse, B.Eng., EIT
Civil Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-633-1501
mmusse@jlrichards.ca

From: Mahad Musse <mmusse@jlrichards.ca>
Sent: Wednesday, July 3, 2024 11:02 AM
To: Polyak, Alex <alex.polyak@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Armstrong, Justin <justin.armstrong@ottawa.ca>; Tatyana Roumie <troumie@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Good morning Alex,

As we discussed last week our Client is looking into the option of converting the row townhouse units into duplex units (townhouse units with apartments in the basement). As a result, this will increase the total demand on the site and we will therefore require new water boundary conditions. We'd like to note that the footprint of the blocks will not change and neither will their layout or any of the offsets.

As a summary:

- Domestic demands were calculated based on a daily consumption rate of 280 L/cap/day with peaking factors consistent with City of Ottawa Guidelines
- Required Fire Flow (RFF) was calculated in accordance to the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection and the City of Ottawa FUS protocol (Bulletin ISDTB-2014-02 & Bulletin ISDTB-2018-02), which considers material, expose distance & height. We have attached the calculation spreadsheet and the figure.

We request boundary conditions under high pressure, peak hour, and maximum day + fire flow conditions (for each of the below fire flows). Domestic demand and fire flow calculations are attached. Please provide the boundary conditions at the proposed connection locations as shown in the attached figure.

Average Day Demand: 6.74 L/s
Maximum Day Demand: 10.53 L/s
Peak Hour Demand: 18.17 L/s
Required Fire Flow (per FUS): 6,000 L/min (100 L/s)
Required Fire Flow (per FUS): 10,000 L/min (167 L/s)
Required Fire Flow (per FUS): 14,000 L/min (233 L/s)
Required Fire Flow (per FUS): 15,000 L/min (250 L/s)

For your reference, the previous boundary condition received from the City is attached and below is the email chain.

If you have any questions or comments please let us know.

Thanks
Mahad

Mahad Musse, B.Eng., EIT
Civil Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-633-1501
mmusse@jlrichards.ca

From: Polyak, Alex <alex.polyak@ottawa.ca>
Sent: Thursday, August 17, 2023 3:01 PM
To: William Rugamba <wrugamba@jlrichards.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Shahira Jalal <sjalal@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Hello William,

Sorry that I missed your call, I was in a meeting. The boundary conditions are attached.

Regards,

Oleksandr (Alex) Polyak, B.Eng., P.Eng
Project Manager, Infrastructure Approvals, Development Review East Branch | Gestionnaire de projet, Direction de l'examen des projets d'aménagement – Est.
Planning, Real Estate and Economic Development Department | Direction générale de la planification, des biens immobiliers et du développement économique

City of Ottawa | Ville d'Ottawa
110 Laurier Ave., 4th Fl East, Ottawa ON K1P 1J1
Email: alex.polyak@ottawa.ca
Cell : 613-857-4380
www.Ottawa.ca

From: William Rugamba <wrugamba@jlrichards.ca>
Sent: August 15, 2023 9:26 AM
To: Polyak, Alex <alex.polyak@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Shahira Jalal <sjalal@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Good morning Alex,

Just wanted to follow up on the status of this boundary request. Please let me know if you need anything else from us.

Thanks,
William

William Rugamba, M.Eng.
Civil Engineering Intern

J.L. Richards & Associates Limited
1000-343 Preston Street, Ottawa, ON K1S 1N4
Direct: 343-804-4374

From: Tatyana Roumie
Sent: Tuesday, July 25, 2023 3:53 PM
To: 'alex.polyak@ottawa.ca' <alex.polyak@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; carmine@zayoungroup.com; Shahira Jalal <sjalal@jlrichards.ca>
Subject: Navan Subdivision - Boundary Condition Request

Hello Alex.

To support our upcoming detailed design for the site, we are requesting updated boundary conditions for the 3079 Navan Road Development.

As a brief history, we received boundary conditions from the City in July 2021 (attached, but with incorrect connection locations) and again in April 2022 (also attached) in support of the functional servicing design. We understand from the April 2022 boundary conditions that the maximum available fire flow for the site is 250 L/s.

We are currently requesting updated boundary conditions for this site as we are commencing the detailed servicing design and this request will accommodate the recent site plan changes and proposed connection points. This request is also applicable to the upcoming site plan designs which will be submitted as separate applications.

We request boundary conditions under high pressure, peak hour, and maximum day + fire flow conditions (for each of the below fire flows). Domestic demand and fire flow calculations are attached. Please provide the boundary conditions at the proposed connection locations as shown in the attached figure.

Average Day Demand: 6.44 L/s
Maximum Day Demand: 9.77 L/s
Peak Hour Demand: 16.50 L/s
Required Fire Flow (per FUS): 6,000 L/min (100 L/s)
Required Fire Flow (per FUS): 10,000 L/min (167 L/s)
Required Fire Flow (per FUS): 14,000 L/min (233 L/s)
Required Fire Flow (per FUS): 15,000 L/min (250 L/s)

Thanks,
Tatyana

'

'
'

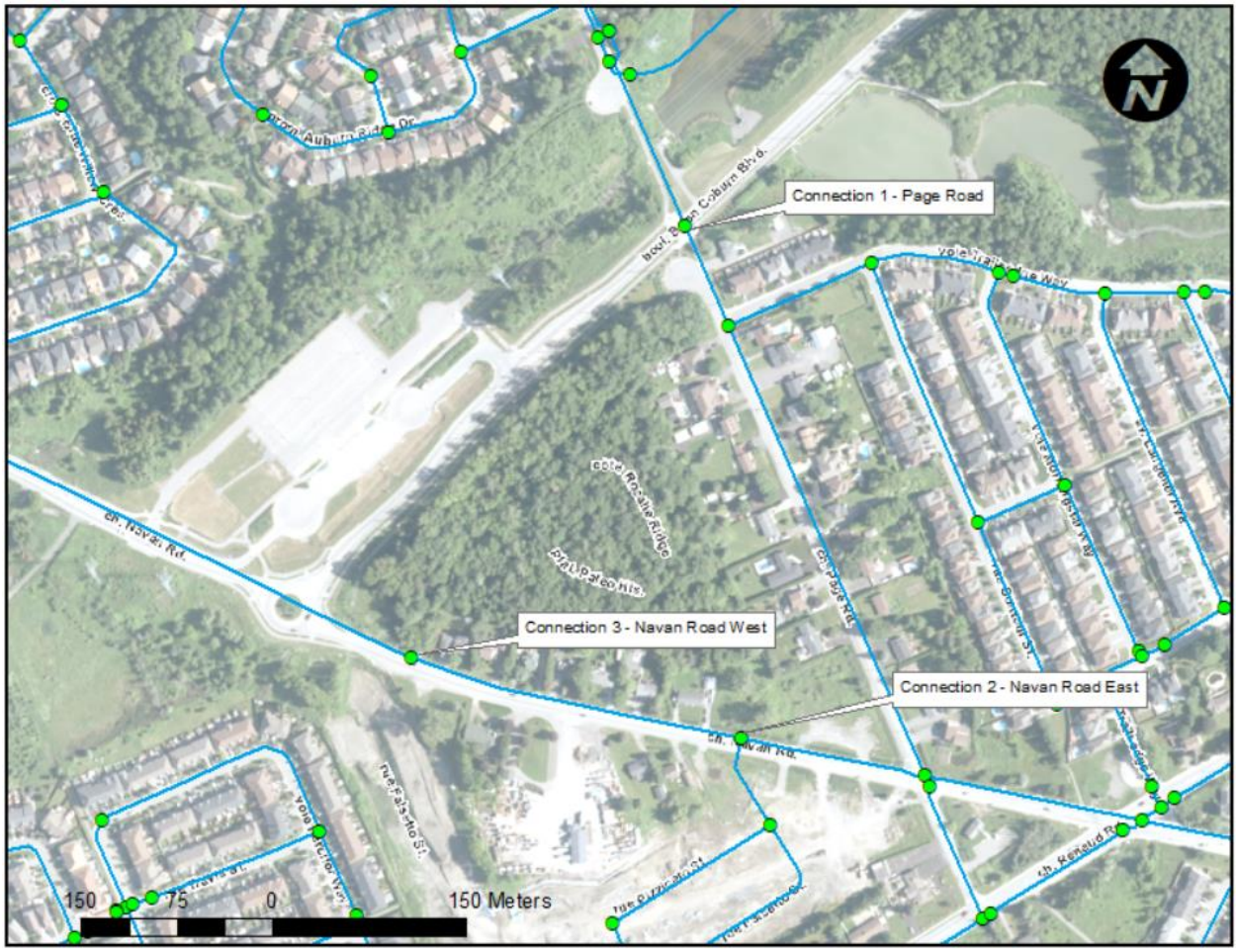
'

Boundary Conditions
Navan Subdivision

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	404	6.74
Maximum Daily Demand	632	10.53
Peak Hour	1,090	18.17
Fire Flow Demand #1	6,000	100.00
Fire Flow Demand #2	10,000	166.67
Fire Flow Demand #3	14,000	233.33
Fire Flow Demand #4	15,000	250.00

Location



Results

Connection 1 - Page Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.7	64.0
Peak Hour	127.0	58.6
Max Day plus Fire Flow #1	128.2	60.4
Max Day plus Fire Flow #2	126.8	58.3
Max Day plus Fire Flow #3	124.9	55.7
Max Day plus Fire Flow #4	124.4	55.0
[1] Ground Elevation =	85.7	m

Connection 2 - Navan Road East

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.7	71.4
Peak Hour	126.8	65.9
Max Day plus Fire Flow #1	127.7	67.1
Max Day plus Fire Flow #2	125.5	64.1
Max Day plus Fire Flow #3	122.7	60.1
Max Day plus Fire Flow #4	121.9	58.9
[1] Ground Elevation =	80.5	m

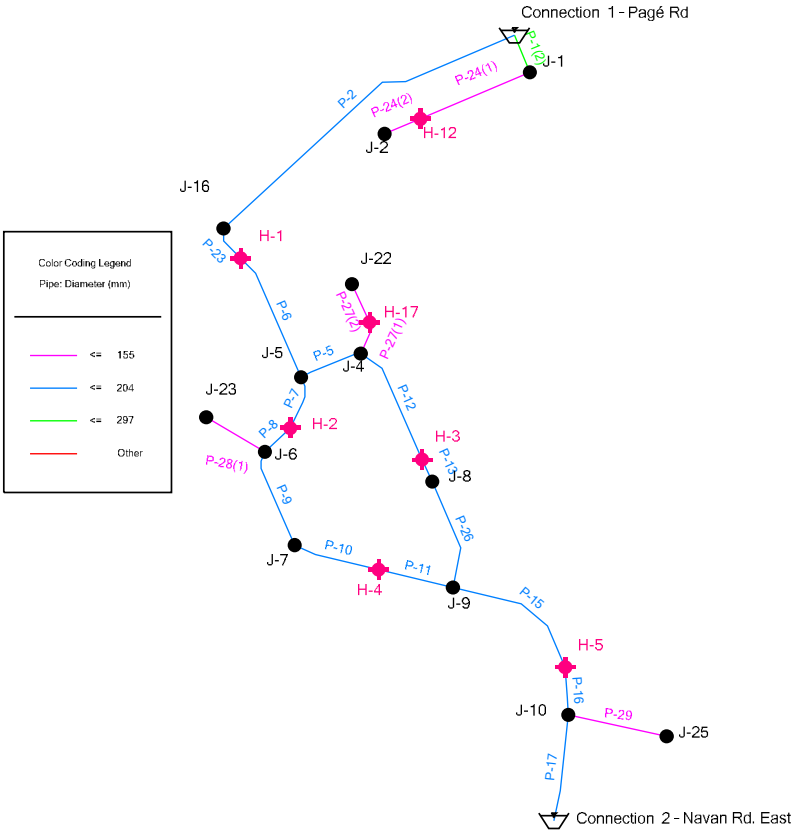
Connection 3 - Navan Road West

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.7	69.3
Peak Hour	126.8	63.8
Max Day plus Fire Flow #1	127.3	64.5
Max Day plus Fire Flow #2	124.6	60.6
Max Day plus Fire Flow #3	120.9	55.3
Max Day plus Fire Flow #4	119.8	53.8
[1] Ground Elevation =	81.9	m

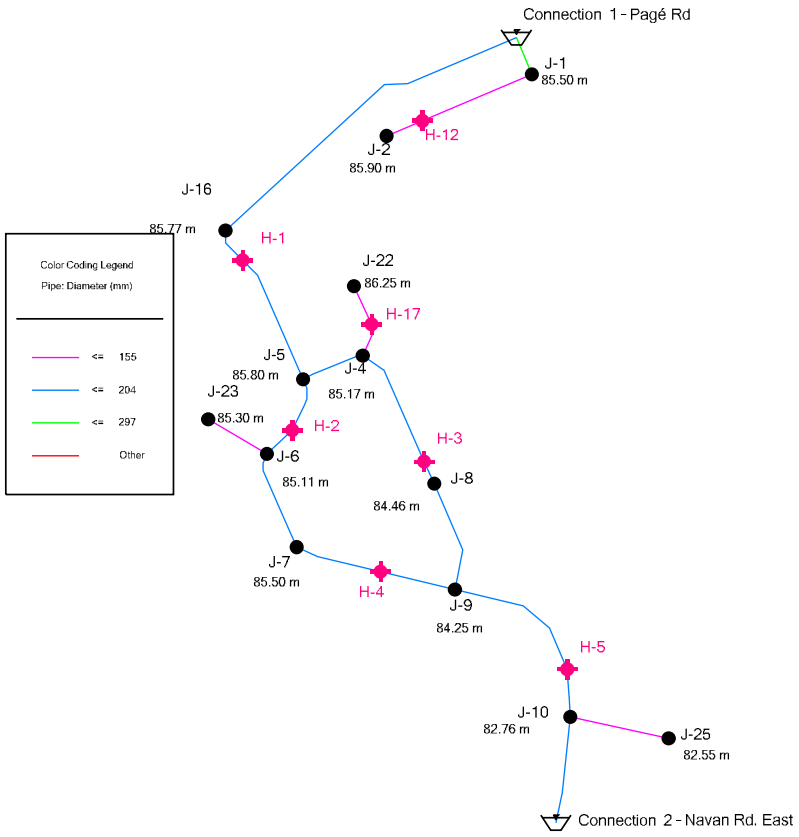
Disclaimer

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.

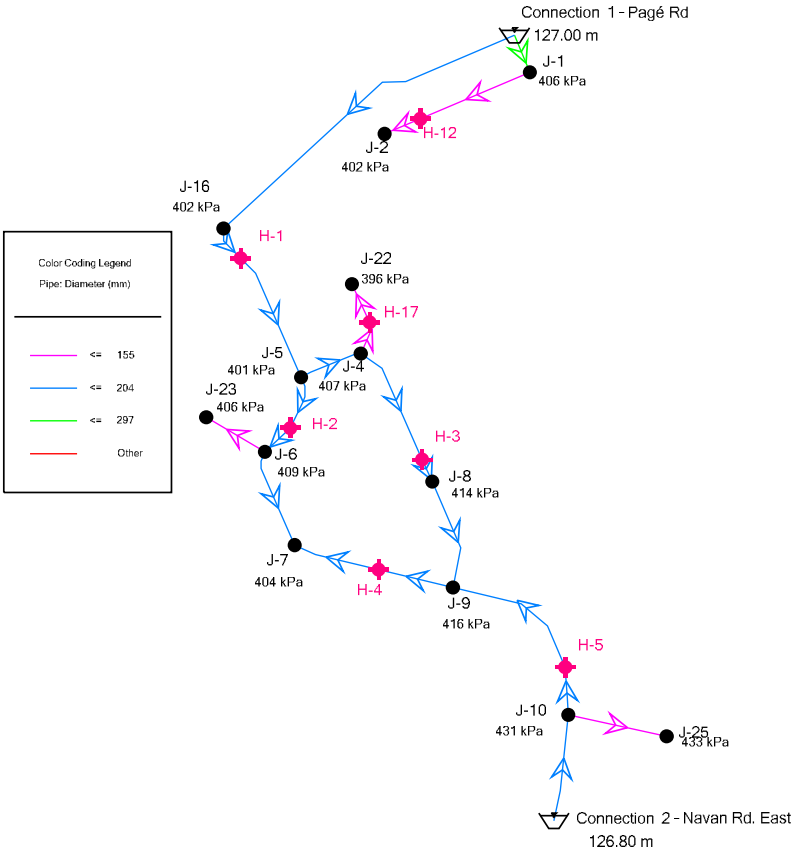
Mixed-Use Site Plan (Block 15)
Model Schematic



Mixed-Use Site Plan (Block 15)
Model Schematic
Elevation Model



Mixed-Use Site Plan (Block 15)
Peak Hour Demand



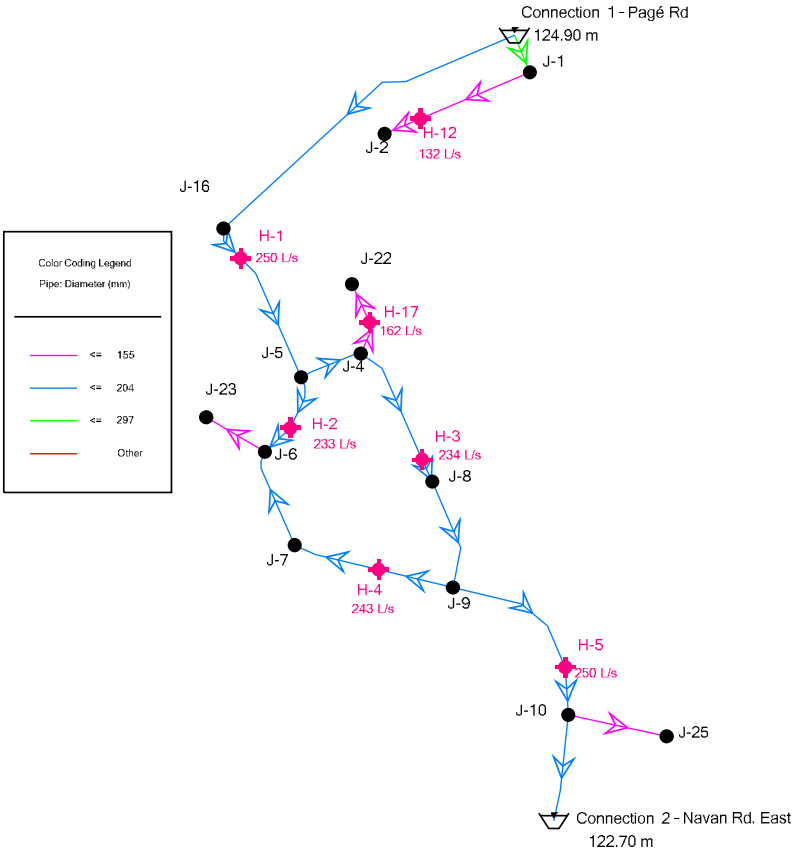
Mixed-Use Site Plan (Block 15)
Peak Hour Demand
Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-22	86.25	2.78	126.76	396
J-5	85.80	0.00	126.78	401
J-16	85.77	0.00	126.85	402
J-2	85.90	0.58	127.00	402
J-7	85.50	4.95	126.77	404
J-23	85.30	2.74	126.76	406
J-1	85.50	0.00	127.00	406
J-4	85.17	0.00	126.78	407
J-6	85.03	0.00	126.77	409
J-8	84.46	1.90	126.77	414
J-9	84.25	1.46	126.77	416
J-10	82.76	0.00	126.78	431
J-25	82.55	3.08	126.76	433

Mixed-Use Site Plan (Block 15)
Peak Hour Demand
Pipe Table

ID	Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
49	P-2	168	204	PVC	110.0	10	0.32
52	P-5	31	204	PVC	110.0	-5	0.15
82	P-6	64	204	PVC	110.0	-10	0.32
85	P-7	26	204	PVC	110.0	5	0.17
86	P-8	16	204	PVC	110.0	5	0.17
54	P-9	48	204	PVC	110.0	3	0.08
91	P-10	41	204	PVC	110.0	-2	0.07
92	P-11	36	204	PVC	110.0	-2	0.07
104	P-12	59	204	PVC	110.0	2	0.07
105	P-13	11	204	PVC	110.0	2	0.07
108	P-15	70	204	PVC	110.0	-3	0.10
109	P-16	23	204	PVC	110.0	-3	0.10
97	P-17	50	204	PVC	110.0	-6	0.20
110	P-23	17	204	PVC	110.0	10	0.32
129	P-24(1)	56	155	PVC	100.0	1	0.03
130	P-24(2)	18	155	PVC	100.0	1	0.03
123	P-26	53	204	PVC	110.0	0	0.01
154	P-27(1)	16	155	PVC	100.0	3	0.15
155	P-27(2)	20	155	PVC	100.0	3	0.15
171	P-28(1)	32	155	PVC	100.0	3	0.15
183	P-29	47	155	PVC	100.0	3	0.16

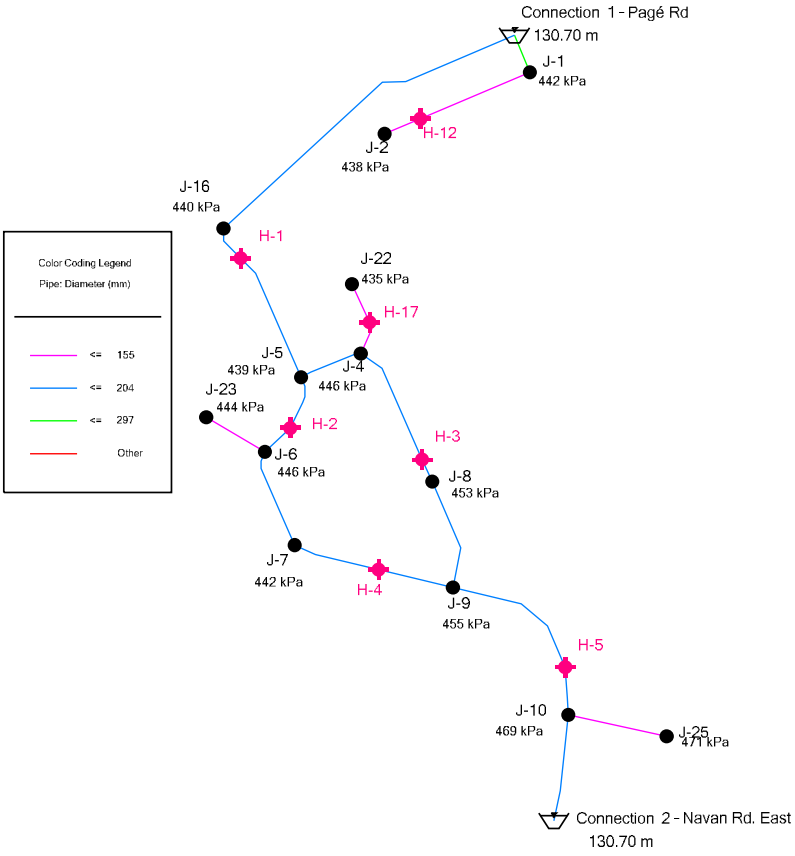
Mixed-Use Site Plan (Block 15)
Max Day + Fire Flow Requirement



Mixed-Use Site Plan (Block 15)
Max Day + Fire Flow Requirement
Hydrant Table

Label	Satisfies Fire Flow Constraints?	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated System Lower Limit) (kPa)	Junction w/ Minimum Pressure (System)
H-1	True	250	250	140	152	178	J-16
H-2	True	233	233	140	140	142	J-23
H-4	True	243	243	140	140	142	J-7
H-3	True	234	234	140	140	158	J-8
H-5	True	250	250	140	256	247	J-23
H-12	True	132	132	140	142	140	J-2
H-17	True	162	162	140	143	140	J-22

Mixed-Use Site Plan (Block 15)
Maximum Pressure Analysis



Mixed-Use Site Plan (Block 15)
Maximum Pressure Analysis
Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-22	86.25	0	130.70	435
J-2	85.90	0	130.70	438
J-5	85.80	0	130.70	439
J-16	85.77	0	130.70	440
J-7	85.50	0	130.70	442
J-1	85.50	0	130.70	442
J-23	85.30	0	130.70	444
J-4	85.17	0	130.70	446
J-6	85.11	0	130.70	446
J-8	84.46	0	130.70	453
J-9	84.25	0	130.70	455
J-10	82.76	0	130.70	469
J-25	82.55	0	130.70	471

Mixed-Use Site Plan (Block 15)
Maximum Pressure Analysis
Pipe Table

ID	Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
114	P-1(2)	19	297	PVC	120.0	0	0.00
49	P-2	168	204	PVC	110.0	0	0.00
52	P-5	31	204	PVC	110.0	0	0.00
82	P-6	64	204	PVC	110.0	0	0.00
85	P-7	26	204	PVC	110.0	0	0.00
86	P-8	16	204	PVC	110.0	0	0.00
54	P-9	48	204	PVC	110.0	0	0.00
91	P-10	41	204	PVC	110.0	0	0.00
92	P-11	36	204	PVC	110.0	0	0.00
104	P-12	59	204	PVC	110.0	0	0.00
105	P-13	11	204	PVC	110.0	0	0.00
108	P-15	70	204	PVC	110.0	0	0.00
109	P-16	23	204	PVC	110.0	0	0.00
97	P-17	50	204	PVC	110.0	0	0.00
110	P-23	17	204	PVC	110.0	0	0.00
129	P-24(1)	56	155	PVC	100.0	0	0.00
130	P-24(2)	18	155	PVC	100.0	0	0.00
123	P-26	53	204	PVC	110.0	0	0.00
154	P-27(1)	16	155	PVC	100.0	0	0.00
155	P-27(2)	20	155	PVC	100.0	0	0.00
171	P-28(1)	32	155	PVC	100.0	0	0.00
183	P-29	47	155	PVC	100.0	0	0.00

Appendix D

Stormwater Management

JLR NO. 29899-002 (NAVAN BLOCK 15)

PIPE REACH																																						
			C-Factor (1:2							Peak Flow Estimation											Sewer Data									Upstream Geometry				Downstream Geometry				Self Cleansing Velocities		
LOCATION	From MH	To MH	0.20	0.90	Total Area (ha)	Add. Area from Upstream (ha)	Cum. Total Area (ha)	Inlet Time (min.)	In Pipe Flow Time (min)	Total Time	1:2 Year Storm (RATIONAL METHOD) 2.78AR	Add. 2.78AR From Upstream	Cum. 2.78AR	1:2 Year Intensity (mm/hr)	1:2 Year Peak Flow (L/s)	PLUG FLOWS ICD Flow (1) EX STM STUB 16 (L/s)	85 L/s/ha Controlled Flow (2) (L/s)	ICD Flow (2) CB 112 (L/s)	Roof Drain Flow (4) (L/s)	Cistern Flow (4) (L/s)	Total Peak Flow (6) (L/s)	Type	Nominal Dia. (mm)	Actual Dia. (mm)	Slope	Length (m)	Q Full (L/s)	V Full (m/s)	Residual Capacity (7) (L/s)	% Full	TG From	Obvert	Invert	Cover	TG To	Obvert	Invert	Cover	Q/Qf Ratio	Flow Depth (mm)	Actual Velocity (8) (m/s)	Flow Depth to Dia. Ratio (d/D)
EAST ORLEANS RIDGE SUBDIVISION / GAS BAR SITE PLAN (BLOCK 16)	UPSTREAM GAS STATION (9)	EXST MH514	0.062	0.037	0.07	1.04	1.11	10.00	0.83	10.83	0.05	2.29	2.34	76.81	180.11	68.00	47.00	10.00			125.00	CONCRETE	525	533.40	0.25%	50.20	224.33	1.00	44.22	80%	85.30	81.48	80.95	3.82	84.93	81.35	80.82	3.58	0.56	294.30	1.03	0.53
BLOCK 15	BLOCK 15	ST MH515	0.086	0.341	0.43		0.43	10.00	0.04	10.04	0.90		0.90	76.81	69.24				4.00	29.00	33.00	PVC	300	324.80	2.00%	5.20	142.67	1.96	72.42	49%	85.85	81.49	81.18	4.36	85.75	81.38	81.08	4.37	0.23	99.67	1.69	0.33
EAST ORLEANS RIDGE SUBDIVISION	ST MH515	EXST MH514					0.43	10.04	0.20	10.24	0.00		0.90	76.64	68.09						33.00	CONCRETE	450	457.20	0.25%	10.60	148.72	0.93	79.83	46%	85.75	81.38	80.93	4.37	84.90	81.36	80.90	3.94	0.22	146.30	0.73	0.33
EAST ORLEANS RIDGE SUBDIVISION	UPSTREAM SUBDIVISION (9)	EXST MH514				0.15	0.15	10.12	0.38	10.50	0.00	0.28	0.28	76.35	21.01		12.00				12.00	PVC	250	264.00	1.50%	34.15	75.98	1.50	64.97	20%												
			Refer to Note 9																																Refer to Note 9						
EAST ORLEANS RIDGE SUBDIVISION	EXST MH514	EXST MH512				0.27	1.96	10.83	0.55	11.39	0.00	0.58	4.10	73.75	302.49		34.00				204.00	CONCRETE	600	609.60	0.35%	42.98	378.96	1.30	76.47	80%												

Design Parameters (Per OSDG)	
Manning's Coefficient =	0.013
1:2 Year Intensity =	732.951 / (Tc + 6.199)^0.810

Note: Tc is the time of concentration in minutes

Drainage Areas Breakdown

Total Site Area:	0.54 ha	
Controlled Area Within Site Property Line:	0.497 ha	
Existing Areas Captured Within Site:	0.003 ha	
Total Captured Areas:	0.500 ha →	This area is part of the total site area (0.54 ha)
Uncontrolled Area - Outlet to Subdivision:	0.04 ha →	This area is part of the total site area (0.54 ha)
Additional Areas from Upstream Runs	1.46 ha →	This area is gas station (0.62) + rear yard subdivision (0.18) + roadway subvision (0.27) + roadway subdivision (0.15) + easement subdivision (0.04)
Total Area from MH514 to MH512 on Subdivision Design Sheet	1.96 ha →	This area is the sum of the Block 15 captured areas (0.50 ha) and the upstream areas (1.46 ha)

Notes on Plug Flows

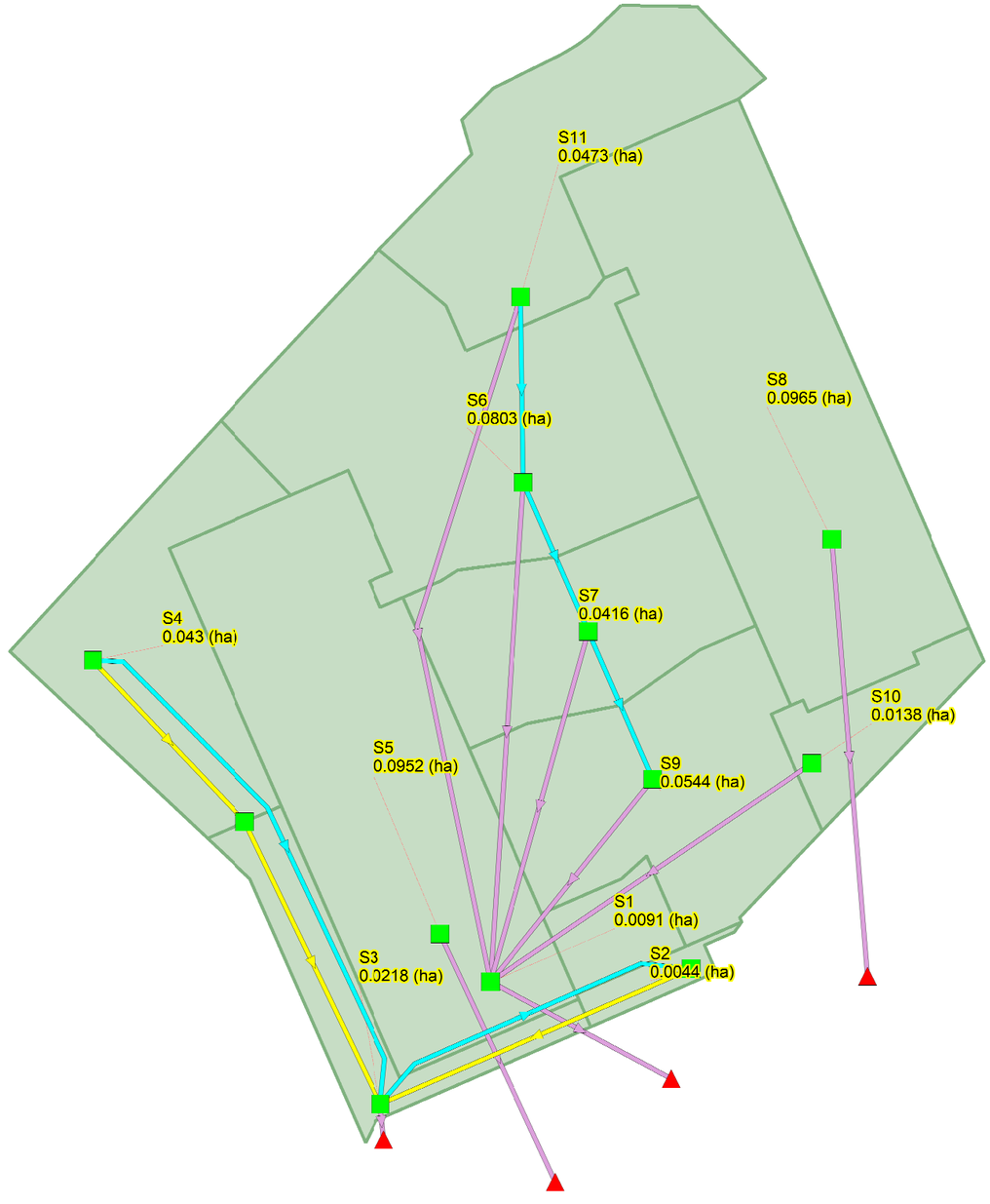
(1) Flow rate controlled downstream of EXST MH516 as part of the Gas Bar (Block 16)
(2) Flow rate controlled by Subdivision at 85 L/s/ha
(3) ICD Flow Rate at CB112
(4) Total flow rates of roof drains for Buildings C and D
(5) Cistern Outflow Rate

Notes on Peak Flow and Pipe Sizing

(6) Peak flows are equal to the allowable release rate for Block 15 (43 L/s), gas station controlled flow (65.09 L/s), roadway controlled flow (23 L/s and 26 L/s), rear yard controlled flow (12 L/s)
(7) Pipes are conservatively sized for 1:2 Year Peak Flow Rate
(8) Actual Velocities based on actual peak flows from Note 5
(9) Details from Existing Sewers Upstream of EXST MH526 can be found within East Orleans Ridge Subdivision Design Sheet. This line is only used to carry over the upstream values for time of concentration and 1:2 year peak flow

REAR YARD CATCH BASIN TABLE

Street Name	CB ID Number	T/G	Inlet				Outlet			COVER (m)	1:100 Yr Restricted Capture Rate (L/s)	CATCH BASIN TYPE	ICD TYPE
			Pipe Dia. (mm)	Pipe Length (m)	Slope	Invert	Pipe Dia. (mm)	Pipe Length (m)	Invert				
BLOCK 15	CB113	85.15	-	-	-	-	150	31.32	83.55	1.45	-	-	NO ICD
	CB110	85.30	-	-	-	-	150	20.47	83.75	1.40	-	-	NO ICD
	CB111	85.60	150	20.47	0.8%	83.59	150	28.91	83.59	1.86	-	-	NO ICD
	CB112 (NE)	85.20	150	31.32	0.6%	83.36	150	4.21	83.28	1.69	10.00	600 mm x 600 mm CATCH BASIN PER OPSD 705.010	Vortex_ICD_95
	CB112 (NW)	85.20	150	28.91	0.8%	83.34							



Legend

- Outfalls
- Storages
- Conduits
- Weirs
- Outlets
- Subcatchments

N

150 m

PROJECT:

NAVAN RESIDENTIAL AND COMMERCIAL SITE PLAN - BLOCK 15
Ottawa, ON

DRAWING:

Overall System Model Schematic

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	ML	JLR NO.:	29899-002
DRAWN:	ML	DRAWING NO.:	Figure 1
CHECKED:	BP		

PROJECT:

NAVAN RESIDENTIAL AND COMMERCIAL BLOCK 15

OTTAWA, ONTARIO

DRAWING:

OVERALL SITE IMPERVIOUSNESS

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

DESIGN: ML

DRAWN: ML

CHECKED: BP

JLR NO: 29899-002

DRAWING NO: **Figure**

Post-Development 3-hour Chicago 1:2 year Event

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:00:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:00:00
END_DATE             01/01/2000
END_TIME             06:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         5
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              12

[EVAPORATION]
;;Data Source    Parameters
;;--------------- ----------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
Rainfall         INTENSITY 0:10     1.0      TIMESERIES 3CHI002

[SUBCATCHMENTS]
;;Name           Rain Gage         Outlet           Area     %Imperv  Width    %Slope
CurbLen  SnowPack
;;-------------- ----------------- ---------------- -------- -------- -------- -------
---- ----------
S1               Rainfall          St_UnGrd         0.0091   100      6.1      15       0
S10              Rainfall          CB118            0.0138   8.79     28.998   1        0
S11              Rainfall          CB114            0.0473   18.805   70.001   2        0
S2               Rainfall          CB113            0.0044   0.002    4.3      1.9      0
S3               Rainfall          CB112            0.0218   17.802   75       1        0
S4               Rainfall          CB110            0.043    8.51     52.001   3.5      0
S5               Rainfall          Roof_1           0.0952   99.998   104.996  1        0
S6               Rainfall          CB115            0.0803   66.775   45.001   2.5      0
S7               Rainfall          CB116            0.0416   90.416   28.601   2.7      0
S8               Rainfall          Roof_2           0.0965   100      105.005  1        0
S9               Rainfall          CB117            0.0544   93.568   50       2.4      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
--
S1               0.013      0.25       1.57       4.67       0          OUTLET
S10              0.013      0.25       1.57       4.67       0          PERVIOUS   100
S11              0.013      0.25       1.57       4.67       0          PERVIOUS   100
S2               0.013      0.25       1.57       4.67       0          OUTLET
S3               0.013      0.25       1.57       4.67       0          PERVIOUS   100
S4               0.013      0.25       1.57       4.67       0          PERVIOUS   100
S5               0.013      0.25       1.57       4.67       0          OUTLET
S6               0.013      0.25       1.57       4.67       0          OUTLET
S7               0.013      0.25       1.57       4.67       0          OUTLET
S8               0.013      0.25       1.57       4.67       0          OUTLET
S9               0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
S1               76.2       13.2       4.14       7          0
S10              76.2       13.2       4.14       7          0
S11              76.2       13.2       4.14       7          0
S2               76.2       13.2       4.14       7          0
S3               76.2       13.2       4.14       7          0
S4               76.2       13.2       4.14       7          0
S5               76.2       13.2       4.14       7          0
S6               76.2       13.2       4.14       7          0
S7               76.2       13.2       4.14       7          0
S8               76.2       13.2       4.14       7          0
S9               76.2       13.2       4.14       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OP4              80.628     FIXED      81.11            NO
OP7              80.628     FIXED      81.11            NO
STUB15           80.628     FIXED      81.11            NO
STUB16           80.646     FIXED      81.28            NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape       Curve Name/Params
SurDepth Fevap    Psi      Ksat       IMD
;;-------------- -------- ---------- ---------- ----------- ---------------------------- --
------ --------- -------- -------- ---------
CB110            83.75    1.9        0          TABULAR     CB110                        0
0
CB111            83.59    2.01       0          TABULAR     CB111                        0
0
CB112            83.28    2.12       0          TABULAR     CB112                        0
0
CB113            83.55    1.7        0          TABULAR     CB113                        0
0
CB114            85.3     0.25       0          TABULAR     CB114                        0
0
CB115            85.25    0.31       0          TABULAR     CB115                        0
0
CB116            85.2     0.4        0          TABULAR     CB116                        0
0
CB117            85.15    0.15       0          TABULAR     CB117                        0
0
CB118            85.22    0.18       0          TABULAR     CB118                        0
0
Roof_1           96.35    0.15       0          FUNCTIONAL  0          0          635       0
0
Roof_2           96.35    0.15       0          FUNCTIONAL  0          0          643       0
0
St_UnGrd         81.8     1          0          FUNCTIONAL  0          0          49        0
0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
--- ---------- ----------
C1               CB111            CB112            28.913     0.013      83.59      83.34
0          0.08
C3               CB113            CB112            31.317     0.013      83.55      83.36
0          0.04
C5               CB110            CB111            20.475     0.013      83.75      83.59
0          0.04

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated
EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------- ---------- ---------- ---------- ---------- -----
--- --------- --------- ---------- ---------- ----------------
W1               CB115            CB116            TRANSVERSE   85.45      1.84       NO
0          0         NO
W2               CB116            CB117            TRANSVERSE   85.35      1.84       NO
0          0         NO
W3               CB112            CB113            TRANSVERSE   85.38      1.84       NO
0          0         NO
W4               CB114            CB115            TRANSVERSE   85.5       1.84       NO
0          0         NO
W5               CB110            CB112            TRANSVERSE   85.6       1.84       NO
0          0         NO

[OUTLETS]
;;Name           From Node        To Node          Offset     Type
QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- ---------------- ----------
---- ---------- --------
C2               CB112            STUB16           83.28      TABULAR/HEAD
Vortex_ICD_95                NO
OL1              CB115            St_UnGrd         85.25      TABULAR/HEAD     ZURN_Z150F-
6NH              NO
OL2              CB116            St_UnGrd         85.2       TABULAR/HEAD     ZURN_Z150F-
6NH              NO
OL3              CB117            St_UnGrd         85.15      TABULAR/HEAD     ZURN_Z150F-
6NH              NO
OL4              Roof_1           STUB15           96.35      TABULAR/HEAD     O_Roof1
NO
OL5              Roof_2           OF4              96.35      TABULAR/HEAD     O_Roof1
NO
OL6              CB114            St_UnGrd         85.3       TABULAR/HEAD     ZURN_Z150F-
6NH              NO
OL7              St_UnGrd         OF7              81.8       TABULAR/HEAD     O_St_UnGrd
NO
OL8              CB118            St_UnGrd         85.22      TABULAR/HEAD     ZURN_Z150F-
6NH              NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
----------
C1               CIRCULAR     0.15             0          0          0          1
C3               CIRCULAR     0.15             0          0          0          1
C5               CIRCULAR     0.15             0          0          0          1
W1               RECT_OPEN    0.11             17.1       0          0
W2               RECT_OPEN    0.25             17.1       0          0
W3               RECT_OPEN    0.02             4.58       0          0
W4               RECT_OPEN    0.05             7          0          0
W5               RECT_OPEN    0.05             3.487      0          0

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline
Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- ----
-----
St_UnGrd         FLOW             InfiltratedInflow FLOW     1.0      1        0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
;Tempest Rating Curve for MHF IPEX TYPE A, No grate allowance
MHF_IPEX_TYPE_A  Rating     0          0
MHF_IPEX_TYPE_A              0.1        0.0057
MHF_IPEX_TYPE_A              0.2        0.0081
MHF_IPEX_TYPE_A              0.3        0.0099
MHF_IPEX_TYPE_A              0.4        0.0114
MHF_IPEX_TYPE_A              0.5        0.0128
MHF_IPEX_TYPE_A              0.6        0.014
MHF_IPEX_TYPE_A              0.7        0.0151
MHF_IPEX_TYPE_A              0.8        0.0162
MHF_IPEX_TYPE_A              0.9        0.0172
MHF_IPEX_TYPE_A              1          0.0181
MHF_IPEX_TYPE_A              1.2        0.0198
MHF_IPEX_TYPE_A              1.4        0.0214
MHF_IPEX_TYPE_A              1.6        0.0229
MHF_IPEX_TYPE_A              1.8        0.0243
MHF_IPEX_TYPE_A              2          0.0256
MHF_IPEX_TYPE_A              2.5        0.0286
MHF_IPEX_TYPE_A              3          0.0313

;Tempest Rating Curve for MHF IPEX TYPE B, No grate allowance
MHF_IPEX_TYPE_B  Rating     0          0
MHF_IPEX_TYPE_B              0.1        0.0081
MHF_IPEX_TYPE_B              0.2        0.0115
MHF_IPEX_TYPE_B              0.3        0.0141
MHF_IPEX_TYPE_B              0.4        0.0162
MHF_IPEX_TYPE_B              0.5        0.0182
MHF_IPEX_TYPE_B              0.6        0.0199
MHF_IPEX_TYPE_B              0.7        0.0215
MHF_IPEX_TYPE_B              0.8        0.023
MHF_IPEX_TYPE_B              0.9        0.0244
MHF_IPEX_TYPE_B              1          0.0257
MHF_IPEX_TYPE_B              1.2        0.0281
MHF_IPEX_TYPE_B              1.4        0.0304
MHF_IPEX_TYPE_B              1.6        0.0325
MHF_IPEX_TYPE_B              1.8        0.0344
MHF_IPEX_TYPE_B              2          0.0363
MHF_IPEX_TYPE_B              2.5        0.0406
MHF_IPEX_TYPE_B              3          0.0445

;Tempest Rating Curve for MHF IPEX TYPE C, No grate allowance
MHF_IPEX_TYPE_C  Rating     0          0
MHF_IPEX_TYPE_C              0.1        0.0106
MHF_IPEX_TYPE_C              0.2        0.015
MHF_IPEX_TYPE_C              0.3        0.0183
MHF_IPEX_TYPE_C              0.4        0.0212
MHF_IPEX_TYPE_C              0.5        0.0237
MHF_IPEX_TYPE_C              0.6        0.0259
MHF_IPEX_TYPE_C              0.7        0.028
MHF_IPEX_TYPE_C              0.8        0.0299
MHF_IPEX_TYPE_C              0.9        0.0317
MHF_IPEX_TYPE_C              1          0.0335
MHF_IPEX_TYPE_C              1.2        0.0366
MHF_IPEX_TYPE_C              1.4        0.0396
MHF_IPEX_TYPE_C              1.6        0.0423
MHF_IPEX_TYPE_C              1.8        0.0449
MHF_IPEX_TYPE_C              2          0.0473
MHF_IPEX_TYPE_C              2.5        0.0529
MHF_IPEX_TYPE_C              3          0.0579

;Tempest Rating Curve for MHF IPEX TYPE D, No grate allowance
MHF_IPEX_TYPE_D  Rating     0          0
MHF_IPEX_TYPE_D              0.1        0.0154
MHF_IPEX_TYPE_D              0.2        0.0217
MHF_IPEX_TYPE_D              0.3        0.0266
MHF_IPEX_TYPE_D              0.4        0.0307
MHF_IPEX_TYPE_D              0.5        0.0343
MHF_IPEX_TYPE_D              0.6        0.0376
MHF_IPEX_TYPE_D              0.7        0.0406
MHF_IPEX_TYPE_D              0.8        0.0434
```

```
MHF_IPEX_TYPE_D             0.9         0.0461
MHF_IPEX_TYPE_D             1           0.0485
MHF_IPEX_TYPE_D             1.2         0.0532
MHF_IPEX_TYPE_D             1.4         0.0574
MHF_IPEX_TYPE_D             1.6         0.0614
MHF_IPEX_TYPE_D             1.8         0.0651
MHF_IPEX_TYPE_D             2           0.0687
MHF_IPEX_TYPE_D             2.5         0.0768
MHF_IPEX_TYPE_D             3           0.0841

;Tempest Rating Curve for MHF IPEX TYPE E, No grate allowance
MHF_IPEX_TYPE_E  Rating      0           0
MHF_IPEX_TYPE_E             0.1         0.0205
MHF_IPEX_TYPE_E             0.2         0.0289
MHF_IPEX_TYPE_E             0.3         0.0355
MHF_IPEX_TYPE_E             0.4         0.0409
MHF_IPEX_TYPE_E             0.5         0.0458
MHF_IPEX_TYPE_E             0.6         0.0501
MHF_IPEX_TYPE_E             0.7         0.0542
MHF_IPEX_TYPE_E             0.8         0.0579
MHF_IPEX_TYPE_E             0.9         0.0614
MHF_IPEX_TYPE_E             1           0.0647
MHF_IPEX_TYPE_E             1.2         0.0709
MHF_IPEX_TYPE_E             1.4         0.0766
MHF_IPEX_TYPE_E             1.6         0.0819
MHF_IPEX_TYPE_E             1.8         0.0868
MHF_IPEX_TYPE_E             2           0.0915
MHF_IPEX_TYPE_E             2.5         0.1023
MHF_IPEX_TYPE_E             3           0.1121

O_Roof1          Rating     0           0
O_Roof1                     0.001       0.002
O_Roof1                     0.15        0.002

O_Roof2          Rating     0           0
O_Roof2                     0.001       0.0025
O_Roof2                     0.15        0.0025

O_St_UnGrd       Rating     0           0
O_St_UnGrd                  0.01        0.029
O_St_UnGrd                  1           0.029

;Tempest Rating Curve for Vortex ICD 100, No grate allowance
Vortex_ICD_100   Rating      0           0
Vortex_ICD_100              0.1         0.0028
Vortex_ICD_100              0.2         0.004
Vortex_ICD_100              0.3         0.0049
Vortex_ICD_100              0.4         0.0056
Vortex_ICD_100              0.5         0.0063
Vortex_ICD_100              0.6         0.0069
Vortex_ICD_100              0.7         0.0075
Vortex_ICD_100              0.8         0.008
Vortex_ICD_100              0.9         0.0085
Vortex_ICD_100              1           0.0089
Vortex_ICD_100              1.2         0.0098
Vortex_ICD_100              1.4         0.0106
Vortex_ICD_100              1.6         0.0113
Vortex_ICD_100              1.8         0.012
Vortex_ICD_100              2           0.0126
Vortex_ICD_100              2.5         0.0141
Vortex_ICD_100              3           0.0155

;Tempest Rating Curve for Vortex ICD 105, No grate allowance
Vortex_ICD_105   Rating      0           0
Vortex_ICD_105              0.1         0.0031
Vortex_ICD_105              0.2         0.0044
Vortex_ICD_105              0.3         0.0054
Vortex_ICD_105              0.4         0.0062
Vortex_ICD_105              0.5         0.0069
Vortex_ICD_105              0.6         0.0076
Vortex_ICD_105              0.7         0.0082
Vortex_ICD_105              0.8         0.0088
Vortex_ICD_105              0.9         0.0093
Vortex_ICD_105              1           0.0098
Vortex_ICD_105              1.2         0.0107
Vortex_ICD_105              1.4         0.0116
Vortex_ICD_105              1.6         0.0124
Vortex_ICD_105              1.8         0.0131
Vortex_ICD_105              2           0.0139
Vortex_ICD_105              2.5         0.0155
Vortex_ICD_105              3           0.017

;Tempest Rating Curve for Vortex ICD 40, No grate allowance
Vortex_ICD_40    Rating      0           0
Vortex_ICD_40               0.1         0.0004
Vortex_ICD_40               0.2         0.0006
Vortex_ICD_40               0.3         0.0007
Vortex_ICD_40               0.4         0.0009
Vortex_ICD_40               0.5         0.001
Vortex_ICD_40               0.6         0.001
Vortex_ICD_40               0.7         0.0011
Vortex_ICD_40               0.8         0.0012
Vortex_ICD_40               0.9         0.0013
Vortex_ICD_40               1           0.0014
Vortex_ICD_40               1.2         0.0015
Vortex_ICD_40               1.4         0.0016
Vortex_ICD_40               1.6         0.0017
Vortex_ICD_40               1.8         0.0018
Vortex_ICD_40               2           0.0019
Vortex_ICD_40               2.5         0.0022
Vortex_ICD_40               3           0.0024

;Tempest Rating Curve for Vortex ICD 45, No grate allowance
Vortex_ICD_45    Rating      0           0
Vortex_ICD_45               0.1         0.0006
Vortex_ICD_45               0.2         0.0008
Vortex_ICD_45               0.3         0.001
Vortex_ICD_45               0.4         0.0011
Vortex_ICD_45               0.5         0.0013
Vortex_ICD_45               0.6         0.0014
Vortex_ICD_45               0.7         0.0015
Vortex_ICD_45               0.8         0.0016
Vortex_ICD_45               0.9         0.0017
Vortex_ICD_45               1           0.0018
Vortex_ICD_45               1.2         0.002
Vortex_ICD_45               1.4         0.0021
Vortex_ICD_45               1.6         0.0023
Vortex_ICD_45               1.8         0.0024
Vortex_ICD_45               2           0.0026
Vortex_ICD_45               2.5         0.0029
Vortex_ICD_45               3           0.0031

;Tempest Rating Curve for Vortex ICD 50, No grate allowance
Vortex_ICD_50    Rating      0           0
Vortex_ICD_50               0.1         0.0007
Vortex_ICD_50               0.2         0.001
Vortex_ICD_50               0.3         0.0012
Vortex_ICD_50               0.4         0.0014
Vortex_ICD_50               0.5         0.0016
Vortex_ICD_50               0.6         0.0018
Vortex_ICD_50               0.7         0.0019
Vortex_ICD_50               0.8         0.002
Vortex_ICD_50               0.9         0.0021
Vortex_ICD_50               1           0.0023
Vortex_ICD_50               1.2         0.0025
Vortex_ICD_50               1.4         0.0027
Vortex_ICD_50               1.6         0.0029
Vortex_ICD_50               1.8         0.003
Vortex_ICD_50               2           0.0032
Vortex_ICD_50               2.5         0.0036
Vortex_ICD_50               3           0.0039

;Tempest Rating Curve for Vortex ICD 55, No grate allowance
Vortex_ICD_55    Rating      0           0
Vortex_ICD_55               0.1         0.0009
Vortex_ICD_55               0.2         0.0012
Vortex_ICD_55               0.3         0.0015
Vortex_ICD_55               0.4         0.0017
Vortex_ICD_55               0.5         0.0019
Vortex_ICD_55               0.6         0.0021
Vortex_ICD_55               0.7         0.0023
Vortex_ICD_55               0.8         0.0024
Vortex_ICD_55               0.9         0.0026
Vortex_ICD_55               1           0.0027
Vortex_ICD_55               1.2         0.003
Vortex_ICD_55               1.4         0.0032
Vortex_ICD_55               1.6         0.0034
Vortex_ICD_55               1.8         0.0036
Vortex_ICD_55               2           0.0038
Vortex_ICD_55               2.5         0.0043
Vortex_ICD_55               3           0.0047

;Tempest Rating Curve for Vortex ICD 60, No grate allowance
Vortex_ICD_60    Rating      0           0
Vortex_ICD_60               0.1         0.0011
Vortex_ICD_60               0.2         0.0015
Vortex_ICD_60               0.3         0.0018
Vortex_ICD_60               0.4         0.0021
Vortex_ICD_60               0.5         0.0023
Vortex_ICD_60               0.6         0.0025
Vortex_ICD_60               0.7         0.0027
Vortex_ICD_60               0.8         0.0029
Vortex_ICD_60               0.9         0.0031
Vortex_ICD_60               1           0.0032
Vortex_ICD_60               1.2         0.0036
Vortex_ICD_60               1.4         0.0038
Vortex_ICD_60               1.6         0.0041
Vortex_ICD_60               1.8         0.0043
Vortex_ICD_60               2           0.0046
Vortex_ICD_60               2.5         0.0051
Vortex_ICD_60               3           0.0056

;Tempest Rating Curve for Vortex ICD 65, No grate allowance
Vortex_ICD_65    Rating      0           0
Vortex_ICD_65               0.1         0.0012
Vortex_ICD_65               0.2         0.0016
Vortex_ICD_65               0.3         0.002
Vortex_ICD_65               0.4         0.0023
Vortex_ICD_65               0.5         0.0025
Vortex_ICD_65               0.6         0.0028
Vortex_ICD_65               0.7         0.003
Vortex_ICD_65               0.8         0.0032
Vortex_ICD_65               0.9         0.0034
Vortex_ICD_65               1           0.0036
Vortex_ICD_65               1.2         0.004
Vortex_ICD_65               1.4         0.0043
Vortex_ICD_65               1.6         0.0046
Vortex_ICD_65               1.8         0.0049
Vortex_ICD_65               2           0.0051
Vortex_ICD_65               2.5         0.0057
Vortex_ICD_65               3           0.0063

;Tempest Rating Curve for Vortex ICD 70, No grate allowance
Vortex_ICD_70    Rating      0           0
Vortex_ICD_70               0.1         0.0013
Vortex_ICD_70               0.2         0.0019
Vortex_ICD_70               0.3         0.0023
Vortex_ICD_70               0.4         0.0027
Vortex_ICD_70               0.5         0.003
Vortex_ICD_70               0.6         0.0033
Vortex_ICD_70               0.7         0.0036
Vortex_ICD_70               0.8         0.0038
Vortex_ICD_70               0.9         0.0041
Vortex_ICD_70               1           0.0043
Vortex_ICD_70               1.2         0.0047
Vortex_ICD_70               1.4         0.0051
Vortex_ICD_70               1.6         0.0055
Vortex_ICD_70               1.8         0.0058
Vortex_ICD_70               2           0.0061
Vortex_ICD_70               2.5         0.0068
Vortex_ICD_70               3           0.0075

;Tempest Rating Curve for Vortex ICD 75, No grate allowance
Vortex_ICD_75    Rating      0           0
Vortex_ICD_75               0.1         0.0016
Vortex_ICD_75               0.2         0.0022
Vortex_ICD_75               0.3         0.0027
Vortex_ICD_75               0.4         0.0032
Vortex_ICD_75               0.5         0.0035
Vortex_ICD_75               0.6         0.0039
Vortex_ICD_75               0.7         0.0042
Vortex_ICD_75               0.8         0.0045
Vortex_ICD_75               0.9         0.0048
Vortex_ICD_75               1           0.005
Vortex_ICD_75               1.2         0.0055
Vortex_ICD_75               1.4         0.0059
Vortex_ICD_75               1.6         0.0063
Vortex_ICD_75               1.8         0.0067
Vortex_ICD_75               2           0.0071
Vortex_ICD_75               2.5         0.0079
Vortex_ICD_75               3           0.0087

;Tempest Rating Curve for Vortex ICD 80, No grate allowance
Vortex_ICD_80    Rating      0           0
Vortex_ICD_80               0.1         0.0018
Vortex_ICD_80               0.2         0.0026
Vortex_ICD_80               0.3         0.0031
Vortex_ICD_80               0.4         0.0036
Vortex_ICD_80               0.5         0.004
Vortex_ICD_80               0.6         0.0044
Vortex_ICD_80               0.7         0.0048
Vortex_ICD_80               0.8         0.0051
Vortex_ICD_80               0.9         0.0054
Vortex_ICD_80               1           0.0057
Vortex_ICD_80               1.2         0.0063
Vortex_ICD_80               1.4         0.0068
Vortex_ICD_80               1.6         0.0072
Vortex_ICD_80               1.8         0.0077
Vortex_ICD_80               2           0.0081
Vortex_ICD_80               2.5         0.009
Vortex_ICD_80               3           0.0099

;Tempest Rating Curve for Vortex ICD 85, No grate allowance
Vortex_ICD_85    Rating      0           0
Vortex_ICD_85               0.1         0.002
Vortex_ICD_85               0.2         0.0029
Vortex_ICD_85               0.3         0.0035
Vortex_ICD_85               0.4         0.0041
Vortex_ICD_85               0.5         0.0045
Vortex_ICD_85               0.6         0.005
Vortex_ICD_85               0.7         0.0054
Vortex_ICD_85               0.8         0.0057
Vortex_ICD_85               0.9         0.0061
Vortex_ICD_85               1           0.0064
Vortex_ICD_85               1.2         0.007
Vortex_ICD_85               1.4         0.0076
Vortex_ICD_85               1.6         0.0081
Vortex_ICD_85               1.8         0.0086
Vortex_ICD_85               2           0.0091
Vortex_ICD_85               2.5         0.0101
Vortex_ICD_85               3           0.0111

;Tempest Rating Curve for Vortex ICD 90, No grate allowance
Vortex_ICD_90    Rating      0           0
Vortex_ICD_90               0.1         0.0022
Vortex_ICD_90               0.2         0.0032
Vortex_ICD_90               0.3         0.0039
Vortex_ICD_90               0.4         0.0045
Vortex_ICD_90               0.5         0.0051
Vortex_ICD_90               0.6         0.0055
Vortex_ICD_90               0.7         0.006
Vortex_ICD_90               0.8         0.0064
Vortex_ICD_90               0.9         0.0068
Vortex_ICD_90               1           0.0072
Vortex_ICD_90               1.2         0.0079
Vortex_ICD_90               1.4         0.0085
Vortex_ICD_90               1.6         0.0091
Vortex_ICD_90               1.8         0.0096
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Vortex_ICD_90               2          0.0102
Vortex_ICD_90               2.5        0.0114
Vortex_ICD_90               3          0.0125

;Tempest Rating Curve for Vortex ICD 95, No grate allowance
Vortex_ICD_95    Rating     0          0
Vortex_ICD_95               0.1        0.0026
Vortex_ICD_95               0.2        0.0036
Vortex_ICD_95               0.3        0.0044
Vortex_ICD_95               0.4        0.0051
Vortex_ICD_95               0.5        0.0057
Vortex_ICD_95               0.6        0.0062
Vortex_ICD_95               0.7        0.0067
Vortex_ICD_95               0.8        0.0071
Vortex_ICD_95               0.9        0.0076
Vortex_ICD_95               1          0.008
Vortex_ICD_95               1.2        0.0087
Vortex_ICD_95               1.4        0.0094
Vortex_ICD_95               1.6        0.0101
Vortex_ICD_95               1.8        0.0107
Vortex_ICD_95               2          0.0113
Vortex_ICD_95               2.5        0.0126
Vortex_ICD_95               3          0.0138

;From Zurn Manual RD178
ZURN_Z150F-6NH   Rating     0          0
ZURN_Z150F-6NH              0.0127     0.00503838308477861
ZURN_Z150F-6NH              0.0257     0.0132420013231177
ZURN_Z150F-6NH              0.0384     0.0234992054543888
ZURN_Z150F-6NH              0.0508     0.0357128365761305
ZURN_Z150F-6NH              0.0765     0.0425019726111045
ZURN_Z150F-6NH              0.1024     0.0433196215564931

CB110            Storage    0          0.073
CB110                       1.55       0.073
CB110                       1.85       120.85
CB110                       1.9        120.85

CB111            Storage    0          0.073
CB111                       2.01       0.073

CB112            Storage    0          0.36
CB112                       1.92       0.36
CB112                       2.1        19.13
CB112                       2.12       19.13

CB113            Storage    0          0.073
CB113                       1.6        0.073
CB113                       1.7        3.62

CB114            Storage    0          0.36
CB114                       0.2        19.2
CB114                       0.25       19.2

CB115            Storage    0          0.36
CB115                       0.2        155.53
CB115                       0.31       155.53

CB116            Storage    0          0.36
CB116                       0.15       73.19
CB116                       0.4        73.19

CB117            Storage    0          0.36
CB117                       0.15       122.26

CB118            Storage    0          0.36
CB118                       0.18       37.7

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Rainfall (mm/hr)
3CHI002          01/01/2000 00:00:00   2.491
3CHI002          01/01/2000 00:10:00   2.966
3CHI002          01/01/2000 00:20:00   3.696
3CHI002          01/01/2000 00:30:00   4.976
3CHI002          01/01/2000 00:40:00   7.828
3CHI002          01/01/2000 00:50:00   19.966
3CHI002          01/01/2000 01:00:00   76.805
3CHI002          01/01/2000 01:10:00   22.777
3CHI002          01/01/2000 01:20:00   11.852
3CHI002          01/01/2000 01:30:00   8.025
3CHI002          01/01/2000 01:40:00   6.096
3CHI002          01/01/2000 01:50:00   4.938
3CHI002          01/01/2000 02:00:00   4.165
3CHI002          01/01/2000 02:10:00   3.613
3CHI002          01/01/2000 02:20:00   3.197
3CHI002          01/01/2000 02:30:00   2.873
3CHI002          01/01/2000 02:40:00   2.613
3CHI002          01/01/2000 02:50:00   2.4
3CHI002          01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI100          01/01/2000 00:00:00   5.339
3CHI100          01/01/2000 00:10:00   6.376
3CHI100          01/01/2000 00:20:00   7.977
3CHI100          01/01/2000 00:30:00   10.797
3CHI100          01/01/2000 00:40:00   17.136
3CHI100          01/01/2000 00:50:00   45.128
3CHI100          01/01/2000 01:00:00   178.107
3CHI100          01/01/2000 01:10:00   51.056
3CHI100          01/01/2000 01:20:00   26.163
3CHI100          01/01/2000 01:30:00   17.571
3CHI100          01/01/2000 01:40:00   13.277
3CHI100          01/01/2000 01:50:00   10.712
3CHI100          01/01/2000 02:00:00   9.008
3CHI100          01/01/2000 02:10:00   7.793
3CHI100          01/01/2000 02:20:00   6.883
3CHI100          01/01/2000 02:30:00   6.174
3CHI100          01/01/2000 02:40:00   5.607
3CHI100          01/01/2000 02:50:00   5.142
3CHI100          01/01/2000 03:00:00   0

;Sum of Infiltrated flow from above the garage slab calculated from Infiltration graphs for
S11 multiplied by the total pervious area above the garage.
InfiltratedInflow 01/01/2000 00:01:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:02:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:03:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:04:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:05:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:06:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:07:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:08:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:09:00   3.711007E-05
InfiltratedInflow 01/01/2000 00:10:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:11:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:12:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:13:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:14:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:15:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:16:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:17:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:18:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:19:00   4.418645E-05
InfiltratedInflow 01/01/2000 00:20:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:21:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:22:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:23:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:24:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:25:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:26:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:27:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:28:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:29:00   5.506175E-05
InfiltratedInflow 01/01/2000 00:30:00   7.413075E-05
InfiltratedInflow 01/01/2000 00:31:00   7.810222E-05
InfiltratedInflow 01/01/2000 00:32:00   8.760457E-05
InfiltratedInflow 01/01/2000 00:33:00   9.052508E-05
InfiltratedInflow 01/01/2000 00:34:00   9.114623E-05
InfiltratedInflow 01/01/2000 00:35:00   9.126959E-05
InfiltratedInflow 01/01/2000 00:36:00   9.129378E-05
InfiltratedInflow 01/01/2000 00:37:00   9.12985E-05
InfiltratedInflow 01/01/2000 00:38:00   9.129943E-05
InfiltratedInflow 01/01/2000 00:39:00   9.12996E-05
InfiltratedInflow 01/01/2000 00:40:00   0.0001337878
InfiltratedInflow 01/01/2000 00:41:00   0.0001420377
InfiltratedInflow 01/01/2000 00:42:00   0.0001433881
InfiltratedInflow 01/01/2000 00:43:00   0.0001435922
InfiltratedInflow 01/01/2000 00:44:00   0.0001436228
InfiltratedInflow 01/01/2000 00:45:00   0.0001436273
InfiltratedInflow 01/01/2000 00:46:00   0.000143628
InfiltratedInflow 01/01/2000 00:47:00   0.0001436281
InfiltratedInflow 01/01/2000 00:48:00   0.0001436281
InfiltratedInflow 01/01/2000 00:49:00   0.0001436281
InfiltratedInflow 01/01/2000 00:50:00   0.0003244559
InfiltratedInflow 01/01/2000 00:51:00   0.0003631043
InfiltratedInflow 01/01/2000 00:52:00   0.0003661426
InfiltratedInflow 01/01/2000 00:53:00   0.0003662956
InfiltratedInflow 01/01/2000 00:54:00   0.0003663276
InfiltratedInflow 01/01/2000 00:55:00   0.0003663344
InfiltratedInflow 01/01/2000 00:56:00   0.0003663358
InfiltratedInflow 01/01/2000 00:57:00   0.0003663361
InfiltratedInflow 01/01/2000 00:58:00   0.0003663362
InfiltratedInflow 01/01/2000 00:59:00   0.0003663362
InfiltratedInflow 01/01/2000 01:00:00   0.0007217364
InfiltratedInflow 01/01/2000 01:01:00   0.0006867272
InfiltratedInflow 01/01/2000 01:02:00   0.000654052
InfiltratedInflow 01/01/2000 01:03:00   0.0006235554
InfiltratedInflow 01/01/2000 01:04:00   0.0005950921
InfiltratedInflow 01/01/2000 01:05:00   0.0005685266
InfiltratedInflow 01/01/2000 01:06:00   0.0005437324
InfiltratedInflow 01/01/2000 01:07:00   0.0005205912
InfiltratedInflow 01/01/2000 01:08:00   0.0004989929
InfiltratedInflow 01/01/2000 01:09:00   0.0004788346
InfiltratedInflow 01/01/2000 01:10:00   0.0004600203
InfiltratedInflow 01/01/2000 01:11:00   0.0004424605
InfiltratedInflow 01/01/2000 01:12:00   0.0004260715
InfiltratedInflow 01/01/2000 01:13:00   0.0004107751
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[REPORT]
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CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]
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Subcatch   S5              Building
Subcatch   S6              ParkingLot
Subcatch   S7              ParkingLot
Subcatch   S8              Building
Subcatch   S9              ParkingLot
Node       St_UnGrd        Underground_Storage

[MAP]
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[COORDINATES]
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STUB16           381319.979         5032958.277
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CB111            381307.131         5032987.6
CB112            381319.643         5032961.536
CB113            381348.344         5032974.064
CB114            381332.566         5033036.058
CB115            381332.827         5033018.906
CB116            381338.815         5033005.189
CB117            381344.774         5032991.539
CB118            381359.473         5032992.996
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Roof_2           381361.335         5033013.684
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[VERTICES]
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[POLYGONS]
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S10              381360.442         5032986.777
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S10              381369.264         5033002.193
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S11              381338.424         5033059.758
S11              381338.861         5033060.089
S11              381341.862         5033062.982
S2               381339.051         5032968.685
S2               381337.931         5032971.251
S2               381337.733         5032971.705
S2               381347.856         5032976.123
S2               381352.652         5032978.217
S2               381352.769         5032978.266
S2               381352.887         5032978.313
S2               381353.006         5032978.356
S2               381352.331         5032977.428
S2               381349.581         5032976.228
S2               381350.662         5032973.753
S2               381339.051         5032968.685
S3               381318.259         5032957.972
S3               381307.625         5032982.332
S3               381303.659         5032986.085
S3               381310.51          5032989.076
S3               381321.435         5032964.05
S3               381337.931         5032971.251
S3               381339.051         5032968.685
S3               381319.267         5032960.048
S3               381318.259         5032957.972
S4               381303.659         5032986.085
S4               381285.414         5033003.349
S4               381304.879         5033024.646
S4               381311.368         5033017.747
S4               381300.135         5033012.843
S4               381310.51          5032989.076
S4               381303.659         5032986.085
```

```
S5                381316.631          5033020.045
S5                381320.706          5033010.711
S5                381318.612          5033009.797
S5                381319.652          5033007.414
S5                381321.746          5033008.328
S5                381327.851          5032994.342
S5                381334.493          5032979.128
S5                381337.733          5032971.705
S5                381337.931          5032971.251
S5                381321.435          5032964.05
S5                381310.51           5032989.076
S5                381300.135          5033012.843
S5                381311.368          5033017.747
S5                381316.631          5033020.045
S6                381327.521          5033031.08
S6                381338.894          5033036.045
S6                381340.298          5033037.792
S6                381342.392          5033038.706
S6                381343.432          5033036.323
S6                381341.338          5033035.409
S6                381349.093          5033017.644
S6                381343.736          5033015.306
S6                381335.821          5033012.047
S6                381326.803          5033010.853
S6                381325.27           5033009.866
S6                381321.746          5033008.328
S6                381319.652          5033007.414
S6                381318.612          5033009.797
S6                381320.706          5033010.711
S6                381316.631          5033020.045
S6                381311.368          5033017.747
S6                381304.879          5033024.646
S6                381307.751          5033027.787
S6                381319.536          5033040.417
S6                381325.697          5033035.259
S6                381327.521          5033031.08
S7                381354.292          5033005.735
S7                381349.118          5033003.477
S7                381341.795          5032998.364
S7                381333.208          5032996.68
S7                381327.851          5032994.342
S7                381321.746          5033008.328
S7                381325.27           5033009.866
S7                381326.803          5033010.853
S7                381335.821          5033012.047
S7                381349.093          5033017.644
S7                381354.292          5033005.735
S8                381336.223          5033047.127
S8                381352.72           5033054.328
S8                381374.019          5033005.534
S8                381368.8            5033003.256
S8                381369.264          5033002.193
S8                381359.142          5032997.774
S8                381358.678          5032998.837
S8                381357.523          5032998.333
S8                381355.797          5033002.286
S8                381341.338          5033035.409
S8                381343.432          5033036.323
S8                381342.392          5033038.706
S8                381340.298          5033037.792
S8                381336.223          5033047.127
S9                381360.442          5032986.777
S9                381352.823          5032978.774
S9                381353.006          5032978.356
S9                381352.846          5032978.297
S9                381352.688          5032978.233
S9                381347.856          5032976.123
S9                381344.215          5032984.464
S9                381341.866          5032982.347
S9                381334.493          5032979.128
S9                381327.851          5032994.342
S9                381333.208          5032996.68
S9                381341.795          5032998.364
S9                381349.118          5033003.477
S9                381354.292          5033005.735
S9                381357.523          5032998.333
S9                381355.738          5032997.554
S9                381360.442          5032986.777

;;Storage Node   X-Coord            Y-Coord
;;--------------- ------------------ ------------------

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

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
  ------------------------------------------------------------


  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 11
  Number of nodes ........... 16
  Number of links ........... 17
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
  Name                 Data Source                    Data       Recording
                                                      Type       Interval
  ----------------------------------------------------------------------
  Rainfall             3CHI002                        INTENSITY   10 min.


  ********************
  Subcatchment Summary
  ********************
  Name                 Area     Width   %Imperv    %Slope Rain Gage            Outlet
  ----------------------------------------------------------------------------------
  S1                   0.01      6.10    100.00   15.0000 Rainfall
St_UnGrd
  S10                  0.01     29.00      8.79    1.0000 Rainfall            CB118
  S11                  0.05     70.00     18.80    2.0000 Rainfall            CB114
  S2                   0.00      4.30      0.00    1.9000 Rainfall            CB113
  S3                   0.02     75.00     17.80    1.0000 Rainfall            CB112
  S4                   0.04     52.00      8.51    3.5000 Rainfall            CB110
  S5                   0.10    105.00    100.00    1.0000 Rainfall            Roof_1
  S6                   0.08     45.00     66.78    2.5000 Rainfall            CB115
  S7                   0.04     28.60     90.42    2.7000 Rainfall            CB116
  S8                   0.10    105.00    100.00    1.0000 Rainfall            Roof_2
  S9                   0.05     50.00     93.57    2.4000 Rainfall            CB117


  ************
  Node Summary
  ************
  Name                 Type                 Invert      Max.    Ponded    External
                                             Elev.     Depth      Area    Inflow
  ----------------------------------------------------------------------------------
  OF4                  OUTFALL                80.63      0.00       0.0
  OF7                  OUTFALL                80.63      0.00       0.0
  STUB15               OUTFALL                80.63      0.00       0.0
  STUB16               OUTFALL                80.65      0.00       0.0
  CB110                STORAGE                83.75      1.90       0.0
  CB111                STORAGE                83.59      2.01       0.0
  CB112                STORAGE                83.28      2.12       0.0
  CB113                STORAGE                83.55      1.70       0.0
  CB114                STORAGE                85.30      0.25       0.0
  CB115                STORAGE                85.25      0.31       0.0
  CB116                STORAGE                85.20      0.40       0.0
  CB117                STORAGE                85.15      0.15       0.0
  CB118                STORAGE                85.22      0.18       0.0
  Roof_1               STORAGE                96.35      0.15       0.0
  Roof_2               STORAGE                96.35      0.15       0.0
  St_UnGrd             STORAGE                81.80      1.00       0.0    Yes


  ************
  Link Summary
  ************
  Name                 From Node        To Node          Type            Length    %Slope
Roughness
  ----------------------------------------------------------------------------------------
----
  C1                   CB111            CB112            CONDUIT           28.9    0.8647
0.0130
  C3                   CB113            CB112            CONDUIT           31.3    0.6067
0.0130
  C5                   CB110            CB111            CONDUIT           20.5    0.7815
0.0130
  W1                   CB115            CB116            WEIR
  W2                   CB116            CB117            WEIR
  W3                   CB112            CB113            WEIR
  W4                   CB114            CB115            WEIR
  W5                   CB110            CB112            WEIR
  C2                   CB112            STUB16           OUTLET
  OL1                  CB115            St_UnGrd         OUTLET
  OL2                  CB116            St_UnGrd         OUTLET
  OL3                  CB117            St_UnGrd         OUTLET
  OL4                  Roof_1           STUB15           OUTLET
  OL5                  Roof_2           OF4              OUTLET
  OL6                  CB114            St_UnGrd         OUTLET
  OL7                  St_UnGrd         OF7              OUTLET
  OL8                  CB118            St_UnGrd         OUTLET


  **********************
  Cross Section Summary
  **********************
  Conduit              Shape                Full      Full     Hyd.     Max.   No. of     Full
                                            Depth      Area     Rad.    Width  Barrels     Flow
  ----------------------------------------------------------------------------------------------
  C1                   CIRCULAR             0.15      0.02     0.04     0.15        1     0.01
  C3                   CIRCULAR             0.15      0.02     0.04     0.15        1     0.01
  C5                   CIRCULAR             0.15      0.02     0.04     0.15        1     0.01


  ****************
  Analysis Options
  ****************
  Flow Units ................ CMS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Surcharge Method ......... EXTRAN
  Starting Date ............ 01/01/2000 00:00:00
  Ending Date .............. 01/01/2000 06:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:01:00
  Dry Time Step ............ 00:01:00
  Routing Time Step ........ 5.00 sec
  Variable Time Step ....... YES
  Maximum Trials ........... 8
  Number of Threads ........ 1
  Head Tolerance ........... 0.001500 m


  **************************       Volume         Depth
  Runoff Quantity Continuity     hectare-m          mm
  **************************     ---------       -------
  Total Precipitation .....          0.016        31.879
  Evaporation Loss ........          0.000         0.000
  Infiltration Loss .......          0.005         9.717
  Surface Runoff ..........          0.011        21.078
  Final Storage ...........          0.001         1.117
  Continuity Error (%) ....         -0.103
```

```
**************************          Volume         Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************  -------------  -------------
Dry Weather Inflow .......          0.000          0.000
Wet Weather Inflow .......          0.011          0.107
Groundwater Inflow .......          0.000          0.000
RDII Inflow ..............          0.000          0.000
External Inflow ..........          0.000          0.002
External Outflow .........          0.011          0.109
Flooding Loss ............          0.000          0.000
Evaporation Loss .........          0.000          0.000
Exfiltration Loss ........          0.000          0.000
Initial Stored Volume ....          0.000          0.000
Final Stored Volume ......          0.000          0.000
Continuity Error (%) .....          0.000


**************************
Highest Continuity Errors
**************************
Node CB113 (18.32%)


*****************************
Time-Step Critical Elements
*****************************
None


*********************************
Highest Flow Instability Indexes
*********************************
Link OL7 (7)


*********************************
Most Frequent Nonconverging Nodes
*********************************
Convergence obtained at all time steps.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     4.50 sec
Average Time Step           :     5.00 sec
Maximum Time Step           :     5.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.00
Time Step Frequencies       :
    5.000 -  3.155 sec      :   100.00 %
    3.155 -  1.991 sec      :     0.00 %
    1.991 -  1.256 sec      :     0.00 %
    1.256 -  0.792 sec      :     0.00 %
    0.792 -  0.500 sec      :     0.00 %


****************************
Subcatchment Runoff Summary
****************************

-----------------------------------------------------------------------------------------------------
-------------------------------------
                            Total      Total      Total      Total     Imperv      Perv
Total       Total      Peak  Runoff     Precip      Runon       Evap      Infil    Runoff    Runoff
Runoff      Runoff    Runoff   Coeff
  Subcatchment             mm         mm         mm         mm         mm         mm
mm     10^6 ltr       CMS
-----------------------------------------------------------------------------------------------------
-------------------------------------
  S1                    31.88       0.00       0.00       0.00      30.36       0.00
30.36       0.00      0.00   0.952
  S10                   31.88       0.00       0.00      30.55       2.67       1.20
1.20        0.00      0.00   0.038
  S11                   31.88       0.00       0.00      28.60       5.71       3.00
3.00        0.00      0.00   0.094
  S2                    31.88       0.00       0.00      31.75       0.00       0.13
0.13        0.00      0.00   0.004
  S3                    31.88       0.00       0.00      28.56       5.40       3.07
3.07        0.00      0.00   0.096
  S4                    31.88       0.00       0.00      30.56       2.58       1.20
1.20        0.00      0.00   0.038
  S5                    31.88       0.00       0.00       0.00      30.35       0.00
30.35       0.03      0.02   0.952
  S6                    31.88       0.00       0.00      10.52      20.27       0.07
20.34       0.02      0.01   0.638
  S7                    31.88       0.00       0.00       3.01      27.44       0.05
27.49       0.01      0.01   0.862
  S8                    31.88       0.00       0.00       0.00      30.35       0.00
30.35       0.03      0.02   0.952
  S9                    31.88       0.00       0.00       2.01      28.40       0.04
28.44       0.02      0.01   0.892


******************
Node Depth Summary
******************

-----------------------------------------------------------------------------
                                  Average  Maximum  Maximum  Time of Max     Reported
                                    Depth    Depth      HGL   Occurrence   Max Depth
Node                 Type          Meters   Meters   Meters  days hr:min       Meters
-----------------------------------------------------------------------------
OF4                  OUTFALL         0.48     0.48    81.11    0  00:00         0.48
OF7                  OUTFALL         0.48     0.48    81.11    0  00:00         0.48
STUB15               OUTFALL         0.48     0.48    81.11    0  00:00         0.48
STUB16               OUTFALL         0.63     0.63    81.28    0  00:00         0.63
CB110                STORAGE         0.00     0.03    83.78    0  01:10         0.03
CB111                STORAGE         0.00     0.03    83.62    0  01:11         0.03
CB112                STORAGE         0.00     0.09    83.37    0  01:11         0.09
CB113                STORAGE         0.00     0.00    83.55    0  01:14         0.00
CB114                STORAGE         0.00     0.01    85.31    0  01:10         0.01
CB115                STORAGE         0.00     0.02    85.27    0  01:10         0.02
CB116                STORAGE         0.00     0.02    85.22    0  01:10         0.02
CB117                STORAGE         0.00     0.02    85.17    0  01:10         0.02
CB118                STORAGE         0.00     0.00    85.22    0  01:10         0.00
Roof_1               STORAGE         0.01     0.03    96.38    0  01:40         0.03
Roof_2               STORAGE         0.01     0.03    96.38    0  01:40         0.03
St_UnGrd             STORAGE         0.00     0.06    81.86    0  01:10         0.06


******************
Node Inflow Summary
******************

-----------------------------------------------------------------------------------------------------
--------
                                  Maximum  Maximum                  Lateral       Total
Flow
                                  Lateral    Total  Time of Max       Inflow       Inflow
Balance
                                   Inflow   Inflow   Occurrence       Volume       Volume
Error
  Node                 Type           CMS      CMS  days hr:min     10^6 ltr     10^6 ltr
Percent
-----------------------------------------------------------------------------------------------------
--------
  OF4                  OUTFALL      0.000    0.002    0  00:51           0       0.0293
0.000
  OF7                  OUTFALL      0.000    0.029    0  01:02           0       0.0495
0.000
  STUB15               OUTFALL      0.000    0.002    0  00:51           0       0.0289
0.000
  STUB16               OUTFALL      0.000    0.002    0  01:11           0      0.00119
0.000
  CB110                STORAGE      0.001    0.001    0  01:10    0.000515    0.000515
-0.097
  CB111                STORAGE      0.000    0.001    0  01:10           0    0.000515
0.658
  CB112                STORAGE      0.002    0.002    0  01:10    0.000669     0.00119
0.004
  CB113                STORAGE      0.000    0.000    0  01:10    5.84e-06    5.84e-06
1.070 ltr
  CB114                STORAGE      0.003    0.003    0  01:10     0.00142     0.00142
-0.001
  CB115                STORAGE      0.012    0.012    0  01:10      0.0163      0.0163
-0.013
  CB116                STORAGE      0.008    0.008    0  01:10      0.0114      0.0114
-0.017
  CB117                STORAGE      0.011    0.011    0  01:10      0.0155      0.0155
-0.013
  CB118                STORAGE      0.000    0.000    0  01:10    0.000166    0.000166
0.006
  Roof_1               STORAGE      0.020    0.020    0  01:10      0.0289      0.0289
-0.002
  Roof_2               STORAGE      0.021    0.021    0  01:10      0.0293      0.0293
-0.002
  St_UnGrd             STORAGE      0.003    0.037    0  01:10     0.00465      0.0495
0.005


**********************
Node Surcharge Summary
**********************

No nodes were surcharged.


**********************
Node Flooding Summary
**********************

No nodes were flooded.


**********************
Storage Volume Summary
**********************

-----------------------------------------------------------------------------------------------------
-------
                          Average     Avg    Evap   Exfil     Maximum     Max     Time of Max
Maximum
                           Volume    Pcnt    Pcnt    Pcnt      Volume    Pcnt      Occurrence
Outflow
  Storage Unit           1000 m³    Full    Loss    Loss     1000 m³    Full     days hr:min
CMS
-----------------------------------------------------------------------------------------------------
-------
  CB110                     0.000     0.0     0.0     0.0       0.000     0.0       0  01:10
0.001
  CB111                     0.000     0.1     0.0     0.0       0.000     1.4       0  01:11
0.001
  CB112                     0.000     0.0     0.0     0.0       0.000     1.1       0  01:11
0.002
  CB113                     0.000     0.0     0.0     0.0       0.000     0.1       0  01:14
0.000
  CB114                     0.000     0.0     0.0     0.0       0.000     0.2       0  01:10
0.003
  CB115                     0.000     0.0     0.0     0.0       0.000     0.7       0  01:10
0.012
  CB116                     0.000     0.0     0.0     0.0       0.000     0.3       0  01:10
0.008
  CB117                     0.000     0.1     0.0     0.0       0.000     2.3       0  01:10
0.011
  CB118                     0.000     0.0     0.0     0.0       0.000     0.0       0  01:10
0.000
  Roof_1                    0.007     6.9     0.0     0.0       0.017    17.6       0  01:40
0.002
  Roof_2                    0.007     7.1     0.0     0.0       0.017    17.7       0  01:40
0.002
  St_UnGrd                  0.000     0.1     0.0     0.0       0.003     5.6       0  01:10
0.029


************************
Outfall Loading Summary
************************

-----------------------------------------------------
                          Flow      Avg      Max    Total
                          Freq     Flow     Flow   Volume
Outfall Node              Pcnt      CMS      CMS 10^6 ltr
-----------------------------------------------------
OF4                      74.27    0.002    0.002    0.029
OF7                      58.74    0.004    0.029    0.049
STUB15                   73.34    0.002    0.002    0.029
STUB16                    6.60    0.001    0.002    0.001
-----------------------------------------------------
System                   53.23    0.008    0.035    0.109


********************
Link Flow Summary
********************

-----------------------------------------------------------------------------
                            Maximum  Time of Max   Maximum    Max/    Max/
                             |Flow|   Occurrence   |Veloc|    Full    Full
Link                 Type       CMS  days hr:min     m/sec    Flow   Depth
-----------------------------------------------------------------------------
C1                   CONDUIT  0.001    0  01:11      0.47    0.08    0.19
C3                   CONDUIT  0.000    0  01:12      0.07    0.00    0.03
C5                   CONDUIT  0.001    0  01:10      0.61    0.10    0.19
W1                   WEIR     0.000    0  00:00                      0.00
W2                   WEIR     0.000    0  00:00                      0.00
W3                   WEIR     0.000    0  00:00                      0.00
W4                   WEIR     0.000    0  00:00                      0.00
W5                   WEIR     0.000    0  00:00                      0.00
C2                   DUMMY    0.002    0  01:11
OL1                  DUMMY    0.012    0  01:10
OL2                  DUMMY    0.008    0  01:10
OL3                  DUMMY    0.011    0  01:10
OL4                  DUMMY    0.002    0  00:51
OL5                  DUMMY    0.002    0  00:51
OL6                  DUMMY    0.003    0  01:10
OL7                  DUMMY    0.029    0  01:02
OL8                  DUMMY    0.000    0  01:10


****************************
Flow Classification Summary
****************************

-----------------------------------------------------------------------------------------------------
                          Adjusted    ---------- Fraction of Time in Flow Class ----------
                           /Actual          Up    Down  Sub   Sup   Up    Down  Norm  Inlet
Conduit                     Length     Dry  Dry    Dry   Crit  Crit  Crit  Crit  Ltd   Ctrl
-----------------------------------------------------------------------------------------------------
C1                            1.00    0.19 0.00   0.00  0.00  0.00  0.00  0.81  0.00  0.00
C3                            1.00    0.19 0.00   0.00  0.01  0.00  0.00  0.80  0.00  0.00
C5                            1.00    0.19 0.00   0.00  0.80  0.01  0.00  0.00  0.80  0.00


*************************
Conduit Surcharge Summary
*************************

No conduits were surcharged.


Analysis begun on:  Thu Oct 10 10:09:49 2024
Analysis ended on:  Thu Oct 10 10:09:49 2024
Total elapsed time: < 1 sec
```

Post-Development 3-hour Chicago 1:100-year Event

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:00:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:00:00
END_DATE             01/01/2000
END_TIME             06:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         5
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              12

[EVAPORATION]
;;Data Source    Parameters
;;--------------- ----------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
Rainfall         INTENSITY 0:10     1.0      TIMESERIES 3CHI100

[SUBCATCHMENTS]
;;Name           Rain Gage         Outlet           Area     %Imperv  Width    %Slope
CurbLen  SnowPack
;;-------------- ----------------- ---------------- -------- -------- -------- -------
---- ----------------
S1               Rainfall          St_UnGrd         0.0091   100      6.1      15       0
S10              Rainfall          CB118            0.0138   8.79     28.998   1        0
S11              Rainfall          CB114            0.0473   18.805   70.001   2        0
S2               Rainfall          CB113            0.0044   0.002    4.3      1.9      0
S3               Rainfall          CB112            0.0218   17.802   75       1        0
S4               Rainfall          CB110            0.043    8.51     52.001   3.5      0
S5               Rainfall          Roof_1           0.0952   99.998   104.996  1        0
S6               Rainfall          CB115            0.0803   66.775   45.001   2.5      0
S7               Rainfall          CB116            0.0416   90.416   28.601   2.7      0
S8               Rainfall          Roof_2           0.0965   100      105.005  1        0
S9               Rainfall          CB117            0.0544   93.568   50       2.4      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
--------
S1               0.013      0.25       1.57       4.67       0          OUTLET
S10              0.013      0.25       1.57       4.67       0          PERVIOUS   100
S11              0.013      0.25       1.57       4.67       0          PERVIOUS   100
S2               0.013      0.25       1.57       4.67       0          OUTLET
S3               0.013      0.25       1.57       4.67       0          PERVIOUS   100
S4               0.013      0.25       1.57       4.67       0          PERVIOUS   100
S5               0.013      0.25       1.57       4.67       0          OUTLET
S6               0.013      0.25       1.57       4.67       0          OUTLET
S7               0.013      0.25       1.57       4.67       0          OUTLET
S8               0.013      0.25       1.57       4.67       0          OUTLET
S9               0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
S1               76.2       13.2       4.14       7          0
S10              76.2       13.2       4.14       7          0
S11              76.2       13.2       4.14       7          0
S2               76.2       13.2       4.14       7          0
S3               76.2       13.2       4.14       7          0
S4               76.2       13.2       4.14       7          0
S5               76.2       13.2       4.14       7          0
S6               76.2       13.2       4.14       7          0
S7               76.2       13.2       4.14       7          0
S8               76.2       13.2       4.14       7          0
S9               76.2       13.2       4.14       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OF4              80.628     FIXED      81.11            NO
OF7              80.628     FIXED      81.11            NO
STUB15           80.628     FIXED      81.11            NO
STUB16           80.646     FIXED      81.28            NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape       Curve Name/Params
SurDepth Fevap    Psi      Ksat       IMD
;;-------------- -------- ---------- ---------- ----------- ----------------------------
----- -------- -------- -------- --------
CB110            83.75    1.9        0          TABULAR     CB110                      0
0
CB111            83.59    2.01       0          TABULAR     CB111                      0
0
CB112            83.28    2.12       0          TABULAR     CB112                      0
0
CB113            83.55    1.7        0          TABULAR     CB113                      0
0
CB114            85.3     0.25       0          TABULAR     CB114                      0
0
CB115            85.25    0.31       0          TABULAR     CB115                      0
0
CB116            85.2     0.4        0          TABULAR     CB116                      0
0
CB117            85.15    0.15       0          TABULAR     CB117                      0
0
CB118            85.22    0.18       0          TABULAR     CB118                      0
0
Roof_1           96.35    0.15       0          FUNCTIONAL  0          0          635       0
0
Roof_2           96.35    0.15       0          FUNCTIONAL  0          0          643       0
0
St_UnGrd         81.8     1          0          FUNCTIONAL  0          0          49        0
0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
--- ---------- ----------
C1               CB111            CB112            28.913     0.013      83.59      83.34
0          0.08
C3               CB113            CB112            31.317     0.013      83.55      83.36
0          0.04
C5               CB110            CB111            20.475     0.013      83.75      83.59
0          0.04

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated
EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -----
--- --------- ---------- ---------- ---------- ----------------
W1               CB115            CB116            TRANSVERSE   85.45      1.84       NO
0         0          NO
W2               CB116            CB117            TRANSVERSE   85.35      1.84       NO
0         0          NO
W3               CB112            CB113            TRANSVERSE   85.38      1.84       NO
0         0          NO
W4               CB114            CB115            TRANSVERSE   85.5       1.84       NO
0         0          NO
W5               CB110            CB112            TRANSVERSE   85.6       1.84       NO
0         0          NO

[OUTLETS]
;;Name           From Node        To Node          Offset     Type
QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- ---------------- ------------
---- ---------- --------
C2               CB112            STUB16           83.28      TABULAR/HEAD
Vortex_ICD_95                NO
OL1              CB115            St_UnGrd         85.25      TABULAR/HEAD     ZURN_Z150F-
6NH              NO
OL2              CB116            St_UnGrd         85.2       TABULAR/HEAD     ZURN_Z150F-
6NH              NO
OL3              CB117            St_UnGrd         85.15      TABULAR/HEAD     ZURN_Z150F-
6NH              NO
OL4              Roof_1           STUB15           96.35      TABULAR/HEAD     O_Roof1
NO
OL5              Roof_2           OF4              96.35      TABULAR/HEAD     O_Roof1
NO
OL6              CB114            St_UnGrd         85.3       TABULAR/HEAD     ZURN_Z150F-
6NH              NO
OL7              St_UnGrd         OF7              81.8       TABULAR/HEAD     O_St_UnGrd
NO
OL8              CB118            St_UnGrd         85.22      TABULAR/HEAD     ZURN_Z150F-
6NH              NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
----------
C1               CIRCULAR     0.15             0          0          0          1
C3               CIRCULAR     0.15             0          0          0          1
C5               CIRCULAR     0.15             0          0          0          1
W1               RECT_OPEN    0.11             17.1       0          0
W2               RECT_OPEN    0.25             17.1       0          0
W3               RECT_OPEN    0.02             4.58       0          0
W4               RECT_OPEN    0.05             7          0          0
W5               RECT_OPEN    0.05             3.487      0          0

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline
Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- ----
----
St_UnGrd         FLOW             InfiltratedInflow FLOW     1.0      1        0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
;Tempest Rating Curve for MHF IPEX TYPE A, No grate allowance
MHF_IPEX_TYPE_A  Rating     0          0
MHF_IPEX_TYPE_A              0.1        0.0057
MHF_IPEX_TYPE_A              0.2        0.0081
MHF_IPEX_TYPE_A              0.3        0.0099
MHF_IPEX_TYPE_A              0.4        0.0114
MHF_IPEX_TYPE_A              0.5        0.0128
MHF_IPEX_TYPE_A              0.6        0.014
MHF_IPEX_TYPE_A              0.7        0.0151
MHF_IPEX_TYPE_A              0.8        0.0162
MHF_IPEX_TYPE_A              0.9        0.0172
MHF_IPEX_TYPE_A              1          0.0181
MHF_IPEX_TYPE_A              1.2        0.0198
MHF_IPEX_TYPE_A              1.4        0.0214
MHF_IPEX_TYPE_A              1.6        0.0229
MHF_IPEX_TYPE_A              1.8        0.0243
MHF_IPEX_TYPE_A              2          0.0256
MHF_IPEX_TYPE_A              2.5        0.0286
MHF_IPEX_TYPE_A              3          0.0313

;Tempest Rating Curve for MHF IPEX TYPE B, No grate allowance
MHF_IPEX_TYPE_B  Rating     0          0
MHF_IPEX_TYPE_B              0.1        0.0081
MHF_IPEX_TYPE_B              0.2        0.0115
MHF_IPEX_TYPE_B              0.3        0.0141
MHF_IPEX_TYPE_B              0.4        0.0162
MHF_IPEX_TYPE_B              0.5        0.0182
MHF_IPEX_TYPE_B              0.6        0.0199
MHF_IPEX_TYPE_B              0.7        0.0215
MHF_IPEX_TYPE_B              0.8        0.023
MHF_IPEX_TYPE_B              0.9        0.0244
MHF_IPEX_TYPE_B              1          0.0257
MHF_IPEX_TYPE_B              1.2        0.0281
MHF_IPEX_TYPE_B              1.4        0.0304
MHF_IPEX_TYPE_B              1.6        0.0325
MHF_IPEX_TYPE_B              1.8        0.0344
MHF_IPEX_TYPE_B              2          0.0363
MHF_IPEX_TYPE_B              2.5        0.0406
MHF_IPEX_TYPE_B              3          0.0445

;Tempest Rating Curve for MHF IPEX TYPE C, No grate allowance
MHF_IPEX_TYPE_C  Rating     0          0
MHF_IPEX_TYPE_C              0.1        0.0106
MHF_IPEX_TYPE_C              0.2        0.015
MHF_IPEX_TYPE_C              0.3        0.0183
MHF_IPEX_TYPE_C              0.4        0.0212
MHF_IPEX_TYPE_C              0.5        0.0237
MHF_IPEX_TYPE_C              0.6        0.0259
MHF_IPEX_TYPE_C              0.7        0.028
MHF_IPEX_TYPE_C              0.8        0.0299
MHF_IPEX_TYPE_C              0.9        0.0317
MHF_IPEX_TYPE_C              1          0.0335
MHF_IPEX_TYPE_C              1.2        0.0366
MHF_IPEX_TYPE_C              1.4        0.0396
MHF_IPEX_TYPE_C              1.6        0.0423
MHF_IPEX_TYPE_C              1.8        0.0449
MHF_IPEX_TYPE_C              2          0.0473
MHF_IPEX_TYPE_C              2.5        0.0529
MHF_IPEX_TYPE_C              3          0.0579

;Tempest Rating Curve for MHF IPEX TYPE D, No grate allowance
MHF_IPEX_TYPE_D  Rating     0          0
MHF_IPEX_TYPE_D              0.1        0.0154
MHF_IPEX_TYPE_D              0.2        0.0217
MHF_IPEX_TYPE_D              0.3        0.0266
MHF_IPEX_TYPE_D              0.4        0.0307
MHF_IPEX_TYPE_D              0.5        0.0343
MHF_IPEX_TYPE_D              0.6        0.0376
MHF_IPEX_TYPE_D              0.7        0.0406
MHF_IPEX_TYPE_D              0.8        0.0434
MHF_IPEX_TYPE_D              0.9        0.0461
MHF_IPEX_TYPE_D              1          0.0485
MHF_IPEX_TYPE_D              1.2        0.0532
MHF_IPEX_TYPE_D              1.4        0.0574
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MHF_IPEX_TYPE_D             1.6         0.0614
MHF_IPEX_TYPE_D             1.8         0.0651
MHF_IPEX_TYPE_D             2           0.0687
MHF_IPEX_TYPE_D             2.5         0.0768
MHF_IPEX_TYPE_D             3           0.0841

;Tempest Rating Curve for MHF IPEX TYPE E, No grate allowance
MHF_IPEX_TYPE_E  Rating     0           0
MHF_IPEX_TYPE_E             0.1         0.0205
MHF_IPEX_TYPE_E             0.2         0.0289
MHF_IPEX_TYPE_E             0.3         0.0355
MHF_IPEX_TYPE_E             0.4         0.0409
MHF_IPEX_TYPE_E             0.5         0.0458
MHF_IPEX_TYPE_E             0.6         0.0501
MHF_IPEX_TYPE_E             0.7         0.0542
MHF_IPEX_TYPE_E             0.8         0.0579
MHF_IPEX_TYPE_E             0.9         0.0614
MHF_IPEX_TYPE_E             1           0.0647
MHF_IPEX_TYPE_E             1.2         0.0709
MHF_IPEX_TYPE_E             1.4         0.0766
MHF_IPEX_TYPE_E             1.6         0.0819
MHF_IPEX_TYPE_E             1.8         0.0868
MHF_IPEX_TYPE_E             2           0.0915
MHF_IPEX_TYPE_E             2.5         0.1023
MHF_IPEX_TYPE_E             3           0.1121

O_Roof1          Rating     0           0
O_Roof1                     0.001       0.002
O_Roof1                     0.15        0.002

O_Roof2          Rating     0           0
O_Roof2                     0.001       0.0025
O_Roof2                     0.15        0.0025

O_St_UnGrd       Rating     0           0
O_St_UnGrd                  0.01        0.029
O_St_UnGrd                  1           0.029

;Tempest Rating Curve for Vortex ICD 100, No grate allowance
Vortex_ICD_100   Rating     0           0
Vortex_ICD_100              0.1         0.0028
Vortex_ICD_100              0.2         0.004
Vortex_ICD_100              0.3         0.0049
Vortex_ICD_100              0.4         0.0056
Vortex_ICD_100              0.5         0.0063
Vortex_ICD_100              0.6         0.0069
Vortex_ICD_100              0.7         0.0075
Vortex_ICD_100              0.8         0.008
Vortex_ICD_100              0.9         0.0085
Vortex_ICD_100              1           0.0089
Vortex_ICD_100              1.2         0.0098
Vortex_ICD_100              1.4         0.0106
Vortex_ICD_100              1.6         0.0113
Vortex_ICD_100              1.8         0.012
Vortex_ICD_100              2           0.0126
Vortex_ICD_100              2.5         0.0141
Vortex_ICD_100              3           0.0155

;Tempest Rating Curve for Vortex ICD 105, No grate allowance
Vortex_ICD_105   Rating     0           0
Vortex_ICD_105              0.1         0.0031
Vortex_ICD_105              0.2         0.0044
Vortex_ICD_105              0.3         0.0054
Vortex_ICD_105              0.4         0.0062
Vortex_ICD_105              0.5         0.0069
Vortex_ICD_105              0.6         0.0076
Vortex_ICD_105              0.7         0.0082
Vortex_ICD_105              0.8         0.0088
Vortex_ICD_105              0.9         0.0093
Vortex_ICD_105              1           0.0098
Vortex_ICD_105              1.2         0.0107
Vortex_ICD_105              1.4         0.0116
Vortex_ICD_105              1.6         0.0124
Vortex_ICD_105              1.8         0.0131
Vortex_ICD_105              2           0.0139
Vortex_ICD_105              2.5         0.0155
Vortex_ICD_105              3           0.017

;Tempest Rating Curve for Vortex ICD 40, No grate allowance
Vortex_ICD_40    Rating     0           0
Vortex_ICD_40               0.1         0.0004
Vortex_ICD_40               0.2         0.0006
Vortex_ICD_40               0.3         0.0007
Vortex_ICD_40               0.4         0.0009
Vortex_ICD_40               0.5         0.001
Vortex_ICD_40               0.6         0.001
Vortex_ICD_40               0.7         0.0011
Vortex_ICD_40               0.8         0.0012
Vortex_ICD_40               0.9         0.0013
Vortex_ICD_40               1           0.0014
Vortex_ICD_40               1.2         0.0015
Vortex_ICD_40               1.4         0.0016
Vortex_ICD_40               1.6         0.0017
Vortex_ICD_40               1.8         0.0018
Vortex_ICD_40               2           0.0019
Vortex_ICD_40               2.5         0.0022
Vortex_ICD_40               3           0.0024

;Tempest Rating Curve for Vortex ICD 45, No grate allowance
Vortex_ICD_45    Rating     0           0
Vortex_ICD_45               0.1         0.0006
Vortex_ICD_45               0.2         0.0008
Vortex_ICD_45               0.3         0.001
Vortex_ICD_45               0.4         0.0011
Vortex_ICD_45               0.5         0.0013
Vortex_ICD_45               0.6         0.0014
Vortex_ICD_45               0.7         0.0015
Vortex_ICD_45               0.8         0.0016
Vortex_ICD_45               0.9         0.0017
Vortex_ICD_45               1           0.0018
Vortex_ICD_45               1.2         0.002
Vortex_ICD_45               1.4         0.0021
Vortex_ICD_45               1.6         0.0023
Vortex_ICD_45               1.8         0.0024
Vortex_ICD_45               2           0.0026
Vortex_ICD_45               2.5         0.0029
Vortex_ICD_45               3           0.0031

;Tempest Rating Curve for Vortex ICD 50, No grate allowance
Vortex_ICD_50    Rating     0           0
Vortex_ICD_50               0.1         0.0007
Vortex_ICD_50               0.2         0.001
Vortex_ICD_50               0.3         0.0012
Vortex_ICD_50               0.4         0.0014
Vortex_ICD_50               0.5         0.0016
Vortex_ICD_50               0.6         0.0018
Vortex_ICD_50               0.7         0.0019
Vortex_ICD_50               0.8         0.002
Vortex_ICD_50               0.9         0.0021
Vortex_ICD_50               1           0.0023
Vortex_ICD_50               1.2         0.0025
Vortex_ICD_50               1.4         0.0027
Vortex_ICD_50               1.6         0.0029
Vortex_ICD_50               1.8         0.003
Vortex_ICD_50               2           0.0032
Vortex_ICD_50               2.5         0.0036
Vortex_ICD_50               3           0.0039

;Tempest Rating Curve for Vortex ICD 55, No grate allowance
Vortex_ICD_55    Rating     0           0
Vortex_ICD_55               0.1         0.0009
Vortex_ICD_55               0.2         0.0012
Vortex_ICD_55               0.3         0.0015
Vortex_ICD_55               0.4         0.0017
Vortex_ICD_55               0.5         0.0019
Vortex_ICD_55               0.6         0.0021
Vortex_ICD_55               0.7         0.0023
Vortex_ICD_55               0.8         0.0024
Vortex_ICD_55               0.9         0.0026
Vortex_ICD_55               1           0.0027
Vortex_ICD_55               1.2         0.003
Vortex_ICD_55               1.4         0.0032
Vortex_ICD_55               1.6         0.0034
Vortex_ICD_55               1.8         0.0036
Vortex_ICD_55               2           0.0038
Vortex_ICD_55               2.5         0.0043
Vortex_ICD_55               3           0.0047

;Tempest Rating Curve for Vortex ICD 60, No grate allowance
Vortex_ICD_60    Rating     0           0
Vortex_ICD_60               0.1         0.0011
Vortex_ICD_60               0.2         0.0015
Vortex_ICD_60               0.3         0.0018
Vortex_ICD_60               0.4         0.0021
Vortex_ICD_60               0.5         0.0023
Vortex_ICD_60               0.6         0.0025
Vortex_ICD_60               0.7         0.0027
Vortex_ICD_60               0.8         0.0029
Vortex_ICD_60               0.9         0.0031
Vortex_ICD_60               1           0.0032
Vortex_ICD_60               1.2         0.0036
Vortex_ICD_60               1.4         0.0038
Vortex_ICD_60               1.6         0.0041
Vortex_ICD_60               1.8         0.0043
Vortex_ICD_60               2           0.0046
Vortex_ICD_60               2.5         0.0051
Vortex_ICD_60               3           0.0056

;Tempest Rating Curve for Vortex ICD 65, No grate allowance
Vortex_ICD_65    Rating     0           0
Vortex_ICD_65               0.1         0.0012
Vortex_ICD_65               0.2         0.0016
Vortex_ICD_65               0.3         0.002
Vortex_ICD_65               0.4         0.0023
Vortex_ICD_65               0.5         0.0025
Vortex_ICD_65               0.6         0.0028
Vortex_ICD_65               0.7         0.003
Vortex_ICD_65               0.8         0.0032
Vortex_ICD_65               0.9         0.0034
Vortex_ICD_65               1           0.0036
Vortex_ICD_65               1.2         0.004
Vortex_ICD_65               1.4         0.0043
Vortex_ICD_65               1.6         0.0046
Vortex_ICD_65               1.8         0.0049
Vortex_ICD_65               2           0.0051
Vortex_ICD_65               2.5         0.0057
Vortex_ICD_65               3           0.0063

;Tempest Rating Curve for Vortex ICD 70, No grate allowance
Vortex_ICD_70    Rating     0           0
Vortex_ICD_70               0.1         0.0013
Vortex_ICD_70               0.2         0.0019
Vortex_ICD_70               0.3         0.0023
Vortex_ICD_70               0.4         0.0027
Vortex_ICD_70               0.5         0.003
Vortex_ICD_70               0.6         0.0033
Vortex_ICD_70               0.7         0.0036
Vortex_ICD_70               0.8         0.0038
Vortex_ICD_70               0.9         0.0041
Vortex_ICD_70               1           0.0043
Vortex_ICD_70               1.2         0.0047
Vortex_ICD_70               1.4         0.0051
Vortex_ICD_70               1.6         0.0055
Vortex_ICD_70               1.8         0.0058
Vortex_ICD_70               2           0.0061
Vortex_ICD_70               2.5         0.0068
Vortex_ICD_70               3           0.0075

;Tempest Rating Curve for Vortex ICD 75, No grate allowance
Vortex_ICD_75    Rating     0           0
Vortex_ICD_75               0.1         0.0016
Vortex_ICD_75               0.2         0.0022
Vortex_ICD_75               0.3         0.0027
Vortex_ICD_75               0.4         0.0032
Vortex_ICD_75               0.5         0.0035
Vortex_ICD_75               0.6         0.0039
Vortex_ICD_75               0.7         0.0042
Vortex_ICD_75               0.8         0.0045
Vortex_ICD_75               0.9         0.0048
Vortex_ICD_75               1           0.005
Vortex_ICD_75               1.2         0.0055
Vortex_ICD_75               1.4         0.0059
Vortex_ICD_75               1.6         0.0063
Vortex_ICD_75               1.8         0.0067
Vortex_ICD_75               2           0.0071
Vortex_ICD_75               2.5         0.0079
Vortex_ICD_75               3           0.0087

;Tempest Rating Curve for Vortex ICD 80, No grate allowance
Vortex_ICD_80    Rating     0           0
Vortex_ICD_80               0.1         0.0018
Vortex_ICD_80               0.2         0.0026
Vortex_ICD_80               0.3         0.0031
Vortex_ICD_80               0.4         0.0036
Vortex_ICD_80               0.5         0.004
Vortex_ICD_80               0.6         0.0044
Vortex_ICD_80               0.7         0.0048
Vortex_ICD_80               0.8         0.0051
Vortex_ICD_80               0.9         0.0054
Vortex_ICD_80               1           0.0057
Vortex_ICD_80               1.2         0.0063
Vortex_ICD_80               1.4         0.0068
Vortex_ICD_80               1.6         0.0072
Vortex_ICD_80               1.8         0.0077
Vortex_ICD_80               2           0.0081
Vortex_ICD_80               2.5         0.009
Vortex_ICD_80               3           0.0099

;Tempest Rating Curve for Vortex ICD 85, No grate allowance
Vortex_ICD_85    Rating     0           0
Vortex_ICD_85               0.1         0.002
Vortex_ICD_85               0.2         0.0029
Vortex_ICD_85               0.3         0.0035
Vortex_ICD_85               0.4         0.0041
Vortex_ICD_85               0.5         0.0045
Vortex_ICD_85               0.6         0.005
Vortex_ICD_85               0.7         0.0054
Vortex_ICD_85               0.8         0.0057
Vortex_ICD_85               0.9         0.0061
Vortex_ICD_85               1           0.0064
Vortex_ICD_85               1.2         0.007
Vortex_ICD_85               1.4         0.0076
Vortex_ICD_85               1.6         0.0081
Vortex_ICD_85               1.8         0.0086
Vortex_ICD_85               2           0.0091
Vortex_ICD_85               2.5         0.0101
Vortex_ICD_85               3           0.0111

;Tempest Rating Curve for Vortex ICD 90, No grate allowance
Vortex_ICD_90    Rating     0           0
Vortex_ICD_90               0.1         0.0022
Vortex_ICD_90               0.2         0.0032
Vortex_ICD_90               0.3         0.0039
Vortex_ICD_90               0.4         0.0045
Vortex_ICD_90               0.5         0.0051
Vortex_ICD_90               0.6         0.0055
Vortex_ICD_90               0.7         0.006
Vortex_ICD_90               0.8         0.0064
Vortex_ICD_90               0.9         0.0068
Vortex_ICD_90               1           0.0072
Vortex_ICD_90               1.2         0.0079
Vortex_ICD_90               1.4         0.0085
Vortex_ICD_90               1.6         0.0091
Vortex_ICD_90               1.8         0.0096
Vortex_ICD_90               2           0.0102
Vortex_ICD_90               2.5         0.0114
Vortex_ICD_90               3           0.0125
```

Post-Development 3-hour Chicago 1:100 year Event

```
;Tempest Rating Curve for Vortex ICD 95, No grate allowance
Vortex_ICD_95    Rating     0          0
Vortex_ICD_95               0.1        0.0026
Vortex_ICD_95               0.2        0.0036
Vortex_ICD_95               0.3        0.0044
Vortex_ICD_95               0.4        0.0051
Vortex_ICD_95               0.5        0.0057
Vortex_ICD_95               0.6        0.0062
Vortex_ICD_95               0.7        0.0067
Vortex_ICD_95               0.8        0.0071
Vortex_ICD_95               0.9        0.0076
Vortex_ICD_95               1          0.008
Vortex_ICD_95               1.2        0.0087
Vortex_ICD_95               1.4        0.0094
Vortex_ICD_95               1.6        0.0101
Vortex_ICD_95               1.8        0.0107
Vortex_ICD_95               2          0.0113
Vortex_ICD_95               2.5        0.0126
Vortex_ICD_95               3          0.0138

;From Zurn Manual RD178
ZURN_Z150F-6NH   Rating     0          0
ZURN_Z150F-6NH              0.0127     0.00503838308477861
ZURN_Z150F-6NH              0.0257     0.0132420013231177
ZURN_Z150F-6NH              0.0384     0.0234992054543888
ZURN_Z150F-6NH              0.0508     0.0357128365761305
ZURN_Z150F-6NH              0.0765     0.0425019726111045
ZURN_Z150F-6NH              0.1024     0.0433196215564931

CB110            Storage    0          0.073
CB110                       1.55       0.073
CB110                       1.85       120.85
CB110                       1.9        120.85

CB111            Storage    0          0.073
CB111                       2.01       0.073

CB112            Storage    0          0.36
CB112                       1.92       0.36
CB112                       2.1        19.13
CB112                       2.12       19.13

CB113            Storage    0          0.073
CB113                       1.6        0.073
CB113                       1.7        3.62

CB114            Storage    0          0.36
CB114                       0.2        19.2
CB114                       0.25       19.2

CB115            Storage    0          0.36
CB115                       0.2        155.53
CB115                       0.31       155.53

CB116            Storage    0          0.36
CB116                       0.15       73.19
CB116                       0.4        73.19

CB117            Storage    0          0.36
CB117                       0.15       122.26

CB118            Storage    0          0.36
CB118                       0.18       37.7

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Rainfall (mm/hr)
3CHI100          01/01/2000 00:00:00   5.339
3CHI100          01/01/2000 00:10:00   6.376
3CHI100          01/01/2000 00:20:00   7.977
3CHI100          01/01/2000 00:30:00   10.797
3CHI100          01/01/2000 00:40:00   17.136
3CHI100          01/01/2000 00:50:00   45.128
3CHI100          01/01/2000 01:00:00   178.107
3CHI100          01/01/2000 01:10:00   51.056
3CHI100          01/01/2000 01:20:00   26.163
3CHI100          01/01/2000 01:30:00   17.571
3CHI100          01/01/2000 01:40:00   13.277
3CHI100          01/01/2000 01:50:00   10.712
3CHI100          01/01/2000 02:00:00   9.008
3CHI100          01/01/2000 02:10:00   7.793
3CHI100          01/01/2000 02:20:00   6.883
3CHI100          01/01/2000 02:30:00   6.174
3CHI100          01/01/2000 02:40:00   5.607
3CHI100          01/01/2000 02:50:00   5.142
3CHI100          01/01/2000 03:00:00   0

;Sum of Infiltrated flow from above the garage slab calculated from Infiltration graphs for
S11 multiplied by the total pervious area above the garage.
InfiltratedInflow 01/01/2000 00:01:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:02:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:03:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:04:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:05:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:06:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:07:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:08:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:09:00   7.95386E-05
InfiltratedInflow 01/01/2000 00:10:00   9.498747E-05
InfiltratedInflow 01/01/2000 00:11:00   9.498747E-05
InfiltratedInflow 01/01/2000 00:12:00   9.498747E-05
InfiltratedInflow 01/01/2000 00:13:00   9.498747E-05
InfiltratedInflow 01/01/2000 00:14:00   9.498747E-05
InfiltratedInflow 01/01/2000 00:15:00   9.498747E-05
InfiltratedInflow 01/01/2000 00:16:00   9.498747E-05
InfiltratedInflow 01/01/2000 00:17:00   0.0001031659
InfiltratedInflow 01/01/2000 00:18:00   0.0001139877
InfiltratedInflow 01/01/2000 00:19:00   0.0001164632
InfiltratedInflow 01/01/2000 00:20:00   0.0001407495
InfiltratedInflow 01/01/2000 00:21:00   0.0001455192
InfiltratedInflow 01/01/2000 00:22:00   0.0001462368
InfiltratedInflow 01/01/2000 00:23:00   0.0001463435
InfiltratedInflow 01/01/2000 00:24:00   0.0001463593
InfiltratedInflow 01/01/2000 00:25:00   0.0001463616
InfiltratedInflow 01/01/2000 00:26:00   0.0001463619
InfiltratedInflow 01/01/2000 00:27:00   0.000146362
InfiltratedInflow 01/01/2000 00:28:00   0.000146362
InfiltratedInflow 01/01/2000 00:29:00   0.000146362
InfiltratedInflow 01/01/2000 00:30:00   0.0001883734
InfiltratedInflow 01/01/2000 00:31:00   0.0001969537
InfiltratedInflow 01/01/2000 00:32:00   0.000197952
InfiltratedInflow 01/01/2000 00:33:00   0.0001980833
InfiltratedInflow 01/01/2000 00:34:00   0.0001981007
InfiltratedInflow 01/01/2000 00:35:00   0.000198103
InfiltratedInflow 01/01/2000 00:36:00   0.0001981033
InfiltratedInflow 01/01/2000 00:37:00   0.0001981034
InfiltratedInflow 01/01/2000 00:38:00   0.0001981034
InfiltratedInflow 01/01/2000 00:39:00   0.0001981034
InfiltratedInflow 01/01/2000 00:40:00   0.0002925396
InfiltratedInflow 01/01/2000 00:41:00   0.0003126802
InfiltratedInflow 01/01/2000 00:42:00   0.0003142753
InfiltratedInflow 01/01/2000 00:43:00   0.0003143887
InfiltratedInflow 01/01/2000 00:44:00   0.0003144075
InfiltratedInflow 01/01/2000 00:45:00   0.0003144107
InfiltratedInflow 01/01/2000 00:46:00   0.0003144112
InfiltratedInflow 01/01/2000 00:47:00   0.0003144113
InfiltratedInflow 01/01/2000 00:48:00   0.0003144113
InfiltratedInflow 01/01/2000 00:49:00   0.0003144113
InfiltratedInflow 01/01/2000 00:50:00   0.000670688
InfiltratedInflow 01/01/2000 00:51:00   0.0006390822
InfiltratedInflow 01/01/2000 00:52:00   0.0006095837
InfiltratedInflow 01/01/2000 00:53:00   0.000582052
InfiltratedInflow 01/01/2000 00:54:00   0.0005563559
InfiltratedInflow 01/01/2000 00:55:00   0.000532373
InfiltratedInflow 01/01/2000 00:56:00   0.0005099892
InfiltratedInflow 01/01/2000 00:57:00   0.0004890978
InfiltratedInflow 01/01/2000 00:58:00   0.0004695993
InfiltratedInflow 01/01/2000 00:59:00   0.0004514008
InfiltratedInflow 01/01/2000 01:00:00   0.0004344156
InfiltratedInflow 01/01/2000 01:01:00   0.0004185629
InfiltratedInflow 01/01/2000 01:02:00   0.0004037672
InfiltratedInflow 01/01/2000 01:03:00   0.0003899579
InfiltratedInflow 01/01/2000 01:04:00   0.0003770694
InfiltratedInflow 01/01/2000 01:05:00   0.0003650402
InfiltratedInflow 01/01/2000 01:06:00   0.000353813
InfiltratedInflow 01/01/2000 01:07:00   0.0003433344
InfiltratedInflow 01/01/2000 01:08:00   0.0003335544
InfiltratedInflow 01/01/2000 01:09:00   0.0003244265
InfiltratedInflow 01/01/2000 01:10:00   0.0003159071
InfiltratedInflow 01/01/2000 01:11:00   0.0003079558
InfiltratedInflow 01/01/2000 01:12:00   0.0003005346
InfiltratedInflow 01/01/2000 01:13:00   0.0002936082
InfiltratedInflow 01/01/2000 01:14:00   0.0002871436
InfiltratedInflow 01/01/2000 01:15:00   0.0002811101
InfiltratedInflow 01/01/2000 01:16:00   0.0002754788
InfiltratedInflow 01/01/2000 01:17:00   0.0002702229
InfiltratedInflow 01/01/2000 01:18:00   0.0002653175
InfiltratedInflow 01/01/2000 01:19:00   0.0002607392
InfiltratedInflow 01/01/2000 01:20:00   0.0002564661
InfiltratedInflow 01/01/2000 01:21:00   0.0002524779
InfiltratedInflow 01/01/2000 01:22:00   0.0002487556
InfiltratedInflow 01/01/2000 01:23:00   0.0002452815
InfiltratedInflow 01/01/2000 01:24:00   0.0002420039
InfiltratedInflow 01/01/2000 01:25:00   0.0002390127
InfiltratedInflow 01/01/2000 01:26:00   0.0002361882
InfiltratedInflow 01/01/2000 01:27:00   0.000233552
InfiltratedInflow 01/01/2000 01:28:00   0.0002310915
InfiltratedInflow 01/01/2000 01:29:00   0.0002287951
InfiltratedInflow 01/01/2000 01:30:00   0.0002266519
InfiltratedInflow 01/01/2000 01:31:00   0.0002246515
InfiltratedInflow 01/01/2000 01:32:00   0.0002227845
InfiltratedInflow 01/01/2000 01:33:00   0.0002210419
InfiltratedInflow 01/01/2000 01:34:00   0.0002194156
InfiltratedInflow 01/01/2000 01:35:00   0.0002178977
InfiltratedInflow 01/01/2000 01:36:00   0.0002164809
InfiltratedInflow 01/01/2000 01:37:00   0.0002151587
InfiltratedInflow 01/01/2000 01:38:00   0.0002139246
InfiltratedInflow 01/01/2000 01:39:00   0.0002127728
InfiltratedInflow 01/01/2000 01:40:00   0.0002116978
InfiltratedInflow 01/01/2000 01:41:00   0.0002106944
InfiltratedInflow 01/01/2000 01:42:00   0.000209758
InfiltratedInflow 01/01/2000 01:43:00   0.000208884
InfiltratedInflow 01/01/2000 01:44:00   0.0002080682
InfiltratedInflow 01/01/2000 01:45:00   0.0002073069
InfiltratedInflow 01/01/2000 01:46:00   0.0002065963
InfiltratedInflow 01/01/2000 01:47:00   0.0002059331
InfiltratedInflow 01/01/2000 01:48:00   0.0002053141
InfiltratedInflow 01/01/2000 01:49:00   0.0002047364
InfiltratedInflow 01/01/2000 01:50:00   0.0002041971
InfiltratedInflow 01/01/2000 01:51:00   0.0002036939
InfiltratedInflow 01/01/2000 01:52:00   0.0002032242
InfiltratedInflow 01/01/2000 01:53:00   0.0002027858
InfiltratedInflow 01/01/2000 01:54:00   0.0002023767
InfiltratedInflow 01/01/2000 01:55:00   0.0002019948
InfiltratedInflow 01/01/2000 01:56:00   0.0002016384
InfiltratedInflow 01/01/2000 01:57:00   0.0002013057
InfiltratedInflow 01/01/2000 01:58:00   0.0002009952
InfiltratedInflow 01/01/2000 01:59:00   0.0002007055
InfiltratedInflow 01/01/2000 02:00:00   0.0002004435
InfiltratedInflow 01/01/2000 02:01:00   0.0002001826
InfiltratedInflow 01/01/2000 02:02:00   0.000199947
InfiltratedInflow 01/01/2000 02:03:00   0.0001997271
InfiltratedInflow 01/01/2000 02:04:00   0.0001995219
InfiltratedInflow 01/01/2000 02:05:00   0.0001993304
InfiltratedInflow 01/01/2000 02:06:00   0.0001991516
InfiltratedInflow 01/01/2000 02:07:00   0.0001989848
InfiltratedInflow 01/01/2000 02:08:00   0.0001988829
InfiltratedInflow 01/01/2000 02:09:00   0.0001986837
InfiltratedInflow 01/01/2000 02:10:00   0.000198548
InfiltratedInflow 01/01/2000 02:11:00   0.0001984214
InfiltratedInflow 01/01/2000 02:12:00   0.0001983033
InfiltratedInflow 01/01/2000 02:13:00   0.000198193
InfiltratedInflow 01/01/2000 02:14:00   0.00019809
InfiltratedInflow 01/01/2000 02:15:00   0.00019794
InfiltratedInflow 01/01/2000 02:16:00   0.0001979043
InfiltratedInflow 01/01/2000 02:17:00   0.0001978206
InfiltratedInflow 01/01/2000 02:18:00   0.0001977425
InfiltratedInflow 01/01/2000 02:19:00   0.0001976696
InfiltratedInflow 01/01/2000 02:20:00   0.0001976015
InfiltratedInflow 01/01/2000 02:21:00   0.000197538
InfiltratedInflow 01/01/2000 02:22:00   0.0001974788
InfiltratedInflow 01/01/2000 02:23:00   0.0001974234
InfiltratedInflow 01/01/2000 02:24:00   0.0001973718
InfiltratedInflow 01/01/2000 02:25:00   0.0001973237
InfiltratedInflow 01/01/2000 02:26:00   0.0001972787
InfiltratedInflow 01/01/2000 02:27:00   0.0001972367
InfiltratedInflow 01/01/2000 02:28:00   0.0001971975
InfiltratedInflow 01/01/2000 02:29:00   0.0001971609
InfiltratedInflow 01/01/2000 02:30:00   0.0001971268
InfiltratedInflow 01/01/2000 02:31:00   0.000197095
InfiltratedInflow 01/01/2000 02:32:00   0.0001970653
InfiltratedInflow 01/01/2000 02:33:00   0.0001970375
InfiltratedInflow 01/01/2000 02:34:00   0.0001970116
InfiltratedInflow 01/01/2000 02:35:00   0.0001969874
InfiltratedInflow 01/01/2000 02:36:00   0.0001969649
InfiltratedInflow 01/01/2000 02:37:00   0.0001969438
InfiltratedInflow 01/01/2000 02:38:00   0.0001969242
InfiltratedInflow 01/01/2000 02:39:00   0.0001969058
InfiltratedInflow 01/01/2000 02:40:00   0.0001968887
InfiltratedInflow 01/01/2000 02:41:00   0.0001968727
InfiltratedInflow 01/01/2000 02:42:00   0.0001968578
InfiltratedInflow 01/01/2000 02:43:00   0.0001968439
InfiltratedInflow 01/01/2000 02:44:00   0.0001968309
InfiltratedInflow 01/01/2000 02:45:00   0.0001968188
InfiltratedInflow 01/01/2000 02:46:00   0.0001968075
InfiltratedInflow 01/01/2000 02:47:00   0.0001967969
InfiltratedInflow 01/01/2000 02:48:00   0.0001967871
InfiltratedInflow 01/01/2000 02:49:00   0.0001967779
InfiltratedInflow 01/01/2000 02:50:00   0.0001967693
InfiltratedInflow 01/01/2000 02:51:00   0.0001967613
InfiltratedInflow 01/01/2000 02:52:00   0.0001967538
InfiltratedInflow 01/01/2000 02:53:00   0.0001967468
InfiltratedInflow 01/01/2000 02:54:00   0.0001967403
InfiltratedInflow 01/01/2000 02:55:00   0.0001967342
InfiltratedInflow 01/01/2000 02:56:00   0.0001967285
InfiltratedInflow 01/01/2000 02:57:00   0.0001967232
InfiltratedInflow 01/01/2000 02:58:00   0.0001967183
InfiltratedInflow 01/01/2000 02:59:00   0.0001967137
InfiltratedInflow 01/01/2000 03:00:00   0.0001967094
InfiltratedInflow 01/01/2000 03:01:00   5.729975E-05
InfiltratedInflow 01/01/2000 03:02:00   2.133145E-06
InfiltratedInflow 01/01/2000 03:03:00   1.137592E-06
InfiltratedInflow 01/01/2000 03:04:00   6.886548E-07
InfiltratedInflow 01/01/2000 03:05:00   4.534706E-07
InfiltratedInflow 01/01/2000 03:06:00   3.170471E-07
InfiltratedInflow 01/01/2000 03:07:00   2.318394E-07
InfiltratedInflow 01/01/2000 03:08:00   1.755464E-07
InfiltratedInflow 01/01/2000 03:09:00   1.366786E-07
InfiltratedInflow 01/01/2000 03:10:00   1.088696E-07
InfiltratedInflow 01/01/2000 03:11:00   8.838072E-08
InfiltratedInflow 01/01/2000 03:12:00   7.290916E-08
InfiltratedInflow 01/01/2000 03:13:00   6.097933E-08
InfiltratedInflow 01/01/2000 03:14:00   5.161327E-08
InfiltratedInflow 01/01/2000 03:15:00   4.414385E-08
InfiltratedInflow 01/01/2000 03:16:00   3.810444E-08
InfiltratedInflow 01/01/2000 03:17:00   3.316141E-08
InfiltratedInflow 01/01/2000 03:18:00   2.907156E-08
InfiltratedInflow 01/01/2000 03:19:00   2.565449E-08
InfiltratedInflow 01/01/2000 03:20:00   2.277434E-08
InfiltratedInflow 01/01/2000 03:21:00   2.032732E-08
InfiltratedInflow 01/01/2000 03:22:00   1.823314E-08
InfiltratedInflow 01/01/2000 03:23:00   1.642901E-08
InfiltratedInflow 01/01/2000 03:24:00   1.486523E-08
InfiltratedInflow 01/01/2000 03:25:00   1.350217E-08
InfiltratedInflow 01/01/2000 03:26:00   1.230787E-08
InfiltratedInflow 01/01/2000 03:27:00   1.125638E-08
InfiltratedInflow 01/01/2000 03:28:00   1.032649E-08
```

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InfiltratedInflow 01/01/2000 03:29:00   9.500691E-09
InfiltratedInflow 01/01/2000 03:30:00   8.764469E-09
InfiltratedInflow 01/01/2000 03:31:00   8.105708E-09
InfiltratedInflow 01/01/2000 03:32:00   7.514236E-09
InfiltratedInflow 01/01/2000 03:33:00   6.981469E-09
InfiltratedInflow 01/01/2000 03:34:00   6.500121E-09
InfiltratedInflow 01/01/2000 03:35:00   6.063984E-09
InfiltratedInflow 01/01/2000 03:36:00   5.667742E-09
InfiltratedInflow 01/01/2000 03:37:00   5.306823E-09
InfiltratedInflow 01/01/2000 03:38:00   4.977278E-09
InfiltratedInflow 01/01/2000 03:39:00   4.675687E-09
InfiltratedInflow 01/01/2000 03:40:00   4.399072E-09
InfiltratedInflow 01/01/2000 03:41:00   4.144837E-09
InfiltratedInflow 01/01/2000 03:42:00   3.910706E-09
InfiltratedInflow 01/01/2000 03:43:00   3.69468E-09
InfiltratedInflow 01/01/2000 03:44:00   3.494999E-09
InfiltratedInflow 01/01/2000 03:45:00   3.310106E-09
InfiltratedInflow 01/01/2000 03:46:00   3.138622E-09
InfiltratedInflow 01/01/2000 03:47:00   2.979323E-09
InfiltratedInflow 01/01/2000 03:48:00   2.831117E-09
InfiltratedInflow 01/01/2000 03:49:00   2.69303E-09
InfiltratedInflow 01/01/2000 03:50:00   2.564192E-09
InfiltratedInflow 01/01/2000 03:51:00   2.443821E-09
InfiltratedInflow 01/01/2000 03:52:00   2.331215E-09
InfiltratedInflow 01/01/2000 03:53:00   2.22574E-09
InfiltratedInflow 01/01/2000 03:54:00   2.126828E-09
InfiltratedInflow 01/01/2000 03:55:00   2.033962E-09
InfiltratedInflow 01/01/2000 03:56:00   1.946675E-09
InfiltratedInflow 01/01/2000 03:57:00   1.864544E-09
InfiltratedInflow 01/01/2000 03:58:00   1.787184E-09
InfiltratedInflow 01/01/2000 03:59:00   1.714243E-09
InfiltratedInflow 01/01/2000 04:00:00   1.645403E-09
InfiltratedInflow 01/01/2000 04:01:00   0
InfiltratedInflow 01/01/2000 04:02:00   3.099256E-09
InfiltratedInflow 01/01/2000 04:03:00   0
InfiltratedInflow 01/01/2000 04:04:00   2.866268E-09
InfiltratedInflow 01/01/2000 04:05:00   0
InfiltratedInflow 01/01/2000 04:06:00   2.657084E-09
InfiltratedInflow 01/01/2000 04:07:00   0
InfiltratedInflow 01/01/2000 04:08:00   2.468666E-09
InfiltratedInflow 01/01/2000 04:09:00   0
InfiltratedInflow 01/01/2000 04:10:00   2.298437E-09
InfiltratedInflow 01/01/2000 04:11:00   0
InfiltratedInflow 01/01/2000 04:12:00   2.144199E-09
InfiltratedInflow 01/01/2000 04:13:00   0
InfiltratedInflow 01/01/2000 04:14:00   2.004073E-09
InfiltratedInflow 01/01/2000 04:15:00   0
InfiltratedInflow 01/01/2000 04:16:00   1.876439E-09
InfiltratedInflow 01/01/2000 04:17:00   0
InfiltratedInflow 01/01/2000 04:18:00   1.759903E-09
InfiltratedInflow 01/01/2000 04:19:00   0
InfiltratedInflow 01/01/2000 04:20:00   1.653253E-09
InfiltratedInflow 01/01/2000 04:21:00   0
InfiltratedInflow 01/01/2000 04:22:00   0
InfiltratedInflow 01/01/2000 04:23:00   2.298981E-09
InfiltratedInflow 01/01/2000 04:24:00   0
InfiltratedInflow 01/01/2000 04:25:00   0
InfiltratedInflow 01/01/2000 04:26:00   2.104736E-09
InfiltratedInflow 01/01/2000 04:27:00   0
InfiltratedInflow 01/01/2000 04:28:00   0
InfiltratedInflow 01/01/2000 04:29:00   1.932717E-09
InfiltratedInflow 01/01/2000 04:30:00   0
InfiltratedInflow 01/01/2000 04:31:00   0
InfiltratedInflow 01/01/2000 04:32:00   1.779756E-09
InfiltratedInflow 01/01/2000 04:33:00   0
InfiltratedInflow 01/01/2000 04:34:00   0
InfiltratedInflow 01/01/2000 04:35:00   1.643222E-09
InfiltratedInflow 01/01/2000 04:36:00   0
InfiltratedInflow 01/01/2000 04:37:00   0
InfiltratedInflow 01/01/2000 04:38:00   0
InfiltratedInflow 01/01/2000 04:39:00   2.002893E-09
InfiltratedInflow 01/01/2000 04:40:00   0
InfiltratedInflow 01/01/2000 04:41:00   0
InfiltratedInflow 01/01/2000 04:42:00   0
InfiltratedInflow 01/01/2000 04:43:00   1.813983E-09
InfiltratedInflow 01/01/2000 04:44:00   0
InfiltratedInflow 01/01/2000 04:45:00   0
InfiltratedInflow 01/01/2000 04:46:00   0
InfiltratedInflow 01/01/2000 04:47:00   1.649109E-09
InfiltratedInflow 01/01/2000 04:48:00   0
InfiltratedInflow 01/01/2000 04:49:00   0
InfiltratedInflow 01/01/2000 04:50:00   0
InfiltratedInflow 01/01/2000 04:51:00   0
InfiltratedInflow 01/01/2000 04:52:00   1.860069E-09
InfiltratedInflow 01/01/2000 04:53:00   0
InfiltratedInflow 01/01/2000 04:54:00   0
InfiltratedInflow 01/01/2000 04:55:00   0
InfiltratedInflow 01/01/2000 04:56:00   0
InfiltratedInflow 01/01/2000 04:57:00   1.666766E-09
InfiltratedInflow 01/01/2000 04:58:00   0
InfiltratedInflow 01/01/2000 04:59:00   0
InfiltratedInflow 01/01/2000 05:00:00   0
InfiltratedInflow 01/01/2000 05:01:00   0
InfiltratedInflow 01/01/2000 05:02:00   0
InfiltratedInflow 01/01/2000 05:03:00   1.782635E-09
InfiltratedInflow 01/01/2000 05:04:00   0
InfiltratedInflow 01/01/2000 05:05:00   0
InfiltratedInflow 01/01/2000 05:06:00   0
InfiltratedInflow 01/01/2000 05:07:00   0
InfiltratedInflow 01/01/2000 05:08:00   0
InfiltratedInflow 01/01/2000 05:09:00   0
InfiltratedInflow 01/01/2000 05:10:00   1.826997E-09
InfiltratedInflow 01/01/2000 05:11:00   0
InfiltratedInflow 01/01/2000 05:12:00   0
InfiltratedInflow 01/01/2000 05:13:00   0
InfiltratedInflow 01/01/2000 05:14:00   0
InfiltratedInflow 01/01/2000 05:15:00   0
InfiltratedInflow 01/01/2000 05:16:00   0
InfiltratedInflow 01/01/2000 05:17:00   0
InfiltratedInflow 01/01/2000 05:18:00   1.812251E-09
InfiltratedInflow 01/01/2000 05:19:00   0
InfiltratedInflow 01/01/2000 05:20:00   0
InfiltratedInflow 01/01/2000 05:21:00   0
InfiltratedInflow 01/01/2000 05:22:00   0
InfiltratedInflow 01/01/2000 05:23:00   0
InfiltratedInflow 01/01/2000 05:24:00   0
InfiltratedInflow 01/01/2000 05:25:00   0
InfiltratedInflow 01/01/2000 05:26:00   0
InfiltratedInflow 01/01/2000 05:27:00   1.752325E-09
InfiltratedInflow 01/01/2000 05:28:00   0
InfiltratedInflow 01/01/2000 05:29:00   0
InfiltratedInflow 01/01/2000 05:30:00   0
InfiltratedInflow 01/01/2000 05:31:00   0
InfiltratedInflow 01/01/2000 05:32:00   0
InfiltratedInflow 01/01/2000 05:33:00   0
InfiltratedInflow 01/01/2000 05:34:00   0
InfiltratedInflow 01/01/2000 05:35:00   0
InfiltratedInflow 01/01/2000 05:36:00   0
InfiltratedInflow 01/01/2000 05:37:00   1.660708E-09
InfiltratedInflow 01/01/2000 05:38:00   0
InfiltratedInflow 01/01/2000 05:39:00   0
InfiltratedInflow 01/01/2000 05:40:00   0
InfiltratedInflow 01/01/2000 05:41:00   0
InfiltratedInflow 01/01/2000 05:42:00   0
InfiltratedInflow 01/01/2000 05:43:00   0
InfiltratedInflow 01/01/2000 05:44:00   0
InfiltratedInflow 01/01/2000 05:45:00   0
InfiltratedInflow 01/01/2000 05:46:00   0
InfiltratedInflow 01/01/2000 05:47:00   0
InfiltratedInflow 01/01/2000 05:48:00   0
InfiltratedInflow 01/01/2000 05:49:00   1.677784E-09
InfiltratedInflow 01/01/2000 05:50:00   0
InfiltratedInflow 01/01/2000 05:51:00   0
InfiltratedInflow 01/01/2000 05:52:00   0
InfiltratedInflow 01/01/2000 05:53:00   0
InfiltratedInflow 01/01/2000 05:54:00   0
InfiltratedInflow 01/01/2000 05:55:00   0
InfiltratedInflow 01/01/2000 05:56:00   0
InfiltratedInflow 01/01/2000 05:57:00   0
InfiltratedInflow 01/01/2000 05:58:00   0
InfiltratedInflow 01/01/2000 05:59:00   0
InfiltratedInflow 01/01/2000 06:00:00   0

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

[TAGS]
Subcatch   S1               Ramp
Subcatch   S5               Building
Subcatch   S6               ParkingLot
Subcatch   S7               ParkingLot
Subcatch   S8               Building
Subcatch   S9               ParkingLot
Node       St_UnGrd         Underground_Storage

[MAP]
DIMENSIONS       381280.91645     5032948.93205    381379.86255     5033068.41295
UNITS            Meters

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OF4              381364.593         5032973.357
OF7              381346.502         5032963.916
STUB15           381335.776         5032954.363
STUB16           381319.979         5032958.277
CB110            381293.102         5033002.513
CB111            381307.131         5032987.6
CB112            381319.643         5032961.536
CB113            381348.344         5032974.064
CB114            381332.566         5033036.058
CB115            381332.827         5033018.906
CB116            381338.815         5033005.189
CB117            381344.774         5032991.539
CB118            381359.473         5032992.996
Roof_1           381325.164         5032977.273
Roof_2           381361.335         5033013.684
St_UnGrd         381329.806         5032972.84

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
W3               381322.829         5032965.271
W3               381343.656         5032974.514
W5               381295.919         5033002.386
W5               381309.233         5032988.935
W5               381320.071         5032965.768
OL6              381323.041         5033005.693

[POLYGONS]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
S1               381344.215         5032984.464
S1               381347.856         5032976.123
S1               381337.733         5032971.705
S1               381334.493         5032979.128
S1               381341.864         5032982.351
S1               381344.215         5032984.464
S10              381360.442         5032986.777
S10              381355.738         5032997.554
S10              381357.523         5032998.333
S10              381358.678         5032998.837
S10              381359.142         5032997.774
S10              381369.264         5033002.193
S10              381368.8           5033003.256
S10              381374.019         5033005.534
S10              381375.365         5033002.452
S10              381360.442         5032986.777
S11              381341.862         5033062.982
S11              381348.903         5033062.839
S11              381355.186         5033056.237
S11              381352.72          5033054.328
S11              381336.223         5033047.127
S11              381340.298         5033037.792
S11              381338.894         5033036.045
S11              381327.521         5033031.08
S11              381325.697         5033035.259
S11              381319.536         5033040.417
S11              381328.068         5033049.243
S11              381327.155         5033052.4
S11              381330.052         5033055.329
S11              381335.192         5033057.864
S11              381336.099         5033058.311
S11              381336.581         5033058.572
S11              381337.055         5033058.848
S11              381337.521         5033059.137
S11              381337.977         5033059.441
S11              381338.424         5033059.758
S11              381338.861         5033060.089
S11              381341.862         5033062.982
S2               381339.051         5032968.685
S2               381337.931         5032971.251
S2               381337.733         5032971.705
S2               381347.856         5032976.123
S2               381352.652         5032978.217
S2               381352.769         5032978.266
S2               381352.887         5032978.313
S2               381353.006         5032978.356
S2               381352.331         5032977.428
S2               381349.581         5032976.228
S2               381350.662         5032973.753
S2               381339.051         5032968.685
S3               381318.259         5032957.972
S3               381307.625         5032982.332
S3               381303.659         5032986.085
S3               381310.51          5032989.076
S3               381321.435         5032964.05
S3               381337.931         5032971.251
S3               381339.051         5032968.685
S3               381319.267         5032960.048
S3               381318.259         5032957.972
S4               381303.659         5032986.085
S4               381285.414         5033003.349
S4               381304.879         5033024.646
S4               381311.368         5033017.747
S4               381300.135         5033012.843
S4               381310.51          5032989.076
S4               381303.659         5032986.085
S5               381316.631         5033020.045
S5               381320.706         5033010.711
S5               381318.612         5033009.797
S5               381319.652         5033007.414
S5               381321.746         5033008.328
S5               381327.851         5032994.342
S5               381334.493         5032979.128
S5               381337.733         5032971.705
S5               381337.931         5032971.251
S5               381321.435         5032964.05
S5               381310.51          5032989.076
S5               381300.135         5033012.843
S5               381311.368         5033017.747
S5               381316.631         5033020.045
S6               381327.521         5033031.08
S6               381338.894         5033036.045
S6               381340.298         5033037.792
S6               381342.392         5033038.706
S6               381343.432         5033036.323
S6               381341.338         5033035.409
S6               381349.093         5033017.644
S6               381343.736         5033015.306
S6               381335.821         5033012.047
S6               381326.803         5033010.853
S6               381325.27          5033009.866
```

```
S6               381321.746         5033008.328
S6               381319.652         5033007.414
S6               381318.612         5033009.797
S6               381320.706         5033010.711
S6               381316.631         5033020.045
S6               381311.368         5033017.747
S6               381304.879         5033024.646
S6               381307.751         5033027.787
S6               381319.536         5033040.417
S6               381325.697         5033035.259
S6               381327.521         5033031.08
S7               381354.292         5033005.735
S7               381349.118         5033003.477
S7               381341.795         5032998.364
S7               381333.208         5032996.68
S7               381327.851         5032994.342
S7               381321.746         5033008.328
S7               381325.27          5033009.866
S7               381326.803         5033010.853
S7               381335.821         5033012.047
S7               381349.093         5033017.644
S7               381354.292         5033005.735
S8               381336.223         5033047.127
S8               381352.72          5033054.328
S8               381374.019         5033005.534
S8               381368.8           5033003.256
S8               381369.264         5033002.193
S8               381359.142         5032997.774
S8               381358.678         5032998.837
S8               381357.523         5032998.333
S8               381355.797         5033002.286
S8               381341.338         5033035.409
S8               381343.432         5033036.323
S8               381342.392         5033038.706
S8               381340.298         5033037.792
S8               381336.223         5033047.127
S9               381360.442         5032986.777
S9               381352.823         5032978.774
S9               381353.006         5032978.356
S9               381352.846         5032978.297
S9               381352.688         5032978.233
S9               381347.856         5032976.123
S9               381344.215         5032984.464
S9               381341.866         5032982.347
S9               381334.493         5032979.128
S9               381327.851         5032994.342
S9               381333.208         5032996.68
S9               381341.795         5032998.364
S9               381349.118         5033003.477
S9               381354.292         5033005.735
S9               381357.523         5032998.333
S9               381355.738         5032997.554
S9               381360.442         5032986.777

;;Storage Node   X-Coord            Y-Coord
;;-------------- ------------------ ------------------

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

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
  ------------------------------------------------------------


  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 11
  Number of nodes ........... 16
  Number of links ........... 17
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
  Name                 Data Source                    Data       Recording
                                                      Type       Interval
  ---------------------------------------------------------------------------
  Rainfall             3CHI100                        INTENSITY   10 min.


  ********************
  Subcatchment Summary
  ********************
  Name                 Area     Width   %Imperv    %Slope Rain Gage            Outlet
  ----------------------------------------------------------------------------------
  S1                   0.01      6.10    100.00   15.0000 Rainfall
St_UnGrd
  S10                  0.01     29.00      8.79    1.0000 Rainfall            CB118
  S11                  0.05     70.00     18.80    2.0000 Rainfall            CB114
  S2                   0.00      4.30      0.00    1.9000 Rainfall            CB113
  S3                   0.02     75.00     17.80    1.0000 Rainfall            CB112
  S4                   0.04     52.00      8.51    3.5000 Rainfall            CB110
  S5                   0.10    105.00    100.00    1.0000 Rainfall            Roof_1
  S6                   0.08     45.00     66.78    2.5000 Rainfall            CB115
  S7                   0.04     28.60     90.42    2.7000 Rainfall            CB116
  S8                   0.10    105.00    100.00    1.0000 Rainfall            Roof_2
  S9                   0.05     50.00     93.57    2.4000 Rainfall            CB117


  ************
  Node Summary
  ************
  Name                 Type                 Invert      Max.    Ponded    External
                                             Elev.     Depth      Area    Inflow
  ---------------------------------------------------------------------------------
  OF4                  OUTFALL                 80.63      0.00       0.0
  OF7                  OUTFALL                 80.63      0.00       0.0
  STUB15               OUTFALL                 80.63      0.00       0.0
  STUB16               OUTFALL                 80.65      0.00       0.0
  CB110                STORAGE                 83.75      1.90       0.0
  CB111                STORAGE                 83.59      2.01       0.0
  CB112                STORAGE                 83.28      2.12       0.0
  CB113                STORAGE                 83.55      1.70       0.0
  CB114                STORAGE                 85.30      0.25       0.0
  CB115                STORAGE                 85.25      0.31       0.0
  CB116                STORAGE                 85.20      0.40       0.0
  CB117                STORAGE                 85.15      0.15       0.0
  CB118                STORAGE                 85.22      0.18       0.0
  Roof_1               STORAGE                 96.35      0.15       0.0
  Roof_2               STORAGE                 96.35      0.15       0.0
  St_UnGrd             STORAGE                 81.80      1.00       0.0    Yes


  ************
  Link Summary
  ************
  Name                 From Node        To Node          Type            Length    %Slope
Roughness
  ---------------------------------------------------------------------------------------
----
  C1                   CB111            CB112            CONDUIT           28.9    0.8647
0.0130
  C3                   CB113            CB112            CONDUIT           31.3    0.6067
0.0130
  C5                   CB110            CB111            CONDUIT           20.5    0.7815
0.0130
  W1                   CB115            CB116            WEIR
  W2                   CB116            CB117            WEIR
  W3                   CB112            CB113            WEIR
  W4                   CB114            CB115            WEIR
  W5                   CB110            CB112            WEIR
  C2                   CB112            STUB16           OUTLET
  OL1                  CB115            St_UnGrd         OUTLET
  OL2                  CB116            St_UnGrd         OUTLET
  OL3                  CB117            St_UnGrd         OUTLET
  OL4                  Roof_1           STUB15           OUTLET
  OL5                  Roof_2           OF4              OUTLET
  OL6                  CB114            St_UnGrd         OUTLET
  OL7                  St_UnGrd         OF7              OUTLET
  OL8                  CB118            St_UnGrd         OUTLET


  **********************
  Cross Section Summary
  **********************
  Conduit              Shape                Full      Full     Hyd.     Max.   No. of     Full
                                            Depth      Area     Rad.    Width  Barrels     Flow
  ---------------------------------------------------------------------------------------------
  C1                   CIRCULAR             0.15      0.02     0.04     0.15        1     0.01
  C3                   CIRCULAR             0.15      0.02     0.04     0.15        1     0.01
  C5                   CIRCULAR             0.15      0.02     0.04     0.15        1     0.01


  ***************
  Analysis Options
  ***************
  Flow Units ................ CMS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Surcharge Method ......... EXTRAN
  Starting Date ............ 01/01/2000 00:00:00
  Ending Date .............. 01/01/2000 06:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:01:00
  Dry Time Step ............ 00:01:00
  Routing Time Step ........ 5.00 sec
  Variable Time Step ....... YES
  Maximum Trials ........... 8
  Number of Threads ........ 1
  Head Tolerance ........... 0.001500 m


  *************************       Volume         Depth
  Runoff Quantity Continuity     hectare-m          mm
  *************************     ---------       -------
  Total Precipitation .....         0.036        71.708
  Evaporation Loss ........         0.000         0.000
  Infiltration Loss .......         0.007        13.013
  Surface Runoff ..........         0.029        57.684
  Final Storage ...........         0.001         1.117
  Continuity Error (%) ....        -0.149
```

```
**************************          Volume         Volume
Flow Routing Continuity       hectare-m      10^6 ltr
**************************  ------------   ------------
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......         0.029          0.293
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........         0.000          0.002
External Outflow .........         0.024          0.241
Flooding Loss ............         0.000          0.000
Evaporation Loss .........         0.000          0.000
Exfiltration Loss ........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.005          0.054
Continuity Error (%) .....        -0.013


**************************
Time-Step Critical Elements
**************************
None


********************************
Highest Flow Instability Indexes
********************************
Link OL7 (6)


********************************
Most Frequent Nonconverging Nodes
********************************
Convergence obtained at all time steps.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.29 sec
Average Time Step           :     5.00 sec
Maximum Time Step           :     5.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.00
Time Step Frequencies       :
    5.000 -  3.155 sec      :    99.98 %
    3.155 -  1.991 sec      :     0.00 %
    1.991 -  1.256 sec      :     0.02 %
    1.256 -  0.792 sec      :     0.00 %
    0.792 -  0.500 sec      :     0.00 %


***************************
Subcatchment Runoff Summary
***************************

-----------------------------------------------------------------------------------------------
-----------------------------------
                          Total      Total      Total      Total      Imperv       Perv
Total       Total     Peak Runoff      Runon       Evap      Infil     Runoff     Runoff
Runoff      Runoff    Runoff  Coeff
  Subcatchment             mm         mm         mm         mm         mm         mm
mm    10^6 ltr       CMS
-----------------------------------------------------------------------------------------------
-----------------------------------
  S1                     71.71       0.00       0.00       0.00      70.25       0.00
70.25        0.01       0.00   0.980
  S10                    71.71       0.00       0.00      40.91       6.17      30.75
30.75        0.00       0.01   0.429
  S11                    71.71       0.00       0.00      37.49      13.19      34.01
34.01        0.02       0.02   0.474
  S2                     71.71       0.00       0.00      44.16       0.00      27.60
27.60        0.00       0.00   0.385
  S3                     71.71       0.00       0.00      37.68      12.49      33.87
33.87        0.01       0.01   0.472
  S4                     71.71       0.00       0.00      40.96       5.97      30.70
30.70        0.01       0.02   0.428
  S5                     71.71       0.00       0.00       0.00      70.24       0.00
70.24        0.07       0.05   0.980
  S6                     71.71       0.00       0.00      14.50      46.91       9.35
56.26        0.05       0.04   0.785
  S7                     71.71       0.00       0.00       4.14      63.51       2.75
66.26        0.03       0.02   0.924
  S8                     71.71       0.00       0.00       0.00      70.24       0.00
70.24        0.07       0.05   0.980
  S9                     71.71       0.00       0.00       2.78      65.73       1.86
67.59        0.04       0.03   0.943


******************
Node Depth Summary
******************

-----------------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max     Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
Node                 Type        Meters   Meters   Meters  days hr:min      Meters
-----------------------------------------------------------------------------------
OF4                  OUTFALL       0.48     0.48    81.11    0  00:00        0.48
OF7                  OUTFALL       0.48     0.48    81.11    0  00:00        0.48
STUB15               OUTFALL       0.48     0.48    81.11    0  00:00        0.48
STUB16               OUTFALL       0.63     0.63    81.28    0  00:00        0.63
CB110                STORAGE       0.08     1.25    85.00    0  01:13        1.25
CB111                STORAGE       0.09     1.37    84.96    0  01:14        1.37
CB112                STORAGE       0.13     1.63    84.91    0  01:15        1.63
CB113                STORAGE       0.09     1.36    84.91    0  01:15        1.36
CB114                STORAGE       0.00     0.03    85.33    0  01:10        0.03
CB115                STORAGE       0.00     0.05    85.30    0  01:10        0.05
CB116                STORAGE       0.00     0.03    85.23    0  01:10        0.03
CB117                STORAGE       0.00     0.04    85.19    0  01:10        0.04
CB118                STORAGE       0.00     0.01    85.23    0  01:10        0.01
Roof_1               STORAGE       0.05     0.08    96.43    0  02:20        0.08
Roof_2               STORAGE       0.05     0.08    96.43    0  02:21        0.08
St_UnGrd             STORAGE       0.10     0.98    82.78    0  01:20        0.98


******************
Node Inflow Summary
******************

-----------------------------------------------------------------------------------------------
--------
                                Maximum  Maximum                  Lateral       Total
Flow                            Lateral    Total  Time of Max      Inflow       Inflow
Balance
                                 Inflow   Inflow   Occurrence      Volume       Volume
Error
  Node                 Type         CMS      CMS  days hr:min    10^6 ltr     10^6 ltr
Percent
-----------------------------------------------------------------------------------------------
--------
  OF4                  OUTFALL    0.000    0.002    0  00:32           0       0.0402
0.000
  OF7                  OUTFALL    0.000    0.029    0  01:00           0        0.139
0.000
  STUB15               OUTFALL    0.000    0.002    0  00:32           0       0.0402
0.000
  STUB16               OUTFALL    0.000    0.010    0  01:15           0       0.0218
0.000
  CB110                STORAGE    0.018    0.018    0  01:10      0.0132       0.0132
-0.017
  CB111                STORAGE    0.000    0.014    0  01:10           0       0.0132
-0.319
  CB112                STORAGE    0.010    0.018    0  01:10     0.00739       0.0229
0.020
  CB113                STORAGE    0.002    0.007    0  01:05     0.00121      0.00227
-0.044
  CB114                STORAGE    0.020    0.020    0  01:10      0.0161       0.0161
-0.000
  CB115                STORAGE    0.037    0.037    0  01:10      0.0452       0.0452
-0.005
  CB116                STORAGE    0.020    0.020    0  01:10      0.0276       0.0276
-0.008
  CB117                STORAGE    0.027    0.027    0  01:10      0.0368       0.0368
-0.006
  CB118                STORAGE    0.006    0.006    0  01:10     0.00424      0.00424
-0.001
  Roof_1               STORAGE    0.047    0.047    0  01:10      0.0669       0.0669
0.003
  Roof_2               STORAGE    0.048    0.048    0  01:10      0.0678       0.0678
0.003
  St_UnGrd             STORAGE    0.005    0.114    0  01:10     0.00886        0.139
0.005


**********************
Node Surcharge Summary
**********************

No nodes were surcharged.


**********************
Node Flooding Summary
**********************

No nodes were flooded.


**********************
Storage Volume Summary
**********************

-----------------------------------------------------------------------------------------------
-------
                          Average    Avg   Evap   Exfil    Maximum    Max    Time of Max
Maximum
                           Volume   Pcnt   Pcnt   Pcnt     Volume   Pcnt     Occurrence
Outflow
  Storage Unit           1000 m³   Full   Loss   Loss    1000 m³   Full     days hr:min
CMS
-----------------------------------------------------------------------------------------------
------
  CB110                    0.000    0.0    0.0    0.0      0.000    0.4      0  01:13
0.014
  CB111                    0.000    4.5    0.0    0.0      0.000   68.3      0  01:14
0.009
  CB112                    0.000    1.6    0.0    0.0      0.001   20.7      0  01:15
0.011
  CB113                    0.000    2.2    0.0    0.0      0.000   32.9      0  01:15
0.001
  CB114                    0.000    0.1    0.0    0.0      0.000    2.4      0  01:10
0.020
  CB115                    0.000    0.1    0.0    0.0      0.001    3.5      0  01:10
0.036
  CB116                    0.000    0.1    0.0    0.0      0.000    1.3      0  01:10
0.020
  CB117                    0.000    0.3    0.0    0.0      0.001    7.8      0  01:10
0.027
  CB118                    0.000    0.0    0.0    0.0      0.000    0.7      0  01:10
0.006
  Roof_1                   0.034   35.4    0.0    0.0      0.049   51.3      0  02:20
0.002
  Roof_2                   0.034   35.7    0.0    0.0      0.050   51.5      0  02:21
0.002
  St_UnGrd                 0.005   10.2    0.0    0.0      0.048   98.1      0  01:20
0.029


************************
Outfall Loading Summary
************************

-----------------------------------------------------------
                          Flow      Avg      Max    Total
                          Freq     Flow     Flow   Volume
Outfall Node              Pcnt      CMS      CMS 10^6 ltr
-----------------------------------------------------------
OF4                      94.93    0.002    0.002    0.040
OF7                      59.70    0.011    0.029    0.139
STUB15                   94.93    0.002    0.002    0.040
STUB16                   18.62    0.005    0.010    0.022
-----------------------------------------------------------
System                   67.05    0.020    0.043    0.241


********************
Link Flow Summary
********************

-----------------------------------------------------------------------------------
                                Maximum  Time of Max   Maximum    Max/    Max/
                                 |Flow|   Occurrence  |Veloc|    Full    Full
Link                 Type         CMS  days hr:min    m/sec    Flow   Depth
-----------------------------------------------------------------------------------
C1                   CONDUIT    0.009    0  01:10     0.56    0.63    1.00
C3                   CONDUIT    0.006    0  01:05     0.38    0.52    1.00
C5                   CONDUIT    0.014    0  01:10     0.87    1.02    1.00
W1                   WEIR       0.000    0  00:00                     0.00
W2                   WEIR       0.000    0  00:00                     0.00
W3                   WEIR       0.000    0  00:00                     0.00
W4                   WEIR       0.000    0  00:00                     0.00
W5                   WEIR       0.000    0  00:00                     0.00
C2                   DUMMY      0.010    0  01:15
OL1                  DUMMY      0.036    0  01:10
OL2                  DUMMY      0.020    0  01:10
OL3                  DUMMY      0.027    0  01:10
OL4                  DUMMY      0.002    0  00:32
OL5                  DUMMY      0.002    0  00:32
OL6                  DUMMY      0.020    0  01:10
OL7                  DUMMY      0.029    0  01:00
OL8                  DUMMY      0.006    0  01:10


***************************
Flow Classification Summary
***************************

-----------------------------------------------------------------------------------------------
                  Adjusted    ---------- Fraction of Time in Flow Class ----------
                   /Actual          Up    Down  Sub   Sup   Up    Down  Norm  Inlet
Conduit             Length     Dry  Dry   Dry   Crit  Crit  Crit  Crit  Ltd   Ctrl
-----------------------------------------------------------------------------------------------
C1                    1.00    0.17 0.00  0.00  0.14  0.00  0.00  0.69  0.02  0.00
C3                    1.00    0.17 0.00  0.00  0.14  0.00  0.00  0.69  0.02  0.00
C5                    1.00    0.17 0.00  0.00  0.82  0.01  0.00  0.00  0.72  0.00


**************************
Conduit Surcharge Summary
**************************

-----------------------------------------------------------------------------
                                                          Hours        Hours
                  --------- Hours Full --------    Above Full   Capacity
Conduit           Both Ends  Upstream  Dnstream    Normal Flow    Limited
-----------------------------------------------------------------------------
C1                     0.61      0.61      0.74           0.01       0.01
C3                     0.62      0.62      0.73           0.01       0.01
C5                     0.55      0.55      0.61           0.01       0.01


Analysis begun on:  Thu Oct 10 10:10:11 2024
Analysis ended on:  Thu Oct 10 10:10:12 2024
Total elapsed time: 00:00:01
```

Post-Development 24-hour SCS 1:100-year Event

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:00:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:00:00
END_DATE             01/02/2000
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         5
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              12

[EVAPORATION]
;;Data Source    Parameters
;;--------------- ----------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
Rainfall         INTENSITY 0:15     1.0      TIMESERIES 24SCS100

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen
SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- ------
----------------
S1               Rainfall         St_UnGrd         0.0091   100      6.1      15       0
S10              Rainfall         CB118            0.0138   8.79     28.998   1        0
S11              Rainfall         CB114            0.0473   18.805   70.001   2        0
S2               Rainfall         CB113            0.0044   0.002    4.3      1.9      0
S3               Rainfall         CB112            0.0218   17.802   75       1        0
S4               Rainfall         CB110            0.043    8.51     52.001   3.5      0
S5               Rainfall         Roof_1           0.0952   99.998   104.996  1        0
S6               Rainfall         CB115            0.0803   66.775   45.001   2.5      0
S7               Rainfall         CB116            0.0416   90.416   28.601   2.7      0
S8               Rainfall         Roof_2           0.0965   100      105.005  1        0
S9               Rainfall         CB117            0.0544   93.568   50       2.4      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
S1               0.013      0.25       1.57       4.67       0          OUTLET
S10              0.013      0.25       1.57       4.67       0          PERVIOUS   100
S11              0.013      0.25       1.57       4.67       0          PERVIOUS   100
S2               0.013      0.25       1.57       4.67       0          OUTLET
S3               0.013      0.25       1.57       4.67       0          PERVIOUS   100
S4               0.013      0.25       1.57       4.67       0          PERVIOUS   100
S5               0.013      0.25       1.57       4.67       0          OUTLET
S6               0.013      0.25       1.57       4.67       0          OUTLET
S7               0.013      0.25       1.57       4.67       0          OUTLET
S8               0.013      0.25       1.57       4.67       0          OUTLET
S9               0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
S1               76.2       13.2       4.14       7          0
S10              76.2       13.2       4.14       7          0
S11              76.2       13.2       4.14       7          0
S2               76.2       13.2       4.14       7          0
S3               76.2       13.2       4.14       7          0
S4               76.2       13.2       4.14       7          0
S5               76.2       13.2       4.14       7          0
S6               76.2       13.2       4.14       7          0
S7               76.2       13.2       4.14       7          0
S8               76.2       13.2       4.14       7          0
S9               76.2       13.2       4.14       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OF4              80.628     FIXED      81.11            NO
OF7              80.628     FIXED      81.11            NO
STUB15           80.628     FIXED      81.11            NO
STUB16           80.646     FIXED      81.28            NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape       Curve Name/Params
SurDepth Fevap    Psi     Ksat     IMD
;;-------------- -------- ---------- ---------- ----------- ----------------------------- -----
--- -------- -------- -------- --------
CB110            83.75    1.9        0          TABULAR     CB110                         0
0
CB111            83.59    2.01       0          TABULAR     CB111                         0
0
CB112            83.28    2.12       0          TABULAR     CB112                         0
0
CB113            83.55    1.7        0          TABULAR     CB113                         0
0
CB114            85.3     0.25       0          TABULAR     CB114                         0
0
CB115            85.25    0.31       0          TABULAR     CB115                         0
0
CB116            85.2     0.4        0          TABULAR     CB116                         0
0
CB117            85.15    0.15       0          TABULAR     CB117                         0
0
CB118            85.22    0.18       0          TABULAR     CB118                         0
0
Roof_1           96.35    0.15       0          FUNCTIONAL  0         0         635       0
0
Roof_2           96.35    0.15       0          FUNCTIONAL  0         0         643       0
0
St_UnGrd         81.8     1          0          FUNCTIONAL  0         0         49        0
0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset
InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ----------
---------- ----------
C1               CB111            CB112            28.913     0.013      83.59      83.34
0          0.08
C3               CB113            CB112            31.317     0.013      83.55      83.36
0          0.04
C5               CB110            CB111            20.475     0.013      83.75      83.59
0          0.04

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated
EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- ---------- --------
-------- ---------- ---------- ---------- ----------------
W1               CB115            CB116            TRANSVERSE   85.45      1.84       NO
0        0          NO
W2               CB116            CB117            TRANSVERSE   85.35      1.84       NO
0        0          NO
W3               CB112            CB113            TRANSVERSE   85.38      1.84       NO
0        0          NO
W4               CB114            CB115            TRANSVERSE   85.5       1.84       NO
0        0          NO
W5               CB110            CB112            TRANSVERSE   85.6       1.84       NO
0        0          NO

[OUTLETS]
;;Name           From Node        To Node          Offset     Type            QTable/Qcoeff
Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- --------------- --------------
- ---------- --------
C2               CB112            STUB16           83.28      TABULAR/HEAD    Vortex_ICD_95
NO
OL1              CB115            St_UnGrd         85.25      TABULAR/HEAD    ZURN_Z150F-6NH
NO
OL2              CB116            St_UnGrd         85.2       TABULAR/HEAD    ZURN_Z150F-6NH
NO
OL3              CB117            St_UnGrd         85.15      TABULAR/HEAD    ZURN_Z150F-6NH
NO
OL4              Roof_1           STUB15           96.35      TABULAR/HEAD    O_Roof1
NO
OL5              Roof_2           OF4              96.35      TABULAR/HEAD    O_Roof1
NO
OL6              CB114            St_UnGrd         85.3       TABULAR/HEAD    ZURN_Z150F-6NH
NO
OL7              St_UnGrd         OF7              81.8       TABULAR/HEAD    O_St_UnGrd
NO
OL8              CB118            St_UnGrd         85.22      TABULAR/HEAD    ZURN_Z150F-6NH
NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ---
-------
C1               CIRCULAR     0.15             0          0          0          1
C3               CIRCULAR     0.15             0          0          0          1
C5               CIRCULAR     0.15             0          0          0          1
W1               RECT_OPEN    0.11             17.1       0          0
W2               RECT_OPEN    0.25             17.1       0          0
W3               RECT_OPEN    0.02             4.58       0          0
W4               RECT_OPEN    0.05             7          0          0
W5               RECT_OPEN    0.05             3.487      0          0

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------
-
St_UnGrd         FLOW             InfiltratedInflow FLOW     1.0      1        0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
;Tempest Rating Curve for MHF IPEX TYPE A, No grate allowance
MHF_IPEX_TYPE_A  Rating     0          0
MHF_IPEX_TYPE_A             0.1        0.0057
MHF_IPEX_TYPE_A             0.2        0.0081
MHF_IPEX_TYPE_A             0.3        0.0099
MHF_IPEX_TYPE_A             0.4        0.0114
MHF_IPEX_TYPE_A             0.5        0.0128
MHF_IPEX_TYPE_A             0.6        0.014
MHF_IPEX_TYPE_A             0.7        0.0151
MHF_IPEX_TYPE_A             0.8        0.0162
MHF_IPEX_TYPE_A             0.9        0.0172
MHF_IPEX_TYPE_A             1          0.0181
MHF_IPEX_TYPE_A             1.2        0.0198
MHF_IPEX_TYPE_A             1.4        0.0214
MHF_IPEX_TYPE_A             1.6        0.0229
MHF_IPEX_TYPE_A             1.8        0.0243
MHF_IPEX_TYPE_A             2          0.0256
MHF_IPEX_TYPE_A             2.5        0.0286
MHF_IPEX_TYPE_A             3          0.0313

;Tempest Rating Curve for MHF IPEX TYPE B, No grate allowance
MHF_IPEX_TYPE_B  Rating     0          0
MHF_IPEX_TYPE_B             0.1        0.0081
MHF_IPEX_TYPE_B             0.2        0.0115
MHF_IPEX_TYPE_B             0.3        0.0141
MHF_IPEX_TYPE_B             0.4        0.0162
MHF_IPEX_TYPE_B             0.5        0.0182
MHF_IPEX_TYPE_B             0.6        0.0199
MHF_IPEX_TYPE_B             0.7        0.0215
MHF_IPEX_TYPE_B             0.8        0.023
MHF_IPEX_TYPE_B             0.9        0.0244
MHF_IPEX_TYPE_B             1          0.0257
MHF_IPEX_TYPE_B             1.2        0.0281
MHF_IPEX_TYPE_B             1.4        0.0304
MHF_IPEX_TYPE_B             1.6        0.0325
MHF_IPEX_TYPE_B             1.8        0.0344
MHF_IPEX_TYPE_B             2          0.0363
MHF_IPEX_TYPE_B             2.5        0.0406
MHF_IPEX_TYPE_B             3          0.0445

;Tempest Rating Curve for MHF IPEX TYPE C, No grate allowance
MHF_IPEX_TYPE_C  Rating     0          0
MHF_IPEX_TYPE_C             0.1        0.0106
MHF_IPEX_TYPE_C             0.2        0.015
MHF_IPEX_TYPE_C             0.3        0.0183
MHF_IPEX_TYPE_C             0.4        0.0212
MHF_IPEX_TYPE_C             0.5        0.0237
MHF_IPEX_TYPE_C             0.6        0.0259
MHF_IPEX_TYPE_C             0.7        0.028
MHF_IPEX_TYPE_C             0.8        0.0299
MHF_IPEX_TYPE_C             0.9        0.0317
MHF_IPEX_TYPE_C             1          0.0335
MHF_IPEX_TYPE_C             1.2        0.0366
MHF_IPEX_TYPE_C             1.4        0.0396
MHF_IPEX_TYPE_C             1.6        0.0423
MHF_IPEX_TYPE_C             1.8        0.0449
MHF_IPEX_TYPE_C             2          0.0473
MHF_IPEX_TYPE_C             2.5        0.0529
MHF_IPEX_TYPE_C             3          0.0579

;Tempest Rating Curve for MHF IPEX TYPE D, No grate allowance
MHF_IPEX_TYPE_D  Rating     0          0
MHF_IPEX_TYPE_D             0.1        0.0154
MHF_IPEX_TYPE_D             0.2        0.0217
MHF_IPEX_TYPE_D             0.3        0.0266
MHF_IPEX_TYPE_D             0.4        0.0307
MHF_IPEX_TYPE_D             0.5        0.0343
MHF_IPEX_TYPE_D             0.6        0.0376
MHF_IPEX_TYPE_D             0.7        0.0406
MHF_IPEX_TYPE_D             0.8        0.0434
MHF_IPEX_TYPE_D             0.9        0.0461
MHF_IPEX_TYPE_D             1          0.0485
MHF_IPEX_TYPE_D             1.2        0.0532
```

```
MHF_IPEX_TYPE_D             1.4         0.0574
MHF_IPEX_TYPE_D             1.6         0.0614
MHF_IPEX_TYPE_D             1.8         0.0651
MHF_IPEX_TYPE_D             2           0.0687
MHF_IPEX_TYPE_D             2.5         0.0768
MHF_IPEX_TYPE_D             3           0.0841

;Tempest Rating Curve for MHF IPEX TYPE E, No grate allowance
MHF_IPEX_TYPE_E  Rating     0           0
MHF_IPEX_TYPE_E             0.1         0.0205
MHF_IPEX_TYPE_E             0.2         0.0289
MHF_IPEX_TYPE_E             0.3         0.0355
MHF_IPEX_TYPE_E             0.4         0.0409
MHF_IPEX_TYPE_E             0.5         0.0458
MHF_IPEX_TYPE_E             0.6         0.0501
MHF_IPEX_TYPE_E             0.7         0.0542
MHF_IPEX_TYPE_E             0.8         0.0579
MHF_IPEX_TYPE_E             0.9         0.0614
MHF_IPEX_TYPE_E             1           0.0647
MHF_IPEX_TYPE_E             1.2         0.0709
MHF_IPEX_TYPE_E             1.4         0.0766
MHF_IPEX_TYPE_E             1.6         0.0819
MHF_IPEX_TYPE_E             1.8         0.0868
MHF_IPEX_TYPE_E             2           0.0915
MHF_IPEX_TYPE_E             2.5         0.1023
MHF_IPEX_TYPE_E             3           0.1121

O_Roof1          Rating     0           0
O_Roof1                     0.001       0.002
O_Roof1                     0.15        0.002

O_Roof2          Rating     0           0
O_Roof2                     0.001       0.0025
O_Roof2                     0.15        0.0025

O_St_UnGrd       Rating     0           0
O_St_UnGrd                  0.01        0.029
O_St_UnGrd                  1           0.029

;Tempest Rating Curve for Vortex ICD 100, No grate allowance
Vortex_ICD_100   Rating     0           0
Vortex_ICD_100              0.1         0.0028
Vortex_ICD_100              0.2         0.004
Vortex_ICD_100              0.3         0.0049
Vortex_ICD_100              0.4         0.0056
Vortex_ICD_100              0.5         0.0063
Vortex_ICD_100              0.6         0.0069
Vortex_ICD_100              0.7         0.0075
Vortex_ICD_100              0.8         0.008
Vortex_ICD_100              0.9         0.0085
Vortex_ICD_100              1           0.0089
Vortex_ICD_100              1.2         0.0098
Vortex_ICD_100              1.4         0.0106
Vortex_ICD_100              1.6         0.0113
Vortex_ICD_100              1.8         0.012
Vortex_ICD_100              2           0.0126
Vortex_ICD_100              2.5         0.0141
Vortex_ICD_100              3           0.0155

;Tempest Rating Curve for Vortex ICD 105, No grate allowance
Vortex_ICD_105   Rating     0           0
Vortex_ICD_105              0.1         0.0031
Vortex_ICD_105              0.2         0.0044
Vortex_ICD_105              0.3         0.0054
Vortex_ICD_105              0.4         0.0062
Vortex_ICD_105              0.5         0.0069
Vortex_ICD_105              0.6         0.0076
Vortex_ICD_105              0.7         0.0082
Vortex_ICD_105              0.8         0.0088
Vortex_ICD_105              0.9         0.0093
Vortex_ICD_105              1           0.0098
Vortex_ICD_105              1.2         0.0107
Vortex_ICD_105              1.4         0.0116
Vortex_ICD_105              1.6         0.0124
Vortex_ICD_105              1.8         0.0131
Vortex_ICD_105              2           0.0139
Vortex_ICD_105              2.5         0.0155
Vortex_ICD_105              3           0.017

;Tempest Rating Curve for Vortex ICD 40, No grate allowance
Vortex_ICD_40    Rating     0           0
Vortex_ICD_40               0.1         0.0004
Vortex_ICD_40               0.2         0.0006
Vortex_ICD_40               0.3         0.0007
Vortex_ICD_40               0.4         0.0009
Vortex_ICD_40               0.5         0.001
Vortex_ICD_40               0.6         0.001
Vortex_ICD_40               0.7         0.0011
Vortex_ICD_40               0.8         0.0012
Vortex_ICD_40               0.9         0.0013
Vortex_ICD_40               1           0.0014
Vortex_ICD_40               1.2         0.0015
Vortex_ICD_40               1.4         0.0016
Vortex_ICD_40               1.6         0.0017
Vortex_ICD_40               1.8         0.0018
Vortex_ICD_40               2           0.0019
Vortex_ICD_40               2.5         0.0022
Vortex_ICD_40               3           0.0024

;Tempest Rating Curve for Vortex ICD 45, No grate allowance
Vortex_ICD_45    Rating     0           0
Vortex_ICD_45               0.1         0.0006
Vortex_ICD_45               0.2         0.0008
Vortex_ICD_45               0.3         0.001
Vortex_ICD_45               0.4         0.0011
Vortex_ICD_45               0.5         0.0013
Vortex_ICD_45               0.6         0.0014
Vortex_ICD_45               0.7         0.0015
Vortex_ICD_45               0.8         0.0016
Vortex_ICD_45               0.9         0.0017
Vortex_ICD_45               1           0.0018
Vortex_ICD_45               1.2         0.002
Vortex_ICD_45               1.4         0.0021
Vortex_ICD_45               1.6         0.0023
Vortex_ICD_45               1.8         0.0024
Vortex_ICD_45               2           0.0026
Vortex_ICD_45               2.5         0.0029
Vortex_ICD_45               3           0.0031

;Tempest Rating Curve for Vortex ICD 50, No grate allowance
Vortex_ICD_50    Rating     0           0
Vortex_ICD_50               0.1         0.0007
Vortex_ICD_50               0.2         0.001
Vortex_ICD_50               0.3         0.0012
Vortex_ICD_50               0.4         0.0014
Vortex_ICD_50               0.5         0.0016
Vortex_ICD_50               0.6         0.0018
Vortex_ICD_50               0.7         0.0019
Vortex_ICD_50               0.8         0.002
Vortex_ICD_50               0.9         0.0021
Vortex_ICD_50               1           0.0023
Vortex_ICD_50               1.2         0.0025
Vortex_ICD_50               1.4         0.0027
Vortex_ICD_50               1.6         0.0029
Vortex_ICD_50               1.8         0.003
Vortex_ICD_50               2           0.0032
Vortex_ICD_50               2.5         0.0036
Vortex_ICD_50               3           0.0039

;Tempest Rating Curve for Vortex ICD 55, No grate allowance
Vortex_ICD_55    Rating     0           0
Vortex_ICD_55               0.1         0.0009
Vortex_ICD_55               0.2         0.0012
Vortex_ICD_55               0.3         0.0015
Vortex_ICD_55               0.4         0.0017
Vortex_ICD_55               0.5         0.0019
Vortex_ICD_55               0.6         0.0021
Vortex_ICD_55               0.7         0.0023
Vortex_ICD_55               0.8         0.0024
Vortex_ICD_55               0.9         0.0026
Vortex_ICD_55               1           0.0027
Vortex_ICD_55               1.2         0.003
Vortex_ICD_55               1.4         0.0032
Vortex_ICD_55               1.6         0.0034
Vortex_ICD_55               1.8         0.0036
Vortex_ICD_55               2           0.0038
Vortex_ICD_55               2.5         0.0043
Vortex_ICD_55               3           0.0047

;Tempest Rating Curve for Vortex ICD 60, No grate allowance
Vortex_ICD_60    Rating     0           0
Vortex_ICD_60               0.1         0.0011
Vortex_ICD_60               0.2         0.0015
Vortex_ICD_60               0.3         0.0018
Vortex_ICD_60               0.4         0.0021
Vortex_ICD_60               0.5         0.0023
Vortex_ICD_60               0.6         0.0025
Vortex_ICD_60               0.7         0.0027
Vortex_ICD_60               0.8         0.0029
Vortex_ICD_60               0.9         0.0031
Vortex_ICD_60               1           0.0032
Vortex_ICD_60               1.2         0.0036
Vortex_ICD_60               1.4         0.0038
Vortex_ICD_60               1.6         0.0041
Vortex_ICD_60               1.8         0.0043
Vortex_ICD_60               2           0.0046
Vortex_ICD_60               2.5         0.0051
Vortex_ICD_60               3           0.0056

;Tempest Rating Curve for Vortex ICD 65, No grate allowance
Vortex_ICD_65    Rating     0           0
Vortex_ICD_65               0.1         0.0012
Vortex_ICD_65               0.2         0.0016
Vortex_ICD_65               0.3         0.002
Vortex_ICD_65               0.4         0.0023
Vortex_ICD_65               0.5         0.0025
Vortex_ICD_65               0.6         0.0028
Vortex_ICD_65               0.7         0.003
Vortex_ICD_65               0.8         0.0032
Vortex_ICD_65               0.9         0.0034
Vortex_ICD_65               1           0.0036
Vortex_ICD_65               1.2         0.004
Vortex_ICD_65               1.4         0.0043
Vortex_ICD_65               1.6         0.0046
Vortex_ICD_65               1.8         0.0049
Vortex_ICD_65               2           0.0051
Vortex_ICD_65               2.5         0.0057
Vortex_ICD_65               3           0.0063

;Tempest Rating Curve for Vortex ICD 70, No grate allowance
Vortex_ICD_70    Rating     0           0
Vortex_ICD_70               0.1         0.0013
Vortex_ICD_70               0.2         0.0019
Vortex_ICD_70               0.3         0.0023
Vortex_ICD_70               0.4         0.0027
Vortex_ICD_70               0.5         0.003
Vortex_ICD_70               0.6         0.0033
Vortex_ICD_70               0.7         0.0036
Vortex_ICD_70               0.8         0.0038
Vortex_ICD_70               0.9         0.0041
Vortex_ICD_70               1           0.0043
Vortex_ICD_70               1.2         0.0047
Vortex_ICD_70               1.4         0.0051
Vortex_ICD_70               1.6         0.0055
Vortex_ICD_70               1.8         0.0058
Vortex_ICD_70               2           0.0061
Vortex_ICD_70               2.5         0.0068
Vortex_ICD_70               3           0.0075

;Tempest Rating Curve for Vortex ICD 75, No grate allowance
Vortex_ICD_75    Rating     0           0
Vortex_ICD_75               0.1         0.0016
Vortex_ICD_75               0.2         0.0022
Vortex_ICD_75               0.3         0.0027
Vortex_ICD_75               0.4         0.0032
Vortex_ICD_75               0.5         0.0035
Vortex_ICD_75               0.6         0.0039
Vortex_ICD_75               0.7         0.0042
Vortex_ICD_75               0.8         0.0045
Vortex_ICD_75               0.9         0.0048
Vortex_ICD_75               1           0.005
Vortex_ICD_75               1.2         0.0055
Vortex_ICD_75               1.4         0.0059
Vortex_ICD_75               1.6         0.0063
Vortex_ICD_75               1.8         0.0067
Vortex_ICD_75               2           0.0071
Vortex_ICD_75               2.5         0.0079
Vortex_ICD_75               3           0.0087

;Tempest Rating Curve for Vortex ICD 80, No grate allowance
Vortex_ICD_80    Rating     0           0
Vortex_ICD_80               0.1         0.0018
Vortex_ICD_80               0.2         0.0026
Vortex_ICD_80               0.3         0.0031
Vortex_ICD_80               0.4         0.0036
Vortex_ICD_80               0.5         0.004
Vortex_ICD_80               0.6         0.0044
Vortex_ICD_80               0.7         0.0048
Vortex_ICD_80               0.8         0.0051
Vortex_ICD_80               0.9         0.0054
Vortex_ICD_80               1           0.0057
Vortex_ICD_80               1.2         0.0063
Vortex_ICD_80               1.4         0.0068
Vortex_ICD_80               1.6         0.0072
Vortex_ICD_80               1.8         0.0077
Vortex_ICD_80               2           0.0081
Vortex_ICD_80               2.5         0.009
Vortex_ICD_80               3           0.0099

;Tempest Rating Curve for Vortex ICD 85, No grate allowance
Vortex_ICD_85    Rating     0           0
Vortex_ICD_85               0.1         0.002
Vortex_ICD_85               0.2         0.0029
Vortex_ICD_85               0.3         0.0035
Vortex_ICD_85               0.4         0.0041
Vortex_ICD_85               0.5         0.0045
Vortex_ICD_85               0.6         0.005
Vortex_ICD_85               0.7         0.0054
Vortex_ICD_85               0.8         0.0057
Vortex_ICD_85               0.9         0.0061
Vortex_ICD_85               1           0.0064
Vortex_ICD_85               1.2         0.007
Vortex_ICD_85               1.4         0.0076
Vortex_ICD_85               1.6         0.0081
Vortex_ICD_85               1.8         0.0086
Vortex_ICD_85               2           0.0091
Vortex_ICD_85               2.5         0.0101
Vortex_ICD_85               3           0.0111

;Tempest Rating Curve for Vortex ICD 90, No grate allowance
Vortex_ICD_90    Rating     0           0
Vortex_ICD_90               0.1         0.0022
Vortex_ICD_90               0.2         0.0032
Vortex_ICD_90               0.3         0.0039
Vortex_ICD_90               0.4         0.0045
Vortex_ICD_90               0.5         0.0051
Vortex_ICD_90               0.6         0.0055
Vortex_ICD_90               0.7         0.006
Vortex_ICD_90               0.8         0.0064
Vortex_ICD_90               0.9         0.0068
Vortex_ICD_90               1           0.0072
Vortex_ICD_90               1.2         0.0079
Vortex_ICD_90               1.4         0.0085
Vortex_ICD_90               1.6         0.0091
Vortex_ICD_90               1.8         0.0096
Vortex_ICD_90               2           0.0102
Vortex_ICD_90               2.5         0.0114
Vortex_ICD_90               3           0.0125
```

```
;Tempest Rating Curve for Vortex ICD 95, No grate allowance
Vortex_ICD_95     Rating     0          0
Vortex_ICD_95                0.1        0.0026
Vortex_ICD_95                0.2        0.0036
Vortex_ICD_95                0.3        0.0044
Vortex_ICD_95                0.4        0.0051
Vortex_ICD_95                0.5        0.0057
Vortex_ICD_95                0.6        0.0062
Vortex_ICD_95                0.7        0.0067
Vortex_ICD_95                0.8        0.0071
Vortex_ICD_95                0.9        0.0076
Vortex_ICD_95                1          0.008
Vortex_ICD_95                1.2        0.0087
Vortex_ICD_95                1.4        0.0094
Vortex_ICD_95                1.6        0.0101
Vortex_ICD_95                1.8        0.0107
Vortex_ICD_95                2          0.0113
Vortex_ICD_95                2.5        0.0126
Vortex_ICD_95                3          0.0138

;From Zurn Manual RD178
ZURN_Z150F-6NH    Rating     0          0
ZURN_Z150F-6NH               0.0127     0.00503838308477861
ZURN_Z150F-6NH               0.0257     0.01324200132311777
ZURN_Z150F-6NH               0.0384     0.0234992054543888
ZURN_Z150F-6NH               0.0508     0.0357128365761305
ZURN_Z150F-6NH               0.0765     0.0425019726111045
ZURN_Z150F-6NH               0.1024     0.0433196215564931

CB110             Storage    0          0.073
CB110                        1.55       0.073
CB110                        1.85       120.85
CB110                        1.9        120.85

CB111             Storage    0          0.073
CB111                        2.01       0.073

CB112             Storage    0          0.36
CB112                        1.92       0.36
CB112                        2.1        19.13
CB112                        2.12       19.13

CB113             Storage    0          0.073
CB113                        1.6        0.073
CB113                        1.7        3.62

CB114             Storage    0          0.36
CB114                        0.2        19.2
CB114                        0.25       19.2

CB115             Storage    0          0.36
CB115                        0.2        155.53
CB115                        0.31       155.53

CB116             Storage    0          0.36
CB116                        0.15       73.19
CB116                        0.4        73.19

CB117             Storage    0          0.36
CB117                        0.15       122.26

CB118             Storage    0          0.36
CB118                        0.18       37.7

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Rainfall (mm/hr)
24SCS100          01/01/2000 00:00:00   1.548
24SCS100          01/01/2000 00:15:00   1.548
24SCS100          01/01/2000 00:30:00   1.548
24SCS100          01/01/2000 00:45:00   1.548
24SCS100          01/01/2000 01:00:00   0.7224
24SCS100          01/01/2000 01:15:00   0.7224
24SCS100          01/01/2000 01:30:00   0.7224
24SCS100          01/01/2000 01:45:00   0.7224
24SCS100          01/01/2000 02:00:00   1.3416
24SCS100          01/01/2000 02:15:00   1.3416
24SCS100          01/01/2000 02:30:00   1.3416
24SCS100          01/01/2000 02:45:00   1.3416
24SCS100          01/01/2000 03:00:00   1.3416
24SCS100          01/01/2000 03:15:00   1.3416
24SCS100          01/01/2000 03:30:00   1.3416
24SCS100          01/01/2000 03:45:00   1.3416
24SCS100          01/01/2000 04:00:00   1.7544
24SCS100          01/01/2000 04:15:00   1.7544
24SCS100          01/01/2000 04:30:00   1.7544
24SCS100          01/01/2000 04:45:00   1.7544
24SCS100          01/01/2000 05:00:00   1.548
24SCS100          01/01/2000 05:15:00   1.548
24SCS100          01/01/2000 05:30:00   1.548
24SCS100          01/01/2000 05:45:00   1.548
24SCS100          01/01/2000 06:00:00   2.064
24SCS100          01/01/2000 06:15:00   2.064
24SCS100          01/01/2000 06:30:00   2.064
24SCS100          01/01/2000 06:45:00   2.064
24SCS100          01/01/2000 07:00:00   2.064
24SCS100          01/01/2000 07:15:00   2.064
24SCS100          01/01/2000 07:30:00   2.064
24SCS100          01/01/2000 07:45:00   2.064
24SCS100          01/01/2000 08:00:00   2.7864
24SCS100          01/01/2000 08:15:00   2.7864
24SCS100          01/01/2000 08:30:00   2.7864
24SCS100          01/01/2000 08:45:00   2.7864
24SCS100          01/01/2000 09:00:00   3.3024
24SCS100          01/01/2000 09:15:00   3.3024
24SCS100          01/01/2000 09:30:00   3.7152
24SCS100          01/01/2000 09:45:00   3.7152
24SCS100          01/01/2000 10:00:00   4.7472
24SCS100          01/01/2000 10:15:00   4.7472
24SCS100          01/01/2000 10:30:00   6.3984
24SCS100          01/01/2000 10:45:00   6.3984
24SCS100          01/01/2000 11:00:00   9.9072
24SCS100          01/01/2000 11:15:00   9.9072
24SCS100          01/01/2000 11:30:00   42.9312
24SCS100          01/01/2000 11:45:00   113.9328
24SCS100          01/01/2000 12:00:00   14.8608
24SCS100          01/01/2000 12:15:00   14.8608
24SCS100          01/01/2000 12:30:00   7.6368
24SCS100          01/01/2000 12:45:00   7.6368
24SCS100          01/01/2000 13:00:00   5.5728
24SCS100          01/01/2000 13:15:00   5.5728
24SCS100          01/01/2000 13:30:00   4.3344
24SCS100          01/01/2000 13:45:00   4.3344
24SCS100          01/01/2000 14:00:00   3.3024
24SCS100          01/01/2000 14:15:00   3.3024
24SCS100          01/01/2000 14:30:00   3.3024
24SCS100          01/01/2000 14:45:00   3.3024
24SCS100          01/01/2000 15:00:00   2.8896
24SCS100          01/01/2000 15:15:00   2.8896
24SCS100          01/01/2000 15:30:00   2.8896
24SCS100          01/01/2000 15:45:00   2.8896
24SCS100          01/01/2000 16:00:00   2.2704
24SCS100          01/01/2000 16:15:00   2.2704
24SCS100          01/01/2000 16:30:00   2.2704
24SCS100          01/01/2000 16:45:00   2.2704
24SCS100          01/01/2000 17:00:00   2.3736
24SCS100          01/01/2000 17:15:00   2.3736
24SCS100          01/01/2000 17:30:00   2.3736
24SCS100          01/01/2000 17:45:00   2.3736
24SCS100          01/01/2000 18:00:00   1.548
24SCS100          01/01/2000 18:15:00   1.548
24SCS100          01/01/2000 18:30:00   1.548
24SCS100          01/01/2000 18:45:00   1.548
24SCS100          01/01/2000 19:00:00   1.2384
24SCS100          01/01/2000 19:15:00   1.2384
24SCS100          01/01/2000 19:30:00   1.2384
24SCS100          01/01/2000 19:45:00   1.2384
24SCS100          01/01/2000 20:00:00   1.7544
24SCS100          01/01/2000 20:15:00   1.7544
24SCS100          01/01/2000 20:30:00   1.7544
24SCS100          01/01/2000 20:45:00   1.7544
24SCS100          01/01/2000 21:00:00   1.1352
24SCS100          01/01/2000 21:15:00   1.1352
24SCS100          01/01/2000 21:30:00   1.1352
24SCS100          01/01/2000 21:45:00   1.1352
24SCS100          01/01/2000 22:00:00   1.032
24SCS100          01/01/2000 22:15:00   1.032
24SCS100          01/01/2000 22:30:00   1.032
24SCS100          01/01/2000 22:45:00   1.032
24SCS100          01/01/2000 23:00:00   1.032
24SCS100          01/01/2000 23:15:00   1.032
24SCS100          01/01/2000 23:30:00   1.032
24SCS100          01/01/2000 23:45:00   1.032
24SCS100          01/02/2000 00:00:00   0

;Rainfall (mm/hr)
3CHI100           01/01/2000 00:00:00   5.339
3CHI100           01/01/2000 00:10:00   6.376
3CHI100           01/01/2000 00:20:00   7.977
3CHI100           01/01/2000 00:30:00   10.797
3CHI100           01/01/2000 00:40:00   17.136
3CHI100           01/01/2000 00:50:00   45.128
3CHI100           01/01/2000 01:00:00   178.107
3CHI100           01/01/2000 01:10:00   51.056
3CHI100           01/01/2000 01:20:00   26.163
3CHI100           01/01/2000 01:30:00   17.571
3CHI100           01/01/2000 01:40:00   13.277
3CHI100           01/01/2000 01:50:00   10.712
3CHI100           01/01/2000 02:00:00   9.008
3CHI100           01/01/2000 02:10:00   7.793
3CHI100           01/01/2000 02:20:00   6.883
3CHI100           01/01/2000 02:30:00   6.174
3CHI100           01/01/2000 02:40:00   5.607
3CHI100           01/01/2000 02:50:00   5.142
3CHI100           01/01/2000 03:00:00   0

;Sum of Infiltrated flow from above the garage slab calculated from Infiltration graphs for
S11 multiplied by the total pervious area above the garage.
InfiltratedInflow 01/01/2000 00:01:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:02:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:03:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:04:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:05:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:06:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:07:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:08:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:09:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:10:00   2.306158E-05
InfiltratedInflow 01/01/2000 00:11:00   2.306158E-05
......
Too many data points (1440 in total).

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

[TAGS]
Subcatch   S1              Ramp
Subcatch   S5              Building
Subcatch   S6              ParkingLot
Subcatch   S7              ParkingLot
Subcatch   S8              Building
Subcatch   S9              ParkingLot
Node       St_UnGrd        Underground_Storage

[MAP]
DIMENSIONS       381280.91645     5032948.93205    381379.86255     5033068.41295
UNITS            Meters

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OF4               381364.593         5032973.357
OF7               381346.502         5032963.916
STUB15            381335.776         5032954.363
STUB16            381319.979         5032958.277
CB110             381293.102         5033002.513
CB111             381307.131         5032987.6
CB112             381319.643         5032961.536
CB113             381348.344         5032974.064
CB114             381332.566         5033036.058
CB115             381332.827         5033018.906
CB116             381338.815         5033005.189
CB117             381344.774         5032991.539
CB118             381359.473         5032992.996
Roof_1            381325.164         5032977.273
Roof_2            381361.335         5033013.684
St_UnGrd          381329.806         5032972.84

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
W3                381322.829         5032965.271
W3                381343.656         5032974.514
W5                381295.919         5033002.386
W5                381309.233         5032988.935
W5                381320.071         5032965.768
OL6               381323.041         5033005.693

[POLYGONS]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
S1                381344.215         5032984.464
S1                381347.856         5032976.123
S1                381337.733         5032971.705
S1                381334.493         5032979.128
S1                381341.864         5032982.351
S1                381344.215         5032984.464
S10               381360.442         5032986.777
S10               381355.738         5032997.554
S10               381357.523         5032998.333
S10               381358.678         5032998.837
S10               381359.142         5032997.774
S10               381369.264         5033002.193
S10               381368.8           5033003.256
S10               381374.019         5033005.534
S10               381375.365         5033002.452
S10               381360.442         5032986.777
S11               381341.862         5033062.982
S11               381348.903         5033062.839
S11               381355.186         5033056.237
S11               381352.72          5033054.328
S11               381336.223         5033047.127
S11               381340.298         5033037.792
S11               381338.894         5033036.045
S11               381327.521         5033031.08
S11               381325.697         5033035.259
S11               381319.536         5033040.417
S11               381328.068         5033049.243
S11               381327.155         5033052.4
S11               381330.052         5033055.329
S11               381335.192         5033057.864
S11               381336.099         5033058.311
S11               381336.581         5033058.572
S11               381337.055         5033058.848
S11               381337.521         5033059.137
S11               381337.977         5033059.441
S11               381338.424         5033059.758
S11               381338.861         5033060.089
S11               381341.862         5033062.982
S2                381339.051         5032968.685
S2                381337.931         5032971.251
```

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S2              381337.733          5032971.705
S2              381347.856          5032976.123
S2              381352.652          5032978.217
S2              381352.769          5032978.266
S2              381352.887          5032978.313
S2              381353.006          5032978.356
S2              381352.331          5032977.428
S2              381349.581          5032976.228
S2              381350.662          5032973.753
S2              381339.051          5032968.685
S3              381318.259          5032957.972
S3              381307.625          5032982.332
S3              381303.659          5032986.085
S3              381310.51           5032989.076
S3              381321.435          5032964.05
S3              381337.931          5032971.251
S3              381339.051          5032968.685
S3              381319.267          5032960.048
S3              381318.259          5032957.972
S4              381303.659          5032986.085
S4              381285.414          5033003.349
S4              381304.879          5033024.646
S4              381311.368          5033017.747
S4              381300.135          5033012.843
S4              381310.51           5032989.076
S4              381303.659          5032986.085
S5              381316.631          5033020.045
S5              381320.706          5033010.711
S5              381318.612          5033009.797
S5              381319.652          5033007.414
S5              381321.746          5033008.328
S5              381327.851          5032994.342
S5              381334.493          5032979.128
S5              381337.733          5032971.705
S5              381337.931          5032971.251
S5              381321.435          5032964.05
S5              381310.51           5032989.076
S5              381300.135          5033012.843
S5              381311.368          5033017.747
S5              381316.631          5033020.045
S6              381327.521          5033031.08
S6              381338.894          5033036.045
S6              381340.298          5033037.792
S6              381342.392          5033038.706
S6              381343.432          5033036.323
S6              381341.338          5033035.409
S6              381349.093          5033017.644
S6              381343.736          5033015.306
S6              381335.821          5033012.047
S6              381326.803          5033010.853
S6              381325.27           5033009.866
S6              381321.746          5033008.328
S6              381319.652          5033007.414
S6              381318.612          5033009.797
S6              381320.706          5033010.711
S6              381316.631          5033020.045
S6              381311.368          5033017.747
S6              381304.879          5033024.646
S6              381307.751          5033027.787
S6              381319.536          5033040.417
S6              381325.697          5033035.259
S6              381327.521          5033031.08
S7              381354.292          5033005.735
S7              381349.118          5033003.477
S7              381341.795          5032998.364
S7              381333.208          5032996.68
S7              381327.851          5032994.342
S7              381321.746          5033008.328
S7              381325.27           5033009.866
S7              381326.803          5033010.853
S7              381335.821          5033012.047
S7              381349.093          5033017.644
S7              381354.292          5033005.735
S8              381336.223          5033047.127
S8              381352.72           5033054.328
S8              381374.019          5033005.534
S8              381368.8            5033003.256
S8              381369.264          5033002.193
S8              381359.142          5032997.774
S8              381358.678          5032998.837
S8              381357.523          5032998.333
S8              381355.797          5033002.286
S8              381341.338          5033035.409
S8              381343.432          5033036.323
S8              381342.392          5033038.706
S8              381340.298          5033037.792
S8              381336.223          5033047.127
S9              381360.442          5032986.777
S9              381352.823          5032978.774
S9              381353.006          5032978.356
S9              381352.846          5032978.297
S9              381352.688          5032978.233
S9              381347.856          5032976.123
S9              381344.215          5032984.464
S9              381341.866          5032982.347
S9              381334.493          5032979.128
S9              381327.851          5032994.342
S9              381333.208          5032996.68
S9              381341.795          5032998.364
S9              381349.118          5033003.477
S9              381354.292          5033005.735
S9              381357.523          5032998.333
S9              381355.738          5032997.554
S9              381360.442          5032986.777

;;Storage Node   X-Coord             Y-Coord
;;--------------- ------------------ ------------------

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

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
  ------------------------------------------------------------


  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 11
  Number of nodes ........... 16
  Number of links ........... 17
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
                                                  Data       Recording
  Name                 Data Source                Type       Interval
  -------------------------------------------------------------------
  Rainfall             24SCS100                   INTENSITY   15 min.


  ********************
  Subcatchment Summary
  ********************
  Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
  ------------------------------------------------------------------------------------------
---------------
  S1                          0.01      6.10    100.00   15.0000 Rainfall            St_UnGrd
  S10                         0.01     29.00      8.79    1.0000 Rainfall            CB118
  S11                         0.05     70.00     18.80    2.0000 Rainfall            CB114
  S2                          0.00      4.30      0.00    1.9000 Rainfall            CB113
  S3                          0.02     75.00     17.80    1.0000 Rainfall            CB112
  S4                          0.04     52.00      8.51    3.5000 Rainfall            CB110
  S5                          0.10    105.00    100.00    1.0000 Rainfall            Roof_1
  S6                          0.08     45.00     66.78    2.5000 Rainfall            CB115
  S7                          0.04     28.60     90.42    2.7000 Rainfall            CB116
  S8                          0.10    105.00    100.00    1.0000 Rainfall            Roof_2
  S9                          0.05     50.00     93.57    2.4000 Rainfall            CB117


  ************
  Node Summary
  ************
                                        Invert      Max.    Ponded    External
  Name                 Type              Elev.     Depth      Area    Inflow
  ---------------------------------------------------------------------------
  OF4                  OUTFALL          80.63      0.00       0.0
  OF7                  OUTFALL          80.63      0.00       0.0
  STUB15               OUTFALL          80.63      0.00       0.0
  STUB16               OUTFALL          80.65      0.00       0.0
  CB110                STORAGE          83.75      1.90       0.0
  CB111                STORAGE          83.59      2.01       0.0
  CB112                STORAGE          83.28      2.12       0.0
  CB113                STORAGE          83.55      1.70       0.0
  CB114                STORAGE          85.30      0.25       0.0
  CB115                STORAGE          85.25      0.31       0.0
  CB116                STORAGE          85.20      0.40       0.0
  CB117                STORAGE          85.15      0.15       0.0
  CB118                STORAGE          85.22      0.18       0.0
  Roof_1               STORAGE          96.35      0.15       0.0
  Roof_2               STORAGE          96.35      0.15       0.0
  St_UnGrd             STORAGE          81.80      1.00       0.0    Yes


  ************
  Link Summary
  ************
  Name                 From Node        To Node          Type            Length    %Slope
Roughness
  ---------------------------------------------------------------------------------------
-
  C1                   CB111            CB112            CONDUIT           28.9    0.8647
0.0130
  C3                   CB113            CB112            CONDUIT           31.3    0.6067
0.0130
  C5                   CB110            CB111            CONDUIT           20.5    0.7815
0.0130
  W1                   CB115            CB116            WEIR
  W2                   CB116            CB117            WEIR
  W3                   CB112            CB113            WEIR
  W4                   CB114            CB115            WEIR
  W5                   CB110            CB112            WEIR
  C2                   CB112            STUB16           OUTLET
  OL1                  CB115            St_UnGrd         OUTLET
  OL2                  CB116            St_UnGrd         OUTLET
  OL3                  CB117            St_UnGrd         OUTLET
  OL4                  Roof_1           STUB15           OUTLET
  OL5                  Roof_2           OF4              OUTLET
  OL6                  CB114            St_UnGrd         OUTLET
  OL7                  St_UnGrd         OF7              OUTLET
  OL8                  CB118            St_UnGrd         OUTLET


  **********************
  Cross Section Summary
  **********************
                                          Full     Full     Hyd.     Max.   No. of     Full
  Conduit              Shape              Depth     Area     Rad.    Width  Barrels     Flow
  ---------------------------------------------------------------------------------------
  C1                   CIRCULAR            0.15     0.02     0.04     0.15        1     0.01
  C3                   CIRCULAR            0.15     0.02     0.04     0.15        1     0.01
  C5                   CIRCULAR            0.15     0.02     0.04     0.15        1     0.01


  ****************
  Analysis Options
  ****************
  Flow Units ................ CMS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ....... HORTON
  Flow Routing Method ....... DYNWAVE
  Surcharge Method .......... EXTRAN
  Starting Date ............. 01/01/2000 00:00:00
  Ending Date ............... 01/02/2000 00:00:00
  Antecedent Dry Days ....... 0.0
  Report Time Step .......... 00:01:00
  Wet Time Step ............. 00:01:00
  Dry Time Step ............. 00:01:00
  Routing Time Step ......... 5.00 sec
  Variable Time Step ........ YES
  Maximum Trials ............ 8
  Number of Threads ......... 1
  Head Tolerance ............ 0.001500 m


  **************************       Volume         Depth
  Runoff Quantity Continuity     hectare-m            mm
  **************************     ---------      -------
  Total Precipitation ......         0.052       103.200
  Evaporation Loss .........         0.000         0.000
  Infiltration Loss ........         0.012        23.698
  Surface Runoff ...........         0.040        78.367
  Final Storage ............         0.001         1.200
  Continuity Error (%) .....        -0.062


  **************************       Volume         Volume
  Flow Routing Continuity        hectare-m       10^6 ltr
```

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.040	0.398
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.005
External Outflow	0.040	0.402
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.008	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

All links are stable.

Most Frequent Nonconverging Nodes

Convergence obtained at all time steps.

Routing Time Step Summary

Minimum Time Step	:	0.34 sec
Average Time Step	:	5.00 sec
Maximum Time Step	:	5.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.00
% of Steps Not Converging	:	0.00
Time Step Frequencies	:	
5.000 - 3.155 sec	:	100.00 %
3.155 - 1.991 sec	:	0.00 %
1.991 - 1.256 sec	:	0.00 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 0.500 sec	:	0.00 %

Subcatchment Runoff Summary

Subcatchment	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm
S1	101.64	0.01	0.00	103.20 0.985	0.00	0.00	0.00	101.64	0.00
S10	29.50	0.00	0.00	103.20 0.286	0.00	0.00	73.59	8.93	29.50
S11	31.43	0.01	0.01	103.20 0.305	0.00	0.00	71.51	19.11	31.43
S2	27.37	0.00	0.00	103.20 0.265	0.00	0.00	75.86	0.00	27.37
S3	31.44	0.01	0.01	103.20 0.305	0.00	0.00	71.52	18.09	31.44
S4	29.49	0.01	0.01	103.20 0.286	0.00	0.00	73.61	8.65	29.49
S5	101.57	0.10	0.03	103.20 0.984	0.00	0.00	0.00	101.57	0.00
S6	77.13	0.06	0.02	103.20 0.747	0.00	0.00	25.01	67.84	9.29
S7	94.58	0.04	0.01	103.20 0.916	0.00	0.00	7.17	91.85	2.73
S8	101.57	0.10	0.03	103.20 0.984	0.00	0.00	0.00	101.57	0.00
S9	96.90	0.05	0.02	103.20 0.939	0.00	0.00	4.81	95.07	1.84

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
OF4	OUTFALL	0.48	0.48	81.11	0 00:00	0.48
OF7	OUTFALL	0.48	0.48	81.11	0 00:00	0.48
STUB15	OUTFALL	0.48	0.48	81.11	0 00:00	0.48
STUB16	OUTFALL	0.63	0.63	81.28	0 00:00	0.63
CB110	STORAGE	0.02	1.27	85.02	0 12:01	1.27
CB111	STORAGE	0.02	1.39	84.98	0 12:02	1.39
CB112	STORAGE	0.03	1.64	84.92	0 12:02	1.64
CB113	STORAGE	0.02	1.37	84.92	0 12:02	1.37
CB114	STORAGE	0.00	0.03	85.33	0 12:00	0.03
CB115	STORAGE	0.00	0.04	85.29	0 12:00	0.04
CB116	STORAGE	0.00	0.03	85.23	0 12:00	0.03
CB117	STORAGE	0.00	0.03	85.18	0 12:00	0.03
CB118	STORAGE	0.00	0.01	85.23	0 12:00	0.01
Roof_1	STORAGE	0.01	0.06	96.41	0 13:00	0.06
Roof_2	STORAGE	0.02	0.06	96.41	0 13:00	0.06
St_UnGrd	STORAGE	0.01	0.78	82.58	0 12:02	0.78

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
OF4	OUTFALL	0.000	0.002	0 11:04	0	0.0979	0.000
OF7	OUTFALL	0.000	0.029	0 11:45	0	0.187	0.000
STUB15	OUTFALL	0.000	0.002	0 11:04	0	0.0966	0.000
STUB16	OUTFALL	0.000	0.010	0 12:02	0	0.0208	0.000
CB110	STORAGE	0.012	0.012	0 12:00	0.0127	0.0127	-0.021
CB111	STORAGE	0.000	0.010	0 12:00	0	0.0127	0.022
CB112	STORAGE	0.006	0.014	0 12:00	0.00685	0.0216	-0.148
CB113	STORAGE	0.001	0.005	0 11:49	0.0012	0.0021	0.026
CB114	STORAGE	0.014	0.014	0 12:00	0.0149	0.0149	-0.001
CB115	STORAGE	0.024	0.024	0 12:00	0.0619	0.0619	-0.000
CB116	STORAGE	0.013	0.013	0 12:00	0.0393	0.0393	-0.001
CB117	STORAGE	0.017	0.017	0 12:00	0.0527	0.0527	-0.001
CB118	STORAGE	0.004	0.004	0 12:00	0.00407	0.00407	-0.001
Roof_1	STORAGE	0.030	0.030	0 11:58	0.0967	0.0967	-0.000
Roof_2	STORAGE	0.031	0.031	0 12:00	0.098	0.098	-0.000
St_UnGrd	STORAGE	0.003	0.075	0 12:00	0.014	0.187	0.001

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
CB110	0.000	0.0	0.0	0.0	0.000	0.4	0 12:01	0.010
CB111	0.000	1.0	0.0	0.0	0.000	69.0	0 12:02	0.008
CB112	0.000	0.4	0.0	0.0	0.001	20.9	0 12:02	0.011
CB113	0.000	0.5	0.0	0.0	0.000	33.2	0 12:02	0.002
CB114	0.000	0.0	0.0	0.0	0.000	1.4	0 12:00	0.014
CB115	0.000	0.0	0.0	0.0	0.001	1.9	0 12:00	0.024
CB116	0.000	0.0	0.0	0.0	0.000	0.7	0 12:00	0.013
CB117	0.000	0.1	0.0	0.0	0.000	4.2	0 12:00	0.017
CB118	0.000	0.0	0.0	0.0	0.000	0.4	0 12:00	0.004
Roof_1	0.009	9.8	0.0	0.0	0.039	40.9	0 13:00	0.002
Roof_2	0.010	10.1	0.0	0.0	0.040	41.2	0 13:00	0.002
St_UnGrd	0.001	1.4	0.0	0.0	0.038	77.7	0 12:02	0.029

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF4	95.17	0.001	0.002	0.098
OF7	97.69	0.002	0.029	0.187
STUB15	95.17	0.001	0.002	0.097
STUB16	4.59	0.005	0.010	0.021
System	73.16	0.010	0.043	0.402

Link Flow Summary

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.008	0 12:00	0.50	0.55	1.00
C3	CONDUIT	0.004	0 11:49	0.28	0.35	1.00
C5	CONDUIT	0.010	0 12:00	0.82	0.76	1.00
W1	WEIR	0.000	0 00:00			0.00
W2	WEIR	0.000	0 00:00			0.00
W3	WEIR	0.000	0 00:00			0.00
W4	WEIR	0.000	0 00:00			0.00
W5	WEIR	0.000	0 00:00			0.00
C2	DUMMY	0.010	0 12:02			
OL1	DUMMY	0.024	0 12:00			
OL2	DUMMY	0.013	0 12:00			
OL3	DUMMY	0.017	0 12:00			
OL4	DUMMY	0.002	0 11:04			
OL5	DUMMY	0.002	0 11:04			
OL6	DUMMY	0.014	0 12:00			
OL7	DUMMY	0.029	0 11:45			
OL8	DUMMY	0.004	0 12:00			

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.49	0.00	0.00	0.03	0.00	0.00	0.48	0.01	0.00
C3	1.00	0.48	0.00	0.00	0.03	0.00	0.00	0.48	0.01	0.00
C5	1.00	0.48	0.00	0.00	0.51	0.01	0.00	0.00	0.48	0.00

Conduit Surcharge Summary

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.57	0.57	0.71	0.01	0.01
C3	0.58	0.58	0.70	0.01	0.01
C5	0.50	0.50	0.57	0.01	0.01

Analysis begun on: Thu Oct 10 10:08:55 2024
Analysis ended on: Thu Oct 10 10:08:55 2024
Total elapsed time: < 1 sec

Engineering Specification

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

Tag _____

RD-200

Small Area Roof Drain

Specification

Watts RD-200 epoxy coated cast iron roof drain with flashing clamp with integral gravel stop, self-locking polyethylene dome (standard), and no hub (standard) outlet.

Pipe Sizing		
Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size (NH Only)	☐

Outlet Type		
Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded	☐
X	Inside Caulk	☐

Options		
Suffix	Description	
-13	Galvanized Body & Flashing Clamp	☐
-B	Sump Receiver	☐
-D	Underdeck Clamp	☐
-F	Deck Flange/Adj. Extension	☐
-GSS	Stainless Steel Ballast Guard	☐
-K	Ductile Iron Dome	☐
-K13	Galvanized Dome	☐
-K80	Aluminum Dome	☐
-K81	Rough Bronze Dome	☐
-K83	SS Mesh Covered Dome	☐
-L	Vandal Proof Dome	☐
-R	2" External Water Dam	☐
-SO	Side Outlet	☐
-W	Adjustable Internal Water Dam	☐

Optional Body Material		
Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

Deck Opening 6 1/2"(165) with Sump Receiver 8"(203)

Free Area
Sq. In.
35

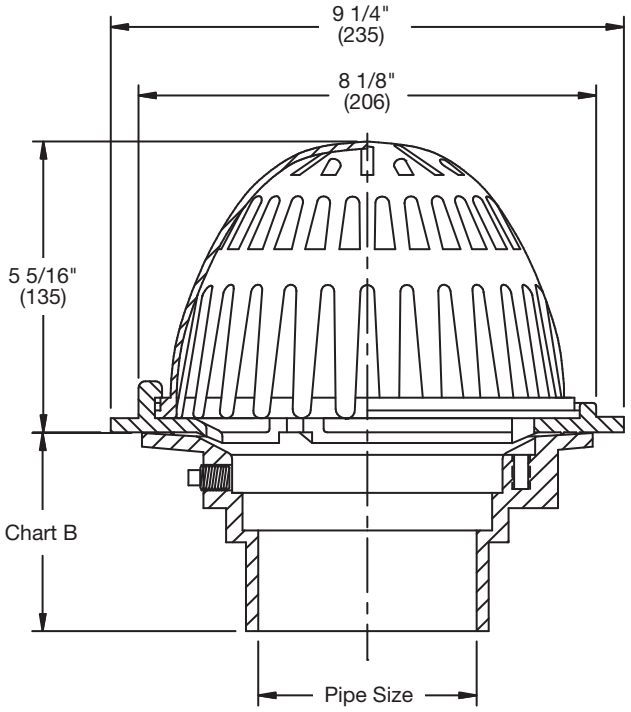

Chart B

Pipe Size	Std. No Hub	P Push On	T Female Thread	X Inside Caulk	60/61 PVC/ ABS
2"(51)	3 5/8"(92)	4 1/4"(108)	4 1/4"(108)	4 1/2"(108)	4"(102)
3"(76)	3 5/8"(92)	4 1/4"(108)	4 1/4"(108)	4 1/2"(108)	4"(102)
4"(102)	3 5/8"(92)	4 1/4"(108)	4 1/4"(108)	4 1/2"(108)	4"(102)

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

USA: T: (800) 338-2581 • F: (828) 248-3929 • Watts.com
Canada: T: (888) 208-8927 • F: (905) 481-2316 • Watts.ca
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Adjustable Accutrol Weir

Tag: _____

Adjustable Flow Control for Roof Drains

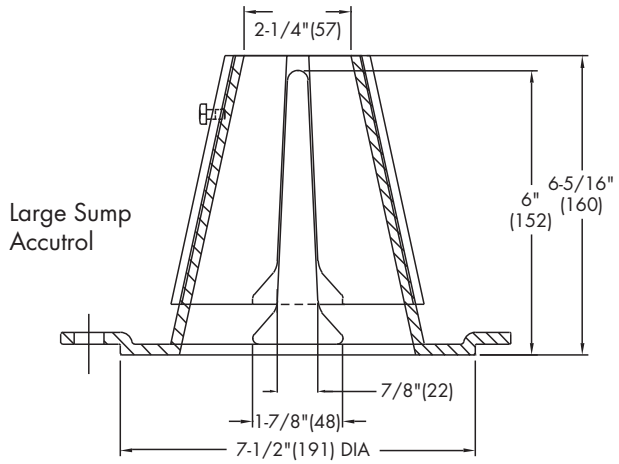
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

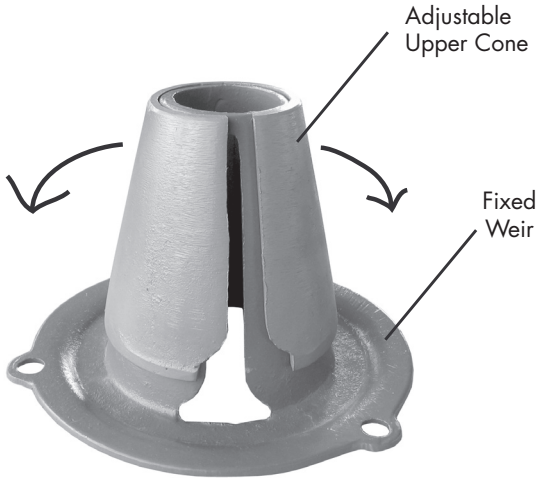
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

USA: Tel: (800) 338-2581 • Fax: (828) 248-3929 • Watts.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • Watts.ca
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

A Watts Water Technologies Company

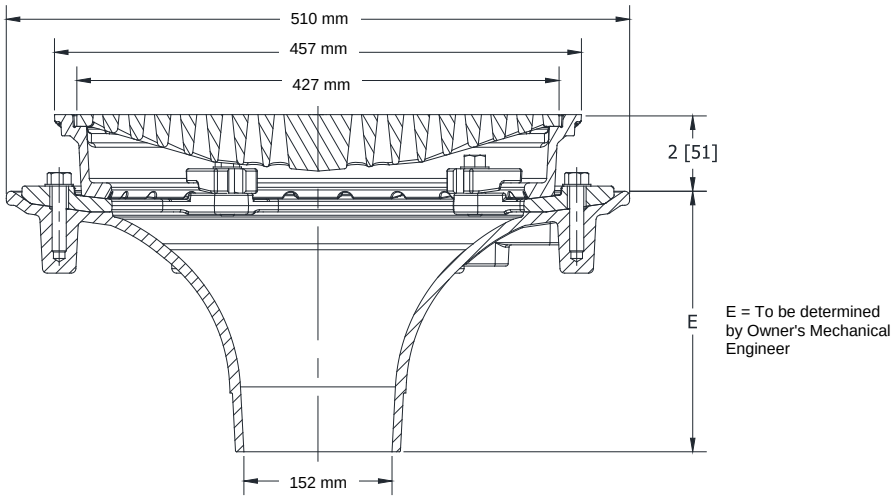
Z150F

FLOFORCE™ HIGH PERFORMANCE PROMENADE DECK DRAIN WITH ROTATABLE FRAME AND HEEL-PROOF GRATE

SPECIFICATION SHEET

TAG _____

Design and Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



4 [102] No-Hub Illustrated

A Outlet Size In. [mm]	B Body Diameter In [mm]	C Frame Size In [mm]	D Grate Size In [mm]	Weight lbs [kg]	Grate Open Area Sq. In. [cm2]
2,3,4 [51,76,102]	16-9/16 [421]	14 [356]	12-13/16 [325]	66 [30]	44 [284]
6,8 [152, 203]	20-3/32 [510]	18 [457]	16-13/16 [427]	94 [43]	70 [452]

ENGINEERING SPECIFICATION: ZURN Z150F

FLOFORCE™ High efficient flow performing roof drain for promenade deck roof drain applications. Drain incorporates a smooth funnel-shaped interior surface, providing a seamless transition to outlet connection and eliminating internal obstructions within the body. Complete with Dura-Coated cast iron body with membrane flashing clamp, rotatable square promenade frame, seepage openings, securing clamps, and heavy-duty ductile iron heel-proof grate.

OPTIONS (Check/specify appropriate options)

PIPE SIZE	(Specify size/type) **OUTLET**			**E BODY HT. DIM.**
2, 3, 4 [51, 76,102]	_____	NH	No-Hub	6-15/16 [176]
6, 8 [152, 203]	_____	NH	No-Hub	7-7/16 [189]
2, 3, 4 [51, 76, 102]	_____	NL	Neo-Loc	7-3/8 [187]
6 [152]	_____	NL	Neo-Loc	8-1/32 [204]
2, 3, 4 [51,76, 102]	_____	IP	Threaded	5-15/16, 6-3/16, 6-5/16 [151, 157, 160]
6, 8 [152, 203]	_____	IP	Threaded	6-11/16, 6-3/4 [170, 171]
3, 4 [76,102]	_____	IC	Inside Caulk	5-13/16 [148]
6 [152]	_____	IC	Inside Caulk	6-1/16 [154]

PREFIXES

_____ Z D.C.C.I. Body and Frame with Ductile Iron Grate*

_____ ZN D.C.C.I. Body and Frame with Ductile Iron Grate and Polished Nickel Bronze Veneer Finish

SUFFIXES

_____ -AR Acid Resistant Epoxy Coated

_____ -C Underdeck Clamp

_____ -DP Top-Set® Deck Plate (Replaces both the -C and -R)

_____ -DR Top-Set® Drain Riser

_____ -E Static Extension 1 [25] thru 4 [102] (Specify Ht.)

_____ -EA Adjustable Extension Assembly 2-1/8 [54] thru 3-1/2 [89]

_____ -G Galvanized Cast Iron

_____ -PD Low-Profile Pedestal Paver Dome

_____ -R Roof Sump Receiver

_____ -SC Secondary Clamp Collar

_____ -TC Neo-Loc Test Cap Gasket (2, 3, 4 [51, 76, 102] NL Bottom Outlet Only)

_____ -VP Vandal-Proof Secured Top

_____ -Y Type 304 [CF8] SS Sediment Bucket

_____ -85 Type 304 [CF8] Stainless Steel Perforated Extension

_____ -89 2 [51] High Overflow Dam and Low-Profile Pedestal Paver Dome

* Regularly furnished unless otherwise specified

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

⚠ **ADVERTENCIA:** Cáncer y daño reproductivo - www.P65Warnings.ca.gov

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1801 Pittsburgh Avenue, Erie, PA 16502, Ph. 855.663.9876

In Canada | Zurn Industries Limited
7900 Goreway Drive, Unit 10, Brampton, Ontario L6T 5W6, Ph. 877.892.5216

www.zurn.com

Rev. -
Date: 08/08/2022
C.N. No. 144780

Appendix E

Sanitary Servicing

JLR NO. 29899-002 (NAVAN BLOCK 15)

Street Name	Pipe Reach							Commercial/Institutional				Infiltration			Peak Design Flow L/s	Pipe Data								Upstream Geometry				Downstream Geometry					Self Cleansing Velocities			
	From	To	Apartments	Pop.	Cum. Pop.	Peaking Factor	Residential Flow (L/s)	Area (ha)	Cum. Area (ha)	Peaking Factor	Inst. Flow (L/s)	Area (ha)	Cum. Area (ha)	Peak Extr. Flow L/s		Dia	Type	Actual Diameter	Slope	Q Full (L/s)	V Full	Length	Residual Capacity	% Full	TG From	Obvert	Invert	Cover	TG TO	Drop	Obvert	Invert	Cover	Q/Qf Ratio	Flow Depth (mm)	Actual Velocity [7] (m/s)	Flow Depth to Dia. Ratio (d/D)
BLOCK 15	BLOCK 15	14	83	149	149	3.55	1.72	0.09	0.09	1.50	0.05	0.57	0.57	0.19	1.95	200	Circular	203.20	1.50%	41.91	1.29	6.10	39.95	5%	85.850	82.467	82.264	3.383	85.840	0.060	82.376	82.173	3.464	0.05	29.67	0.66	0.15
EAST ORLEANS RIDGE SUBDIVISION	14	13			149	3.55	1.72		0.09	1.50	0.05		0.57	0.19	1.95	200	Circular	203.20	1.50%	41.91	1.29	13.50	39.95	5%	85.840	82.316	82.113	3.524	84.940		82.113	81.910	2.827	0.05	29.67	0.66	0.15

Design Parameters		
Apartments Population	1.8	Cap/Unit
Residential Flows	280	L/Cap/Day
Infiltration Flows	0.33	L/s/ha
Harmon's Correction Facto	0.8	unitless
Commercial Peak Factor	1.5	unitless
Institutional/Commercial A	28000	L/gross ha/d
Manning Coefficient	0.013	unitless

William Rugamba

From: William Rugamba
Sent: July 22, 2024 8:18 AM
To: William Rugamba
Subject: FW: Re-confirmation of Mechanical Items for Servicing Report

William Rugamba, M.Eng., B.A.Sc., EIT
Civil Engineering Graduate
Ottawa, ON
Work: 343-804-4374

From: Sarith Lopez <slopez@qmeengineering.com>
Sent: Wednesday, July 17, 2024 8:07 PM
To: Mahad Musse <mmusse@jlrichards.ca>; Chuck Clark <CWC@qmeengineering.com>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>
Subject: RE: Re-confirmation of Mechanical Items for Servicing Report

Hi Mahad,

All items below confirmed

Regards

Sarith López
Project Manager

9 Gurdwara Road, Unit 200
Ottawa, ON K2E 7X6
T: 613-366-4763 ext. 129
slopez@qmeengineering.com

From: Mahad Musse <mmusse@jlrichards.ca>
Sent: Tuesday, July 16, 2024 3:08 PM
To: Sarith Lopez <slopez@qmeengineering.com>; Chuck Clark <CWC@qmeengineering.com>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>
Subject: Re-confirmation of Mechanical Items for Servicing Report

Hi Sarith/Chuck,

Thank you for the information below and in our meetings. I understand all these items have been discussed before but we need to submit something as part of our report. Can you just re-confirm the following questions below and then we will attach your confirmation to the Report.

1. Please confirm that the sanitary service size of 200mm diameter for the Site Plan Blocks (Block 14, 15 and 17) is preferred by the mechanical engineer on file;

2. Please confirm that a sprinkler flow of 25 L/s can be assumed for the Site Plan Blocks (Block 14, 15 and 17) at this stage.

Thanks
Mahad

Mahad Musse, B.Eng., EIT
Civil Engineering Graduate

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