NOVATECH

Engineers, Planners & Landscape Architects

Engineering

- Land / Site Development
- Municipal Infrastructure
- Environmental / Water Resources
- Traffic / Transportation
- Structural
- Recreational

Planning

- Land / Site Development
- Planning Application Management
- Municipal Planning Documents & Studies
- Expert Witness (OMB)
- Wireless Industry

Landscape Architecture

- Urban Design & Streetscapes
- Open Space, Parks & Recreation Planning
- Community & Residential Developments
- Commercial & Institutional Sites
- Environmental Restoration

36 Years

Hard Rock Ottawa
4837 Albion Road

Servicing & Stormwater Management Report

Engineering excellence. Planning precision. Inspired landscapes.

HARD ROCK OTTAWA

4837 ALBION ROAD
OTTAWA, ONTARIO

SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

November 20, 2019
Revised April 24, 2020

Novatech File: 116111
Report Ref: R-2019-196

Engineers, Planners & Landscape Architects

April 24, 2020

City of Ottawa
Planning Infrastructure and Economic Development Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON
K1P 1J1

Attention: **Allison Hamlin, MCIP, RPP, Planner II**

Reference: **4837 Albion Road Hard Rock Ottawa**
Servicing and Stormwater Management Report
Novatech File No.: 116111

Novatech has prepared this Servicing and Stormwater Management Report, on behalf of Hard Rock Ottawa, in support of Site Plan and Re-Zoning Applications for review and approval.

The report addresses how the proposed development will be serviced by watermain, sanitary sewer, storm sewers, and stormwater management.

Should you have any questions or comments, please do not hesitate to contact us.

Sincerely,

NOVATECH

Cara Ruddle, P.Eng.
Senior Project Manager | Land Development Engineering

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Background 1
1.2 Proposed Development 1
1.3 Site Constraints 2
1.4 Background Reports 2

2.0 WATER SERVICING 3

2.1 Existing Water Services 3
2.2 Proposed Water Servicing 3
2.2.1 Domestic Water Demands 3
2.2.2 Fire Flow 4

3.0 SANITARY SERVICING 5

3.1 Existing Sanitary Services 5
3.2 Proposed Sanitary Services 5
3.2.1 Sanitary Flows 5
3.3 Existing Sanitary Sewers and Pump Station 6

4.0 STORM SERVICING AND STORMWATER MANAGEMENT 7

4.1 Previous Studies 7
4.1.1 Leitrim Wetlands 7
4.1.2 Rideau Carleton Raceway Expansion (OLG Slots) 7
4.2 Storm Servicing & Stormwater Management Design 8
4.2.1 Minor System (Storm Sewer) Design Criteria 8
4.2.2 Major System (Overland Flow) Design Criteria 9
4.2.3 Stormwater Quantity Control 9
4.2.4 Water Quality Treatment Criteria 9
4.2.5 Best Management Practices and Low Impact Development 9
4.3 Proposed Storm Infrastructure 10
4.3.1 Underground Storage / Infiltration Chambers 10
4.3.2 Surface Storage 11
4.3.3 Storage Swale 11
4.4 Stormwater Quality Control 11
4.4.1 Underground Storage (Infiltration) 11
4.4.2 Stormwater Management Pond 12
4.5 Stormwater Management Model Development 13
4.5.1 PCSWMM Model Parameters 13
4.6 PCSWMM Model Results 16
4.6.1 Existing Conditions 16
4.6.2 Proposed Conditions 17
4.6.3 Comparison of Peak Flows and Runoff Volumes 18

5.0 EROSION AND SEDIMENT CONTROL 19

6.0 CONCLUSIONS AND RECOMMENDATIONS 19

7.0 CLOSURE 21

LIST OF TABLES

Table 2.1: Water Demand Summary
Table 2.2: Boundary Condition Summary
Table 3.1: Sanitary Flow Summary
Table 4.1: Water Quality Treatment Volumes (SWM Pond)
Table 4.2: Existing Conditions Peak Flows and Runoff Volumes
Table 4.3: Proposed Conditions Peak Flows and Runoff Volumes

LIST OF FIGURES

Figure 1 Key Plan
Figure 2 Existing Conditions
Figure 3 Proposed Development Plan

LIST OF APPENDICIES

Appendix A Water Servicing Information
Appendix B Sanitary Servicing Information
Appendix C Storm Servicing Information
Appendix D Stormwater Management Modeling
Appendix E Development Servicing Study Checklist
Appendix F Drawings

LIST OF DRAWINGS (enclosed)

Storm Sewer Drainage Area Plan	(116111-STM)
Stormwater Management Drainage Area Plan	(116111-SWM)

LIST OF DRAWINGS (separate)

Cover Page	
Notes and Details	(116111-ND, ND2)
Removals Plan	(116111-REM)
General Plan of Services	(116111-GP, GP1, GP2, GP3, GP4)
Grading Plan	(116111-GR, GR1, GR2, GR3, GR4)
Erosion Sediment Control Plan	(116111-ESC)

ENCLOSED CD

- Report (pdf)
- Drawings (pdf)
- PCSWMM Packaged Model Files
    - 100-year 3-hour Chicago Storm

1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed Hard Rock Casino Expansion at 4837 Albion Road within Ottawa, Ontario. This report will support a Site Plan and Re-Zoning Application for the proposed development. **Figure 1** is a Key Plan showing the site location.

This report outlines the site sanitary and water servicing, along with the proposed storm drainage and stormwater management strategy for the proposed development.

1.1 Background

The existing Rideau Carleton Raceway and OLG Slots property is located at 4837 Albion Road. The subject property was recently severed into two separate parcels. The Rideau Carleton Raceway has retained the 43.8-hectare undeveloped parcel to the east of the existing racetrack that fronts onto Bank Street. Hard Rock Ottawa presently owns the 40.5-hectare parcel that fronts on to Albion Road. This is the property that is subject to this application.

The 40.5-hectare property at 4837 Albion Road is bound by Albion Road to the West, vacant undeveloped land to the north, the retained Rideau Carleton Raceway property to the east, and farmland to the south. The site slopes away from Albion Road to the low point north of the existing horse barns. **Figure 2** shows the existing site conditions.

Prior to the recent severance the original raceway facility consisted of the raceway building with buffet restaurant, grandstand and racetrack with apron as well as stables, barns and horseman's kitchen located at the rear of the site. The original raceway facility was serviced by a private well and septic system. The existing septic bed continues to service the barn, stables and horseman's kitchen.

In 2000, the existing raceway building was expanded to accommodate the addition of the OLG slots. This expansion included the following works:

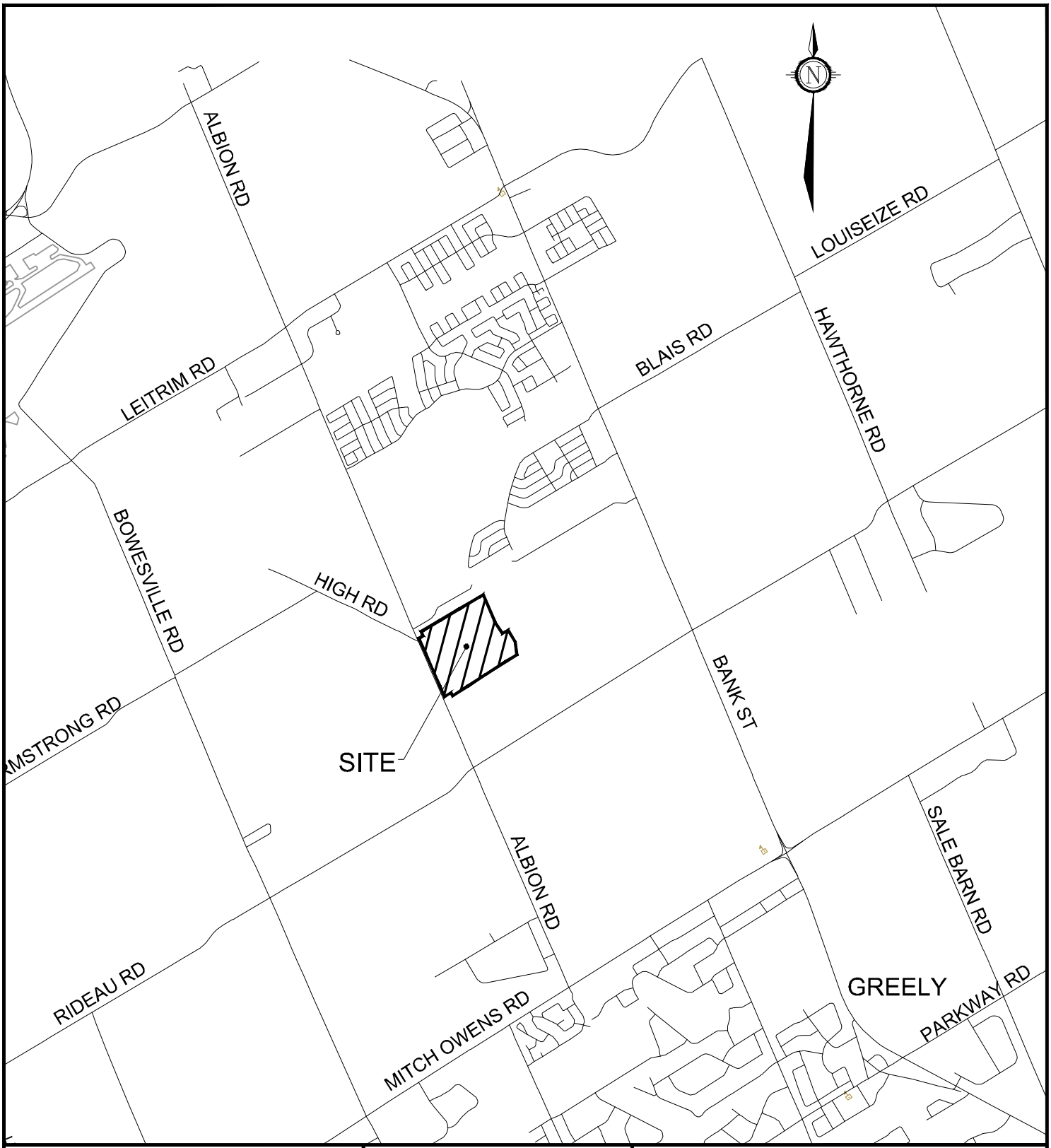
- Expansion of the existing watermain system and addition of the fire suppression system.
- Watermain installed across the property to the east connecting to the existing watermain along Bank Street.
- Storm drainage and stormwater management infrastructure.

In 2006, the sanitary sewer system was added with a pump station.

In 2018, a rezoning application was approved by the City of Ottawa for the addition of 20 gaming tables to the existing OLG slots casino and the proposed hotel.

1.2 Proposed Development

The proposed Hard Rock Casino expansion will consist of an 8-storey hotel with 178 rooms, multiple different restaurants with a total of approximately seat count of 775, a live auditorium with 1600 seats, and approximately 2000 gaming positions all under one roof. The proposed expansions will also include expansions and improvements to the existing parking area and laneways. **Figure 3** shows the proposed site development.



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

KEY PLAN

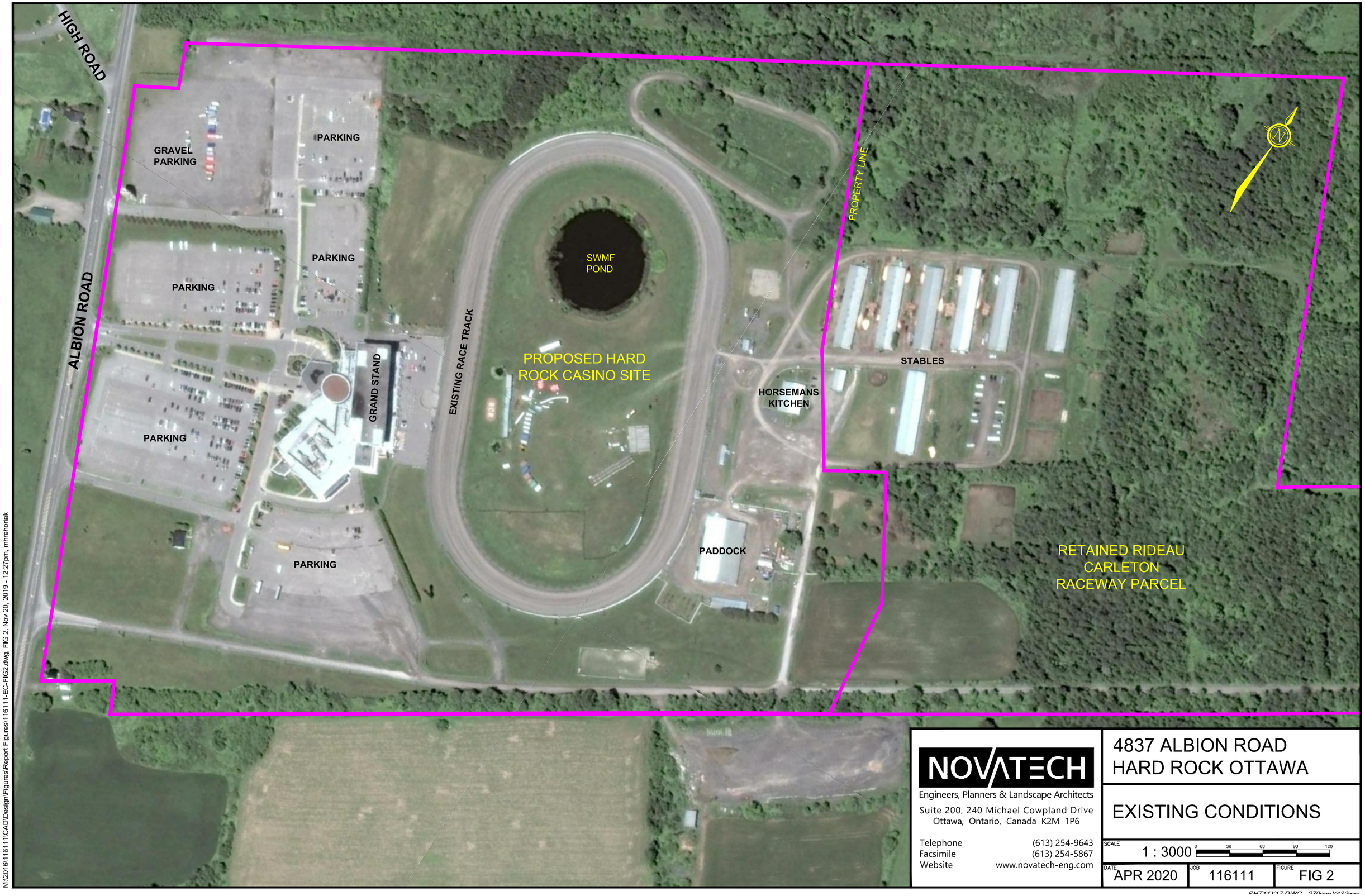
CITY OF OTTAWA

4837 ALBION ROAD
HARD ROCK OTTAWA

DATE	JOB	FIGURE
NOV 2019	116111	FIG 1

SHT8X11.DWG - 216mmx279mm

M:\2016\116111\CAD\Design\Figures\Report Figures\116111-KP-FIG1.dwg, FIG 1, Nov 07, 2019 - 3:01pm, amestwarp



M:\2016\116111\CAD\Design\Figures\Report Figures\116111-EC-FIG2.dwg, FIG 2, Nov 20, 2019 - 12:27pm, mhrehoriak

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

4837 ALBION ROAD HARD ROCK OTTAWA

EXISTING CONDITIONS

SCALE 1 : 3000 (0, 30, 60, 90, 120)

DATE APR 2020 | JOB 116111 | FIGURE FIG 2

SHT11X17.DWG - 279mmX432mm

HIGH ROAD

FUTURE EARL ARMSTRONG EXTENSION

ALBION ROAD

EX. SWM POND

EX. RACE TRACK

EX. GRAND STAND

EX. RIDEAU CARLETON RACEWAY AND OLG SLOTS

HOTEL

HARD ROCK CASINO ADDITION

LIVE AUDITORIUM

STABLES

HORSEMAN'S KITCHEN

PADDOCK

N

M:\2016\116111\CAD\Design\Figures\Report Figures\116111- PS-FIG 3.dwg, FIG3, Apr 22, 2020 - 1:45pm, mhrehoniak

NOVATECH

Engineers, Planners & Landscape Architects

Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

4837 ALBION ROAD
HARD ROCK OTTAWA

PROPOSED SITE PLAN

SCALE 1 : 3000 (0, 30, 60, 90, 120)

DATE APR 2020 | JOB 116111 | FIGURE FIG 3

SHT11X17.DWG - 279mmX432mm

1.3 Site Constraints

Paterson Group performed the geotechnical investigation in support of the proposed development and provided the following report '*Geotechnical Investigation Proposed Building Expansion, 4837 Albion Road, Ottawa, ON Paterson Group' dated October 30, 2019.* The report indicates that bedrock is expected to range from 15m-25m below existing grade and the groundwater table is expected to be at a depth greater than 7m below existing grade. There is a permissible grade raise restriction of 2.0m above existing ground only where a clay deposit is present. An MECP permit to take water is not anticipated during construction; however, if pumping exceeds anticipated rates than a permit to take water application should be filed.

1.4 Background Reports

This report provides information on the considerations and approach by which Novatech has designed and evaluated the proposed servicing and stormwater management strategies. This report should be read in conjunction with the following:

- *Geotechnical Investigation, Proposed Building Expansion, 4837 Albion Road, Ottawa, ON Paterson Group (October 30, 2019)*
- *Serviceability Report, 4837 Albion Road, Hard Rock Ottawa, Ottawa, Ontario, Novatech (January 2018)*
- *Sanitary Sewer Brief Rideau Carleton Raceway David McManus Engineering Ltd. (October 6, 2005)*
- *Sanitary Sewage Report Rideau Carleton Raceway David McManus Engineering Ltd. (October 6, 2005)*
- *Rideau Carleton Raceway Expansion Servicing Options Study Oliver, Mangione, McCalla & Associates (March 7, 2000)*
- *Rideau Carleton Raceway Stormwater Design Oliver, Mangione, McCalla & Associates (September 3, 1999)*
- *Leitrim Development Area, Stormwater Management Environmental Study Report and Pre-Design. Golder Associates Limited (August 1994)*
- *Planning for Leitrim and Integrated Approach, Volume II Master Drainage Plan Cumming Cockburn Limited (August 1991)*

2.0 WATER SERVICING

2.1 Existing Water Services

The existing development is currently serviced from the existing 400mm diameter watermain to the northeast of the site in the Bank Street right-of-way. A 200mm diameter private watermain extends through the property to the east from Bank Street to an existing hydrant by the northwest corner of the property just outside of the Albion Road right-of-way. The existing private 200mm diameter watermain provides a potable water service for the existing Rideau Carleton Raceway Operations, the OLG slots, the horseman's kitchen and paddock at the rear of the racetrack.

Existing Fire Suppression

There are existing holding tanks and a dry hydrant for fire suppression that service the existing building and sprinkler system.

There is an existing well on the property that provides the following functions:

- Pumps water to the existing fountain in the middle of the racetrack area.
- Pumps water to the existing fire suppression tanks.
- Supplies water (non-domestic) to the existing stables.

2.2 Proposed Water Servicing

The existing 200mm diameter watermain will continue to service the existing development and provide service for the proposed Hard Rock expansion. The existing building water system will be extended internally to the proposed Hard Rock expansion to provide domestic water. Refer to the General Plan of Services (dwg 116111-GP) for watermain servicing details.

2.2.1 Domestic Water Demands

Design Criteria from the City of Ottawa Water Distribution Guidelines and the Ontario Building Code were used to calculate the theoretical water demands for proposed expansion. The demand calculations are based on flow requirements for the proposed different uses on site.

The water demand calculations for the existing facility are based on historical water record data. Detailed water record information and calculations are provided in **Appendix A**. The domestic water demands for the existing and proposed developments are summarized in **Table 2.1** below.

Table 2.1: Water Demand Summary

Use	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)
Existing RCR and OLG Slots	*1.01	1.52	2.74
Proposed Restaurants, Hard Rock Auditorium, Casino Additions	2.65	3.98	7.16
Proposed Hard Rock Hotel	0.83	2.08	4.58
Existing + Proposed Expansion	**4.49**	**7.58**	**14.48**

**Existing average daily demand calculated from 2015-2017 water meter data.*

2.2.2 Fire Flow

Fire flow requirements for the proposed building expansion were calculated by the Mechanical Consultant, SNC Lavalin; refer to Fire Protection Water Supply letter prepared by SNC Lavalin provided in **Appendix A**. This letter indicates that the existing 90,900 gallon and 30,000 gallon underground storage tanks on the north side of the building will be connected to service both the existing and proposed internal building fire suppression systems. The existing 500 USGPM fire pump will be replaced by a new 1250 USGPM pump to meet the fire suppression requirements for all areas of the existing and proposed building. A 70,000-gallon underground storage tank is also proposed in the southwest parking lot to service a proposed dry hydrant system. The fire department will draw water from the tank and pressurize the dry hydrant system in the event of a fire. Refer to the General Plan of Services (dwg 116111-GP) for details.

2.2.3 Hydraulic Analysis

The domestic water demand information was submitted to the City of Ottawa for boundary conditions. The boundary conditions were provided for the existing 400mm watermain on Bank Street. The results of the boundary conditions are summarized below in **Table 2.2**.

Table 2.2: Boundary Condition Summary

Condition	Service Connection Location	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	Bank Street	4.49	80psi (Max)	67.7
Peak Hour	Bank Street	14.48	40psi (Min)	49.1

These boundary conditions were input into the hydraulic model EPANET for analyzing the performance of the existing watermain systems for the following two (2) theoretical conditions:

1) High Pressure check under Average Day conditions
2) Peak Hour demand

The model indicates that the existing private 200mm watermain on site can provide adequate pressures for domestic use. Therefore, based on the proceeding analysis it can be concluded that the watermain, as designed, will provide adequate system pressures for domestic demands. It should be noted that in the future the City has identified potential higher peak demands on the existing Bank Street watermain. These higher demands would result in lower watermain pressures which would be resolved by a second pump at the Leitrim pump station.

Refer to **Appendix A** for detailed model results, schematics of the model and boundary conditions.

3.0 SANITARY SERVICING

3.1 Existing Sanitary Services

The existing development is currently serviced by an existing 250mm diameter gravity sanitary sewer. The conveyance of sanitary flows is as follows:

- Sanitary flows are conveyed to a private pump station at the north side of the property.
- The existing pump station pumps sanitary flows through a 150mm diameter sanitary forcemain.
- The forcemain outlets to an existing 250mm diameter gravity sanitary sewer within the High Road right-of-way; connecting to an existing 250mm diameter sanitary sewer along Earl Armstrong Road.
- The Earl Armstrong Road sanitary sewer connects to an existing 675mm diameter trunk sanitary sewer approximately 800 meters south west of the Bowesville Road intersection in an unopened road allowance.

A portion of the City of Ottawa Sewer Mapping (geoOttawa) is included in **Appendix B** for reference.

There is an existing septic system east of the existing paddock that services the existing horseman's kitchen, and paddock behind the racetrack. The existing septic system on the inside of the racetrack has been abandoned.

3.2 Proposed Sanitary Services

It is proposed to construct a new 250mm diameter sanitary service for the expansion and connect into the existing sanitary sewer by the rear northeast corner of the proposed building expansion. Refer to the General Plan of Services (116111-GP) for details.

3.2.1 Sanitary Flows

Flows from the existing development have been calculated using the previously noted historical water usage data. Flows for the proposed development have been calculated using criteria provided in Section 4 of City of Ottawa Sewer Design Guidelines and the Ontario Building Code. Detailed calculations are provided in **Appendix B** for reference.

The sanitary flows are summarized below in **Table 3.1**.

Table 3.1: Sanitary Flow Summary

Use	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Design Flow (L/s)
Existing RCR and OLG Slots	*1.52	4.13	5.65
Proposed Restaurants, Hard Rock Auditorium, Casino Additions	3.97	**N/A	3.97
Proposed Hard Rock Hotel	2.66	**N/A	2.66
Existing + Expansion	**8.15**	**4.13**	**12.28**

**Existing peak flows calculated from 2015-2017 water meter data with a commercial peaking factor applied.*

***Infiltration flow accounted for in existing development sanitary flow calculations from the David McManus Engineering Ltd. Sanitary Sewage Report Rideau Carleton Raceway Report, Dated October 6, 2005.*

The total theoretical peak sanitary flow for the development including the existing Rideau Carleton Raceway was calculated to be 12.28 L/s. The total sanitary flow is calculated based on a total development area of 14.74ha.

The existing 250mm diameter sewer on site at a minimum slope of 0.28% has a theoretical capacity of 31.4 L/s. The capacity of the existing pump station will be discussed in the following section of the report.

3.3 Existing Sanitary Sewers and Pump Station

The existing 250mm diameter gravity sanitary sewer in High Road was originally designed to accommodate the 20-year expansion plan for the Rideau Carleton Raceway. The 20-year plan included a hotel, 1500 seat theater, retail center, trade center and golf course.

The total sanitary peak flow for the 20-year plan was estimated to be 20.64 L/s. This was allocated to the existing pump station and existing sanitary sewer in High Road.

Existing Forcemains and Pumps

The forcemain size and pumps were selected such that only minimal changes would be required in the future to allow for increased servicing flows from current conditions to the predicted 20-year flows.

A Flygt Pump model NP-3102-463 was selected and operates under normal conditions at a flow rate of 17.2 L/s.

2005 Sanitary Sewage Report (High Road / Earl Armstrong Road)

The 2005 David McManus Engineering Ltd. Sanitary Sewage Report indicates that the existing 250mm gravity sewer in High Road and Earl Armstrong Road has an excess capacity of 6.01 L/s in the 20-year flow condition plus an allotted 5 L/s from the future Central Canada Exhibition Site located at the northwest corner of the Albion Road and Rideau Road intersection.

As such, there is adequate capacity in the existing sanitary sewer infrastructure for the proposed Hard Rock expansion. Refer to **Appendix B** for the 2005 David McManus Engineering Ltd. report.

Assessment on the Existing Pump Station

A Technical Memorandum prepared by Novatech (November 1, 2019) reviews and assesses the condition of the existing pump station. This Technical Memorandum had the following conclusions:

- Operation and Maintenance documentation be compiled for the existing system.
- Improvements for accessing the pump station be completed.
- Enter into a service agreement to provide regular service checks on the pump station and emergency response services.

A copy of the Technical Memorandum is provided in **Appendix B** for reference.

CCTV Investigation

A CCTV investigation was completed for the existing gravity sanitary sewer: High Road / Albion Road intersection to approximately 800m south west of the Bowesville Road intersection.

The CCTV Investigation Report prepared by Veolia compiles the CCTV information for the sanitary sewer. The recommendation, from Novatech's review, is to clean the full length of sanitary sewer as there appears to grease buildup in areas and debris.

A copy of the CCTV Investigation Report, CD of the video footage and Novatech's review is provided in **Appendix B** for reference.

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

The Rideau Carleton Raceway was initially built in 1962. The site was previously developed without the incorporation of stormwater management practices. The site was subsequently expanded in 1999 to accommodate the addition of the OLG slots. Storm infrastructure was subsequently installed during the expansion.

4.1 Previous Studies

4.1.1 Leitrim Wetlands

The Rideau Carleton Raceway site drains northwards into the Findlay Creek Drain and the Leitrim Wetlands. The Leitrim Wetlands have been classified as a Provincially Significant Wetland.

The Leitrim Wetland was included in the following reports:

- *Planning for Leitrim and Integrated Approach, Volume II Master Drainage Plan Cumming Cockburn Limited (August 1991)*
- *Leitrim Development Area, Stormwater Management Environmental Study Report and Pre-Design. Golder Associates Limited (August 1994)*

The CCL (1991) report referenced above provided a 5-year flow as 4,515 L/s for a 293 ha area.

4.1.2 Rideau Carleton Raceway Expansion (OLG Slots)

The OLG Slots expansion involved the installation of new storm drainage and stormwater management infrastructure; designed per the following report, provided in **Appendix C**:

- *Rideau Carleton Raceway Stormwater Design*
  Oliver, Mangione, McCalla & Associates (September 3, 1999)

The 1999 stormwater design included source controls, private storm sewer system and end-of-pipe stormwater management pond. Inlet control devices were used to restrict peak flows in the storm sewer system. Most catchbasins had offline arch-style infiltration chambers to promote infiltration.

The 1999 stormwater design identified an allowable release rate for the 13.74 ha redevelopment. The allowable release rate was to restrict the 100-year storm event to a 5-year pre-development level (213 L/s). This was the allowable release rate used in the design of the end-of-pipe stormwater management pond.

The stormwater management pond is located within the middle of the racetrack area. The pond outlets via a culvert under the racetrack to a ditch on the north side of the existing horse barns. The remainder of the developed portion of the site east of the racetrack drains by a combination of sheet flows and channelized ditch flow to the same outlet location as the pond outlet ditch.

4.2 Storm Servicing & Stormwater Management Design

Storm servicing for the site will be provided using a dual drainage system:

- Runoff will be stored, infiltrated, and conveyed by underground storage / infiltration chambers (minor system).
- Flows from large storm events that exceed the capacity of the minor system will be stored on the surface and conveyed along defined overland flow routes (major system).

Runoff from the site is controlled by the existing stormwater management pond before discharging to the Findlay Creek Drain.

4.2.1 Minor System (Storm Sewer) Design Criteria

Runoff from frequent events will be conveyed by the existing and proposed storm sewers (minor system). Inlet control devices will be used to restrict flows to the minor system.

Storm Sewer Design Criteria

The following is the storm sewer design criteria based on the City of Ottawa Sewer Design Guidelines (October 2012) and associated Technical Bulletins:

- Rational Method (Q) = 2.78CIA, where
  - Q = peak flow (L/s)
  - C = runoff coefficient
    - C = (0.70 * %Imp.) + 0.20
  - I = rainfall intensity for a 2-year return period (mm/hr)
    - $I_{2yr} = 732.951 / [(Tc(min) + 6.199)]^{0.810}$
  - A = site area (ha)
- Minimum Pipe Size = 250 mm; Minimum / Maximum Full Flow Velocity = 0.8 m/s / 3.0 m/s

Refer to the storm sewer design sheets provided in **Appendix C**.

Inlet Control Devices

Inlet control devices (ICDs) will restrict inflows to the minor system based on the following:

Existing Areas: Maximize above-ground storage while preventing 2-year ponding.

Proposed Areas: Maximize flow restrictions to prevent the storm sewer from 'spilling' out of the structures in the racetrack area.

4.2.2 Major System (Overland Flow) Design Criteria

Flows that exceed the restricted release rates will be stored on the surface. The proposed grading design provides an overland flow path towards the stormwater management pond in the racetrack area and the private laneway to the southeast. Refer to the Grading Plan (Drawing 116111-GR).

Major System (Overland Flow) Design Criteria

The following overland flow criteria will be applied to the proposed design:

- Promote surface storage by ponding stormwater on the surface.
- Ensure no ponding on the surface during a 2-year event.
- Ensure that major system flows have a maximum dynamic depth of 0.35 m during the 100-year event.
- Ensure that water levels will not touch the building envelope / lowest opening during the Stress Test event (100-year +20%).

4.2.3 Stormwater Quantity Control

There is no defined release rate for minor & major system flows from the parking area / building to the pond within the center of the racetrack. The restricted release rates from the 1999 stormwater management report would result in excessive overland flow to the racetrack / pond.

To minimize the impact on the performance of the existing pond the 100-year is to be contained within the parking area for the proposed areas being retrofitted. The total minor & major system peak flows and runoff volumes from the parking area are to be less than existing conditions; per the existing conditions model.

4.2.4 Water Quality Treatment Criteria

The proposed development is within the jurisdiction of the Rideau Valley Conservation Authority (RVCA). The water quality treatment criteria for the proposed development is to provide an Enhanced level of water quality treatment. This corresponds to 80% long-term removal of total suspended solids (TSS).

4.2.5 Best Management Practices and Low Impact Development

The proposed development is to utilize the use of best management practices (BMPs) and low impact development (LID) techniques. This will reduce the impacts of the proposed development on the hydrologic cycle; and mitigate the reduction in groundwater infiltration / recharge resulting from the proposed increase in impervious areas.

4.3 Proposed Storm Infrastructure

The existing storm sewer network will need to be modified for the proposed development as a large area of the existing parking lot area will be developed / redeveloped. Refer to the following drawings for the existing / proposed storm servicing design:

116111-GP1 to GP4	General Plan of Services	(provided separately)
116111-GR1 to GR4	Grading Plans	(provided separately)
116111-STM	Storm Sewer Drainage Area Plan	(Appendix C)
116111-SWM	Stormwater Management Plan	(Appendix D)

The existing stormwater management design concept will be continued and incorporated into any modifications to the storm sewer system. This includes surface ponding in parking areas, source controls via infiltration basins and storage of stormwater on building roofs.

4.3.1 Underground Storage / Infiltration Chambers

Underground storage will be required for the proposed development to attenuate runoff. By adhering to the 1999 flow restrictions surface ponding would occur during the 2-year storm event. Underground storage is provided to store runoff from a 2-year storm event and infiltrate stormwater for a 5mm (4-hour Chicago) storm.

The underground storage systems will consist of Stormtech SC-740 arch-type chambers (or approved equivalent), which are covered in 50mm dia. (D50) clearstone. The chambers will be installed under the parking areas immediately upstream each inlet.

A total of 475 proposed Stormtech SC-740 arch-type chambers will provide approximately 1,006 m^3 of underground storage. Storage is provided in the chambers and surrounding clearstone.

Refer to **Appendix C** for further details. The proposed layout of underground storage chambers is shown on the General Plan of Services (drawing 116111-GP).

The underground storage / infiltration chamber system is consistent with the 1999 approach for stormwater management.

Isolator Row

Pre-treatment will be provided via the Isolator Row within the underground storage system. The Isolator Row is a row (typically first row) of Stormtech SC-740 arch-type chambers that is surrounded by filter fabric (geotextile). The fabric-wrapped chambers provide for settling and filtration of sediment.

Stormwater runoff is directed to the Isolator Row. During frequent (small) storm events sediment will be captured in the Isolator Row. This protects the adjacent chambers & surrounding clearstone from sediment accumulation.

Sediment will accumulate on the filter fabric within the Isolator Row. A such, the Isolator Row will require period maintenance (i.e. jet flushing / vacuuming). Refer to **Appendix C** for further information on the Isolator Row and maintenance procedures.

4.3.2 Surface Storage

The parking areas have been designed to store runoff from storms that exceed the capacity of the underground storage chambers at each inlet. The site has been graded to ensure that ponding is confined within the parking areas at a maximum depth of 0.35 m (static ponding + dynamic flow).

Overland flow paths have been provided to ensure that runoff from extreme storm events that exceed the available storage can be safely directed towards the stormwater management pond.

4.3.3 Storage Swale

The existing swale at the northeast portion of the site will be expanded to accommodate the proposed development. The swale will provide approximately 395 m^3 of quantity control storage for the northeast parking lot. An ICD will be installed within the existing catchbasin to restrict peak flows to the existing storm sewer system.

4.4 Stormwater Quality Control

Stormwater quality control will be provided via the underground storage / infiltration chambers and the end-of-pipe stormwater management pond.

4.4.1 Underground Storage (Infiltration)

Water quality treatment will initially be provided by the underground storage / infiltration chambers (source controls). Ultimately water quality treatment is provided by the water quality pond in the center of the racetrack.

The underground storage chambers have been designed per the following design guidance provided in the MOE Stormwater Management Planning (SWMP) and Design Manual (March 2003), for a pervious pipe / infiltration system for stormwater management:

1 Provide storage volume per the water quality storage requirements provided in Table 3.2 (MOE, 2003).

2 Provide storage volumes for the pervious pipe / infiltration system equal to the runoff from a 5mm – 4-hour storm (minimum) and 15mm – 4-hour storm (maximum).

3 Native soils should have a percolation rate greater than 15 mm/hr.

4 The bottom of the storage layer should be located at least 1m above the depth of bedrock and seasonally high groundwater table.

Percolation Rates

Estimated percolation rates were provided based on the permeameter testing documented in the following memorandum (provided in **Appendix C**):

> Permeameter Test Investigation – Proposed Infiltration System
> Hard Rock Ottawa – 4837 Albion Road, Ottawa
> Paterson Group (November 26, 2019)

The estimated percolation rates ranged from 25 mm/hr to 110 mm/hr. For design purposes the estimated percolation rates were divided by 2 to account for clogging; per the Low Impact Development Stormwater Management Planning and Design Guide (CVC/TRCA, 2010).

Estimated percolation rates for each catchbasin are provided in **Appendix D**.

Existing Infiltration

Under existing conditions quality control of stormwater is provided using a combination of source and conveyance controls. Source controls are provided in the form of dry wells (infiltration chambers) installed at each catchbasin.

The provided storage for infiltration is 6.7 m^3 per inlet via 10x arch-type infiltration chambers. This value was based the total area to the existing catchbasins (6.47 ha) multiplied by the runoff coefficient and 5mm. The total storage volume of 226 m^3 was divided by the number of catchbasins (34) that are connected to a dry well.

Proposed Infiltration

The clearstone base of the underground storage chambers will provide storage for infiltration. Additional infiltration will also be provided due to the restrictiveness of the ICDs and high percolation rate of the surficial sandy soils.

Overall the site will store and infiltrate (at a minimum) 7.5mm of runoff. Refer to **Appendix D** for a summary of the infiltration storage volumes.

Depth of Bedrock / Groundwater

The geotechnical investigation (Paterson Group, October 30, 2019) indicates that bedrock was observed at an elevation of 93.90 m at BH4-19. In addition, the report states that groundwater was observed at BH4-19 (99.34 m) & BH7-19 (103.87 m).

The lowest elevation for the proposed infiltration chambers (clearstone) is 110.90 m; therefore, the infiltration-based measures meet the minimum requirements for depth to bedrock / groundwater (min. 1.0 m); as outlined in the Low Impact Development Stormwater Management Planning and Design Guide (CVC/TRCA, 2010).

4.4.2 Stormwater Management Pond

The stormwater management pond in the middle of the racetrack area was sized to provide water quality treatment for a 12.88 ha area with an assumed 85% imperviousness. Runoff from the building rooftop was not included in the calculations as rooftop runoff does not required water quality treatment.

The pond is considered a 'wet pond' with a permanent pool and extended detention. The 1999 stormwater design provided required storage volumes based on the MOE Stormwater Management Practices, Planning and Design Manual (June 1994), which was superseded in by the SWMP and Design Manual (March 2003).

Table 4.1 provides a comparison of the provided and required permanent pool and extended detention volumes. The 2020 design required storage volumes are based on Table 3.2 in the SWMP and Design Manual (March 2003). Based on 85% impervious the required water quality treatment volume for a wet pond is 250 m^3/ha; of which 210 m^3/ha is the permanent pool and 40 m^3/ha is the extended detention.

Table 4.1: Water Quality Treatment Volumes (SWM Pond)

Pond Feature	Provided Storage Volume	Required Storage Volume	
		1999 Design	2020 Design*
Permanent Pool	5,179 m^3	2,705 m^3 (210 m^3/ha x 12.88 ha)	2,434 m^3 (203 m^3/ha x 11.97 ha)
Extended Detention	2,350 m^3	515 m^3 (40 m^3/ha x 12.88 ha)	479 m^3 (40 m^3/ha x 11.97 ha)
TOTAL	**7,529 m^3**	**3,220 m^3**	**2,913 m^3**

**Permanent pool volume based on interpolating values presented in Table 3.2 of the SWM Planning & Design Manual. (MOE, 2003)*

The 1999 stormwater management report assumed a 12.88 ha area based on 85% imperviousness. The proposed development will have less treatable area (11.97 ha) due to the additional building. The overall imperviousness is slightly less (81%) than previously assumed. The required permanent pool volume is less than what was previously estimated; therefore, no modifications are proposed for the stormwater management pond.

4.5 Stormwater Management Model Development

Dual drainage stormwater management models (PCSWMM) for existing conditions and proposed conditions were prepared. The models provide estimated minor and major system peak flows, overland flow depths, HGL elevations, and on-site storage requirements.

4.5.1 PCSWMM Model Parameters

Design Storms

The model includes the following design storms based on the City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (October 2012):

- 3-hour Chicago Storm Distribution (10-minute time step)
- 12-hour SCS Storm Distribution (30-minute time step)

Each storm distribution includes the 2-year, 5-year, 100-year, and 100-year (+20%) return periods. The 100-year (+20%) return period is used to 'stress test' the storm drainage system. It has a 20% higher intensity and total volume compared to the 100-year event. The 'stress test' event would be comparable to a 500-year to 800-year storm event.

The 3-hour Chicago distribution generates the highest peak flows for both the minor and major systems and was determined to be the critical storm distribution for the design and analysis of the storm drainage system.

Historical Storms

The historical storm events in the City of Ottawa are as follows:

- July 1, 1979
- August 4, 1988
- August 8, 1996

When compared to design storms the historical storms produce higher runoff volumes or peak flows. As such, they are compared to the 100-year (+20%) stress-test event.

The historical storm events are used to assess how the storm drainage and stormwater management system will function under extreme events. The results from the historical storms are to be used to identify if there would be severe flooding to properties. It is also used to check if the drainage system needs to be modified.

A summary of the historical and design storm distributions is provided in **Appendix D**.

PCSWMM Model Schematics, Output Data and Modeling Files

PCSWMM model schematics and output data for the 100-year 3-hour Chicago storm distribution is provided in **Appendix D**. The PCSWMM modeling files are provided on the enclosed CD.

Subcatchment Areas

For modeling purposes, the site has been divided into subcatchments based on the drainage areas tributary to each inlet of the existing and proposed storm sewer systems. The subcatchment areas are shown on the Stormwater Management Area Plan (drawing 116111-SWM).

The hydrologic modeling parameters for each subcatchment were developed based on the Site Plan (Figure 3) and the Stormwater Management Plan specified above. Subcatchment parameters are provided in **Appendix D**.

Impervious Values

Runoff coefficients for each subcatchment area were determined based on the proposed site plan. Refer to the Stormwater Management Plan (drawing 116111-SWM) for details. Percent impervious values were calculated using the following formula:

$$\%imp = \frac{c - 0.2}{0.7}$$

Infiltration

Infiltration losses for all catchment areas were modeled using Horton's infiltration equation, which defines the infiltration capacity of soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values as specified in the Sewer Design Guidelines were used for all catchments.

Horton's Equation:
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: f_o = 76.2 mm/hr
Final infiltration rate: f_c = 13.2 mm/hr
Decay Coefficient: k = 4.14/hr

Depression Storage

The default values for depression storage (1.57mm impervious / 4.67 mm pervious) have been applied to all catchments.

The 'zero impervious' parameter (areas with no depression storage) represents the percent of roof top areas to total impervious area. The 'zero impervious' parameter for the existing and proposed building rooftops is set to 100%.

Subarea Routing

Subarea routing for all subcatchments is set to 'direct to outlet'.

Equivalent Width

The 'Equivalent Width' parameter refers to the width of the subcatchment flow path.

The equivalent width parameter for all subcatchments is based on the measured flow length. Flow lengths were digitized in PCSWMM as described in Section 5.4.5.6 of the City of Ottawa Sewer Design Guidelines (October 2012).

The flow paths are shown on the PCSWMM model schematics provided in **Appendix D**.

Building Rooftop Release Rates / Storage

The building rooftops were simulated in PCSWMM based on an outlet rating curve and using a storage node to represent the available storage provided by the roof surface. For modeling purposes, the available storage and flow rating curve for the roof drains has been multiplied by the number of drains on each roof, and the total rooftop storage lumped into a single storage node.

The outlet rating curve for the proposed building rooftop includes the following overall peak flows for the 5-year and 100-year storm events:

Rooftop Release Rates		5-year	100-year	Storage Provided
North Outlet	(R1-R5)	85.4 L/s	147.2 L/s	344.8 m^3
East Outlet	(R6-R7)	17.0 L/s	28.0 L/s	72.5 m^3
TOTAL		102.4 L/s	175.2 L/s	417.3 m^3

The existing building had an assumed release rate of 196.8 L/s, per the 1999 storm sewer design sheet. To adhere to this flow rate, the model has an assumed rooftop storage area in the existing rating curve that represents 50% of the existing roof area.

Refer to Roof Drain calculations provided in **Appendix C**.

Inlet Control Devices

In the existing conditions PCSWMM model ICDs were sized to provide a 100-year peak flow that is equivalent to the restricted flow rate specified in the 1999 storm sewer design sheet.

Proposed inlet control devices (ICDs) are represented in the model as theoretical circular orifices. The proposed ICDs will consist of IPEX Tempest LMF (vortex type) or HF (snout type) ICDs (or approved equivalent). ICD information is indicated on the General Plan of Services (drawing 116111-GP). Refer to ICD information provided in **Appendix D**. Documentation for the Tempest LMF & HF ICD's is provided in **Appendix C**.

Storage Rating Curves

The stage-storage curves for each inlet were calculated based on the number of proposed Stormtech SC-740 storage chambers provided (at a depth of 0.76 m) and based on the maximum amount of surface storage. Surface storage volumes were estimated based on the proposed Grading Plan (drawing 116111-GR) and existing 1:1000 topographic mapping provided by the City of Ottawa.

The total underground and surface storage for each inlet is provided in **Appendix D**.

Minor System Conduits (Bend / Exit Losses)

The minor system network was created in Civil3D and imported into PCSWMM. The following exit losses have been inputted into the model. They represent the loss coefficient based on the bend angle, as per the Appendix 6-B in the City of Ottawa Sewer Design Guidelines (October 2012).

Bend Angle	Loss Coefficient
0	0.00
15	0.09
30	0.21
45	0.39
60	0.64
75	0.96
90	1.32

Major System Conduits

Major system conduits (overland flow network) have been defined using rectangular transect with a 3m length, 3m bottom width, and 1m theoretical depth. These values have been chosen to reduce the amount of surface storage accounted for while maintaining model stability. Short conduit lengths lead to model stability issues.

Junctions representing high points have an invert elevation that represents either the lowest 'spill' elevation, depending on the path of the overland flow route.

Downstream Boundary Conditions (Outfalls)

The storm sewer outlet for the proposed development is the existing stormwater management pond. The pond storage volumes and outlet control structures are not included in the model. The model was run using a 'Normal' outfall for the minor system and 'Free' outfall for the major system.

4.6 PCSWMM Model Results

4.6.1 Existing Conditions

An existing conditions PCSWMM model was developed to determine the minor and major system peak flows and volumes of runoff to the existing SWM pond. The drainage areas and flow restrictions are based on those specified in the 1999 storm sewer design sheet, which identified flow restrictions for each storm sewer run. The total restricted minor system peak flow to the stormwater management pond is 591.0 L/s. Refer to reproduced existing conditions (1999) storm sewer design sheet provided in **Appendix C**.

Major system ponding areas and spill elevations are based on an existing topographic surface developed from the City of Ottawa's 1:1000 mapping product. The results of the existing conditions model are provided in **Table 4.2**.

Table 4.2: Existing Conditions Peak Flows and Runoff Volumes

Scenario	Peak Flow (L/s)			Total Runoff Volume (m^3)
	Minor System	Major System	TOTAL	
2-year	472	339	811	3,334
5-year	514	675	1,189	4,582
100-year	591	3,599	4,190	8,315
100-year (+20%)	601	4,291	4,892	10,217

**PCSWMM model results for the 3-hour Chicago storm distribution.*

Our existing conditions model indicates there is considerable overland flow to the pond. This overland flow would predominantly flow down the laneways / pathways towards the racetrack / grandstand. The model indicates that overland flow would be observed during more frequent (i.e. 5-year) storm events.

It is recommended that major system flows be stored within the parking area for all storms up-to and including the 100-year storm event. This approach will utilize the available storage within the parking area and reduce overall (minor & major system) peak flows and runoff volumes to the pond.

4.6.2 Proposed Conditions

Hydraulic Grade Line

The results of the analysis were used to determine if there would be any surcharging from the storm sewer system during the 100-year storm event. **Appendix D** provides a summary of the 100-year HGL elevation at each storm manhole, as well as a summary of the HGL elevations for a 20% increase (rainfall intensity and total precipitation) in the 100-year design event.

The results of the HGL analysis and the stress testing indicates that the proposed storm sewer will surcharge during the 100-year event and 100-year (+20%) storm event; however, the HGL will not spill out of the structures in the racetrack area.

Major System Design and Analysis

The major system network was evaluated using the PCSWMM model to ensure that the ponding depths conform to City of Ottawa standards. A summary of ponding depths at each inlet for the 2-year, 5-year, 100-year and 100-year (+20%) events are provided in **Appendix D**.

There is no ponding during the 2-year storm event for the proposed inlets. In addition, the maximum static and dynamic ponding depths are less than 0.35m during the 100-year storm event, thereby meeting the major system criteria for the proposed areas.

The model indicates that there would be 2-year ponding for the existing catchbasins, and ponding depths will exceed 0.35m during the 100-year storm event. The release rates identified in the 1999 SWM report / storm sewer design sheet are being maintained. There is no change to the existing level of service within the existing parking areas. Note that the existing storm sewer system has been in operation since 2000 without any known issues.

Historical Storms

As per technical bulletin PIEDTB-2016-01: *"the depth of flow may extend adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the 'stress-test' event".*

The lowest building opening (i.e. finished floor elevation) for the existing and proposed buildings is 114.00 m. The catchbasins adjacent the buildings were used to compare the computed max hydraulic grade line (HGL) elevations for the historical storms and 'stress-test' events. Refer to results provided in **Appendix D**.

The maximum computed HGL elevation near the buildings was 113.74 m. Therefore, during the 'stress test' and historical storm events a minimum of 0.26 m of freeboard is provided to the lowest building opening (finished floor elevation).

4.6.3 Comparison of Peak Flows and Runoff Volumes

Table 4.3 provides a summary of the proposed minor system & major system peak flows and runoff volumes. These values are to be compared with the results from the existing conditions model (**Table 4.2**).

Table 4.3: Proposed Conditions Peak Flows and Runoff Volumes

Scenario	Peak Flow (L/s)			Total Runoff Volume (m^3)
	Minor System	Major System	TOTAL	
2-year	726	0	726	3,135
5-year	908	0	908	4,459
100-year	1,164	0	1,164	8,285
100-year (+20%)	1,225	462	1,687	10,694

**PCSWMM model results for the 3-hour Chicago storm distribution.*

The 100-year minor system peak flow to the pond is higher than the restricted release rates provided in the 1999 storm sewer design sheet. The total 100-year major system peak flows will be contained within the parking area for all storms up-to and including the 100-year storm event. As such, the total minor and major system peak flow to the pond is less than those estimated in the existing conditions model.

Runoff volumes are less than those estimated with the existing conditions model for all storms up-to and including the 100-year event. As such, the proposed storm drainage and stormwater management design should have no impact on the pond and pond release rates.

The PCSWMM model is based on the existing and proposed storm drainage and grading design. By adhering to the allowable release rates specified in the 1999 storm sewer design sheet the site is overcontrolling the minor system, which results in additional major system flow.

5.0 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter socks (catchbasin inserts) will be placed in existing catchbasins and manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site;

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (117203-ESC) for additional information.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Watermain

The analysis of the proposed watermain network confirms the following:

- The existing 200mm diameter watermain that connects to the existing watermain along Bank Street has adequate capacity to service the proposed development.
- The proposed expansion will be services via extension of internal plumbing.
- The existing fire suppression storage tanks will be connected to service the sprinkler system. An additional 70,000-gallon fire suppression storage tank is proposed to service a proposed dry hydrant system on site.

Sanitary Servicing

The analysis of the proposed sanitary servicing confirms the following:

- There is adequate capacity within the existing sanitary servicing infrastructure including the existing sanitary sewer, forcemain and pump station, to service the proposed development.
- Connection to existing sanitary sewer will include a minor extension to the existing gravity system.

Stormwater Management

The following provides a summary of the storm sewer and stormwater management system:

- No modifications are proposed for the stormwater management pond or pond outlet structure.
- Proposed storm sewer system will connect with the existing storm sewer system.

  - Storm sewers (minor system) are limited by the downstream sewer size. Inflows to the minor system will be controlled using inlet control devices (ICDs).
  - The existing storm servicing infrastructure can be modified to service the proposed development.
  - The 100-year hydraulic grade line (HGL) will not spill out of the structures within the racetrack area.

- Parking lot graded to maximize surface stormwater storage during storm events that exceed the allowable minor system inlet rate.
  - The major overland flow outlet from the parking area to the existing stormwater management pond.
  - No ponding of stormwater at the proposed inlets during a 2-year storm event.
  - Ponding depths will not exceed 0.35m for all storms up to and including the 100-year event.
- Underground storage will be provided to prevent surface ponding during a 2-year storm and promote infiltration.
  - The underground storage / infiltration system will consist of Stormtech SC-740 arch-type chambers (or approved equivalent).

Erosion and Sediment control

- Erosion and sediment control measures (i.e. filter fabric, catchbasin inserts, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.

7.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:



Matt Hrehoriak, P.Eng.
Project Coordinator
Land Development Engineering



Conrad Stang, M.A.Sc., P.Eng.
Project Manager
Water Resources

Reviewed by:

Cara Ruddle, P.Eng.
Senior Project Manager
Land Development Engineering

J. Lee Sheets, C.E.T.
Director
Land Development Engineering

Appendix A

Water Servicing Information

HARD ROCK OTTAWA
RIDEAU CARLETON RACEWAY
WATER DEMANDS

Table 1.0: 4837 Albion Road City of Ottawa Water Meter Usage

Year	Month	Usage (m3)
2015	September	2,842
	October	2,364
	November	1,945
	December	1,694
2016	January	1,421
	February	1,284
	March	1,574
	April	1,539
	May	1,399
	June	2,133
	July	1,852
	August	2,468
	September	1,809
	October	1,694
	November	1,829
	December	1,508
2017	January	1,595
	February	1,728
	March	1,948
	April	2,228
	May	1,861
	June	1,980
	July	2,006
	August	2,582

Table 1.1 Existing Development Water Demand Calculations from Metered Usage

Condition	Total Usage (m^3)	No. of Months	Monthly Flow (m^3/month)	Daily Flow (m^3/day)	Avg Day Demand (L/s)	Max Day Demand (L/s)	Peak Hour Demand (L/s)
Average Months	45283	24	1887	63	0.73	1.09	1.97
Min Month	1284	1	1284	43	0.50	0.74	1.34
Max Month	2842	1	2842	95	1.10	1.64	2.96
Annual Max Month Avg	7892	3	2631	88	1.01	1.52	2.74

Design Parameters:

Commercial Peaking Factor (Section 4.0 Ottawa Water Distribution Guidelines)

Max. Daily Demand:	1.5	x Avg. Day
Peak Hourly Demand:	1.8	x Max. Day

Table 2.0: OLG Slots Water Meter Usage

Year	Month	Usage (m3)
2015	January	1,083
	February	1,009
	March	1,253
	April	1,235
	May	1,463
	June	1,270
	July	1,325
	August	1,328
	September	1,196
	October	1,177
	November	1,147
	December	881
2016	January	699
	February	709
	March	859
	April	872
	May	814
	June	1,091
	July	1,105
	August	1,139
	September	959
	October	984
	November	869
	December	807
2017	January	902
	February	988
	March	1,024
	April	1,011
	May	1,073
	June	1,101
	July	1,157
	August	1,175
	September	1,060
	October	1,040

Table 2.1 Existing OLG Slots Water Demand Calculation from Metered Usage

Condition	Total Usage (m^3)	No. of Months	Monthly Flow (m^3/month)	Daily Flow (m^3/day)	Avg Day Demand (L/s)	Max Day Demand (L/s)	Peak Hour Demand (L/s)	No. Existing Slots	OLG Slot Demand (L/Slot/day)
Average Months	35805	34	1053	35	0.41	0.61	1.10	1250	28
Min Month	699	1	699	23	0.27	0.40	0.73	1250	19
Max Month	1463	1	1463	49	0.56	0.85	1.52	1250	39
Annual Max Month Avg	3642	3	1214	40	0.47	0.70	1.26	1250	32

Design Parameters:

Commercial Peaking Factor (Section 4.0 Ottawa Water Distribution Guidelines)

Max. Daily Demand:	1.5	x Avg. Day
Peak Hourly Demand:	1.8	x Max. Day

Table 3.0: Water Demands Existing Building

Node	Commercial Demand (L/s)		
	* Avg Day	Max. Daily	Peak Hour
Existing Building	1.01	1.52	2.74

*Note: Average Day demand calculated from averaged peak month demand from City of Ottawa metered water usage from 2015-2017

Table 3.1: Water Demands Phase 2 Hard Rock Entertainment

Node	Commercial Yield				Commercial Demand (L/s)		
	Amenity / Attraction				Avg Day	Max. Daily	Peak Hour
	*Gaming Positions (No. Positions)	Restaurant Seats (No. Seats)	Hard Rock Live Auditorium (No. Seats)	New Employees (No. Employees)			
Hard Rock Casino	2330	775	2000	230	2.65	3.98	7.16

*Note: Includes the 35 gaming tables from the phase1 additions.

Table 3.2: Water Demands Phase 2 Hard Rock Hotel

Node	Hotel Yield		Residential Demand (L/s)		
	Units		Avg Day	Max. Daily	Peak Hour
	Hotel Rooms	Total Population			
Hard Rock Hotel	178	320	0.83	2.08	4.58

Table 3.3: Water Demands Total Proposed and Existing Development

Node	Total Demand (L/s)		
	Avg Day	Max. Daily	Peak Hour
Existing + Hard Rock Addition	4.49	7.58	14.48

Design Parameters:

- Hotel population = 1.8 person/room
- Gaming Tables = 6 seats/table

Section 4.0 Ottawa Sewer Design Guidelines

- Restaurant (Steakhouse, Hard Rock Café, Casual dinning, incl employee allotment)	125	L/seat/day
- Auditoriums (No food, incl employee allotment)	20	L/seat/day
- Hotel (incl. employee allotment)	225	L/person/day
- Employees (Excluding Hotel, Casio Floor, Live, and Restaurant Employees)	75	L/person/day

Novatech Daily Usage Calculation

- OLG Slots (calculated based on existing usage)	32	L/slot/day
- Gaming Tables (based on existing slots calculation)	32	L/seat/day

Commercial Peaking Factor (Section 4.0 Ottawa Water Distribution Guidelines)

Max. Daily Demand:	1.5	x Avg. day
Peak Hourly Demand:	1.8	x Max. day

Residential Peaking Factor (Section 4.0 Ottawa Water Distribution Guidelines)

Max. Daily Demand:	2.5	x Avg. day
Peak Hourly Demand:	2.2	x Max. day

SNC·LAVALIN

2140 Regent St. South, Unit 12A
Sudbury, Ontario, Canada, P3E 5S8
705.675.6881 705.675.8330

City of Ottawa
110 Laurier Ave. West
Ottawa, Ontario K1P 1J1

Project No. **2019-667797**

April 23, 2020

Attention: **Ms. Terri Hunt**
Program Manager, Permits Approval
Building Code Services

Mr. Allan Evans
Fire Protection Engineer
Ottawa Fire Department

Mr. Akhil Kumar
Engineer
Building Code Services

Fax: 613-580-2495

Re: **Hardrock Ottawa Phase 2 Expansion Casino and Hotel**
Fire Protection Water Supply
4837 Albion Road
Ottawa, Ontario

Hello Terri / Allan / Akhil

Further to our previous letter and discussions with Allan Evans the following information has been updated to include the latest requests for fire-fighting services at the site. Required capacities for the building's fire protection systems are based on the most recent design development drawings for the building.

Fire Suppression Facilities

A capacity of 100,000 US gallon / 378,500 L water is required for the fire protection systems serving the entire building (existing and new). This will be achieved by combining the capacities in the existing 30,000 US gallon / 113,500 L buried tank (see attached drawing Appendix A which shows this set of tanks as well as the larger tank noted below) serving the existing building fire protection systems and the 90,900 gallon / 344,100 L buried tank which presently serves as a plenum of water available for the fire department to pull from. Both tanks are located to the North of the existing building. The existing dry hydrant connected to the larger of the two tanks will remain in place as a secondary drafting point for use by the fire department. A recently completed report on the larger of the tanks is attached which confirms it's dimensions and capacity (Appendix B).

The combined storage tank system will provide the required capacity for all required areas of coverage and includes a total hose allowance (inside and outside) of 500 USGPM for use by the fire department meeting both the requirements of NFPA 13 and the OBC for on-site storage. The on-site wells will be used to top up the tanks as needed. The tanks will be monitored for level and temperature as required by NFPA 25.

A new fire pump meeting NFPA 20 requirements will draw from this tank system to provide the flow and pressures necessary to meet the requirements of NFPA 13 and NFPA 14 for all areas of the entire building (presently estimated at 1250 USGPM). A common sprinkler and standpipe header serving all areas of the building will be installed and pressurized by the new pump.

It has been confirmed that the Ottawa Fire Service pumper trucks have the capacity to boost the pressure in the standpipe system through the new siamese connection to provide the 100 psi pressure required at the top of the Hotel portion of the building so a second booster pump will not be required.

The existing 500 USGPM fire pump connected to the buried 30,000 US gallon tank which serves the existing building will become redundant for NFPA fire protection purposes and will be removed from service.

A new 70,000 US gallon / 265,000 L buried water storage tank will be provided in the parking area to the South of the new addition for fire department use and will be monitored for level and temperature as required by NFPA 25. The tank will be provided with two pull ports for use by fire department pumper vehicles and connections for refill from tankers (refer to Appendix C).

A series of dry hydrants located around the site will allow the fire department trucks to provide pressurized water to various draw points around the site (refer to Appendix C).

Fire Events

In the event of a fire the fire alarm system will alarm and the building will be evacuated.

If a sprinkler head in the building is set off or a fire hose cabinet put into use, the system pressure will drop. The jockey pump will run to maintain pressure and if cannot keep up the fire pump will be automatically activated. It will draw water from the combined storage tanks at the North end of the building to pressurize the combined sprinkler / standpipe system throughout the building.

The pump capacity of 1250 US gpm is sized to meet the requirement of both NFPA 13 and NFPA 14 and includes a flow of approximately 325 US gpm (to be finalized at the time of final sprinkler design) for sprinklers and the remainder for the standpipe system for fire-fighting purposes through the standpipe system.

As the level drops in the tank the floats will open the make up water valves fed from the wells and water will be added to the tanks and will continue to flow until the top up levels are reached.

Both during and following a fire event the tanks would be filled up using the water supplied from the wells on site. Data from previous tests on the wells that are in place that maintain water levels in these two tanks identifies an available flow of 100 gallons per minute. Similarly, water supply trucks can be brought in to re-fill the tank during or after a fire.

The fire department will be able to arrive on site and set up adjacent to the new 70,000 US gallon storage tank to the South of the building. The pumper trucks will connect to the pull ports at the tank and pressurize the dry hydrant system provided or set their own lines as required. The tanks are provided with refill connections and will be replenished with tanker trucks as needed.

Should the city allow the use of the domestic water feed to the site as an additional source of water during a fire, it can be used:

a) as a direct source of pressurized water to a designated hydrant on site for pumper trucks to connect to;

b) as a source of water to refeed the buried storage tanks to add capacity to extend the draw down time to the sprinkler / standpipe system through the fire pump or to the tank used for drafting of water by the fire department pumper truck

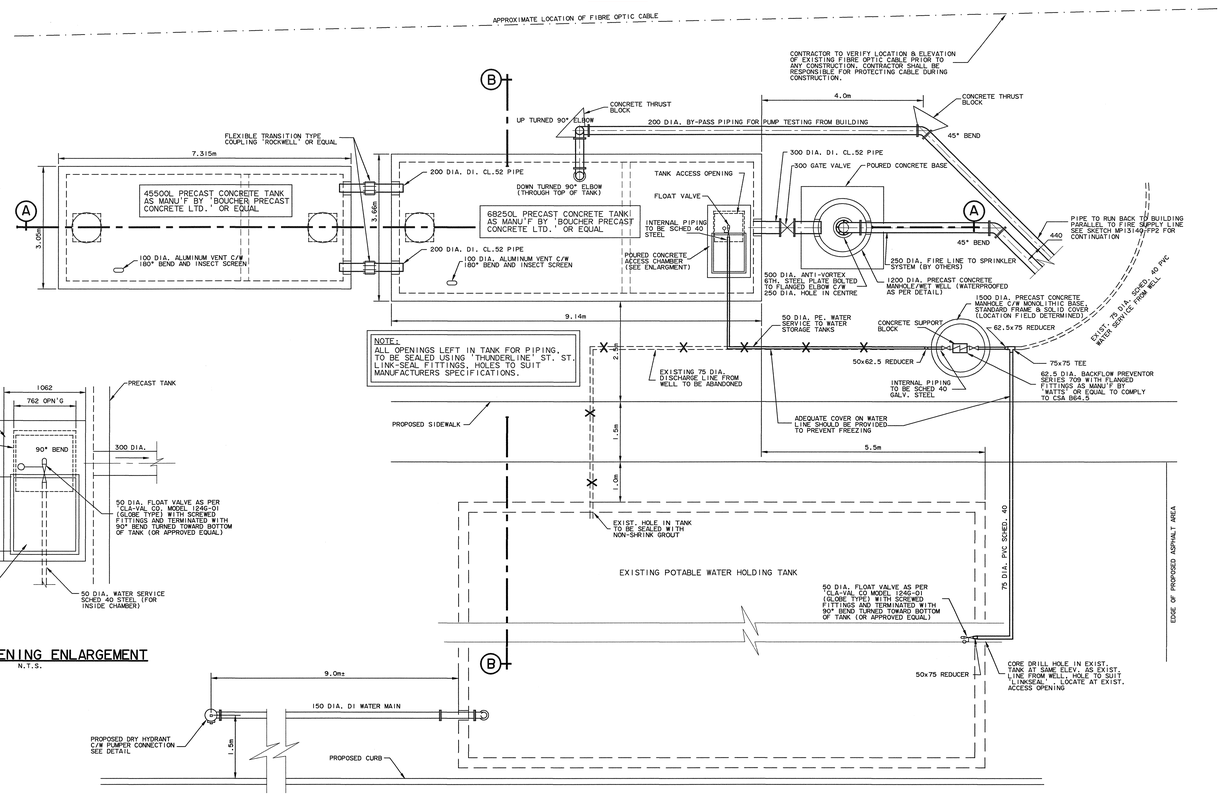
If you have any further questions or require additional clarifications please feel free to contact me.

SNC-LAVALIN INC.
Buildings Ontario

per: 

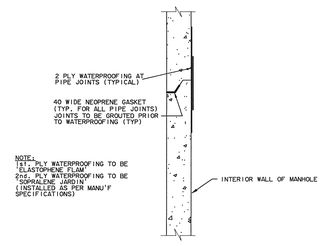
Jeff Hunter, P. Eng.
Mechanical Director

Appendix A

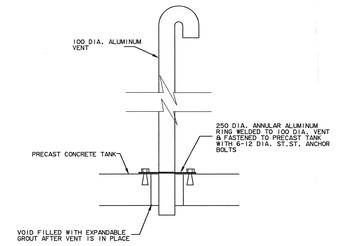


PLAN OF FIRE PROTECTION WATER TANKS
SCALE: 1:50

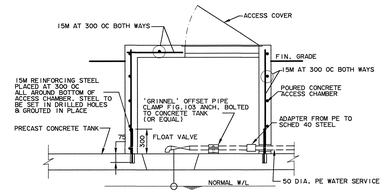
ACCESS OPENING ENLARGEMENT
N.T.S.



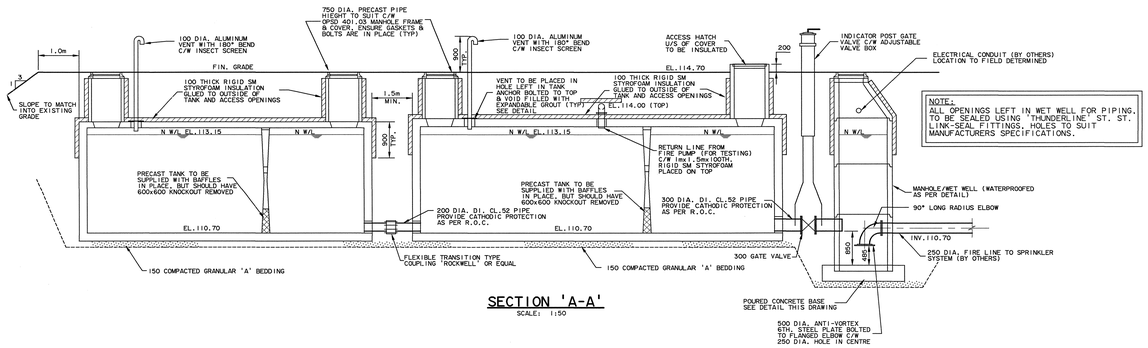
MANHOLE/WET WELL WATERPROOFING DETAIL
N.T.S.



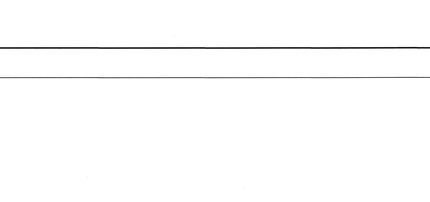
VENT DETAIL
N.T.S.



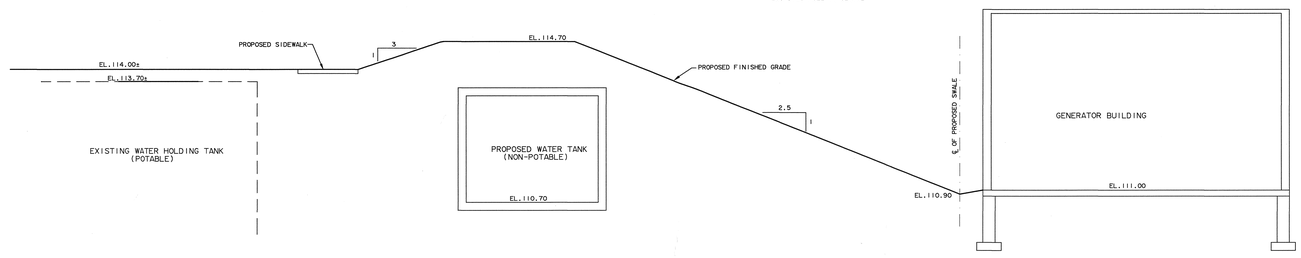
DISCHARGE DETAIL AT STORAGE TANK
N.T.S.



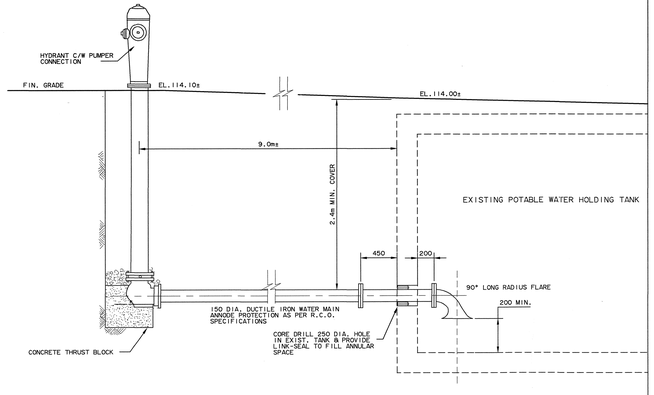
SECTION 'A-A'
SCALE: 1:50



MANHOLE/WET WELL BASE DETAIL
N.T.S.



SECTION 'B-B'
SCALE: 1:50



DRY HYDRANT DETAIL
N.T.S.

No.	DESCRIPTION	DATE	BY
5	WATER SUPPLY RELOCATED	25/11/99	GJR
4	GENERAL REVISIONS	17/11/99	GJR
3	GENERAL REVISIONS	22/10/99	GJR
2	ADDED CHAMBER DETAILS	8/10/99	GJR
1	RAISED FL. GENERATOR BLDG.	1/10/99	GJR

REVISIONS

REGISTERED PROFESSIONAL ENGINEER D.F. McGOVERN PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER D.W. SMITH PROVINCE OF ONTARIO

OMM A TROW COMPANY Trow
CONSULTING ENGINEERS, HYDROGEOLOGISTS & PLANNERS
Oliver, Mangione, McCalla & Associates a division of Trow Consulting Engineers Ltd.
154 COLONNADE RD. S. NEPEAN ONTARIO
PHONE (613) 225-9340
FAX (613) 225-7337

CLIENT: P.B.K. ARCHITECTS

PROJECT: RIDEAU CARLETON RACEWAY

TITLE: FIRE PROTECTION WATER TANKS

design by	G.J.R.
drawn by	G.J.R.
checked by	C.B.W.
date	SEPT. 1999
scale	AS SHOWN

project no. MP 13140A
drawing no. FP-1
revision no. 5

PROP. ACCESS ROAD

SEE DRAWING SI40-HT2 FOR MORE DETAIL

PROP. GRASS SWALE 0.5% SLOPE

T/G=111.70

GRASS SWALE 1.2% SLOPE

FUTURE PUMPING STATION

EXISTING SEPTIC TANK AND SYPHON CHAMBER

PROP. 40m-200 DIA. PVC FORCE MAIN

FUTURE FORCE MAIN

EXISTING ASPHALT

EXISTING SANITARY FROM BUILDING

EXISTING GRANDSTAND

PROPOSED GENERATOR

PROVIDE PADS AS REQUIRED

NEW TRANSFORMER

ASPHALT PAVING

EXISTING ACCESS TO REMAIN

EXISTING ACCESS TO REMAIN

LINE OF EXISTING FENCE

Approximate Position of Fiberoptic Cable

EXISTING HEDGE TO REMAIN

EXISTING HOYDRO PANEL

Hydro Kiosk

GRASSED SWALE 1.0% SLOPE

T/G=112.40

200 DIA CB LEAD AT GR. 1.5

ASPHALT WALKWAY

GARBAGE BINS

Chain Link Fence

MH 102A INV.=112.50

PROP. 54m-300 DIA. PVC STORM SEWER AT GR.=1.0%

MH 103 INV.=111.90

MH 102 INV.=111.90

BOLLARD WITH CHAIN BETWEEN STAFF AND VALET PARKING

CB C/W IPEX ICD T/G=113.90

LOADING BAY

MH 103 - 250 DIA PVC PIPE INV.=111.20

150 DIA PVC AT 1.5%

SIAMESE CONN.

CONC. PAVERS

CONC. SIDEWALK

STORM SEWERS MANHOLE AND CATCH BASINS TO BE REMOVED IN THE PROPOSED BUILDING AREA (TYP.)

PROPOSED ONE STOREY ADDITION

SALLY PORT ENTRANCE

CONC. CURB

EXTENT OF CONC. CURB

MH 117 INV.=111.30

CB/MH C/W IPEX ICD T/G=112.70

PROP. 40.0m-250 DIA. PVC STORM SEWER AT GR.=0.45%

BUS SHELTER ON CONCRETE CURB

BUS PARKING

GRAVEL PARKING

ASPHALT PAVING

GRASS SWALE 1.2% SLOPE

EXISTING STORM SEWER TO BE ABANDONED

CB C/W IPEX ICD T/G=113.70

PUMPER HYDRANT

PARKING P3

ASPHALT PAVING

GRAVEL PARKING(FUTURE ASPHALT)

CONC. SIDEWALK

FUTURE WATER FEATURE

PROP. 600mm DIA. STORM SEWER

MH 104 INV.=110.70

PROP. 97m-600 DIA. PVC STORM SEWER AT GR.0.32%

MH 105 INV.=110.26

CONC. CURB

T/G=113.40

T/G=113.36

T/G=113.30

FIRE ROUTE

BUSES AND TAXIS ONLY

CONC. CURB

EXTENT OF CONC. CURB

PARKING P1

BUS SHELTER ON CONCRETE CURB

LIMIT OF GRAVEL PARKING

LIMIT OF PAVED PARKING

PARKING P5

SODDED AREA

MH 105

MH C/W IPEX ICD

DIRECT CONNECTION TO CB

CONC. CURB

T/G=113.70

INV.=112.50

INV.=111.71

INV.=111.71

INV.=112.50

200 DIA CB LEAD AT GR. 3.95%

200 DIA CB LEAD AT GR. 4.94%

PARKING P4

MH 106

PROP. 300 DIA. PVC STORM SEWER AT GR.0.20%

INV.=112.19

INV.=112.24

200 DIA CB LEAD AT GR. 1.46%

BUS SHELTER ON CONCRETE CURB

EXISTING SLOPE TO REMAIN

GRAVEL PARKING(FUTURE ASPHALT)

EXISTING CATCH BASIN TO BE REMOVED

PROP. 69.3m-300 DIA. PVC STORM SEWER AT GR.=0.5%

Approx. Position of Hydro Duct

PROP. 300 DIA. PVC STORM SEWER AT GR.0.20%

INV.=112.37

INV.=112.40

MH 107

200 DIA CB LEAD AT GR. 0.6%

EXISTING STORM SEWER TO BE ABANDONED

Approximate Position of Bell Line

CONC. SIDEWALK

FIRE ROUTE

EXTENT OF CONC. CURB

LIMIT OF CONTRACT

CULVERT 600mm CSP (BY OTHERS)

PROPERTY LINE

min. setback from existing fence

PYLON SIGN

Approximate Position of Gas Line

EXISTING STORM SEWER & MANHOLE TO BE ABANDONED

PROP. 82m-300 DIA. PVC STORM SEWER AT GR.=0.20%

MH 112

INV.=112.09

INV.=113.75

PROP. 93.5m-300 DIA. PVC STORM SEWER AT GR.=0.43%

INV.=112.52

PROP. 13m-250 DIA. PVC STUB AT 0.43% FOR FUTURE CONNECTION

MH 110

INV.=113.75

PROP. 36.0m-250 DIA. PVC STORM SEWER AT GR.0.43%

INV.=112.36

PROP. 49.5m-250 DIA. PVC STORM SEWER AT GR.0.43%

INV.=112.41

MH 111

EXIST. 250 DIA. CONC. STORM SEWER AT GR.=0.58%

EXISTING CATCH BASIN TO BE REMOVED

EXISTING STORM SEWER TO BE ABANDONED

PROP. 32m-250 DIA. PVC STORM SEWER AT GR.0.43%

PROP. 53.5m-250 DIA. PVC STORM SEWER AT GR.=0.43%

PARKING P2

BUS SHELTER ON CONCRETE CURB

ASPHALT PAVING

CONC. CURB

EXISTING STORM SEWER & MANHOLE TO BE ABANDONED

PROP. 82m-300 DIA. PVC STORM SEWER AT GR.=0.20%

MH 112

INV.=112.09

INV.=113.75

PROP. 93.5m-300 DIA. PVC STORM SEWER AT GR.=0.43%

INV.=112.52

PROP. 13m-250 DIA. PVC STUB AT 0.43% FOR FUTURE CONNECTION

LIMIT OF CONTRACT

CULVERT 600mm CSP (BY OTHERS)

EXTENT OF CONC. CURB

LIMIT OF CONTRACT

PROPERTY LINE

MH 113 INV.=112.19

INV.=112.21 PROP. 54.5m-250 DIA. PVC STORM SEWER AT GR.=0.43%

INV.=112.60

MH 114

T/G=113.70

PROP. 13m-250 DIA. PVC STUB AT 0.43% FOR FUTURE CONNECTION

EXTENT OF CONC. CURB

DI INV 112.80 T/G=113.20

PROP. 13m-250 DIA. PVC STUB AT 0.43% FOR FUTURE CONNECTION

POSSIBLE FUTURE PARKING

GRASS FIELD

UP O/H Wires

Gravel Road

Ditch

Cedar Hedge

Edge of Asphalt

Centreline of Gravel Road

Centreline Ditch

Edge of Ditch

FENCE

Tower

LS

LEGEND

EXISTING ELEVATION

EXISTING STORM SEWER & MANHOLE

PROPOSED STORM SEWER & MANHOLE

PROPOSED FUTURE STORM SEWER & MANHOLE

HEAVY DUTY AREAS
- 45mm HL3
- 40mm HL8
- 40mm HL8
- 150mm GRANULAR "A"
- 300mm GRANULAR "B"

ASPHALT PARKING AREAS
- 50mm HL3
- 200mm GRANULAR "A"

GRAVEL PARKING AREAS
- 200mm GRANULAR "A"

GRAVEL BUS PARKING AREAS
- 200mm GRANULAR "A"
- 600mm GRANULAR "B"

PROPOSED INFILTRATOR UNITS (10 CHAMBERS)

CURB

PROPOSED STORM MANHOLE IPEX TYPE 'A' ICD'S

PROPOSED CATCHBASIN MANHOLE

PROPOSED CATCHBASIN MANHOLE IPEX TYPE 'A' ICD'S

PROPOSED CATCH BASIN

PROPOSED CATCH BASIN TO INCLUDE IPEX TYPE 'A' ICD'S

9	NEW CURB LAYOUT	4/10/99	GJR
8	ADDED EXISTING UTILITIES	29/09/99	AM
7	REVISED SITEPLAN	22/09/99	AM
6	ADD MH 102A	03/09/99	AMC
5	ISSUED FOR SITE PLAN AGREEMENT AND TENDER	27/08/99	AM
4	ISSUED FOR SITE PLAN AGREEMENT AND TENDER	28/07/99	AMC
3	REMOVE STORM SEWERS SOUTH PARKING	16/07/99	AM
2	AS PER CITY OF GLOUCTER	6/08/99	AM
1	ROTATED HATCHING	21/06/99	MF

LICENCE PROFESSIONAL ENGINEER C.B. WARNOCK PROVINCE OF ONTARIO

LICENCE PROFESSIONAL ENGINEER D.W. SMITH PROVINCE OF ONTARIO

OMM Trow
A TROW COMPANY
CONSULTING ENGINEERS, HYDROGEOLOGISTS & PLANNERS

154 COLONNADE RD. S NEPEAN ONTARIO
PHONE (613) 225-9940
FAX (613) 225-7337

CLIENT: P.B.K. ARCHITECTS

PROJECT: RIDEAU CARLETON RACEWAY

TITLE: SITE SERVICING PLAN

design by	C.B.W.
drawn by	A.M.C.
checked by	C.B.W.
date	JUNE 1999
scale	1 : 500

project no. MP 15140A
drawing no. SSI
revision no. 9

Appendix B

H. O. Wright & Sons Ltd.

2383 Church Street, P.O. Box 129
North Gower, ON
K0A 2T0

Tel: 613- 489-3372
Fax: 613- 489-2593
EMAIL: gpratt@howright.ca

ECRA/ESA LIC. # 7002328
WELL CONTRACTOR LIC. # 6357

Quality Sales and Service Since 1954

Plumbing - Electrical - Well Systems - Myers Pumps and Water Treatment

March 9,2020

Hard Rock Ottawa
4837 Albion Road
Ottawa,Ontario

RE: Underground water storage tank

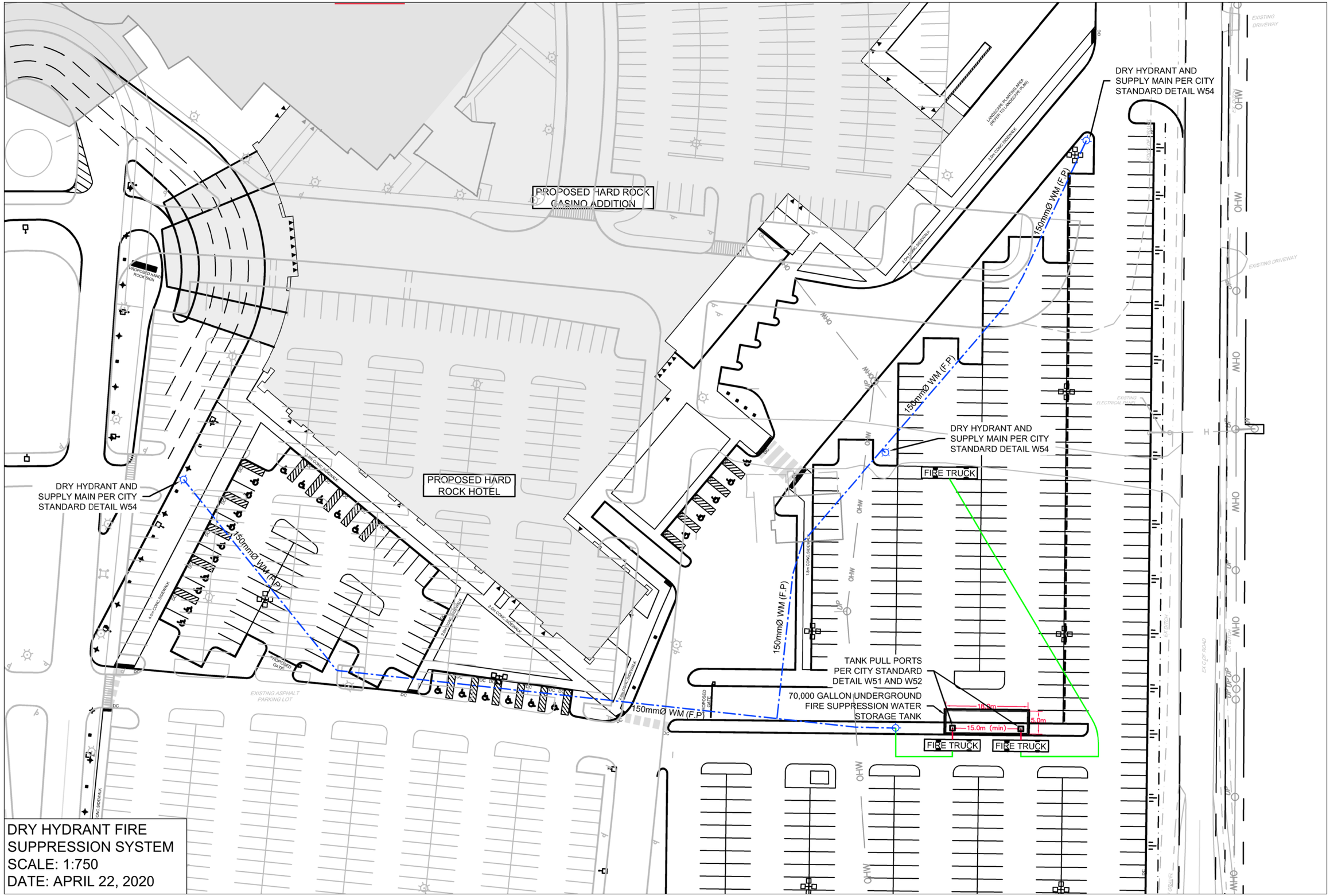
As a summary of our findings, we entered the tank which is constructed of poured concrete and measures 42' - 6" long (north to south) and 30' - 1" wide (east to west) and 9' - 6.5" deep.

There are 4 structural support columns that measure 12" X 12" that run from floor to ceiling that are positioned as per the drawing. The concrete is in excellent condition and there is no visible deterioration of the concrete. There are a number of penetrations through the walls of piping as indicated on the drawing. The only defect that could be noted is at the north end about 10 feet from the east side wall at the top of the tank there is a root mass from the tree (hedge) that has grown into the tank in search of water. To stop any further growth of this mass I would suggest that the end of the tank be excavated , the source of the roots removed and the end of the tank sealed from the exterior.

A calculation of water volume that the tank would hold if full to the top would be approximately 75,500 imperial gallons or 344,100 litres.

Pictures were taken of the inside of the tank, but due to the poor lighting the quality is not great. They have been sent by email to Richard Gardner.

Appendix C


PROPOSED HARD ROCK CASINO ADDITION
PROPOSED HARD ROCK SIGN
PROPOSED HARD ROCK HOTEL
DRY HYDRANT AND SUPPLY MAIN PER CITY STANDARD DETAIL W54
DRY HYDRANT AND SUPPLY MAIN PER CITY STANDARD DETAIL W54
DRY HYDRANT AND SUPPLY MAIN PER CITY STANDARD DETAIL W54
150mmØ WM (F.P)
150mmØ WM (F.P)
150mmØ WM (F.P)
150mmØ WM (F.P)
LANDSCAPE PLANTING AREA (REFER TO LANDSCAPE PLAN)
2.5m CONC. SIDEWALK
4.5m CONC. SIDEWALK
1.5m CONC. SIDEWALK
PROPOSED GATE
PROPOSED GATE
EXISTING ASPHALT PARKING LOT
EXISTING DRIVEWAY
EXISTING DRIVEWAY
EXISTING ELECTRICAL RMAC
OHW
FIRE TRUCK
FIRE TRUCK
FIRE TRUCK
TANK PULL PORTS PER CITY STANDARD DETAIL W51 AND W52
70,000 GALLON UNDERGROUND FIRE SUPPRESSION WATER STORAGE TANK
18.0m
5.0m
15.0m (min)
EX. DITCH
EX. DITCH
EX. OFF ROAD
DRY HYDRANT FIRE SUPPRESSION SYSTEM
SCALE: 1:750
DATE: APRIL 22, 2020

Boundary Conditions 4837 Albion Road

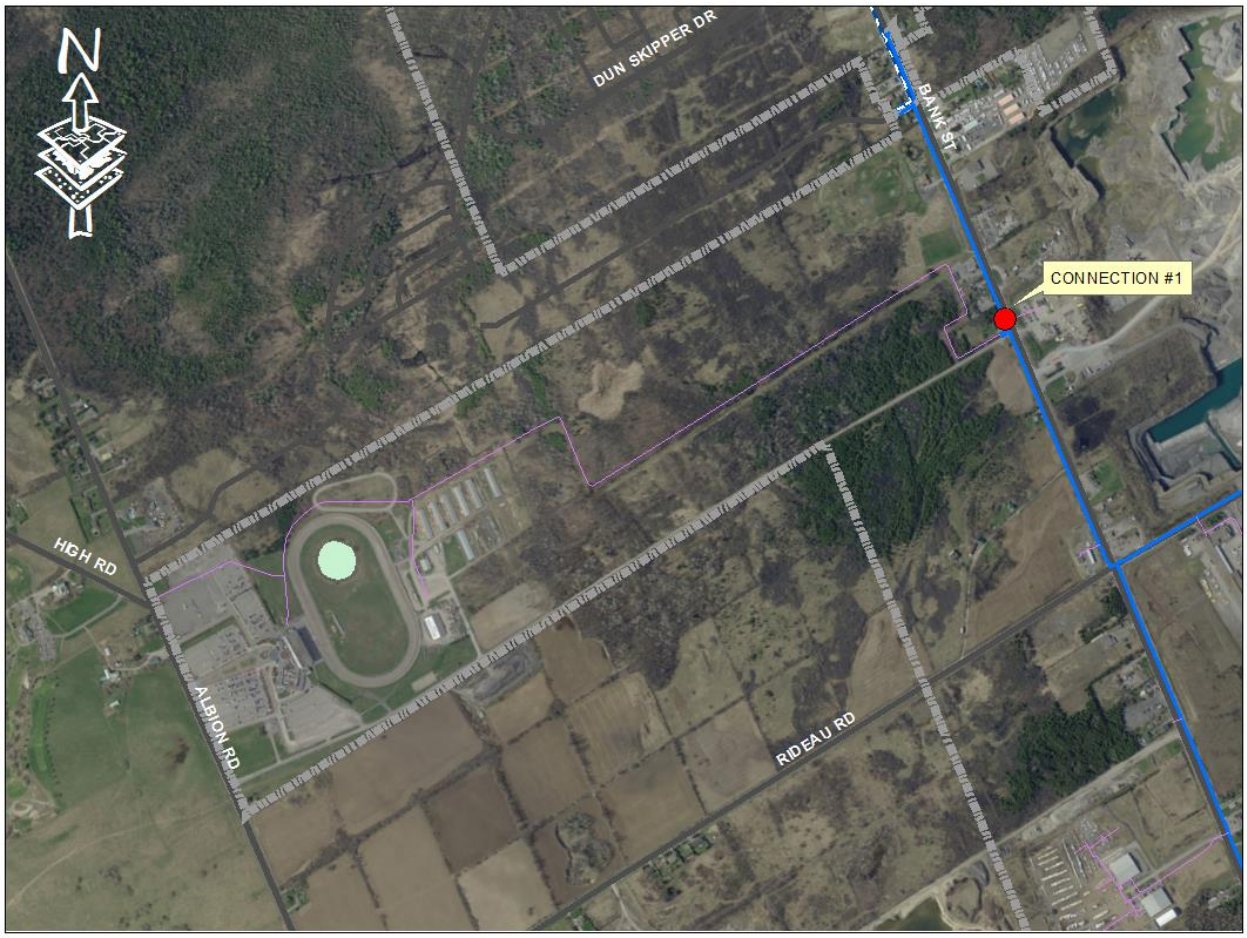
Information Provided

Date provided: 30 Jan 2020

Scenario	Demand	
	L/min	L/s
Average Daily Demand	269.4	4.49
Maximum Daily Demand	454.8	7.58
Peak Hour	868.8	14.48
Fire Flow Demand	0	0

- It is understood that these demands represent the total future demands for the property, including the existing demands associated with the Rideau Carleton Raceway

Location



Results

Under Existing Condition

Connection 1 - 4837 Albion Connection (N12551)

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	164.9	67.7
Peak Hour	151.9	49.1
Max Day	163.3	65.4

[1] Ground Elevation = 117.3 m

With Future SUC Zone Reconfiguration

Connection 1 - 4837 Albion Connection (N12551)

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	164.9	67.7
Peak Hour	143.7	37.5
Max Day	163.3	65.4

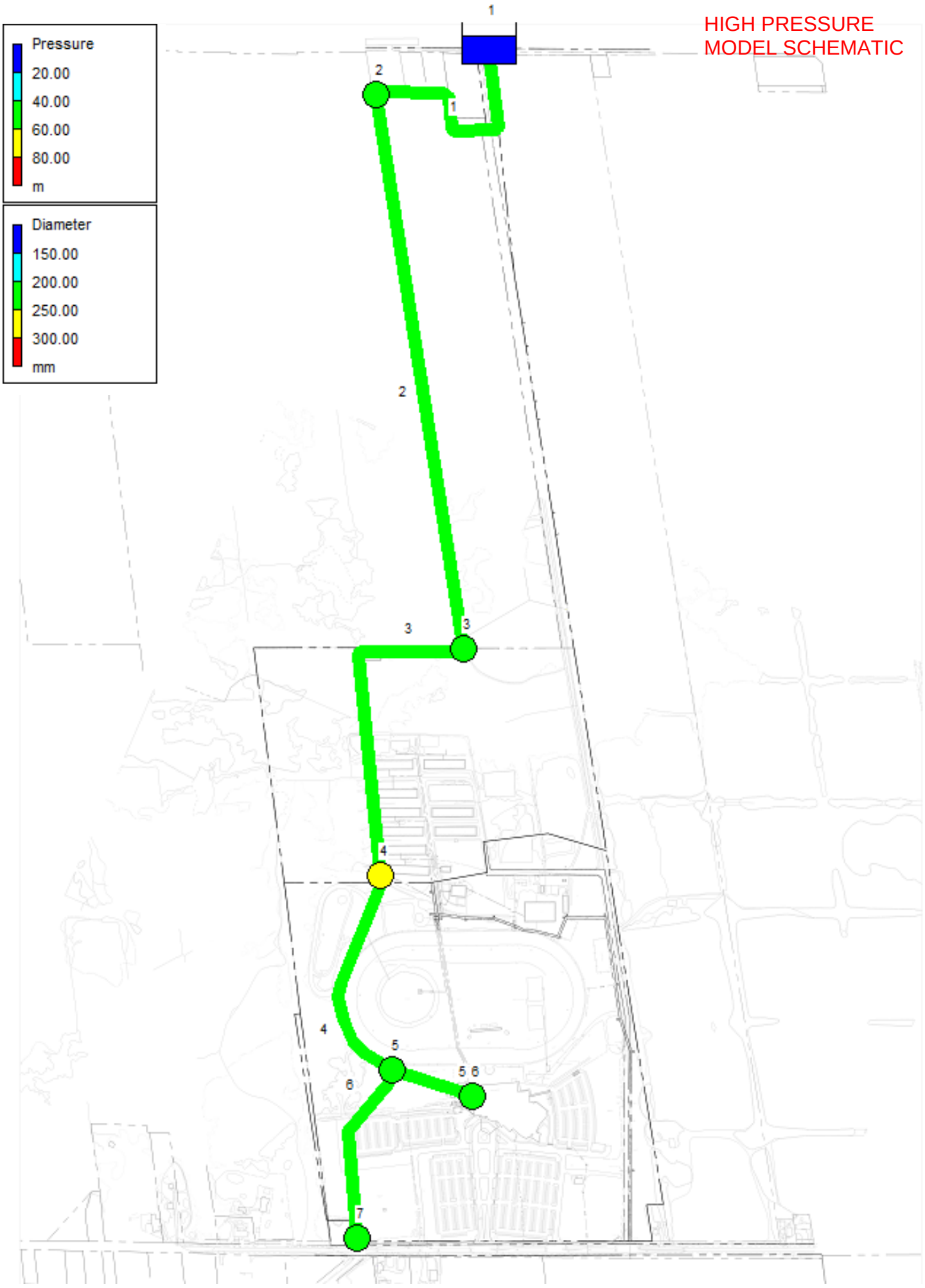
[1] Ground Elevation = 117.3 m

Notes

A second pump can be turned ON at Leitrim PS, if the peak hour pressure is low.

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.


HIGH PRESSURE
MODEL SCHEMATIC
Pressure
20.00
40.00
60.00
80.00
m
Diameter
150.00
200.00
250.00
300.00
mm
1
2
1
2
3
3
4
4
5
5 6
6
7

```
******************************************************************
*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                         Version 2.0                            *
******************************************************************
```

Input File: High Pressure.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	2	425	200
2	2	3	1010	200
3	3	4	700	200
4	4	5	410	200
5	5	6	160	200
6	5	7	340	200

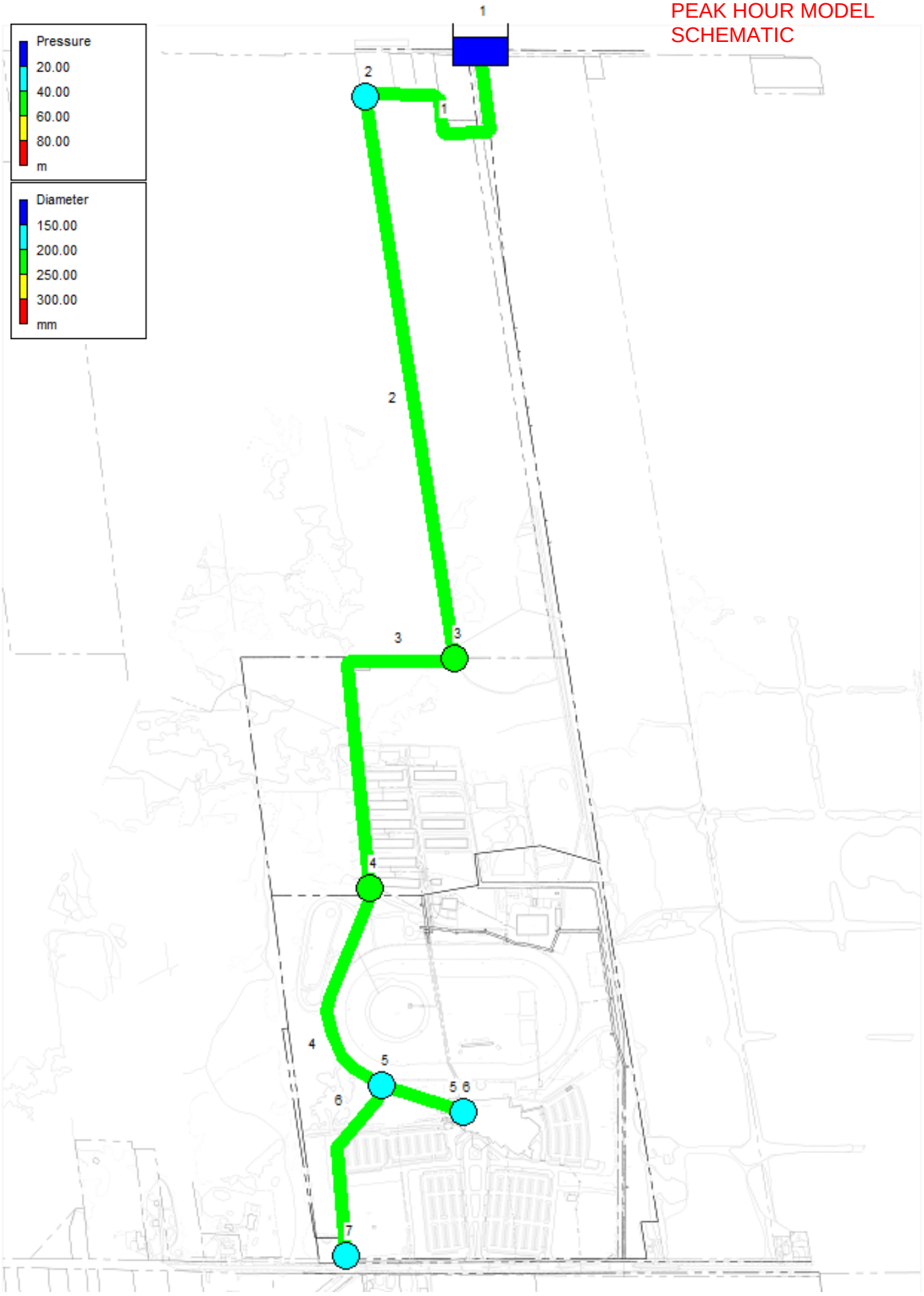
Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	164.83	52.83	0.00	
3	0.00	164.65	57.35	0.00	
4	0.00	164.53	60.53	0.00	
5	0.00	164.46	55.96	0.00	
6	4.49	164.44	50.44	0.00	
7	0.00	164.46	47.96	0.00	
1	-4.49	164.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	4.49	0.14	0.17	Open
2	4.49	0.14	0.17	Open
3	4.49	0.14	0.17	Open
4	4.49	0.14	0.17	Open
5	4.49	0.14	0.17	Open
6	0.00	0.00	0.00	Open

PEAK HOUR MODEL SCHEMATIC



```
******************************************************************
*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                         Version 2.0                            *
******************************************************************
```

Input File: Peak Hour.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	2	425	200
2	2	3	1010	200
3	3	4	700	200
4	4	5	410	200
5	5	6	160	200
6	5	7	340	200

Node Results:

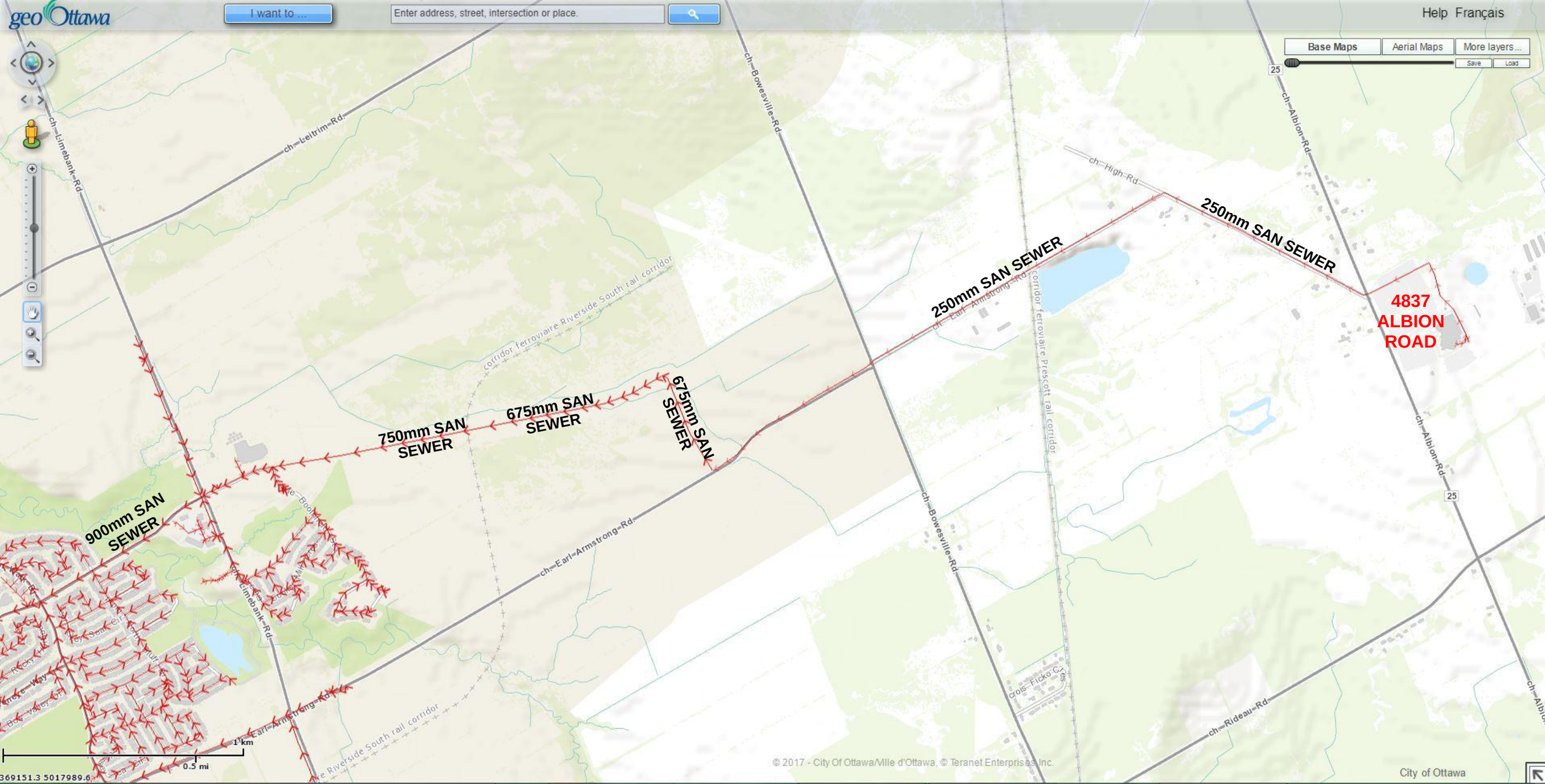
Node ID	Demand LPS	Head m	Pressure m	Quality	
2	0.00	151.26	39.26	0.00	
3	0.00	149.75	42.45	0.00	
4	0.00	148.70	44.70	0.00	
5	0.00	148.08	39.58	0.00	
6	14.48	147.85	33.85	0.00	
7	0.00	148.08	31.58	0.00	
1	-14.48	151.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	14.48	0.46	1.50	Open
2	14.48	0.46	1.50	Open
3	14.48	0.46	1.50	Open
4	14.48	0.46	1.50	Open
5	14.48	0.46	1.50	Open
6	0.00	0.00	0.00	Open

Appendix B

Sanitary Servicing Information


geo Ottawa
I want to ...
Enter address, street, intersection or place.
Help Français
Base Maps
Aerial Maps
More layers ...
Save
Load
ch—Limebank—Rd
ch—Leitrim—Rd
ch—Bowesville—Rd
ch—High—Rd
ch—Albion—Rd
ch—Earl—Armstrong—Rd
ch—Rideau—Rd
corridor ferroviaire Riverside South rail corridor
corridor ferroviaire Prescott rail corridor
750mm SAN SEWER
675mm SAN SEWER
675mm SAN SEWER
900mm SAN SEWER
250mm SAN SEWER
250mm SAN SEWER
4837 ALBION ROAD
1 km
0.5 mi
369151.3 5017989.6
© 2017 - City Of Ottawa/Ville d'Ottawa, © Teranet Enterprises Inc.
City of Ottawa

HARD ROCK OTTAWA
RIDEAU CARLETON RACEWAY
SANITARY FLOW ANALYSIS

Table 4.0: Sanitary Flow Calculations Existing and Proposed Development

Location	Existing Flow	Hard Rock Auditorium	Restaurant Additions	Gaming Positions	Employee Additions	Hotel Addition		Total Phase Restaurant / Casino Flow (L/s)	Total Phase Hotel Flow (L/s)	Peak Flow				Infiltration		Peak Design Flow (l/s)	PIPE					
Area	Flow (L/s)	No. Seats	No. Seats	No. Positions	No. Seats	No. Rooms	Total Population			Commercial Peak Factor	Residential Peak Factor	Phased Peak Flow (l/s)	Total Peak Flow (l/s)	Development Area (ha)	Infilt. Flow (l/s)		Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
Existing 4837 Albion	1.01							1.01	0.00	1.5	N/A	1.52	1.52	14.74	4.13	5.65	250	0.28	N/A	31.4	0.64	18.0%
Hard Rock Casino Addition		2000	775	2330	230	178	320	2.65	0.83	1.5	3.2	6.63	8.15	14.74	4.13	12.28	250	0.28	N/A	31.4	0.64	39.1%

*Note: Sanitary flows for the Phase 2 additions include the phase 1 interim additions

Design Parameters:

- Hotel population = 1.8 person/room
- Gaming Position = 6 seats/position

Section 4.0 Ottawa Sewer Design Guidelines

- Restaurant (Steakhouse, Hard Rock Café, Casual dinning, incl employees)	125	L/seat/Day
- Auditoriums (No food, incl employees)	20	L/seat/Day
- Hotel (incl employees)	225	L/person/day
- Employees (Additional employees not included in above uses)	75	L/person/day

Novatech Daily Usage Calculation

- OLG Slots (calculated based on existing usage)	32	L/slot/day
- Gaming Tables (based on existing slots calculation)	32	L/seat/Day
Commercial Peaking Factor (Section 4.0 Ottawa Sewer Design Guidelines)	1.5	
Residential Peaking Factor (Section 4.0 Ottawa Sewer Design Guidelines)	Harmon Formula	

Section 4.0 Ottawa Sewer Design Guidelines

- Extraneous Flows	0.28	L/s/effective gross ha

NOVATECH
Engineers, Planners & Landscape Architects

TECHNICAL MEMORANDUM

DATE: NOVEMBER 1, 2019

TO: FILE

FROM: CARL SCIUK

RE: JOB#116111: HARD ROCK CASINO – SANITARY PUMP STATION EXISTING CONDITIONS

The following technical memorandum will review condition of the Sanitary Pump Station which services this site:

The sanitary pump station is located approximately 240m north of the main building. Sewage is conveyed to the pump station via a 250mm gravity sewer. The station pumps sewage approximately 325m via a 150mm force main to an existing gravity sewer at the intersection of Albian Road and High Road [Drawings attached].

DME prepared a design report for the pump station in October 2005 [attached]. The report includes details of forcemain sizing, wet well sizing [for up to 20.64L/s], and pump sizing to accommodate a design flow of 17.2L/s and future flow of 20.64L/s.

The station consists of a control panel, fibreglass wet well, two submersible pumps, an ultrasonic level controller and floats [Refer to Xylem Sanitary Lift Station drawing attached]. The submersible sewage pumps [Flygt NP-3102-463] are each rated for peak flow of 17.2L/s and alter between duty and standby on each pump cycle. It appears the pumps operate primarily by ultrasonic levels, with floats providing backup control and high alarms. A high water alarm is wired to the central monitoring of the building. The pump station is connected to standby power which serves the entire facility in the event of a power outage. The wet well and associated equipment was installed in 2006. The wet well and associated control panel were supplied by Xylem. The wet well and associated internal equipment has been constructed to standards typical for municipal pump stations in Ottawa.

The wet well and control panel are accessed from the main parking lot via a 50m long gravel access pathway. The access pathway currently shows signs of surface erosion. The pathway should be maintained in good condition and plowed in the winter to ensure access for maintenance and emergencies. The pathway ends approximately 5m from the wet well and should extend closer to the wet well to ease both foot and vehicular access. The access hatches were not locked at the time of visit, but facility staff noted that locks will be installed soon. The control panel is located above grade on support posts and was locked. No documents for the facility were in the control panel.

We are not aware of any protocol for response to a high level alarm condition. The facility should ensure that the emergency contact is able to address alarms in a timely manner. Response should include procedures to follow at the pump station to evaluate and mitigate the issues, as well as contact with a service qualified technician and possibly a septic hauler.

There was no information available about past maintenance of the pump station. The inside of the wet well was quite grimy, and the inlet trash basket was full of debris. We recommend that a

maintenance contract with a minimum of quarterly site visits should be arranged. The site visits should include as a minimum: confirmation of each pump operation, confirmation of ultrasonic level control, confirmation of alarm floats & registration of high alarm at building control room, cleaning of trash basket and provision for emergency response. The initial site visit should also include a cleaning of wet well internals to clear off slime buildup.

The submersible sewage pumps are likely original and near the end of their service life. The pumps should be evaluated and upgraded prior to servicing the new facility. The wet well includes pump rails, a pump base and pump chain, so that pumps can easily be removed and replaced/upgraded to new station capacity if required without entering the wet well.

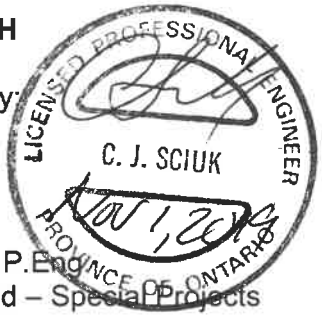
Conclusion

Based on the foregoing, the sanitary pump station is adequately designed and sized to service 17.2L/s [with capability to upgrade via pump impeller changes to 20.64L/s]. We recommend the following actions be taken to address existing conditions:

- Lock access hatches. Use a common key system for all padlocks including the control panel.
- Provide Operation and Maintenance documentation including: drawings of facility/control panel, protocol for emergencies, etc at the pump station.
- Improve access in the immediate vicinity of the pump station and maintain the gravel access road in both summer and winter
- Engage a qualified service contractor to make quarterly visits as a minimum. The service agreement should include reasonable emergency response times.
- Upgrade submersible pumps if required to meet sanitary service demands for the proposed hotel.

NOVATECH

Prepared by:



Carl Sciuk, P.Eng.
Project Lead – Special Projects

Enclosed

Sanitary Sewage Report by DME, October 6,2005
Xylem "Rideau Carleton Raceway Lift Station" Drawing, Rev 3
Site Drawing 2538-OS-P1, Rev 8
Site Drawing 2538-OS-P2, Rev 9

Sanitary Sewage Report

Rideau Carleton Raceway

D.M.E. Project No. 2538

Prepared by:



September 12, 2005

Revised: October 6, 2005

400-30 Camelot Drive, Nepean, ON K2G 5X8 • Telephone (613) 225-1929 Fax (613) 225-7330 • E-mail: mcmanus@dmel.on.ca

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 EXISTING CONDITIONS 1

3.0 PROPOSED DEVELOPMENT 1

4.0 DESIGN FLOWS 1

5.0 GRAVITY SEWER 2

6.0 SANITARY FORCEMAIN AND PUMP STATION 2

FIGURES

Figure 1: Key Plan
Figure 2: Site Plan

APPENDICES

Appendix A: Sanitary Design Flows
Appendix B: System Hydraulics & Cycle Time Calculations
Appendix C: Electrical & Structural Info

DRAWINGS:

RCR Site Overall Servicing, 2538-OS4
RCR Site Forcemain Profile, 2538-OS P1
RCR Site Gravity Sewer Profile, 2538-OS P2
Pump Station Drawing

1.0 INTRODUCTION

The Rideau Carleton Raceway site is located at 4837 Albion Road within the City of Ottawa (former City of Gloucester). *Figure 1* shows the site location. The Raceway would like to upgrade its sanitary sewage system and this report is in support of the design drawings.

2.0 EXISTING CONDITIONS

Sanitary sewage currently drains to two existing holding/septic tanks and tile beds. The holding tanks require pumping frequently. The existing MOE Certificate of Approval for the present system requires a more permanent solution. Also, the City of Ottawa has recently increased the hauling and dumping fees for sewage thus so the Rideau Carleton Raceway would like to upgrade its sanitary sewage system.

3.0 PROPOSED DEVELOPMENT

It is proposed to install a gravity sewer from the main building to an on-site pump station. A forcemain would then be constructed from the on-site pump station to a gravity sanitary sewer at the intersection of Albion Road and High Road. A gravity sanitary sewer is to be constructed from Albion and High Road along High Road to Earl Armstrong Road and then along Earl Armstrong Road westerly to Canyon Walk Drive. This gravity sewer has been submitted for review and approval under separate cover. Figure 2 shows the sewers within the Rideau Carleton Raceway site. The attached drawings show, in more detail, the proposed gravity sewer, forcemain and pump station within the Rideau Carleton Raceway property.

4.0 DESIGN FLOWS

The Rideau Carleton Raceway has intentions of expanding their facilities. The proposed infrastructure has been designed to include any future expansion. Design flows are calculated in further detail in Appendix A and are summarized as follows:

Existing Peak Sanitary Flow = 7.51 L/s
10 year Peak Sanitary Flow = 10.51 L/s
20 year Peak Sanitary Flow = 20.64 L/s

5.0 GRAVITY SEWER

Approximately 385m of 250mm diameter gravity sanitary sewer at 0.35% is proposed from the existing building to the proposed pump station. The sewer has a capacity of 36.7L/s which is greater than the 20 year Peak Sanitary Flow predicted for the site. This gravity sanitary sewer is illustrated on dwg 2535-P1, attached.

6.0 SANITARY FORCEMAIN AND PUMP STATION

6.1 Forcemain

Approximately 325m of forcemain is to be installed from the pump station to the upstream manhole proposed for the gravity sewer at the intersection of Albion Road and High Road. The forcemain will be 150mm diameter in size. The forcemain size and pump has been selected such that only minimal changes may be required for servicing flows from current conditions to the predicted 20 year flows. Minor changes may be required such as changing the pump impellor.

6.2 Pump Station

The pump station is designed for a dual pump system. The pumps will be set to alternate at each cycle with the second pump starting in the event of a failure. The pump station will incorporate standard control systems with alarms in the event of a failure. All alarms will be remotely monitored in the Raceway Control room.

The total head loss is the sum of losses in the system including static head, dynamic head and fitting losses. The dynamic head loss is calculated using the Hazen Williams formula.

$$V = 0.85 C_H R^{0.63} S^{0.54}$$

Where
V = velocity = Flow/Area
C_H = Hazen Williams roughness coefficient (based on pipe material and age)
R = hydraulic radius (d/4 for a full pipe)
S = slope of the energy grade line (ratio of head loss to length of pipe)

The static head loss is calculated as the difference between the forcemain outlet invert and the liquid level in the wet well under given conditions. The MOE Guidelines for the Design of Sanitary Sewage Systems indicates there are three conditions to be analyzed. These conditions show the range from worst case scenario where the pump has to work the hardest to the best case scenario where the pump has to work the least.

Condition A:
Hazen Williams roughness coefficient = 120 and the water level is low in the wet well

Condition B:
Hazen Williams roughness coefficient = 130 and there is a median water level over the normal operation range in the wet well

Condition C:
Hazen Williams roughness coefficient = 140 and an overflow water level in wet well

Fitting losses are also calculated in terms of equivalent lengths of pipe per fitting.

Table 1 presents and totals the losses for a 150mm (6") forcemain. This is the amount of head that the pump must overcome in order to pump sewage at various flow rates through the pump system and forcemain. Therefore, system curves can be created for each condition and plotted with the pump performance curve to determine which pump to select.

A Flygt Pump model NP-3102-463 was selected and the system curve and pump performance curve are shown in Figure B1. A schematic of the pump station with respect to elevations is shown in Figure B2. From the pump performance curve, the pump will operated under normal conditions at a flow rate of 17.2 L/s. This flow rate is less than the estimated 20 Year Peak Flow of 20.64 L/s. Therefore, the pumps may have to be replaced to accommodate the actual 20 Year Peak Flows.

Cycle times for each of the existing, 10 year and 20 year flows are calculated and shown in Appendix B. The average cycle time should be around 10 minutes. The cycle times for the 20 Year Flows are greater than 10 minutes which is also an indication that the a different pump should be installed for the 20 Year Flows.

It is proposed to install a pre-fabricated fiberglass reinforced plastic (FRP) pumping station. The contractor is required to prepare the concrete pad for this pre-fabricated unit, connect the inlet and outlet pipes, install the pre-assembled pumps and make any necessary electrical connections. A drawing for the pump station, prepared by Barski Industries Ltd., for the pre-fabricated unit is contained at the rear of the report.

An overflow outlet has been provided to the existing holding tanks. The elevation of the overflow outlet is higher than the pump station outlet but lower and the building finished floor elevation. Refer to the Overall Servicing Drawings (dwg 2538-OS4) for more detailed information.

6.3 Wet Well

The minimum size for the wet well, according to MOE criteria, is a 2.4m diameter wet well. This minimum size will be used in this case in order to have adequate cycle times. The cycle times for the given flows are calculated in Appendix B. The cycle times help determine if the float levels for the different flow rates need to be adjusted.

6.4 Electrical & Structural

Electrical information in terms of ductwork required is shown on the enclosed plans and a Wiring Diagram is included in Appendix C. A detail for the structural slab required for the pump station is also included in Appendix C.

Cara Ruddle, P.Eng..	David McManus, P.Eng
Project Engineer	Principal

APPENDIX A:

SANITARY DESIGN FLOWS

Design Flows

The existing peak sanitary flow is estimated at 3.38 L/s. This number is based on Water Consumption Reports for the peak period, which is during the summer months, and using a peaking factor of 1.5. Infiltration is calculated based on estimated areas of development and using City criteria of 0.28L/s/ha. The flows are calculated as follows:

Existing Sanitary Flow = peak flow + Infiltration
Existing Sanitary Flow = 3.38 + (14.74 x 0.28)
Existing Sanitary Flow = 3.38 + 4.13
Existing Sanitary Flow = 7.51 L/s

The 10 Year Sanitary Flow includes a 240 room Hotel and 1500 seat Theatre which will be within the existing developed area of the property and so the infiltration is the same as for the existing flows.

10 Year Sanitary Flow = peak flow + infiltration
10 Year Sanitary Flow = 3.38 + 1.95 (hotel) + 1.05 (theatre) + 4.13
10 Year Sanitary Flow = 3.38 + 1.95 + 1.05 + 4.13
10 Year Sanitary Flow = 10.51 L/s

The 20 Year Sanitary Flow includes a Retail Centre, Trade Centre and Golf Course which is outside the current developed area.

20 Year Sanitary Flow = peak flow + infiltration
20 Year Sanitary Flow = 10.51 + 7.25 +(10.26x0.28)
20 Year Sanitary Flow = 10.51 + 7.25 + 2.87
20 Year Sanitary Flow = 20.64 L/s

APPENDIX B:

SYSTEM HYDRAULICS & CYCLE TIME CALCULATIONS

Existing Flows

Design Peak Flow = 7.51 L/s
Actual (peak) Flow = 17.2 L/s (from Pump Performance Curve)
Average Flow rate = 65% of design peak flow

$$\text{Run Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{flow rate out – average flow incoming}}$$

$$\text{Run Time} = \frac{4.52 \times (105.4-105.05)}{17.2/1000 - 0.65 \times 7.51/1000}$$

Run Time = 128.4 seconds
Run Time = 2.14 minutes

$$\text{Fill Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{Average flow incoming – no outgoing flow}}$$

$$\text{Fill Time} = \frac{4.52 \times (105.4 - 105.05)}{0.65 \times 7.51/1000 - 0}$$

Fill Time = 324.1 seconds
Fill Time = 5.4 minutes

Total Cycle Time = Run Time + Fill Time
Total Cycle Time = 2.14 + 5.4
Total Cycle Time = 7.54 minutes

$$\text{Minimum Cycle Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{Flow rate out – no incoming flow}}$$

$$\text{Minimum Cycle Time} = \frac{4.52 \times (105.4-105.05)}{17.2/1000 - 0}$$

Minimum Cycle Time = 92.0 seconds
Minimum Cycle Time = 1.53 minutes

10 Year Flows

Design Peak Flow = 10.51 L/s
Actual (peak) Flow = 17.2 L/s (from Pump Performance Curve)
Average Flow rate = 65% of design peak flow

$$\text{Run Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{flow rate out – average flow incoming}}$$

$$\text{Run Time} = \frac{4.52 \times (105.4-105.05)}{17.2/1000 - 0.65 \times 10.51/1000}$$

Run Time = 152.58 seconds
Run Time = 2.54 minutes

$$\text{Fill Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{Average flow incoming – no outgoing flow}}$$

$$\text{Fill Time} = \frac{4.52 \times (105.4 - 105.05)}{0.65 \times 10.51/1000 - 0}$$

Fill Time = 231.57 seconds
Fill Time = 3.86 minutes

Total Cycle Time = Run Time + Fill Time
Total Cycle Time = 2.54 + 3.86
Total Cycle Time = 6.40 minutes

$$\text{Minimum Cycle Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{Flow rate out – no incoming flow}}$$

$$\text{Minimum Cycle Time} = \frac{4.52 \times (105.4-105.05)}{17.2/1000 - 0}$$

Minimum Cycle Time = 92.0 seconds
Minimum Cycle Time = 1.53 minutes

20 Year Flows

Design Peak Flow = 20.64 L/s
Actual (peak) Flow = 17.2 L/s (from Pump Performance Curve)
Average Flow rate = 65% of design peak flow

$$\text{Run Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{flow rate out – average flow rate incoming}}$$

$$\text{Run Time} = \frac{4.52 \times (105.4-104.72)}{17.2/1000 - 0.65 \times 20.64/1000}$$

Run Time = 812.26 seconds
Run Time = 13.54 minutes

$$\text{Fill Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{Average flow incoming – no outgoing flow}}$$

$$\text{Fill Time} = \frac{4.52 \times (105.4 - 104.72)}{0.65 \times 20.64/1000 - 0}$$

Fill Time = 229.10 seconds
Fill Time = 3.82 minutes

Total Cycle Time = Run Time + Fill Time
Total Cycle Time = 13.54 + 3.82
Total Cycle Time = 17.36 minutes

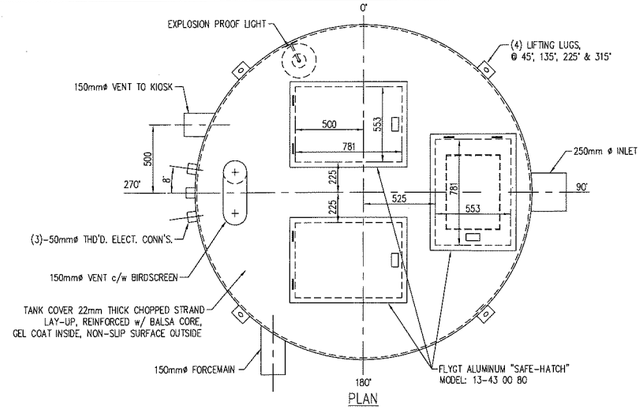
$$\text{Minimum Cycle Time} = \frac{\text{area of wet well x (pump start level – pump stop level)}}{\text{Flow rate out – no incoming flow}}$$

$$\text{Minimum Cycle Time} = \frac{4.52 \times (105.4-104.72)}{17.2/1000 - 0}$$

Minimum Cycle Time = 178.70 seconds
Minimum Cycle Time = 2.98 minutes

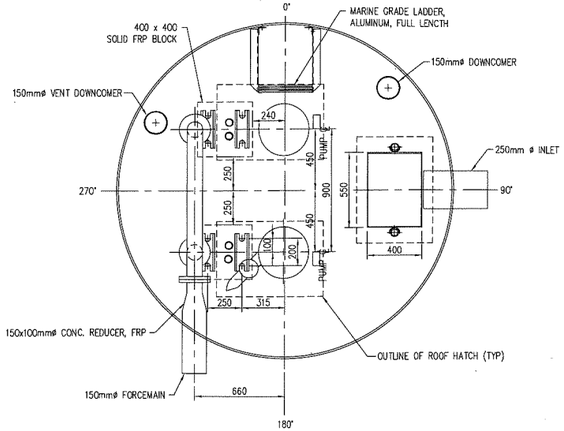
APPENDIX C:

ELECTRICAL AND STRUCTURAL INFORMATION



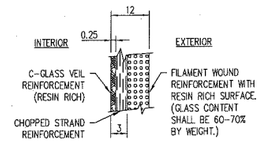
PLAN

SCALE 1:20



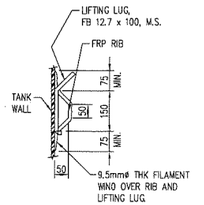
SECTION "A-A" - PUMPS LAYOUT

SCALE 1:20



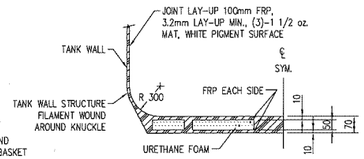
DETAIL "1" - VESSEL WALL

N.T.S.



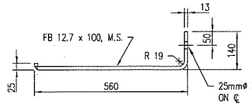
DETAIL "2" - LIFTING LUG

SCALE 1:10



DETAIL "3" - BOTTOM BASE

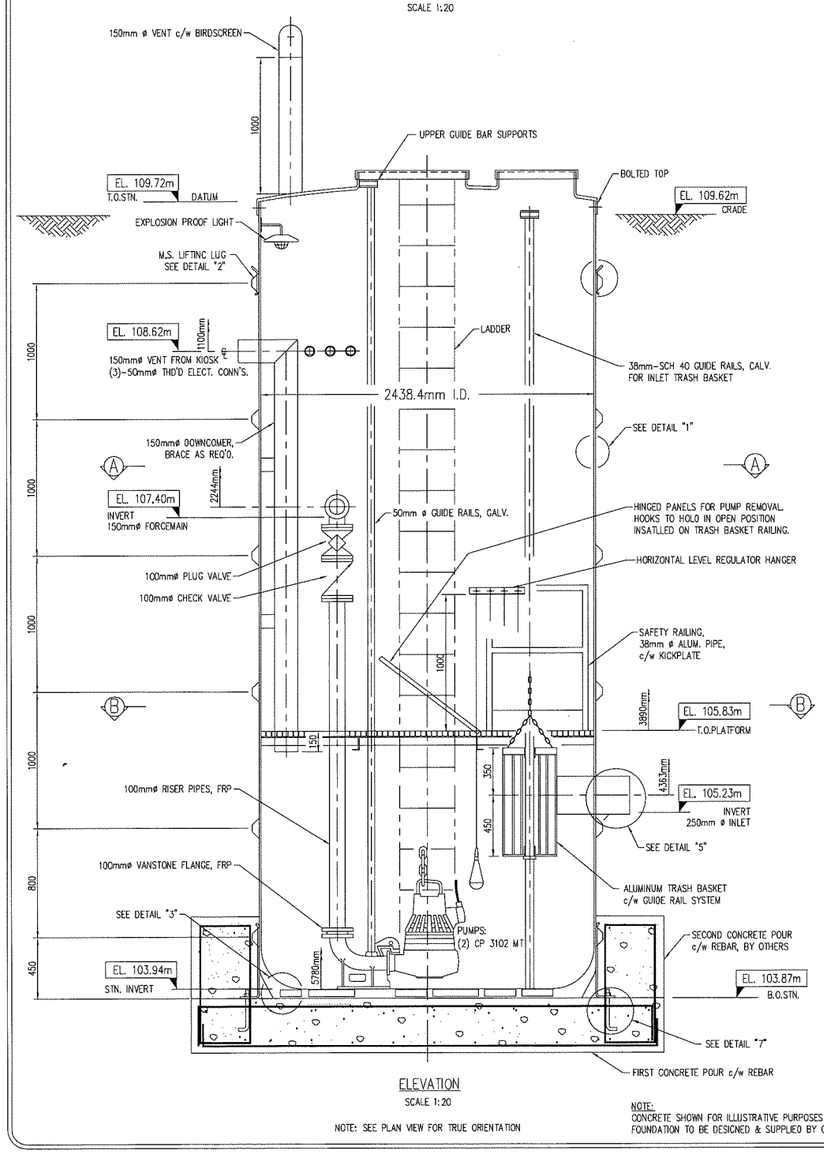
N.T.S.



NOTE:
ACTUAL LOCATION OF LUGS MAY VARY. DO NOT LOCATE ANCHOR BOLTS UNTIL RECEIPT OF COMPLETED STATION OR TEMPLATE OF HOLD DOWN LUG LOCATIONS.

DETAIL "4" - HOLD DOWN LUG

SCALE 1:10

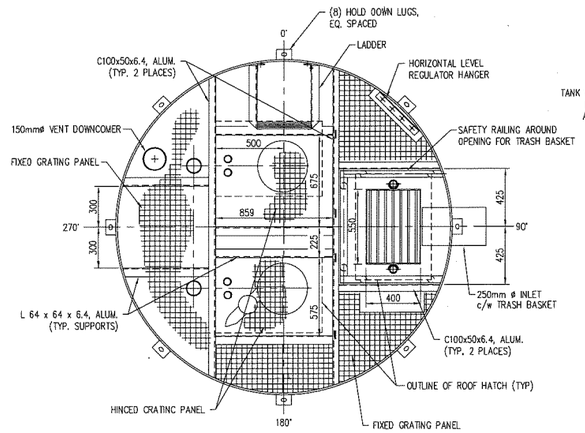


ELEVATION

SCALE 1:20

NOTE: SEE PLAN VIEW FOR TRUE ORIENTATION

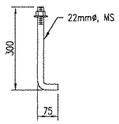
NOTE:
CONCRETE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. FOUNDATION TO BE DESIGNED & SUPPLIED BY OTHERS.



NOTES:
1. ALL GRATING PANELS TO BE 38 x 38 x 38 HIGH FRP
2. ALL SUPPORTS TO BE ALUMINUM

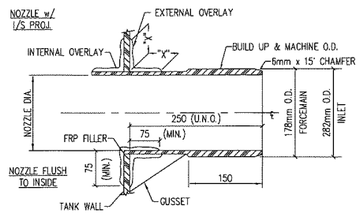
SECTION "B-B" - PLATEORM LAYOUT

SCALE 1:20



DETAIL "7" - ANCHOR BOLT

SCALE 1:10 (BY OTHERS)



NOZZLE NOTES

A MINIMUM OF 2 LAYERS OF WOVEN ROVING IS REQUIRED FOR NOZZLE PORTION OF OVERLAY. TANK PORTION OF OVERLAY SHALL BE SAME THICKNESS AS TANK WALL. DIMENSION "X" SHALL BE GREATER THAN ONE HALF THE NOZZLE DIAMETER. INTERNAL OVERLAY TO HAVE A MINIMUM OF 2 LAYERS MATT. FRP REINFORCING MATERIAL TO BE CUT TO A SHAPE TO ENSURE A SMOOTH LAMINATE.

O.D.'s REPRESENT THICKNESSES REQUIRED FOR ADEQUATE NOZZLE STRENGTH. TO BE CONNECTED TO EXTERIOR PIPING WITH A ROBAR TRANSITION COUPLER OR EQUAL.

DETAIL "5" - TYPICAL NOZZLE, MACHINED

N.T.S.

BILL OF MATERIALS

ITEM	QTY	DESCRIPTION	
1	8	HOLD DOWN LUGS, MS	
2	4	LIFTING LUGS, MS.	
3	3	FLYGT ALUMINUM "SAFE-HATCH" ACCESS FRAMES MODEL 13-43 00 80	
4			
5	1	MARINE GRADE SAFETY LADDER, ALUMINUM, FULL LENCTH	
6	1	250mmø INLET, MACHINED, FRP c/w ALUMINUM TRASH BASKET & GUIDE RAILS	
7	1	150mmø FORCEMAIN, MACHINED, FRP, c/w (2) 100mm ø RISER PIPES, FLxVANSTONE	
		(1)-100mm LR 90° ELL, FLxFRP; (1)-100mmø STR. TEE, FRP	
8	1	150mm ø VENT, FRP, c/w 180° RET. BEND & BIRDSCREEN	
9	1	150mmø VENT TO KIOSK, FRP, c/w DOWNCOMER	
10	3	50mmø THD'D. ELECTRICAL CONNECTIONS	
11	8	20mmø PUMP BASE BOLTS, 304 SS	
12	4	50mmø GUIDE BARS, GALV.	
13	2	38mm-SCH 40 GUIDE BARS, GALV. (TRASH BASKET)	
14	1	EXPLOSION PROOF LIGHT, APPLETON 100 WATT MODEL ABLB 1075	
15	1	INTERMEDIATE PLATFORM, FULL DIAMETER c/w ALUMINUM SUPPORT MEMBERS,	
		FRP GRATING PANELS, HINGED HATCHES FOR PUMP REMOVAL, OPENING FOR	
		TRASH BASKET REMOVAL c/w REMOVABLE HAND RAILINGS	
16	8	22mmø ANCHOR BOLTS, MS	(BY OTHERS)
17	2	UPPER GUIDE BAR SUPPORTS	(BY FLYGT)
18	2	PUMP CP 3102 MT DN100, c/w DISCHARGE ELBOW	(BY FLYGT)
19	2	100mmø CHECK VALVE	(BY FLYGT)
20	2	100mmø PLUG VALVE	(BY FLYGT)
21	1	HORIZONTAL LEVEL REGULATOR HANGER	(BY FLYGT)

FABRICATION DESIGN STANDARDS

1. FLYGT SPECIFICATION GE-1008-04, REVISION MAY 2002
2. AMEC 4S-1Q.01 MANUFACTURE AND INSTALLATION FOR FRP STRUCTURES
3. AMEC 4S-1Q.02 FRP PRESSURE PIPE, FITTINGS AND FLANGES
4. CANADIAN GOVERNMENT STANDARD 41-GP-22

GENERAL NOTES

1. WINDING ANGLE - 70°
2. TANK WALL - 12mm THICK, (9) COVERS
3. LINER - C-GLASS VEIL AND (2)-1 1/2 oz. MATT
4. RESIN - ASHLAND 1951 ISOPHTHALIC
5. EXTERIOR (ABOVE GRADE) TO HAVE DARK GREEN GELCOAT
6. INTERIOR FINISH: WHITE ISOPHTHALIC NPG GELCOAT
7. DIMENSIONS ARE IN MILLIMETERS U.N.O.

INSTALLATION PROCEDURES

THE FOLLOWING RECOMMENDATIONS ARE BASED ON FLYGT EXPERIENCE AND ARE IN NO WAY MEANT TO REPLACE THE ENGINEERS INSTRUCTIONS OR SPECIFICATIONS AND MUST BE USED IN CONJUNCTION WITH THE EXISTING AND ANTICIPATED CONDITIONS AT THE JOBSITE.

1. USE THE LIFTING LUGS PROVIDED FOR VERTICAL HANDLING.
2. USE SLINGS AROUND THE MAIN TANK FOR HORIZONTAL HANDLING.
3. ENSURE UNIT IS STANDING VERTICAL ON CONCRETE PAD.
4. BOLT UNIT FIRMLY AND SQUARELY IN PLACE, SHIM WHERE NECESSARY.
5. ENCASE BOTTOM RIB IN CONCRETE TO A MINIMUM HEIGHT OF 150mm ABOVE RIB TO PROVIDE ANCHORAGE. REBAR TO CONNECT SECOND POUR TO CONCRETE BASE PAD.
6. WHEN EXTERNAL VALVES ARE MOUNTED, SUPPORT PIPING CONNECTIONS DIRECT TO CONCRETE PAD.
7. MAINTAIN A DRY SITE UNTIL BACKFILLING OPERATIONS COMMENCE.
8. USE A GOOD QUALITY SCREENING OR SAND AS BACKFILL MATERIAL TO 90% COMPACTION.
9. PLACE THE BACKFILL IN EQUAL INCREMENTS NOT EXCEEDING 300mm THICK AROUND THE STATION TO PREVENT UNBALANCED LOADS BEING IMPOSED DURING BACKFILLING OPERATIONS. PROGRESSIVELY TAMP BACKFILL AROUND STATION TO FULL HEIGHT TO REDUCE SETTLEMENT TO AN ABSOLUTE MINIMUM.

REV	DATE	DESCRIPTION	BY
3	2006/02/24	REVISED ROOF ACCESS HATCHES	LMc
2	2005/12/01	PLATFORM RELOCATED	LMc
1	2005/11/29	ELEVATION CHANGES	LMc
0	2005/09/30	ISSUED FOR APPROVAL	LMc

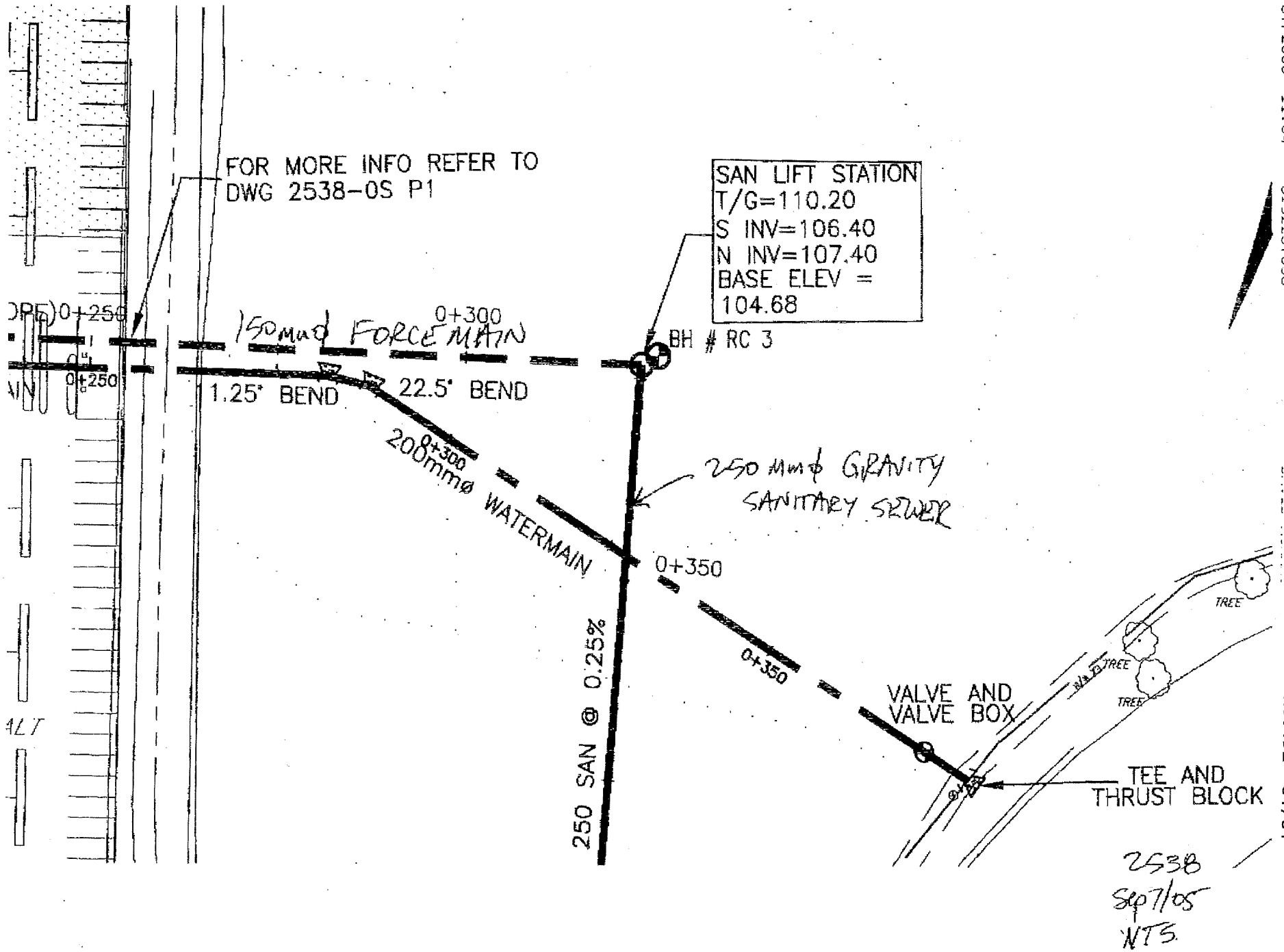
TOLERANCES (U.N.O.)

LINEAR	ANGULAR
X ± 1.5	X.X ± 1/2°

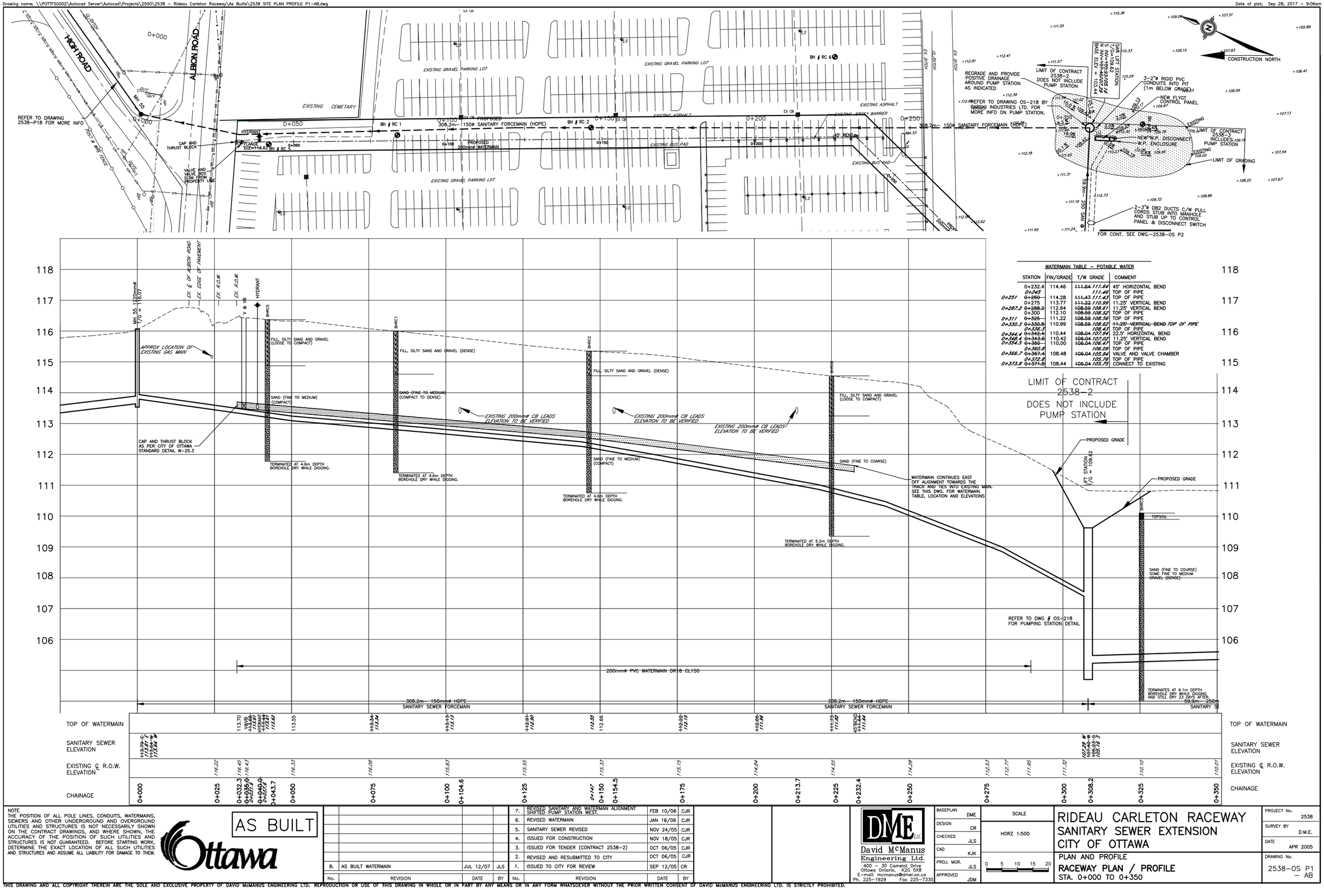
BARSKI INDUSTRIES (1985) LTD.
2378 WESTLAKE RD.
KELOWNA, B.C.
V1Z 2V2

NOTICE: THIS DRAWING HAS NOT BEEN PUBLISHED AND IS THE SOLE PROPERTY OF BARSKI INDUSTRIES (1985) LTD. AND IS LENT TO THE BORROWER FOR HIS CONFIDENTIAL USE ONLY, AND IN CONSIDERATION OF THE LOAN OF THIS DRAWING, THE BORROWER PROMISES AND AGREES TO RETURN IT UPON REQUEST AND AGREES THAT IT SHALL NOT BE REPRODUCED, COPIED, LENT OR OTHERWISE DISPOSED OF DIRECTLY OR INDIRECTLY, NOR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT WAS FURNISHED.

CLIENT	ITT FLYGT CANADA
ENGINEER	DAVID McMANUS ENGINEERING LTD. NEPEAN, ONTARIO
PROJECT	RIDEAU CARLETON RACEWAY SEWAGE PUMP STATION
TITLE	2438.4mm I.D. RIDEAU CARLETON RACEWAY LIFT STATION
ENG BY:	DATE:
CAD BY: LMc	DATE: 2005/09/30
APP BY:	DATE:
ISSUED BY:	DATE:
CAD FILE: RideauCarleton	PROJECT:
SCALE: AS SHOWN	
DRAWING NUMBER: 05-218	REV: 3



ITT FLYGT OTTAWA 613 225 5496 09/08 '05 08:09 NO.152 01/01



WATERMAIN TABLE - POTABLE WATER

STATION	FIN/GRADE	T/W GRADE	COMMENT
0+232.4	114.46	~~111.64~~ *111.64*	45° HORIZONTAL BEND
0+245		*111.46*	TOP OF PIPE
0+251 ~~0+250~~	114.28	~~111.47~~ *111.43*	TOP OF PIPE
0+275	113.77	~~111.22~~ *110.99*	11.25° VERTICAL BEND
0+287.2 ~~0+288.2~~	112.64	~~108.59~~ *108.61*	11.25° VERTICAL BEND
0+300	112.10	~~108.59~~ *108.52*	TOP OF PIPE
0+311 ~~0+325~~	111.22	~~108.59~~ *108.56*	TOP OF PIPE
0+330.3 ~~0+330.8~~	110.99	~~108.59~~ *108.62*	~~11.25° VERTICAL BEND~~ *TOP OF PIPE*
0+335.3		*108.43*	TOP OF PIPE
0+344.4 ~~0+342.4~~	110.44	~~108.04~~ *107.94*	22.5° HORIZONTAL BEND
0+345.4 ~~0+343.6~~	110.42	~~106.04~~ *107.02*	11.25° VERTICAL BEND
0+354.5 ~~0+350~~	110.00	~~106.04~~ *106.47*	TOP OF PIPE
0+360.0		*106.09*	TOP OF PIPE
0+366.7 ~~0+367.4~~	108.48	~~106.04~~ *105.84*	VALVE AND VALVE CHAMBER
0+372.6		*105.75*	TOP OF PIPE
0+373.8 ~~0+371.8~~	108.44	~~106.04~~ *105.75*	CONNECT TO EXISTING

NOTE
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

AS BUILT

Ottawa

No.	REVISION	DATE	BY
8.	AS BUILT WATERMAIN	JUL 12/07	JLS
7.	REVISED SANITARY AND WATERMAIN ALIGNMENT SHIFTED PUMP STATION WEST.	FEB 10/06	CJR
6.	REVISED WATERMAIN	JAN 16/06	CJR
5.	SANITARY SEWER REVISED	NOV 24/05	CJR
4.	ISSUED FOR CONSTRUCTION	NOV 18/05	CJR
3.	ISSUED FOR TENDER (CONTRACT 2538-2)	OCT 06/05	CJR
2.	REVISED AND RESUBMITTED TO CITY	OCT 06/05	CJR
1.	ISSUED TO CITY FOR REVIEW	SEP 12/05	CR

DME Ltd.
David McManus Engineering Ltd.
400 - 30 Camelot Drive
Ottawa Ontario, K2G 5X8
E-mail: mcmanus@dmel.on.ca
Ph. 225-1929 Fax 225-7330

BASEPLAN	DME
DESIGN	CR
CHECKED	JLS
CAD	KJK
PROJ. MGR.	JLS
APPROVED	JDM

SCALE
HORZ 1:500
0 5 10 15 20

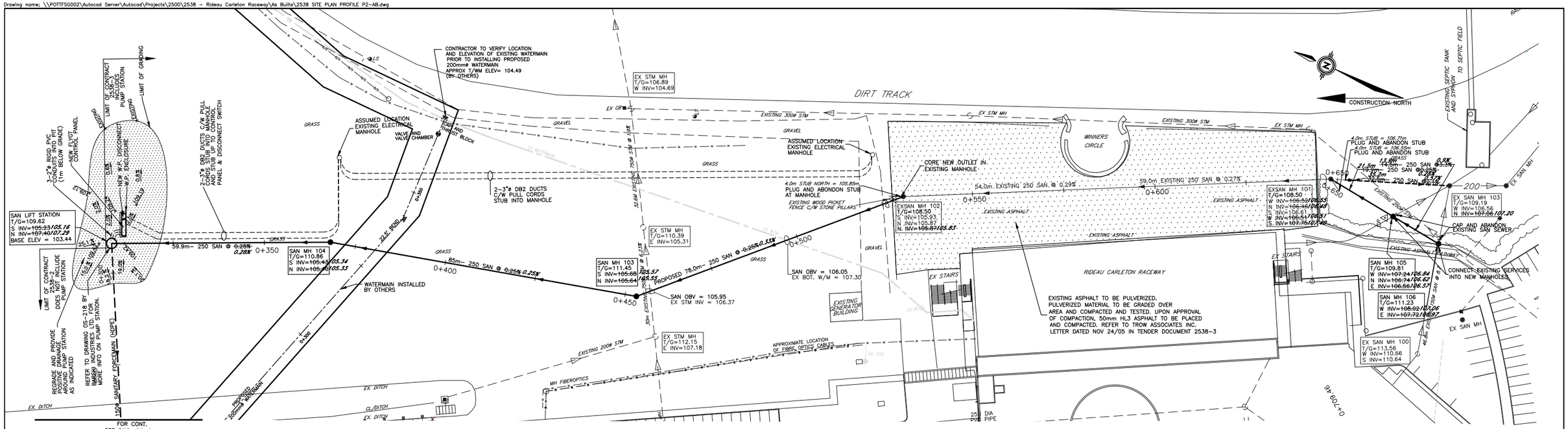
RIDEAU CARLETON RACEWAY
SANITARY SEWER EXTENSION
CITY OF OTTAWA

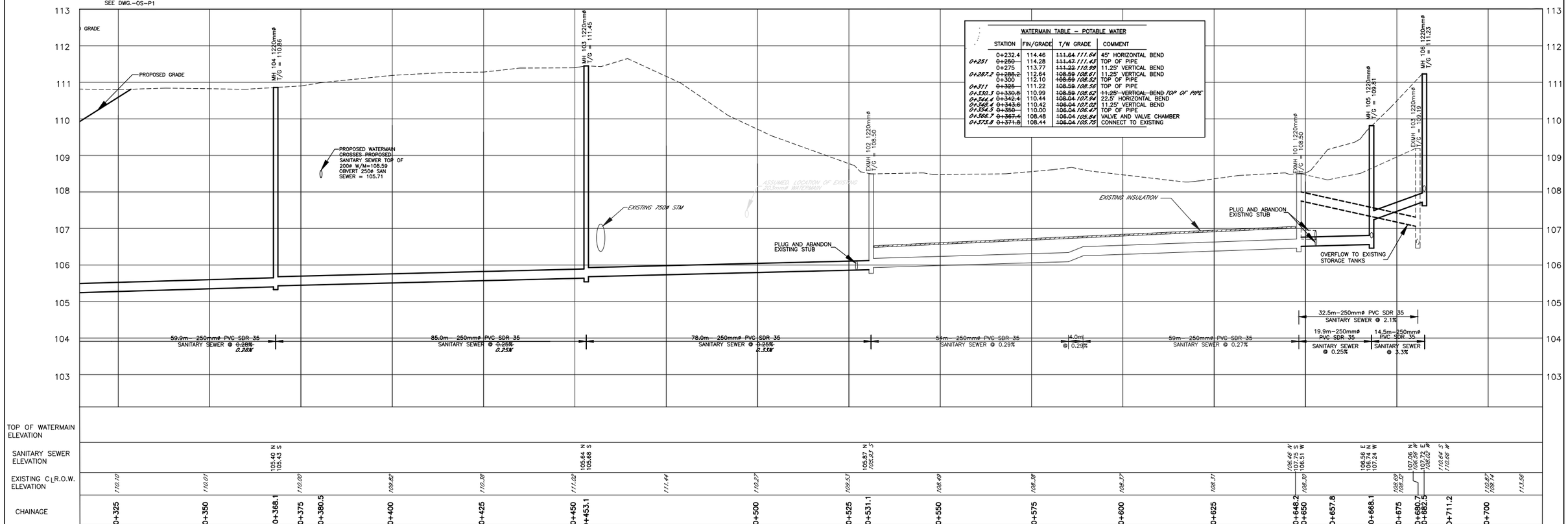
PLAN AND PROFILE
RACEWAY PLAN / PROFILE
STA. 0+000 TO 0+350

PROJECT No. 2538
SURVEY BY D.M.E.
DATE APR 2005
DRAWING No. 2538-OS P1 - AB

THIS DRAWING AND ALL COPYRIGHT THEREIN ARE THE SOLE AND EXCLUSIVE PROPERTY OF DAVID McMANUS ENGINEERING LTD. REPRODUCTION OR USE OF THIS DRAWING IN WHOLE OR IN PART BY ANY MEANS OR IN ANY FORM WHATSOEVER WITHOUT THE PRIOR WRITTEN CONSENT OF DAVID McMANUS ENGINEERING LTD. IS STRICTLY PROHIBITED.

Drawing name: \\POTTFSG002\Autocad Server\Autocad\Projects\2500\2538 - Rideau Carleton Raceway\As Builts\2538 SITE PLAN PROFILE P2-AB.dwg





WATERMAIN TABLE – POTABLE WATER			
STATION	FIN/GRADE	T/W GRADE	COMMENT
0+232.4	114.46	~~111.64~~ *111.64*	45° HORIZONTAL BEND
~~0+250~~ *0+251*	114.28	~~111.47~~ *111.43*	TOP OF PIPE
0+275	113.77	~~111.22~~ *110.99*	11.25° VERTICAL BEND
~~0+286.2~~ *0+287.2*	112.64	~~108.59~~ *108.61*	11.25° VERTICAL BEND
0+300	112.10	~~108.59~~ *108.52*	TOP OF PIPE
~~0+325~~ *0+311*	111.22	~~108.59~~ *108.56*	TOP OF PIPE
~~0+330.8~~ *0+330.1*	110.99	~~108.59~~ *108.63*	~~11.25° VERTICAL BEND~~ *TOP OF PIPE*
~~0+342.4~~ *0+344.4*	110.44	~~108.04~~ *107.84*	22.5° HORIZONTAL BEND
~~0+343.6~~ *0+346.4*	110.42	~~106.04~~ *107.03*	11.25° VERTICAL BEND
~~0+350~~ *0+354.5*	110.00	~~106.04~~ *106.47*	TOP OF PIPE
~~0+367.4~~ *0+366.7*	108.48	~~106.04~~ *105.84*	VALVE AND VALVE CHAMBER
~~0+371.8~~ *0+373.8*	108.44	~~106.04~~ *105.75*	CONNECT TO EXISTING

NOTE
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

AS BUILT

Ottawa

No.	REVISION	DATE	BY
9.	AS BUILT INVERTS ADDED	OCT 9/07	CJR
8.	ISSUED FOR CONSTRUCTION (CONTRACT 2538-3)	MAY 25/06	CJR
7.	ISSUED FOR TENDER (CONTRACT 2538-3)	APR 12/06	CJR
6.	REVISED SANITARY AND WATERMAN ALIGNMENT SHIFTED PUMP STATION WEST.	FEB 10/06	CJR
5.	SANITARY SEWER REVISED	NOV 24/05	CJR
4.	ELECTRICAL INFO ADDED	NOV 01/05	CJR
3.	ISSUED FOR TENDER (CONTRACT 2538-2)	OCT 06/05	CJR
2.	REVISED AND RESUBMITTED TO CITY	OCT 06/05	CJR
1.	ISSUED TO CITY FOR REVIEW	SEP 12/05	CJR

DME Ltd.
David McManus Engineering Ltd.
400 - 30 Camelot Drive
Ottawa Ontario, K2G 5X8
E-mail: mcmanus@dmel.on.ca
Ph. 225-1929 Fax 225-7330

BASEPLAN	DME
DESIGN	CR
CHECKED	JLS
CAD	KJK
PROJ. MGR.	JLS
APPROVED	JDM

SCALE
HORZ 1:500
0 5 10 15 20

RIDEAU CARLETON RACEWAY
SANITARY SEWER EXTENSION
CITY OF OTTAWA
PLAN AND PROFILE
RACEWAY PLAN / PROFILE
STA. 0+350 TO 0+702.2

PROJECT No.	2538
SURVEY BY	D.M.E.
DATE	APR 2005
DRAWING No.	2538-OS P2 - AB

THIS DRAWING AND ALL COPYRIGHT THEREIN ARE THE SOLE AND EXCLUSIVE PROPERTY OF DAVID McMANUS ENGINEERING LTD. REPRODUCTION OR USE OF THIS DRAWING IN WHOLE OR IN PART BY ANY MEANS OR IN ANY FORM WHATSOEVER WITHOUT THE PRIOR WRITTEN CONSENT OF DAVID McMANUS ENGINEERING LTD. IS STRICTLY PROHIBITED.


PUMP 1
PUMP 2
MAIN DISCONNECT
OPEN
FLYGT
MINI CONTROL AND STATUS II
24V AC/DC
LEAKAGE
TEMPERATURE
SUPPLY
DANGER
HAUT HIGH VOLTAGE
AVERTISSEMENT
DÉBRANCHER L'ALIMENTATION AVANT D'OUVRIR CETTE PORTE
CAUTION
DISCONNECT MAIN SUPPLY BEFORE OPENING THIS DOOR
CAUTION
INTRINSIC SECURITY CABLES AND NON-INTRINSIC SECURITY CABLES MUST NOT SHARE THE SAME CABLE CONDUITS (WIRING DUCT)
MILLTRONICS
MultiRanger 100
PUMP 1
PUMP 2
SPS
FEED FROM OLD ELECTRICAL ROOM



NOVATECH
Engineers, Planners & Landscape Architects

CCTV Sewer Inspection Review Form

2019-11-14

Project Name Rideau Carleton Raceway – Hard Rock Casino **Report No.**

Novatech Project No. 116111
Owner
General Contractor

Inspection Date
Inspection Conducted By **Veolia**

Comments Verified by Municipality
Yes ☐ No ☐ N/A ☐

Report Received
Inspection Reviewed
Review Done By LKC
Review to Contractor

Sewer Type
☒ Sanitary Sewer
☐ Storm Sewer
☐ Combined Sewer

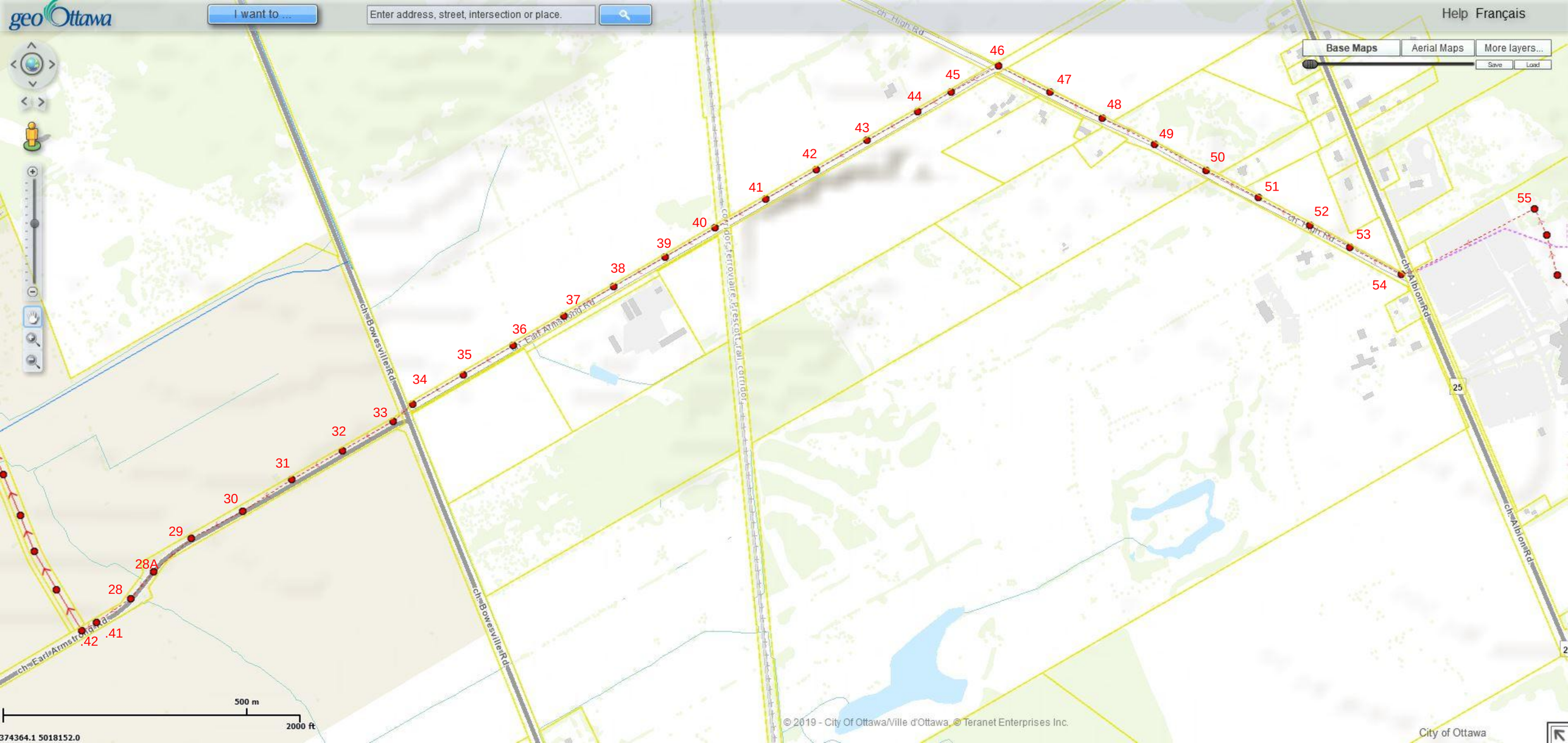
Video Type
☐ Preliminary Set
☐ Repair Set
☐ Final Set

DVD No.	Street Name	Start MH No.	End MH No.	(Check Applicable Box)			Inspection Length (m)	Problem/Observation	Comment/Action
				Acceptable	Monitor	Repair			
MHSA-.42 MHSA-.41	EARL ARMSTRONG	.42	.41	☒	☐	☐	119.00	Moderate Silt, Pile of Gravel @ 35.7m	Requires Cleaning
MHSA-28 MHSA-29	EARL ARMSTRONG	28	29	☒	☐	☐	72.00	Moderate Grease	Requires Cleaning
MHSA-28A MHSA-28	EARL ARMSTRONG	28A	28	☒	☐	☐	119.50	Moderate Grease	Requires Cleaning
MHSA-28A NORTH	EARL ARMSTRONG	28A	28A	☒	☐	☐	2.00	Significant Silt	Requires Cleaning
MHSA-29 MHSA-30	EARL ARMSTRONG	29	30	☒	☐	☐	0	Significant Gravel, Aborted	Requires Cleaning
MHSA-30 MHSA-29	EARL ARMSTRONG	30	29	☒	☐	☐	118.00	Significant Grease, Silt, Gravel and Rocks	Requires Cleaning
MHSA-31 MHSA-30	EARL ARMSTRONG	31	30	☒	☐	☐	118.50	Moderate Grease	Requires Cleaning
MHSA-32 MHSA-31	EARL ARMSTRONG	32	31	☒	☐	☐	119.50	Moderate Debris @ 61.5m, 99.6m, 103.5m	Requires Cleaning
MHSA-33 MHSA-32	EARL ARMSTRONG	33	32	☒	☐	☐	118.00		
MHSA-33 MHSA-34	EARL ARMSTRONG	33	34	☒	☐	☐	119.00	Mild Grease	Requires Cleaning
MHSA-35 MHSA-34	EARL ARMSTRONG	35	34	☒	☐	☐	52.00		

MHSA-36 MHSA-35	EARL ARMSTRONG	36	35	☒	☐	☐	118.50		
MHSA-37 MHSA-36	EARL ARMSTRONG	37	36	☒	☐	☐	119.00		
MHSA-38 MHSA-37	EARL ARMSTRONG	38	37	☒	☐	☐	118.00		
MHSA-39 MHSA-38	EARL ARMSTRONG	39	38	☒	☐	☐	118.00	Mild Grease, Debris @ 99.0	Requires Cleaning
MHSA-40 MHSA-39	EARL ARMSTRONG	40	39	☒	☐	☐	118.50		
MHSA-41 MHSA-40	EARL ARMSTRONG	41	40	☒	☐	☐	118.50		
MHSA-42 MHSA-41	EARL ARMSTRONG	42	41	☒	☐	☐	118.00	Moderate Silt	Requires Cleaning
MHSA-42 MHSA-43	EARL ARMSTRONG	42	43	☒	☐	☐	120.00		
MHSA-43 MHSA-42	EARL ARMSTRONG	43	42	☒	☐	☐	120.00		
MHSA-44 MHSA-43	EARL ARMSTRONG	44	43	☒	☐	☐	119.00		
MHSA-44 MHSA-45	EARL ARMSTRONG	44	45	☒	☐	☐	118.00	Significant Grease, Moderate Silt	Requires Cleaning
MHSA-45A MHSA-44A	EARL ARMSTRONG	45A	44A	☒	☐	☐	118.50	Mild Grease, Silt	Requires Cleaning
MHSA-46 MHSA-45	EARL ARMSTRONG	46	45	☒	☐	☐	77.50	Significant Silt, Rocks	Requires Cleaning
MHSA-47 MHSA-46	EARL ARMSTRONG	47	46	☒	☐	☐	109.00	Moderate Grease and Silt	Requires Cleaning
MHSA-47A MHSA-46A	EARL ARMSTRONG	47A	46A	☒	☐	☐	109.50	Moderate Grease	Requires Cleaning
MHSA-48 MHSA-47	EARL ARMSTRONG	48	47	☒	☐	☐	118.00	Moderate Grease	Requires Cleaning
MHSA-49 MHSA-48	EARL ARMSTRONG	49	48	☒	☐	☐	118.00	Moderate Grease	Requires Cleaning
MHSA-50 MHSA-49	EARL ARMSTRONG	50	49	☒	☐	☐	119.00		
MHSA-51 MHSA-50	EARL ARMSTRONG	51	50	☒	☐	☐	119.00		
MHSA-52 MHSA-51	EARL ARMSTRONG	52	51	☒	☐	☐	118.10		

CCTV Sewer Inspection Review Form

MHSA-53 MHSA-52	EARL ARMSTRONG	53	52	☒	☐	☐	118.00	Mild Grease	Requires Cleaning
MHSA-54 MHSA-53	EARL ARMSTRONG	54	43	☒	☐	☐	95.00	Mild Grease	Requires Cleaning
MHSA-55 MHSA-54	EARL ARMSTRONG	55	54	☒	☐	☐	118.00		


geoOttawa
I want to ...
Enter address, street, intersection or place.
Help Français
Base Maps
Aerial Maps
More layers...
Save
Load
ch. High Rd
ch. Bowesville Rd
ch. Earl Armstrong Rd
corridor ferroviaire Prescott rail corridor
ch. Albion Rd
25
.41
.42
28
28A
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
500 m
2000 ft
374364.1 5018152.0
© 2019 - City Of Ottawa/Ville d'Ottawa, © Teranet Enterprises Inc.
City of Ottawa

CCTV inspection report

Hard Rock Ottawa L.P

Sanitary Sewer

EARL ARMSTRONG, HIGH RD

Page

1. Index of pipes, sorted by pipe 3
2. Index of pipes, sorted by manhole 4
3. Index of pipes, sorted by road 5
4. Internal condition grade 6
5. Operational performance grade 7
6. Reinspection with ZOOM 8
7. Regular inspection required 9
8. Structural condition 10
9. Service defects 11
10. Construction features 13
11. Miscellaneous features 15
12. Comments 17
13. Survey abandoned 18
14. Pipe summary and condition details 19

33 items

Pipe	Start/End	Inspection direction	Road	Page
MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	19
MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG	22
MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	24
MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG	27
MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG	29
MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG	31
MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG	33
MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG	35
MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	EARL ARMSTRONG	37
MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG	39
MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	EARL ARMSTRONG	41
MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG	43
MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	EARL ARMSTRONG	45
MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	EARL ARMSTRONG	47
MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	49
MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	EARL ARMSTRONG	52
MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	EARL ARMSTRONG	54
MHSA-42 MHSA-41	MHSA-42 --> MHSA-41	Direction of flow	EARL ARMSTRONG	56
MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	EARL ARMSTRONG	58
MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	EARL ARMSTRONG	60
MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG	62
MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG	64
MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	66
MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG	69
MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG	71
MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD	73
MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	75
MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	HIGH RD	78
MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	HIGH RD	80
MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	HIGH RD	82
MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD	84
MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD	86
MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	HIGH RD	88

33 items

Start/End	Inspection direction	Pipe	Road	Page
MHSA-.42 --> MHSA-.41	Direction of flow	MHSA-.42 MHSA-.41	EARL ARMSTRONG	19
MHSA-28 --> MHSA-29	Against flow	MHSA-28 MHSA-29	EARL ARMSTRONG	22
MHSA-28A --> MHSA-28	Against flow	MHSA-28A MHSA-28	EARL ARMSTRONG	24
MHSA-28A --> NORTH	Direction of flow	MHSA-28A NORTH	EARL ARMSTRONG	27
MHSA-29 --> MHSA-30	Against flow	MHSA-29 MHSA-30	EARL ARMSTRONG	29
MHSA-30 --> MHSA-29	Direction of flow	MHSA-30 MHSA-29	EARL ARMSTRONG	31
MHSA-31 --> MHSA-30	Direction of flow	MHSA-31 MHSA-30	EARL ARMSTRONG	33
MHSA-32 --> MHSA-31	Direction of flow	MHSA-32 MHSA-31	EARL ARMSTRONG	35
MHSA-33 --> MHSA-32	Direction of flow	MHSA-33 MHSA-32	EARL ARMSTRONG	37
MHSA-33 --> MHSA-34	Against flow	MHSA-33 MHSA-34	EARL ARMSTRONG	39
MHSA-35 --> MHSA-34	Direction of flow	MHSA-35 MHSA-34	EARL ARMSTRONG	41
MHSA-36 --> MHSA-35	Direction of flow	MHSA-36 MHSA-35	EARL ARMSTRONG	43
MHSA-37. --> MHSA-36.	Direction of flow	MHSA-37. MHSA-36.	EARL ARMSTRONG	45
MHSA-38 --> MHSA-37	Direction of flow	MHSA-38 MHSA-37	EARL ARMSTRONG	47
MHSA-39 --> MHSA-38	Direction of flow	MHSA-39 MHSA-38	EARL ARMSTRONG	49
MHSA-40 --> MHSA-39	Direction of flow	MHSA-40 MHSA-39	EARL ARMSTRONG	52
MHSA-41 --> MHSA-40	Direction of flow	MHSA-41 MHSA-40	EARL ARMSTRONG	54
MHSA-42 --> MHSA-41	Direction of flow	MHSA-42 MHSA-41	EARL ARMSTRONG	56
MHSA-42 --> MHSA-43	Against flow	MHSA-42 MHSA-43	EARL ARMSTRONG	58
MHSA-43 --> MHSA-42	Direction of flow	MHSA-43 MHSA-42	EARL ARMSTRONG	60
MHSA-44 --> MHSA-43	Direction of flow	MHSA-44 MHSA-43	EARL ARMSTRONG	62
MHSA-44 --> MHSA-45	Against flow	MHSA-44 MHSA-45	EARL ARMSTRONG	64
MHSA-44... --> MHSA-45...	Direction of flow	MHSA-45... MHSA-44...	EARL ARMSTRONG	66
MHSA-46. --> MHSA-45.	Direction of flow	MHSA-46. MHSA-45.	EARL ARMSTRONG	69
MHSA-47... --> MHSA-46...	Direction of flow	MHSA-47... MHSA-46...	EARL ARMSTRONG	71
MHSA-48 --> MHSA-47	Direction of flow	MHSA-48 MHSA-47	HIGH RD	73
MHSA-49 --> MHSA-48	Direction of flow	MHSA-49 MHSA-48	HIGH RD	75
MHSA-50 --> MHSA-49	Direction of flow	MHSA-50 MHSA-49	HIGH RD	78
MHSA-51... --> MHSA-50...	Direction of flow	MHSA-51... MHSA-50...	HIGH RD	80
MHSA-52.. --> MHSA-51..	Direction of flow	MHSA-52.. MHSA-51..	HIGH RD	82
MHSA-53 --> MHSA-52	Direction of flow	MHSA-53 MHSA-52	HIGH RD	84
MHSA-54 --> MHSA-53	Direction of flow	MHSA-54 MHSA-53	HIGH RD	86
MHSA-55.. --> MHSA-54..	Direction of flow	MHSA-55.. MHSA-54..	HIGH RD	88

33 items

Road	Pipe	Start/End	Inspection direction	Page
EARL ARMSTRONG	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	19
EARL ARMSTRONG	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	22
EARL ARMSTRONG	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	24
EARL ARMSTRONG	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	27
EARL ARMSTRONG	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	29
EARL ARMSTRONG	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	31
EARL ARMSTRONG	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	33
EARL ARMSTRONG	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	35
EARL ARMSTRONG	MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	37
EARL ARMSTRONG	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	39
EARL ARMSTRONG	MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	41
EARL ARMSTRONG	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	43
EARL ARMSTRONG	MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	45
EARL ARMSTRONG	MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	47
EARL ARMSTRONG	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	49
EARL ARMSTRONG	MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	52
EARL ARMSTRONG	MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	54
EARL ARMSTRONG	MHSA-42 MHSA-41	MHSA-42 --> MHSA-41	Direction of flow	56
EARL ARMSTRONG	MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	58
EARL ARMSTRONG	MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	60
EARL ARMSTRONG	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	62
EARL ARMSTRONG	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	64
EARL ARMSTRONG	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	66
EARL ARMSTRONG	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	69
EARL ARMSTRONG	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	71
HIGH RD	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	73
HIGH RD	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	75
HIGH RD	MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	78
HIGH RD	MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	80
HIGH RD	MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	82
HIGH RD	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	84
HIGH RD	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	86
HIGH RD	MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	88

33 items

1 - Acceptable structural condition (33 of 33 items)

Total	Peak	Pipe	Start/End	Direction	Road	Page
0	0	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	19
0	0	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG	22
0	0	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	24
0	0	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG	27
0	0	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG	29
0	0	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG	31
0	0	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG	33
0	0	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG	35
0	0	MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	EARL ARMSTRONG	37
0	0	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG	39
0	0	MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	EARL ARMSTRONG	41
0	0	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG	43
0	0	MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	EARL ARMSTRONG	45
0	0	MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	EARL ARMSTRONG	47
0	0	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	49
0	0	MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	EARL ARMSTRONG	52
0	0	MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	EARL ARMSTRONG	54
0	0	MHSA-42 MHSA-41	MHSA-42 --> MHSA-41	Direction of flow	EARL ARMSTRONG	56
0	0	MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	EARL ARMSTRONG	58
0	0	MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	EARL ARMSTRONG	60
0	0	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG	62
0	0	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG	64
0	0	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	66
0	0	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG	69
0	0	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG	71
0	0	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD	73
0	0	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	75
0	0	MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	HIGH RD	78
0	0	MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	HIGH RD	80
0	0	MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	HIGH RD	82
0	0	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD	84
0	0	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD	86
0	0	MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	HIGH RD	88

33 items

Grade: 3 (20 of 33 items)

Total	Peak	ICG	Pipe	Start/End	Direction	Road	Page
12	2	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	49
8	2	1	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG	31
8	2	1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	66
7	2	1	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	19
4	2	1	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG	22
4	2	1	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	24
4	2	1	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG	29
4	2	1	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG	33
4	2	1	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG	64
4	2	1	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG	71
4	2	1	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD	73
4	2	1	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	75
4	2	1	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD	84
2	2	1	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG	27
2	2	1	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG	35
2	2	1	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG	39
2	2	1	MHSA-42 MHSA-41	MHSA-42 --> MHSA-41	Direction of flow	EARL ARMSTRONG	56
2	2	1	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG	62
2	2	1	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG	69
2	2	1	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD	86

Grade: 1 (13 of 33 items)

Total	Peak	ICG	Pipe	Start/End	Direction	Road	Page
0	0	1	MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	EARL ARMSTRONG	37
0	0	1	MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	EARL ARMSTRONG	41
0	0	1	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG	43
0	0	1	MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	EARL ARMSTRONG	45
0	0	1	MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	EARL ARMSTRONG	47
0	0	1	MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	EARL ARMSTRONG	52
0	0	1	MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	EARL ARMSTRONG	54
0	0	1	MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	EARL ARMSTRONG	58
0	0	1	MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	EARL ARMSTRONG	60
0	0	1	MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	HIGH RD	78
0	0	1	MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	HIGH RD	80
0	0	1	MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	HIGH RD	82
0	0	1	MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	HIGH RD	88







80 items

DE - Debris (non-silt / grease) (1 of 80 items)

%	Qty	OPG	ICG	Pipe	Start/End	Direction	Road	Picture	Page
5	1	3	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	50	49

DEG - Debris grease (33 of 80 items)

%	Qty	OPG	ICG	Pipe	Start/End	Direction	Road	Picture	Page
15	1	3	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	51	49
5	1	3	1	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	20	19
5	1	3	1	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG	23	22
5	1	3	1	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG	23	22
5	1	3	1	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	25	24
5	1	3	1	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	25	24
5	1	3	1	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG	30	29
5	1	3	1	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG	32	31
5	1	3	1	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG	32	31
5	1	3	1	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG	34	33
5	1	3	1	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG	34	33
5	1	3	1	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG	36	35
5	1	3	1	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG	40	39
5	1	3	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	50	49
5	1	3	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	50	49
5	1	3	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	50	49
5	1	3	1	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG	63	62
5	1	3	1	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG	65	64
5	1	3	1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	67	66
5	1	3	1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	67	66
5	1	3	1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	67	66
5	1	3	1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	68	66
5	1	3	1	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG	72	71
5	1	3	1	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG	72	71
5	1	3	1	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD	74	73
5	1	3	1	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD	74	73
5	1	3	1	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	76	75
5	1	3	1	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	76	75
5	1	3	1	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD	85	84
5	1	3	1	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD	85	84
5	1	3	1	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD	87	86
0	1	3	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG		49
0	1	3	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	51	49

DES - Debris silt (9 of 80 items)

%	Qty	OPG	ICG	Pipe	Start/End	Direction	Road	Picture	Page
15	1	3	1	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG	32	31
10	1	3	1	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	20	19
10	1	3	1	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG	28	27
5	1	3	1	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	20	19
5	1	3	1	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG	30	29
5	1	3	1	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG	32	31
5	1	3	1	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG	65	64
5	1	3	1	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG	70	69
0	1	3	1	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	20	19

WL - Water level (37 of 80 items)

%	Qty	OPG	ICG	Pipe	Start/End	Direction	Road	Picture	Page
15	1	3	1	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	76	75
10	1	3	1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	67	66
10	1	3	1	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG	72	71
10	1	3	1	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	76	75
10		3	1	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG		31

WL - Water level (37 of 80 items)

%	Qty	OPG	ICG	Pipe	Start/End	Direction	Road	Picture	Page
10		1	1	MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	EARL ARMSTRONG		52
10		3	1	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG		64
5	1	3	1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	68	66
5		3	1	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG		19
5		3	1	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG		22
5		3	1	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG		24
5		3	1	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG		27
5		3	1	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG		29
5		3	1	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG		33
5		3	1	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG		35
5		1	1	MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	EARL ARMSTRONG		37
5		3	1	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG		39
5		1	1	MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	EARL ARMSTRONG		41
5		1	1	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG		43
5		1	1	MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	EARL ARMSTRONG		45
5		1	1	MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	EARL ARMSTRONG		47
5		3	1	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG		49
5		1	1	MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	EARL ARMSTRONG		54
5		1	1	MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	EARL ARMSTRONG		58
5		1	1	MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	EARL ARMSTRONG		60
5		3	1	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG		62
5		3	1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG		66
5		3	1	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG		69
5		3	1	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG		71
5		3	1	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD		73
5		3	1	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD		75
5		1	1	MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	HIGH RD		78
5		1	1	MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	HIGH RD		80
5		1	1	MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	HIGH RD		82
5		3	1	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD		84
5		3	1	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD		86
5		1	1	MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	HIGH RD		88

59 items

MH - Manhole / node (59 of 59 items)

Qty	Pipe	Start/End	Direction	Road	Picture	Page
	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG		19
	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	20	19
	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG	23	22
	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG		22
	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	25	24
	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG		24
	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG		27
	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG		29
	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG		31
	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG	34	33
	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG		33
	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG		35
	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG	36	35
	MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	EARL ARMSTRONG		37
	MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	EARL ARMSTRONG	38	37
	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG		39
	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG	40	39
	MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	EARL ARMSTRONG		41
	MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	EARL ARMSTRONG	42	41
	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG		43
	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG	44	43
	MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	EARL ARMSTRONG		45
	MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	EARL ARMSTRONG	46	45
	MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	EARL ARMSTRONG	48	47
	MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	EARL ARMSTRONG		47
	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	51	49
	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG		49
	MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	EARL ARMSTRONG	53	52
	MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	EARL ARMSTRONG		52
	MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	EARL ARMSTRONG	55	54
	MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	EARL ARMSTRONG		54
	MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	EARL ARMSTRONG		58
	MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	EARL ARMSTRONG		60
	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG		62
	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG	63	62
	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG	65	64
	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG		64
	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	68	66
	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG		66
	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG		69
	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG	70	69
	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG	72	71
	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG		71
	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD		73
	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD	74	73
	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	76	75
	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD		75
	MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	HIGH RD	79	78
	MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	HIGH RD		78
	MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	HIGH RD	81	80
	MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	HIGH RD		80
	MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	HIGH RD		82
	MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	HIGH RD	83	82
	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD	85	84
	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD		84
	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD	87	86
	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD		86
	MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	HIGH RD		88

MH - Manhole / node (59 of 59 items)

Qty	Pipe	Start/End	Direction	Road	Picture	Page
	MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	HIGH RD	89	88

72 items

FH - Finish of Survey (27 of 72 items)

Qty	Pipe	Start/End	Direction	Road	Picture	Page
	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG	21	19
	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG	23	22
	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	26	24
	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG	34	33
	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG	36	35
	MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	EARL ARMSTRONG	38	37
	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG	40	39
	MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	EARL ARMSTRONG	42	41
	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG	44	43
	MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	EARL ARMSTRONG	46	45
	MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	EARL ARMSTRONG	48	47
	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG	51	49
	MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	EARL ARMSTRONG	53	52
	MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	EARL ARMSTRONG	55	54
	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG	63	62
	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG	65	64
	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	68	66
	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG	70	69
	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG	72	71
	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD	74	73
	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD	77	75
	MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	HIGH RD	79	78
	MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	HIGH RD	81	80
	MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	HIGH RD	83	82
	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD	85	84
	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD	87	86
	MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	HIGH RD	89	88

GO - General observation at this point (8 of 72 items)

Qty	Pipe	Start/End	Direction	Road	Picture	Page
1	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	25	24
1	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG	25	24
1	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG	28	27
1	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG	30	29
1	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG	44	43
1	MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	EARL ARMSTRONG	59	58
1	MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	EARL ARMSTRONG	61	60
1	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG	67	66

SA - Survey abandoned (5 of 72 items)

Qty	Pipe	Start/End	Direction	Road	Picture	Page
	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG	28	27
	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG	30	29
	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG	32	31
	MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	EARL ARMSTRONG	59	58
	MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	EARL ARMSTRONG	61	60

ST - Start of Survey (32 of 72 items)

Qty	Pipe	Start/End	Direction	Road	Picture	Page
	MHSA-.42 MHSA-.41	MHSA-.42 --> MHSA-.41	Direction of flow	EARL ARMSTRONG		19
	MHSA-28 MHSA-29	MHSA-28 --> MHSA-29	Against flow	EARL ARMSTRONG		22
	MHSA-28A MHSA-28	MHSA-28A --> MHSA-28	Against flow	EARL ARMSTRONG		24
	MHSA-28A NORTH	MHSA-28A --> NORTH	Direction of flow	EARL ARMSTRONG		27
	MHSA-29 MHSA-30	MHSA-29 --> MHSA-30	Against flow	EARL ARMSTRONG		29
	MHSA-30 MHSA-29	MHSA-30 --> MHSA-29	Direction of flow	EARL ARMSTRONG		31
	MHSA-31 MHSA-30	MHSA-31 --> MHSA-30	Direction of flow	EARL ARMSTRONG		33
	MHSA-32 MHSA-31	MHSA-32 --> MHSA-31	Direction of flow	EARL ARMSTRONG		35

ST - Start of Survey (32 of 72 items)

Qty	Pipe	Start/End	Direction	Road	Picture	Page
	MHSA-33 MHSA-32	MHSA-33 --> MHSA-32	Direction of flow	EARL ARMSTRONG		37
	MHSA-33 MHSA-34	MHSA-33 --> MHSA-34	Against flow	EARL ARMSTRONG		39
	MHSA-35 MHSA-34	MHSA-35 --> MHSA-34	Direction of flow	EARL ARMSTRONG		41
	MHSA-36 MHSA-35	MHSA-36 --> MHSA-35	Direction of flow	EARL ARMSTRONG		43
	MHSA-37. MHSA-36.	MHSA-37. --> MHSA-36.	Direction of flow	EARL ARMSTRONG		45
	MHSA-38 MHSA-37	MHSA-38 --> MHSA-37	Direction of flow	EARL ARMSTRONG		47
	MHSA-39 MHSA-38	MHSA-39 --> MHSA-38	Direction of flow	EARL ARMSTRONG		49
	MHSA-40 MHSA-39	MHSA-40 --> MHSA-39	Direction of flow	EARL ARMSTRONG		52
	MHSA-41 MHSA-40	MHSA-41 --> MHSA-40	Direction of flow	EARL ARMSTRONG		54
	MHSA-42 MHSA-43	MHSA-42 --> MHSA-43	Against flow	EARL ARMSTRONG		58
	MHSA-43 MHSA-42	MHSA-43 --> MHSA-42	Direction of flow	EARL ARMSTRONG		60
	MHSA-44 MHSA-43	MHSA-44 --> MHSA-43	Direction of flow	EARL ARMSTRONG		62
	MHSA-44 MHSA-45	MHSA-44 --> MHSA-45	Against flow	EARL ARMSTRONG		64
	MHSA-45... MHSA-44...	MHSA-44... --> MHSA-45...	Direction of flow	EARL ARMSTRONG		66
	MHSA-46. MHSA-45.	MHSA-46. --> MHSA-45.	Direction of flow	EARL ARMSTRONG		69
	MHSA-47... MHSA-46...	MHSA-47... --> MHSA-46...	Direction of flow	EARL ARMSTRONG		71
	MHSA-48 MHSA-47	MHSA-48 --> MHSA-47	Direction of flow	HIGH RD		73
	MHSA-49 MHSA-48	MHSA-49 --> MHSA-48	Direction of flow	HIGH RD		75
	MHSA-50 MHSA-49	MHSA-50 --> MHSA-49	Direction of flow	HIGH RD		78
	MHSA-51... MHSA-50...	MHSA-51... --> MHSA-50...	Direction of flow	HIGH RD		80
	MHSA-52.. MHSA-51..	MHSA-52.. --> MHSA-51..	Direction of flow	HIGH RD		82
	MHSA-53 MHSA-52	MHSA-53 --> MHSA-52	Direction of flow	HIGH RD		84
	MHSA-54 MHSA-53	MHSA-54 --> MHSA-53	Direction of flow	HIGH RD		86
	MHSA-55.. MHSA-54..	MHSA-55.. --> MHSA-54..	Direction of flow	HIGH RD		88





Pipe identification

Pipe:	MHSA-.42 MHSA-.41	**Direction of inspection:**	MHSA-.42 --> MHSA-.41
Direction of flow:	MHSA-.42 --> MHSA-.41	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	EARL ARMSTRONG	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	119.00
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 9:19 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	119.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 7
Peak: 2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-.42

#3 0.00
WL - Water level, 5%

#4 5.90
DEG - Debris grease, from 5 o'clock to 7 o'clock, 5%



#5 35.70
DES - Debris silt, 10%



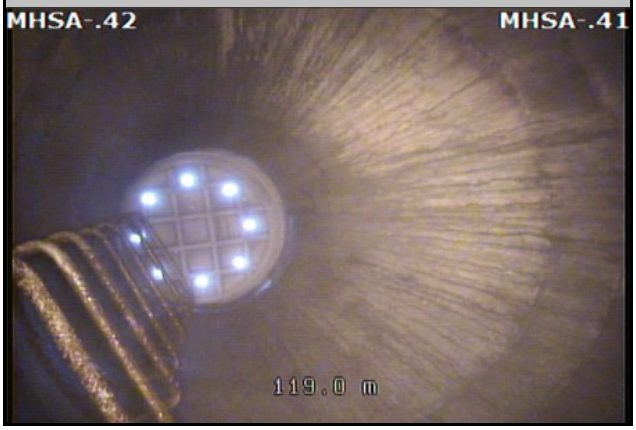
#6 35.70
(S1) DES - Debris silt, 5%



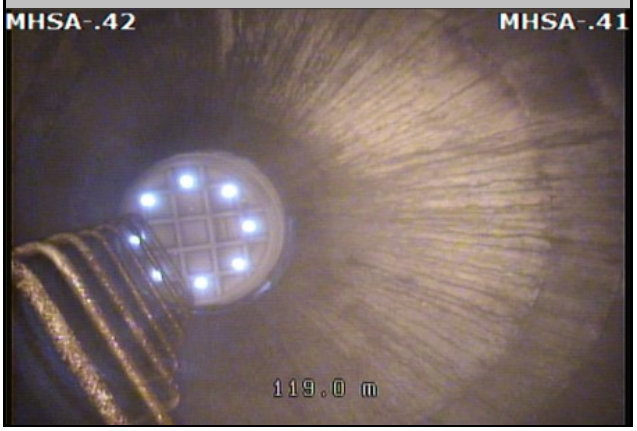
#7 119.00
(F1) DES - Debris silt, 0%



#8 119.00
MH - Manhole / node, MHSA-.41



#9 119.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-28 MHSA-29	**Direction of inspection:**	MHSA-28 --> MHSA-29
Direction of flow:	MHSA-29 --> MHSA-28	**Direction:**	Against flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	S BEND / POOR ACCESS	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	72.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	07/01/2019 12:07 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	72.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 4
Peak: 2

Comments

Other information

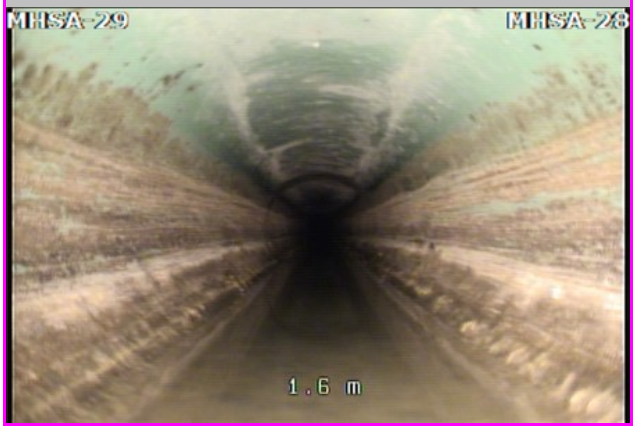
Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

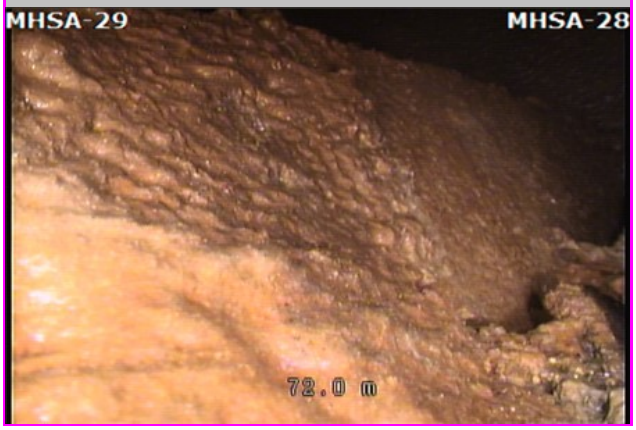
#2 0.00
MH - Manhole / node, MHSA-28

#3 0.00
WL - Water level, 5%

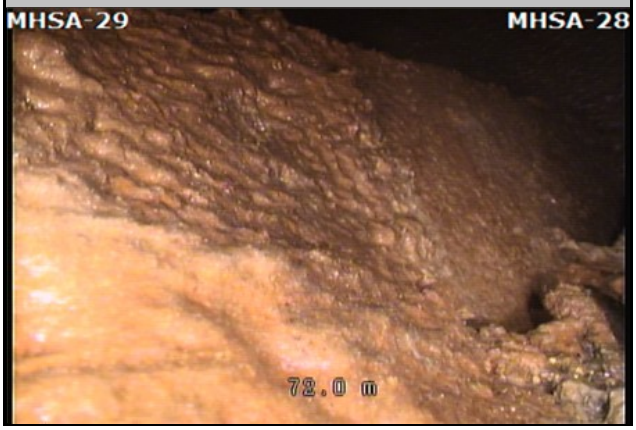
#4 1.60
(S1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



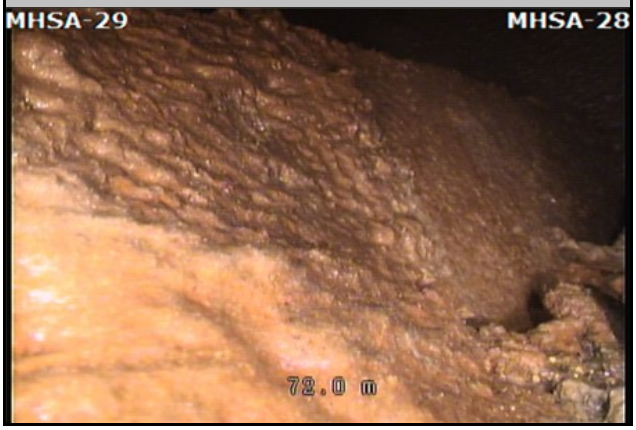
#5 72.00
(F1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#6 72.00
MH - Manhole / node, MHSA-29



#7 72.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-28A MHSA-28	**Direction of inspection:**	MHSA-28A --> MHSA-28
Direction of flow:	MHSA-28 --> MHSA-28A	**Direction:**	Against flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	119.50
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	07/01/2019 11:42 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	119.50
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 4
Peak: 2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-28A

#3 0.00
WL - Water level, 5%

#4 0.00
GO - General observation at this point, at 6 o'clock, drop pipe



#5 3.90
(S1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#6 34.00
GO - General observation at this point, from 1 o'clock to 12 o'clock, bured manhole at 34m to the east of 28



#7 119.50
(F1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#8 119.50
MH - Manhole / node, MHSA-28



#9 119.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-28A NORTH	**Direction of inspection:**	MHSA-28A --> NORTH
Direction of flow:	MHSA-28A --> NORTH	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	2.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	07/01/2019 1:05 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	2.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 2
Peak: 2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

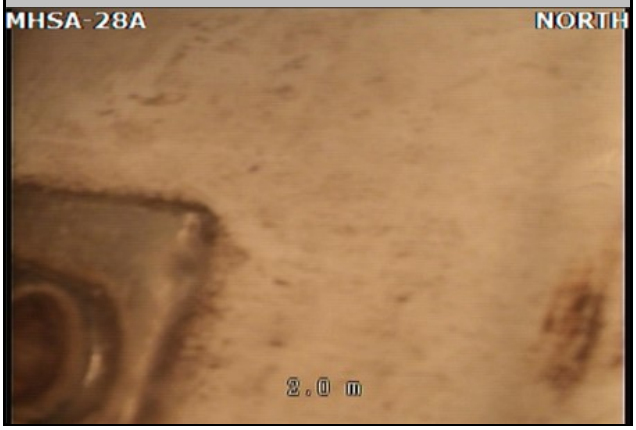
#2 0.00
MH - Manhole / node, MHSA-28A

#3 0.00
WL - Water level, 5%

#4 0.00
DES - Debris silt, 10%



#5 2.00
GO - General observation at this point, PASS SCOPE OF WORK



#6 2.00
SA - Survey abandoned, PASS SCOPE OF WORK



Pipe identification

Pipe:	MHSA-29 MHSA-30	**Direction of inspection:**	MHSA-29 --> MHSA-30
Direction of flow:	MHSA-30 --> MHSA-29	**Direction:**	Against flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	3.80
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	07/01/2019 12:31 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	3.80
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade:	1
Total:	0
Peak:	0

Operational Performance

Grade:	3
Total:	4
Peak:	2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-29

#3 0.00
WL - Water level, 5%

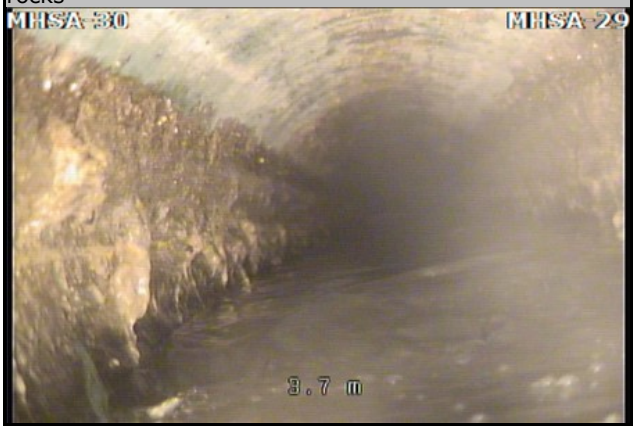
#4 2.70
(S1) DEG - Debris grease, from 1 o'clock to 11 o'clock, 5%



#5 3.00
DES - Debris silt, 5%



#6 3.70
GO - General observation at this point,
from 4 o'clock to 8 o'clock, robot stop by drbris amd rocks



#7 3.80
SA - Survey abandoned, reversal not complete due to debris of rocks



Pipe identification

Pipe:	MHSA-30 MHSA-29	**Direction of inspection:**	MHSA-30 --> MHSA-29
Direction of flow:	MHSA-30 --> MHSA-29	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	12/12/2018 9:32 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	95.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 8
Peak: 2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

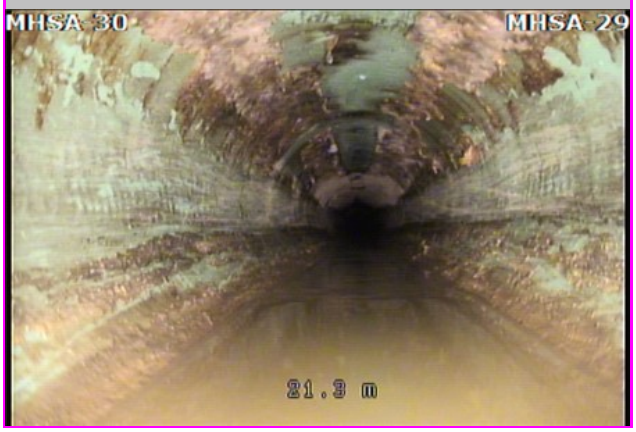
#2 0.00
MH - Manhole / node, MHSA-30

#3 0.00
WL - Water level, 10%

#4 1.20
DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



#5 21.30
DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



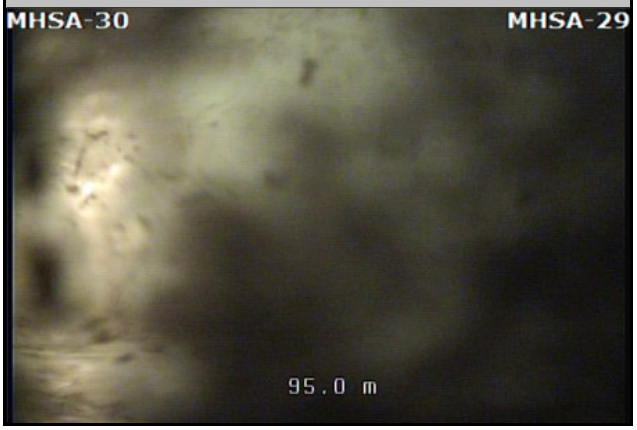
#6 48.90
DES - Debris silt, 5%, debris underwater



#7 95.00
DES - Debris silt, 15%, debris underwater block robot.



#8 95.00
SA - Survey abandoned, debris underwater block robot.



Pipe identification

Pipe:	MHSA-31 MHSA-30	**Direction of inspection:**	MHSA-31 --> MHSA-30
Direction of flow:	MHSA-31 --> MHSA-30	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.50
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	12/12/2018 9:18 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.50
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 4
Peak: 2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-31

#3 0.00
WL - Water level, 5%

#4 1.60
(S1) DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



#5 118.50
(F1) DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



#6 118.50
MH - Manhole / node, MHSA-30



#7 118.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-32 MHSA-31	**Direction of inspection:**	MHSA-32 --> MHSA-31
Direction of flow:	MHSA-32 --> MHSA-31	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	EARL ARMSTRONG	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	119.50
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 2:54 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	119.50
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 2
Peak: 2

Comments

Other information

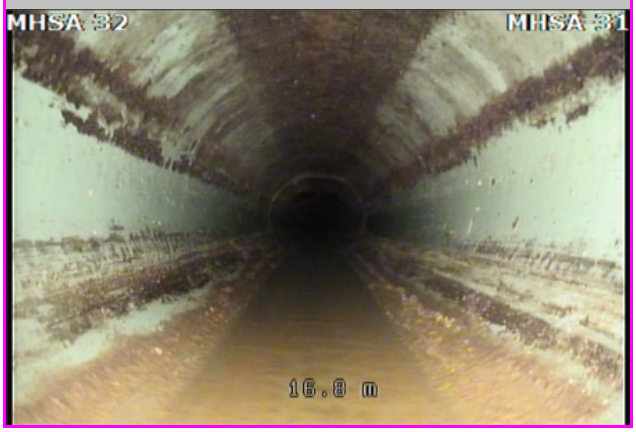
Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-32

#3 0.00
WL - Water level, 5%

#4 16.80
DEG - Debris grease, from 1 o'clock to 12 o'clock, 5%



#5 119.50
MH - Manhole / node, MHSA-31



#6 119.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-33 MHSA-32	**Direction of inspection:**	MHSA-33 --> MHSA-32
Direction of flow:	MHSA-33 --> MHSA-32	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	1ST MH WEST OF BOWESVILLE	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 2:36 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

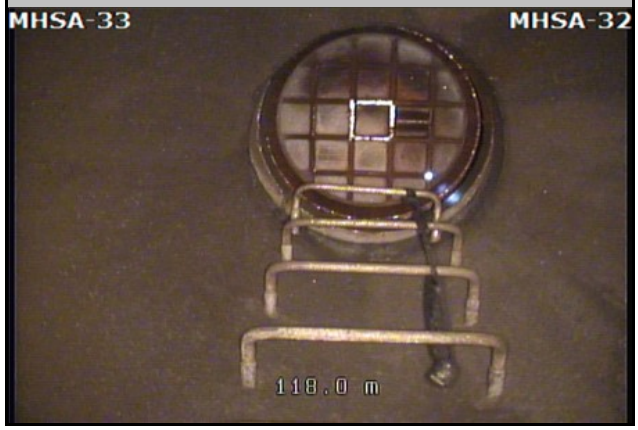
Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-33

#3 0.00
WL - Water level, 5%

#4 118.00
MH - Manhole / node, MHSA-32



#5 118.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-33 MHSA-34	**Direction of inspection:**	MHSA-33 --> MHSA-34
Direction of flow:	MHSA-34 --> MHSA-33	**Direction:**	Against flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	1ST MH WEST OF BOWESVILLE	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	119.00
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 2:09 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	119.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 2
Peak: 2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-33

#3 0.00
WL - Water level, 5%

#4 106.10
(S1) DEG - Debris grease, from 5 o'clock to 7 o'clock, 5%



#5 119.00
MH - Manhole / node, MHSA-34



#6 119.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-35 MHSA-34	**Direction of inspection:**	MHSA-35 --> MHSA-34
Direction of flow:	MHSA-35 --> MHSA-34	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	BOWESVILLE	**Area:**	
Location:	Main road - Urban	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	52.00
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 1:24 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	52.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

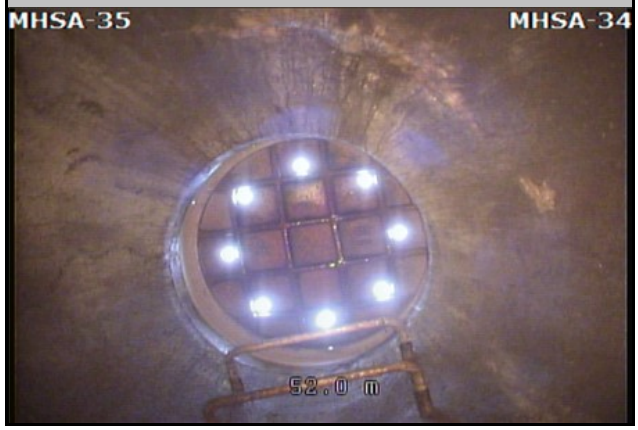
Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

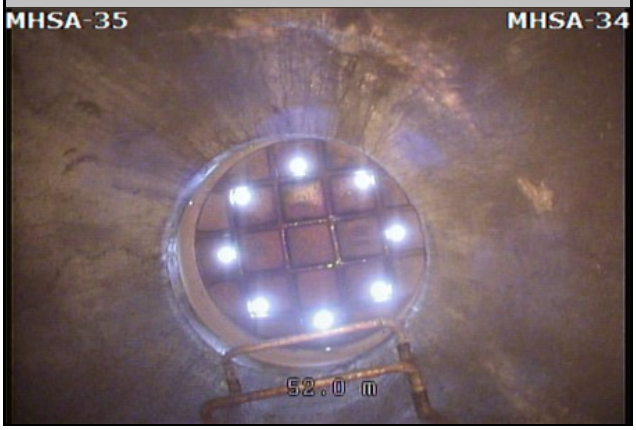
#2 0.00
MH - Manhole / node, MHSA-35

#3 0.00
WL - Water level, 5%

#4 52.00
MH - Manhole / node, MHSA-34



#5 52.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-36 MHSA-35	**Direction of inspection:**	MHSA-36 --> MHSA-35
Direction of flow:	MHSA-36 --> MHSA-35	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	EARL ARMSTRONG	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.50
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 1:04 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.50
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

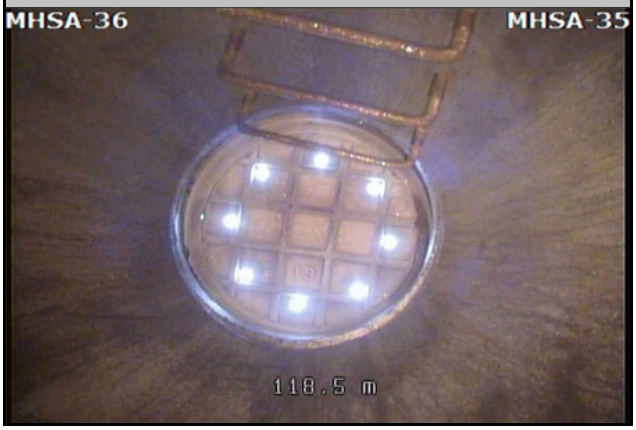
#2 0.00
MH - Manhole / node, MHSA-36

#3 0.00
WL - Water level, 5%

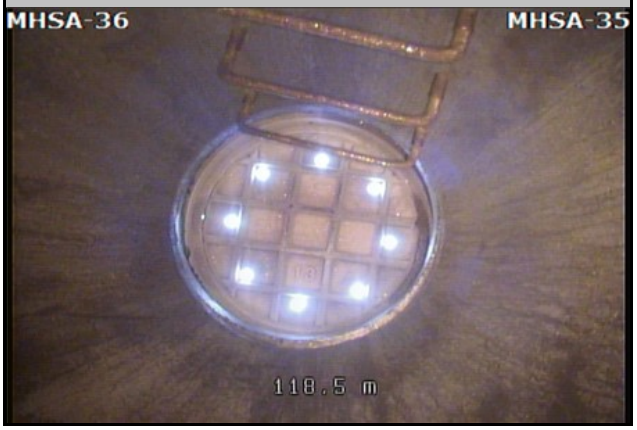
#4 118.50
GO - General observation at this point, from 1 o'clock to 12 o'clock, MHSA-35 IS AT BOWESVILLE



#5 118.50
MH - Manhole / node, MHSA-35



#6 118.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-37. MHSA-36.	**Direction of inspection:**	MHSA-37. --> MHSA-36.
Direction of flow:	MHSA-37. --> MHSA-36.	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	119.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	12/12/2018 10:55 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	119.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade:	1
Total:	0
Peak:	0

Operational Performance

Grade:	1
Total:	0
Peak:	0

Comments

Other information

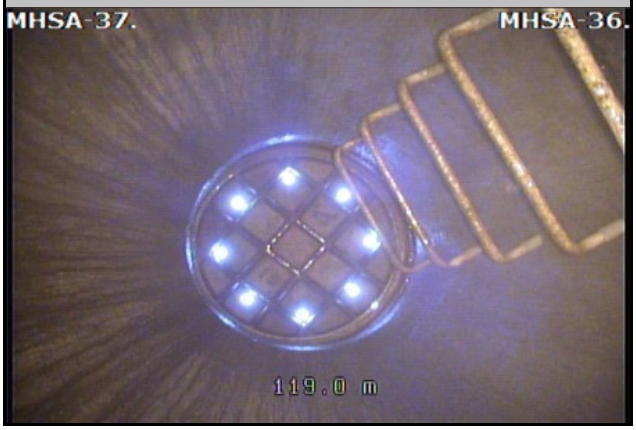
Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

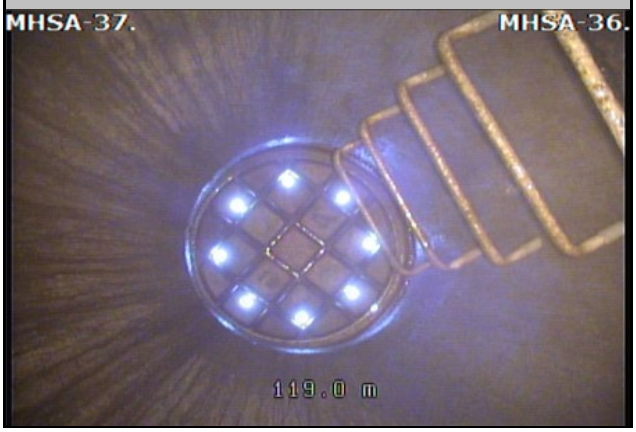
#2 0.00
MH - Manhole / node, MHSA-37.

#3 0.00
WL - Water level, 5%

#4 119.00
MH - Manhole / node, MHSA-36.



#5 119.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-38 MHSA-37	**Direction of inspection:**	MHSA-38 --> MHSA-37
Direction of flow:	MHSA-38 --> MHSA-37	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	EARL ARMSTRONG	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 11:47 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-38

#3 0.00
WL - Water level, 5%

#4 118.00
MH - Manhole / node, MHSA-37



#5 118.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-39 MHSA-38	**Direction of inspection:**	MHSA-39 --> MHSA-38
Direction of flow:	MHSA-39 --> MHSA-38	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	2220 EARL ARMSTRONG	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 11:25 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 12
Peak: 2

Comments

Other information

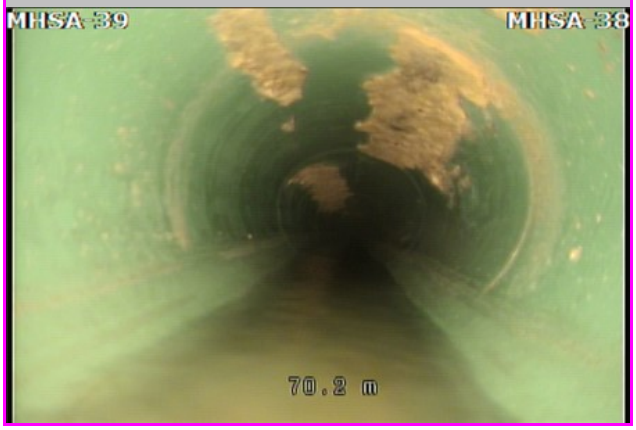
Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-39

#3 0.00
WL - Water level, 5%

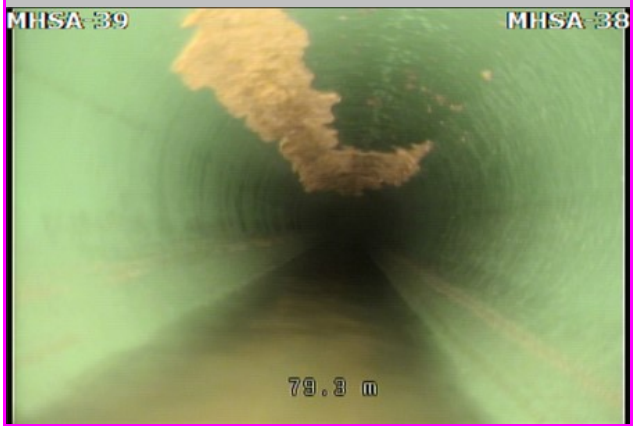
#4 70.20
DE - Debris (non-silt / grease), 5%



#5 73.20
DEG - Debris grease, from 11 o'clock to 12 o'clock, 5%



#6 79.30
(S1) DEG - Debris grease, from 11 o'clock to 1 o'clock, 5%



#7 82.00
(F1) DEG - Debris grease, from 11 o'clock to 1 o'clock, 0%

#8 87.00
(S2) DEG - Debris grease, from 11 o'clock to 1 o'clock, 5%



#9 98.90
DEG - Debris grease, from 3 o'clock to 5 o'clock, 15%



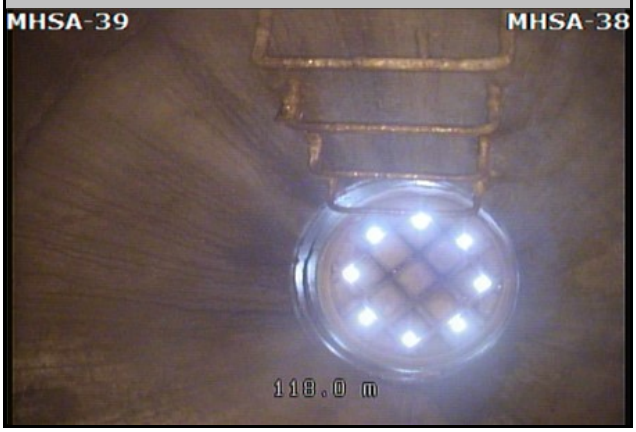
#10 118.00
(F2) DEG - Debris grease, from 11 o'clock to 1 o'clock, 0%



#11 118.00
MH - Manhole / node, MHSA-38



#12 118.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-40 MHSA-39	**Direction of inspection:**	MHSA-40 --> MHSA-39
Direction of flow:	MHSA-40 --> MHSA-39	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	EARL ARMSTRONG	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.50
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 10:50 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.50
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

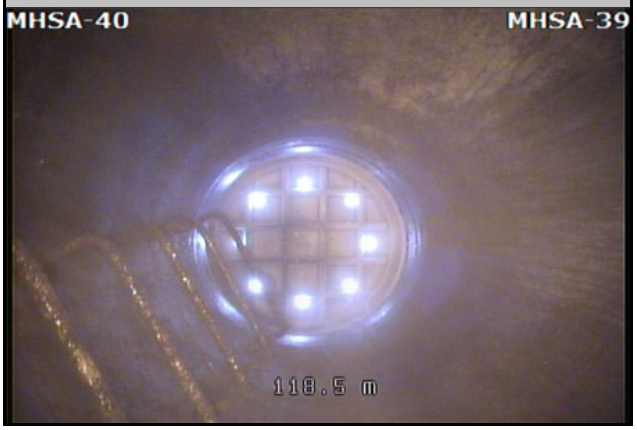
Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

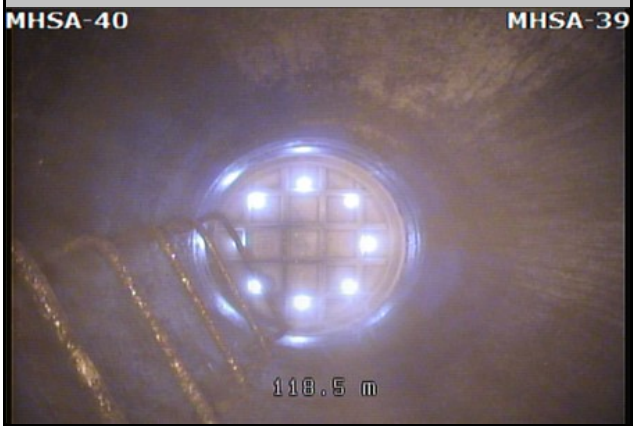
#2 0.00
MH - Manhole / node, MHSA-40

#3 0.00
WL - Water level, 10%

#4 118.50
MH - Manhole / node, MHSA-39



#5 118.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-41 MHSA-40	**Direction of inspection:**	MHSA-41 --> MHSA-40
Direction of flow:	MHSA-41 --> MHSA-40	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	AT BICYCLE PATH	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.50
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	11/12/2018 10:29 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.50
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

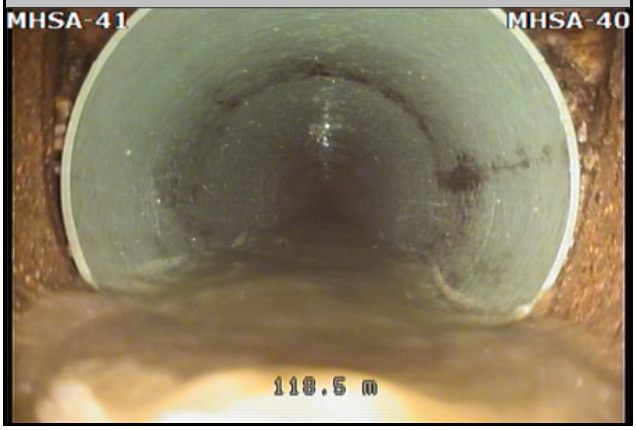
Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

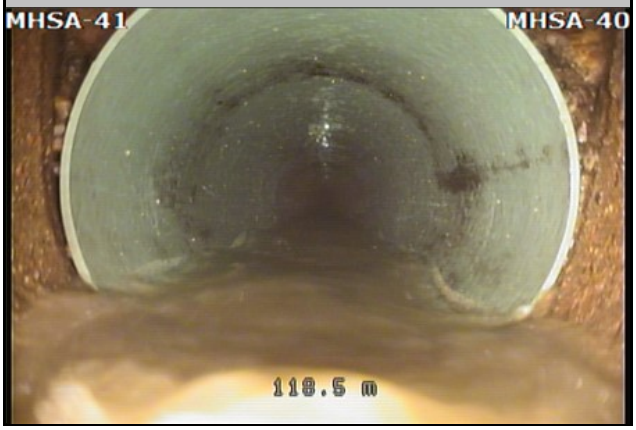
#2 0.00
MH - Manhole / node, MHSA-41

#3 0.00
WL - Water level, 5%

#4 118.50
MH - Manhole / node, MHSA-40



#5 118.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-42 MHSA-41	**Direction of inspection:**	MHSA-42 --> MHSA-41
Direction of flow:	MHSA-42 --> MHSA-41	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	06/12/2018 11:01 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	18.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 2
Peak: 2

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1

Pipe identification

Pipe:	MHSA-42 MHSA-43	**Direction of inspection:**	MHSA-42 --> MHSA-43
Direction of flow:	MHSA-43 --> MHSA-42	**Direction:**	Against flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:	HIGH RD	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	120.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	06/12/2018 10:45 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	16.10
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-42

#3 0.00
WL - Water level, 5%

#4 16.10
GO - General observation at this point, reversal overlap



#5 16.10
SA - Survey abandoned, reversal complete



Pipe identification

Pipe:	MHSA-43 MHSA-42	**Direction of inspection:**	MHSA-43 --> MHSA-42
Direction of flow:	MHSA-43 --> MHSA-42	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	120.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	06/12/2018 8:32 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	106.40
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-43

#3 0.00
WL - Water level, 5%

#4 106.40
SA - Survey abandoned, track spining on grease



#5 106.90
GO - General observation at this point,
from 5 o'clock to 7 o'clock, track spining on grease



Pipe identification

Pipe:	MHSA-44 MHSA-43	**Direction of inspection:**	MHSA-44 --> MHSA-43
Direction of flow:	MHSA-44 --> MHSA-43	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	119.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	05/12/2018 11:41 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	119.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 2
Peak: 2

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-44

#3 0.00
WL - Water level, 5%

#4 65.10
(S1) DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



#5 119.00
MH - Manhole / node, MHSA-43



#6 119.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-44 MHSA-45	**Direction of inspection:**	MHSA-44 --> MHSA-45
Direction of flow:	MHSA-45 --> MHSA-44	**Direction:**	Against flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	05/12/2018 11:44 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 4
Peak: 2

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

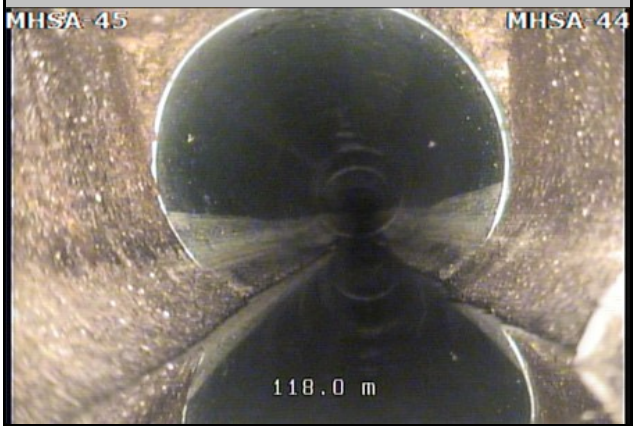
#2 0.00
MH - Manhole / node, MHSA-44

#3 0.00
WL - Water level, 10%

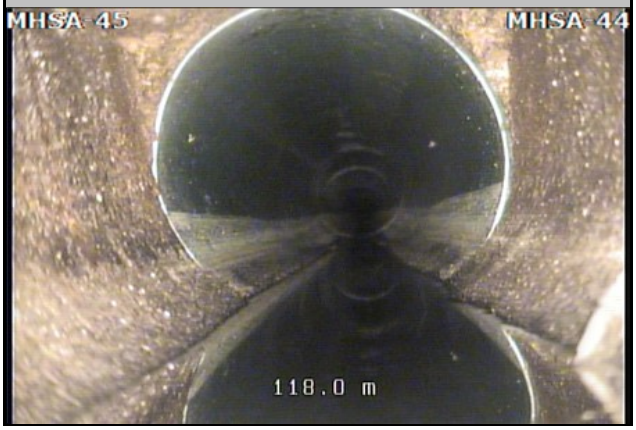
#4 2.30
(S1) DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



#5 118.00
MH - Manhole / node, MHSA-45



#6 118.00
FH - Finish of Survey



#7 120.60
DES - Debris silt, 5%



Pipe identification

Pipe:	MHSA-45... MHSA-44...	**Direction of inspection:**	MHSA-44... --> MHSA-45...
Direction of flow:	MHSA-44... --> MHSA-45...	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.50
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	31/01/2019 1:54 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.50
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 8
Peak: 2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-44...

#3 0.00
WL - Water level, 5%

#4 0.00
(S1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#5 0.00
GO - General observation at this point, manhole cover no access



#6 0.00
WL - Water level, 10%



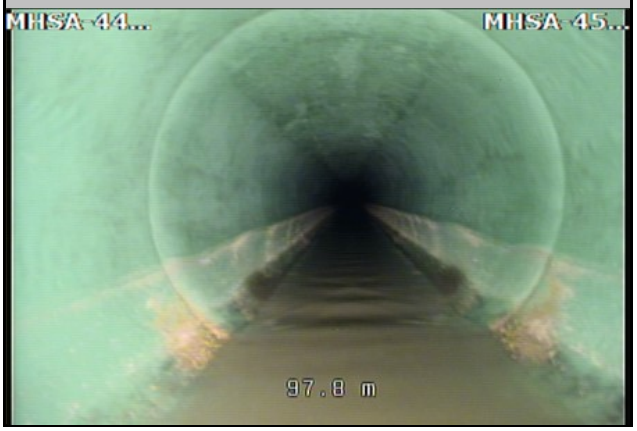
#7 62.00
(S2) DEG - Debris grease, at 12 o'clock, 5%



#8 63.20
(F2) DEG - Debris grease, at 12 o'clock, 5%



#9 97.90
WL - Water level, 5%



#10 118.50
(F1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#11 118.50
MH - Manhole / node, MHSA-45...



#12 118.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-46. MHSA-45.	**Direction of inspection:**	MHSA-46. --> MHSA-45.
Direction of flow:	MHSA-46. --> MHSA-45.	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	77.50
Lining:		**Pipe unit length:**	NA
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	05/12/2018 2:56 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	77.50
Contractor project #:	OTTAWA	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Snow		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 2
Peak: 2

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-46.

#3 0.00
WL - Water level, 5%

#4 13.20
DES - Debris silt, 5%, ROCK



#5 77.50
MH - Manhole / node, MHSA-45.



#6 77.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-47... MHSA-46...	**Direction of inspection:**	MHSA-47... --> MHSA-46...
Direction of flow:	MHSA-47... --> MHSA-46...	**Direction:**	Direction of flow

Pipe location

Road:	EARL ARMSTRONG	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	109.50
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	31/01/2019 12:41 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	109.50
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 4
Peak: 2

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-47...

#3 0.00
WL - Water level, 5%

#4 1.50
(S1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#5 68.00
WL - Water level, 10%



#6 109.50
(F1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#7 109.50
MH - Manhole / node, MHSA-46...



#8 109.50
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-48 MHSA-47	**Direction of inspection:**	MHSA-48 --> MHSA-47
Direction of flow:	MHSA-48 --> MHSA-47	**Direction:**	Direction of flow

Pipe location

Road:	HIGH RD	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	30/11/2018 12:03 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 4
Peak: 2

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-48

#3 0.00
WL - Water level, 5%

#4 2.90
(S1) DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



#5 118.00
MH - Manhole / node, MHSA-47



#6 118.00
FH - Finish of Survey



#7 118.30
(F1) DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



Pipe identification

Pipe:	MHSA-49 MHSA-48	**Direction of inspection:**	MHSA-49 --> MHSA-48
Direction of flow:	MHSA-49 --> MHSA-48	**Direction:**	Direction of flow

Pipe location

Road:	HIGH RD	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	30/11/2018 11:47 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 4
Peak: 2

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-49

#3 0.00
WL - Water level, 5%

#4 5.50
WL - Water level, 15%



#5 10.00
WL - Water level, 10%



#6 74.10
(S1) DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



#7 118.00
(F1) DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%



#8 118.00
MH - Manhole / node, MHSA-48



#9 118.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-50 MHSA-49	**Direction of inspection:**	MHSA-50 --> MHSA-49
Direction of flow:	MHSA-50 --> MHSA-49	**Direction:**	Direction of flow

Pipe location

Road:	HIGH RD	**City:**	Template
Crossroad:		**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	119.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	30/11/2018 11:22 AM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	119.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-50

#3 0.00
WL - Water level, 5%

#4 119.00
MH - Manhole / node, MHSA-49



#5 119.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-51... MHSA-50...	**Direction of inspection:**	MHSA-51... --> MHSA-50...
Direction of flow:	MHSA-51... --> MHSA-50...	**Direction:**	Direction of flow

Pipe location

Road:	HIGH RD	**City:**	Template
Crossroad:	HIGH RD	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	119.00
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	10/01/2019 2:33 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	119.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	DT		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-51...

#3 0.00
WL - Water level, 5%

#4 119.00
MH - Manhole / node, MHSA-50...



#5 119.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-52.. MHSA-51..	**Direction of inspection:**	MHSA-52.. --> MHSA-51..
Direction of flow:	MHSA-52.. --> MHSA-51..	**Direction:**	Direction of flow

Pipe location

Road:	HIGH RD	**City:**	Template
Crossroad:	HIGH RD	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.10
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	10/01/2019 2:07 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.10
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	DT		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-52..

#3 0.00
WL - Water level, 5%

#4 118.10
MH - Manhole / node, MHSA-51..



#5 118.10
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-53 MHSA-52	**Direction of inspection:**	MHSA-53 --> MHSA-52
Direction of flow:	MHSA-53 --> MHSA-52	**Direction:**	Direction of flow

Pipe location

Road:	HIGH RD	**City:**	Template
Crossroad:	EARL ARMSTRONG	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	26/11/2018 2:41 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Rain		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 4
Peak: 2

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-53

#3 0.00
WL - Water level, 5%

#4 107.70
(S1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#5 118.00
MH - Manhole / node, MHSA-52



#6 118.00
FH - Finish of Survey



#7 118.80
(F1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



Pipe identification

Pipe:	MHSA-54 MHSA-53	**Direction of inspection:**	MHSA-54 --> MHSA-53
Direction of flow:	MHSA-54 --> MHSA-53	**Direction:**	Direction of flow

Pipe location

Road:	HIGH RD	**City:**	Template
Crossroad:	EARL ARMSTRONG	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	95.00
Lining:		**Pipe unit length:**	2.80
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	26/11/2018 2:06 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	95.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Light Rain		
Operator:	RS		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 3
Total: 2
Peak: 2

Comments

Other information

Other 1:	45-5019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-54

#3 0.00
WL - Water level, 5%

#4 6.40
(S1) DEG - Debris grease, from 4 o'clock to 8 o'clock, 5%



#5 95.00
MH - Manhole / node, MHSA-53



#6 95.00
FH - Finish of Survey



Pipe identification

Pipe:	MHSA-55.. MHSA-54..	**Direction of inspection:**	MHSA-55.. --> MHSA-54..
Direction of flow:	MHSA-55.. --> MHSA-54..	**Direction:**	Direction of flow

Pipe location

Road:	HIGH RD	**City:**	Template
Crossroad:	ALBION RD	**Area:**	
Location:	Main road - Suburban/Rural	**Road segment:**	

Pipe characteristics

Category:	Sanitary	**Size:**	250
Shape:	Circular	**Width:**	
Material:	Polyvinyl chloride	**Total length:**	118.00
Lining:		**Pipe unit length:**	4.00
Type:	Main	**Year laid:**	
Invert (upstream):		**Invert (downstream):**	
Depth (upstream):		**Depth (downstream):**	
Cover level (upstream):		**Cover level (downstream):**	

Additional details

Date:	10/01/2019 12:21 PM	**Survey Abandoned:**	
Client project #:	Sanitary Sewer	**Inspected length:**	118.00
Contractor project #:	HARD ROCK CASINO LP	**Pre-cleaning:**	☑
		Blocked flow:	☐
Project type:	Video Inspection	**Regular CCTV:**	☐
Project supplier:		**Reinspect with ZOOM:**	☐
Client:	Hard Rock Ottawa L.P	**Medium #:**	
Purpose:	Assessment of complete remedial or renovation works	**Start position:**	
		End position:	
Weather:	Dry		
Operator:	DT		
Analyst:			

Internal Condition

Grade: 1
Total: 0
Peak: 0

Operational Performance

Grade: 1
Total: 0
Peak: 0

Comments

Other information

Other 1:	455019	**Other 7:**	
Other 2:		**Other 8:**	
Other 3:		**Other 9:**	
Other 4:		**Other 10:**	
Other 5:		**PI5 (MAMR):**	
Other 6:		**PI6 (MAMR):**	

#1 0.00
ST - Start of Survey

#2 0.00
MH - Manhole / node, MHSA-55..

#3 0.00
WL - Water level, 5%

#4 118.00
MH - Manhole / node, MHSA-54..



#5 118.00
FH - Finish of Survey



Appendix C

Storm Servicing Information

RIDEAU CARLETON RACEWAY
STORMWATER DESIGN

Prepared for:
PBK Architects Inc.
6188-555 Richmond Street West
Toronto, ON M5V 3B1

Oliver, Mangione, McCalla & Associates
a division of Trow Consulting Engineers Ltd.

154 Colonnade Road South
Nepean, Ontario K2E 7J5
Telephone: (613) 225-9940
Facsimile: (613) 225-7337

Project No. MP13140A
Date: September 3, 1999

Table of Contents

1.0 Introduction **1**

1.1 Background 1

1.2 Terms of Reference 1

1.3 Background Information 1

2.0 Site Description **2**

2.1 Site Location and Description 2

2.2 Topography and Drainage 2

3.0 Stormwater Management **3**

3.1 Stormwater Management Concerns 3

3.2 Source Controls 3

3.3 End-of -Pipe Facilities 5

4.0 Summary **8**

TABLES

Table 1. Available parking lot storage and sewer release rates 9

Table 2. Available storage volumes 9

APPENDICES

"A" Storm Sewer Calculation Sheet

1.0 Introduction

1.1 Background

The Rideau Carleton Raceway is a harness racing facility located in a rural area within the municipal boundaries of the City of Gloucester, Ontario, about 15 kilometres south of downtown Ottawa. The facility, which was built in 1962, consists of a grandstand, 5/8 mile racetrack, horse barns, offices and associated buildings.

The racetrack is currently undergoing expansion and renovation to accommodate a gaming facility. The following report will address the stormwater aspect of the site.

1.2 Terms of Reference

This report was prepared to investigate current hydrological conditions and to make recommendations to improve conditions considering the proposed expansion. Particular concerns have been expressed regarding potential impacts to the Provincially Classified Class I Leitrim Wetland, the southern boundary of which is located about 500 metres to the north of the facility.

1.3 Background Information

The Leitrim Wetland was included in numerous detail reports prepared for the City of Gloucester by Cumming Cockburn Limited (CCL). Two CCL reports that we have referenced are, *"Planning for Leitrim an Integrated Approach, Volume II Master Drainage Plan, August 1991",* and*, "Leitrim Development Area, Stormwater Management Environmental Study Report and Pre-Design, October 1994.* As part of the report, Golder Associates Limited (GAL) prepared a report entitled, *"Hydrogeological and Geotechnical Considerations Pre-Design of Stormwater Management Works Leitrim Development Area, August 1994".* The design procedure and parameters followed are those outlined in the Ministry of Environment (MOE) publication, *"Stormwater Management Practices Planning and Design Manual"*, June 1994 (SWMP).

2.0 Site Description

2.1 Site Location and Description

The Rideau Carleton Raceway is located at 4837 Albion Road in the City of Gloucester, near the intersections of Albion Road with High and Rideau Roads. The site is approximately 4 kilometres southeast of the Macdonald-Cartier International Airport and about 15 kilometres southeast of downtown Ottawa.

The lands owned by the Raceway extend from Albion Road in the west to Bank Street (Hwy 31) in the east, and occupy an area of approximately 130 hectares.

This report will address only the lands which are being redeveloped. This will be approximately 11.83 hectares of land on the west and south side of the property. This land is presently used as a parking area and includes the existing and proposed building. There is an additional 1.91 hectares in the south west corner that may drain to the pond in the future. Therefore the calculations will be based on a total contributing area of 13.74 hectares.

2.2 Topography and Drainage

The Rideau Carleton Raceway site drains northwards into the Findlay Creek Drain and the Leitrim Wetlands. The Leitrim Wetlands have been classified as a Provincially Significant Wetland. This wetland and the implications of development within the watershed which contains this wetland have been studied in detail in connection with the City of Gloucester Official Plan Amendment No. 10 for the Leitrim Urban Community.

The western part of the raceway property, where the redevelopment will take place, is situated on a ridge of higher land which slopes downward towards the north and east. The higher land to the south and west is at an elevation of 113 to 116 metres above sea level, while the land to the north, which includes the Leitrim Wetlands, is at elevations of 95 to 98 m.a.s.l.

The parking area located to the west of the grandstand building is equipped with a private storm sewer system. Water from this system is conveyed to a large (100 m diameter) pond located in the north end of the infield. Currently, the pond water is used for dust control on the racetrack and as a storage reservoir for fire-fighting purposes.

The dominant surficial feature in the area is a deposit of stratified sand which forms a northwest/southeast trending ridge from Greely in the south to the Macdonald-Cartier Airport in the north. The western portion of the racetrack property is located on the stratified glacial deposit.

3.0 Stormwater Management

3.1 Stormwater Management Concerns

The site has been previously developed without the incorporation of stormwater management practices, therefore, there is the opportunity to improve the quality of runoff from the site.

The studies mentioned earlier provide guidance in setting stormwater management objectives for the further development of the Rideau Carleton Raceway site. The following stormwater management objectives are proposed:

- restrict the rate of post-development runoff for events up to the 1:100 year storm to 1:5 year pre-development levels;
- maximize the infiltration of runoff so as to minimize groundwater impacts;
- apply all feasible source controls to maximize the quality of runoff and minimize the runoff volumes requiring treatment;
- treat all runoff from the site;
- augment low flows in downstream water courses;
- mitigate temperature increase arising at any of the stormwater treatment works; and
- integrate an ongoing operation and maintenance plan into the stormwater treatment works to assure continued performance;

The preceding objectives will require aggressive use of source controls, measures to maximize infiltration, and a treatment facility, which may take the form of a constructed wetland or a wet pond. Detention of runoff in the treatment facility will improve the quality of discharged flows, reduce flow rates and erosion downstream of the site, and augment flows after storm events.

3.2 Source Controls

Source controls recommended for this site include:

- erosion and sediment controls during construction, and
- catch basin restrictors in the storm sewers to detain stormwater on the parking lots.

Control of erosion on construction sites and the removal of sediments from construction site runoff is very important if downstream areas are to be protected. During all construction, erosion and sedimentation will be controlled by the following techniques:

i) Limitation of the extent of exposed soils at any given time.
ii) Revegetation of exposed areas as soon as possible.
iii) Minimization of area to be cleared and grubbed.
iv) Silt fences and check dams.

3.3 Conveyance Controls

Three categories of stormwater conveyance controls are:

- pervious pipe systems,
- pervious catch basins, and
- grassed swales.

The existing site is suitable for all three options. Pervious catch-basins and pervious pipe systems will be used throughout the paved parking lots and road entrances. Grass ditches will be used to convey runoff from the gravel parking areas. The grass swales will eventually discharge to the proposed storm sewer network.

The native soil is very pervious and the water table is well below the ground surface in the area of the parking lots. This makes the parking lot site ideal for infiltration practices. The pervious pipe and catch-basin system will incorporate the following design details:

- pre-treatment using oversized sumps,
- filter fabric,
- clear stone, and
- anti-seepage cut walls.

The total area that drains to the catch basins is approximately 6.47 hectares with an runoff coefficient of approximately 0.70. The perforated catch basins will be designed to infiltrate 5 mm (minimum recommended by the MOE SWMP 1994 Manual) of runoff from the impervious area. The required storage volume for infiltration would be:

6.47 ha. x 5 mm x 0.70 = 226 cubic metres

There are 34 catch basins that will be connected to a dry well. Therefore each dry well must be designed to contain 6.7 cubic metres. SK1 shows the proposed dry well design. Ten (10) infiltration chambers will be required at each catch basin. Runoff from the gravel parking area will sheet flow overland towards a grass swale. Pre-treatment of storm runoff will be provided by a grass side slopes, which will reduce the velocity, remove litter, promote infiltration and remove some of the suspended solids before entering the pond.

Appendix A contains the storm drainage calculation sheet. The pipes have been designed to convey the restricted flow rates . Flow from the building roof enters at manhole 108 located at the front entrance of the gaming facility. An allowance has been made for 20 L/s for the 1.97 hectares of land in the south west corner. This is comparable to the release rates for the proposed paved parking lots. Flow from the north west parking lot has been included as the future controlled rate of 60 L/s (3 restrictors).

The existing 200 mm pipe in front of the Grandstand will be used once it is cleaned and inspected. This sewer may become surcharged during a heavy rainstorm. Therefore it must be tv inspected. The video will show if there are any connections to the sewer. If there are any connections then it must be determined what these connections are and where do the lead. The decision will then be made if surcharging is suitable for this segment of pipe. Surcharging could cause water to exit the catch basin manholes located in front of the grandstand possibly causing some erosion at the base of the track. The storm sewer will be installed at the same time as the sanitary force main unless, as discussed above the sewer is not deemed suitable.

Source controls and conveyance controls in themselves will not provide the entire treatment, therefore, end-of-pipe treatment will be necessary.

3.3 End-Of-Pipe SWM Facility
{tc \l 2 "3.3 End-Of-Pipe SWM Facility"}

The MOEE SWMP Planning and Design Manual categorises nine end-of-pipe SWM facilities as follows:

- wet ponds,
- wetlands,
- dry ponds,
- infiltration basins,
- infiltration trenches,
- filter strips,
- buffer strips,
- sand filters, and
- oil/grit separators.

The facilities recommended for use at the Rideau Carleton Raceway are:

- detention ponds or tanks,
- infiltration trenches,
- infiltration basins,
- wetponds, and
- wetland retention facilities.

The recommended end-of-pipe treatment is a combination wet pond and infiltration trench.

The existing pond will be used as the proposed wet pond. A two phase approach will be used

Phase I

Phase I will use the existing outlet from the pond. The existing outlet must be located and cleaned. A new swale will be excavated in order to connect the outlet to the existing swale. The water level in the pond will be monitored in a stilling well with the information stored on a data logger. If there area more than four (4) pond overflows per year then phase II construction will begin. The criteria is based on the calculations that follow and the design criteria of four overflows allowed for a quality control pond tributary to the Rideau River. The calculations that will follow show that a pond overflow is unlikely.

Phase II

Quality Control

Phase II will consist of a new outlet from the pond and a new grass-lined ditch. The capacity of the existing wet pond will be verified based on the development area being 85 percent impervious. The wet pond will consist of an extended detention portion and a permanent pool. The volume of the extended detention and permanent pool are taken from the Ministry of Environment Stormwater Management Practices, Planning and Design Manual, June 1994, which states 40 m^3/ha for extended detention, and 210 m^3/ha for the permanent pool for a development that is 85 percent impervious, and a receiving stream that requires Level 1 (Ministry of Natural Resources) protection. Examples of Level 1 habitat include spawning, rearing and highly protective feeding areas, and groundwater recharge areas in coldwater streams.

The quality portion of the pond is based upon 12.88 hectares. Runoff from the building roof area does not require treatment therefore is not included in the calculations. The required pond volumes are then:

Permanent Pool:

V = 210 m³/ha x 12.88 ha
= 2,705 m³

Extended Detention:

V = 40 m³/ha x 12.88 ha
= 515 m³

The existing pond bottom is at approximately 103.00 metres with a surface diameter of 71 metres. The water surface elevation is at 104.00 metres with a diameter of 91 metres. Available storage volume is calculated as follows:

- = (1/3) x A x d (A = surface area, d = depth of water)
- = (1/3) x (3959 m^2+6504 m^2+(3959 m^2x6504 m^2)$^{1/2}$ m^2)x 1.00 m)
- = 5179 m^3

The permanent pool in the wet pond is approximately 5179 cubic metres which is more than 2 times the required volume. The extended detention will be designed for a maximum depth of 0.3 metres. This will provide approximately 2,350 cubic metres which is more than 5 times the required volume.

Drawing SWM3 shows the pond details. The pond bottom will be at 103.0 metres. The quality control outlet from the pond will be at 104.00 metres.

The quality control orifice diameter is based on the falling head orifice equation:

$t = 2(A_p)(h_1^{.5} - h_2^{.5})/[CA_0(2g)^{.5}]$(sec)
A_p = 7850 m^2
h_1 = .30 m
h_2 = 0 m
C = 0.60
g = 9.81 m/s^2
A_0 = ☎d^2/4
d = m
t = 2(7850 m^2)(0.30 m)$^{.5}$)/[0.60 x ☎d^2/4 x (2 x 9.81 m/s^2)$^{0.5}$]
= 8599/2.087 d^2 (sec)

A pipe diameter of 175 mm:

t = 37 hrs.

To assist in the removal of debris and to prevent access to the sewers, gratings are proposed for the inlet and outlet control structures.

Quantity Control

The allowable release rate from the 13.74 hectare redevelopment must be restricted to 1:5 year pre-development level. The report *"Planning for Leitrim an Integrated Approach, Volume II Master Drainage Plan, August 1991",* gives the 5 year flow as 4515 L/s for an area of 293 hectares. Pro-rating this value our release rate would be 213 L/s. Quantity control from the pond will be provided by an orifice for all storms up to the 100 year event. For events greater, water will flow over a weir set at elevation 105.1 m. Flows through the orifice are based upon the maximum head that will occur. The head is measured to the centerline of the orifice. The orifice equation is as follows:

Where $Q = CA(2gh)^{1/2}$

$C = 0.60$

$A =$ area of orifice (m^2)

$g = 9.81$ m/s

$H =$ head over centerline of orifice

Example:

a) 175 mm orifice at elevation 104.0 metres

$Q = .6x(\text{☎}x(.175m)^2/4)(2x9.81x(105.1m-104.0m+.175m/2))^{1/2}$

$Q = 64$ L/s

b) 300 mm orifice at elevation 104.0 metres

$Q = .6x(\text{☎}x(.300m)^2/4)(2x9.81x(105.1m-104.3m+.300m/2))^{1/2}$

$Q = 151$ L/s

The head over the orifice would be 1.1 metres above the low flow orifice (175mm) and 0.65 metres above the high flow orifice (300mm). The total combined outflow would be 215 L/s. SK2 shows the proposed outlet control manhole if Phase II should be implemented.

Three (3) areas are available for storage of excess stormwater runoff. Table 1 lists the available storage volumes and release rates for the four (4) paved areas.

Table 1. Available parking lot storage and sewer release rates.

Parking Lot Number	Available Storage Volume (m^3)	Release Rate (L/s)
P1	260	40

P2	1063	20
P3	239	40
P4	621	20
Total =	2183	120

Table 2 shows the available storage volumes at the three different areas.

Table 2. Available storage volumes.

Location	Available Storage Volume (m^3)
Pond	7529
Dry wells	223
Parking lots	2183
Total =	9935

The total available storage volume is 9935 m^3. Storage volume requirements can be calculated by various methods (Modified Rational Method, et.). To show that there is ample storage volume available a zero release rate was assumed as the worst case scenario. The total runoff volume is then equal to the total rainfall multiplied by the runoff coefficient by the area. The following calculations illustrate the total runoff from the 100 year storm is less than the available storage volume.

Runoff volume = runoff coefficient x rainfall x area

The 100 year rainfall for a 24 hour storm is 88.6 mm.

$$C = \frac{(0.2 \times 2.32)+(0.6 \times 4.09)+(0.7 \times 6.47)+(0.9 \times 0.86)}{13.74}$$

$$C = 0.60$$

Runoff volume = 0.60 x .0886 m x 137400 m^2

Runoff volume = 7304 m^3

This calculation demonstrates that with a zero release rate from the site there is sufficient storage available for the 100 year storm. The assumptions are made for the current development conditions. If future parking areas are developed the storage volumes in Table 2 will then be amended to reflect the new conditions.

If Phase II work is required the receiving water coarse for the pond outlet will be the existing drain on the northern boundary of the property. A grass lined infiltration trench with approximately 100 m^3 storage will connect the pond with the receiving water coarse. Although the 100 m^3 of storage is not required for quality or quantity control it will permit additional infiltration.

4.0 Summary

This report has outlined a stormwater plan that will treat runoff from the proposed 13.74 hectare redevelopment and expansion area of the Rideau Carleton Raceway.

Flow from this area will be controlled by inlet restrictors in the catch-basins which will minimize peak flows from the parking lot. Dry wells will be attached to each catch basin while final control is by utilizing the existing pond located inside of the race track. This system will treat all runoff from the site. To minimize groundwater impacts the infiltration of runoff has been maximized. This is accomplished by providing pervious catch-basins, pervious pipes, grass-lined swales, and infiltration trench downstream of the pond outlet. This type of design will augment low flows in downstream water courses by increasing the amount of water that is infiltrated into the ground and thereby decreasing the amount of water that enters the pond. Less water too the pond also means that storm water will not have time to heat up. To further avoid temperature increase the outlet from the pond will be from the bottom. Furthermore, it will minimize the runoff volumes requiring treatment in the existing pond

Phase I will consist of cleaning the outlet and connecting to the existing swale. The water levels will be monitored and measured constantly using a stilling well recording the information on a data logger. If there are more than 4 overflows per year phase II construction of the new pond outlet as shown on SWM3 will be implemented.

The system will have an ongoing Operation and Maintenance Plan to assure continued performance. Sumps will be cleaned yearly with copies sent to the City of Gloucester and the SNRCA.

Oliver, Mangione, McCalla & Associates
a division of Trow Consulting Engineers Ltd.

Stephen J. Pichette, P.Eng.
Manager
Civil, Private Division

Charles B. Warnock, P.Eng.
Senior Water Resources Engineer
Civil, Private Division

cbw/cbw

Appendix A: **Storm Sewer Calculation Sheet**

City of Gloucester
STORM SEWER COMPUTATION FORM
Client: PBK
Project: Rideau Carleton Raceway Redevelopment
Date: September, 1999
Designed by: CBW
Checked by: Charles Warnock

Rational Method:
(IDF curve for Ottawa Airport
5 yr frequency)

Q = 2.78AIR
Tc = Time of Concentration = 15
n = 0.013
R = Runoff coefficient
I = Rainfall Intensity = 30.3 x t ^(-.7270)

Area	From MH	To MH	Roof Flow (L/s)	Roof Area (ha)	AREA (ha) R 0.2	0.6	0.9	Ind. 2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall Intensity (mm/hr) (I)	Flow Restriction (L/s)	Peak Flow Q(L/sec)	Flow in Sewer (L/s)	Type of Pipe	SEWER DATA Diameter (mm) (nom.)	(act.)	Slope (%)	Length (m)	Capacity (L/sec)	Velocity (m/sec)	Time of Flow (min)	REMARKS
								0.00															Page 1 of 1
	114	113					0.06	0.15	0.15	15.0	83.0	20.0	12.5	12.5	Conc.	250	254	0.43	64.5	40.7	0.80	1.34	
	113	109					2.63	6.58	6.73	16.3	78.0	100.0	525.0	112.5	Conc.	375	381	0.43	121.5	119.9	1.05	1.93	
	110	109					1.97	4.93	4.93	15.0	83.0	20.0	409.3	20.0	Conc.	300	305	2.46	26.5	158.2	2.17	0.20	
	108	109	178.6	0.86				0.00	0.00	15.0	83.0	0.0	178.6	178.6	Conc.	375	381	1.00	28.0	182.9	1.60	0.29	
	109	104					0.79	1.98	13.64	18.3	71.9	40.0	981.1	351.0	Conc.	600	610	0.32	22.0	362.4	1.24	0.30	
	105	104			0.41		1.29	3.46	3.46	15.0	83.0	20.0	287.2	20.0	Conc.	300	305	1.32	18.0	115.9	1.59	0.19	
														411.0									
	104	102					0.50	1.25	18.35	15.3	81.9	40.0	1502.2	238.6	Conc.	600	610	1.00	65.0	640.6	2.19	0.49	
	103	102						0.00	0.00	15.0	83.0	0.0	0.0	0.0	Conc.	300	305	1.87	81.0	138.0	1.89	0.71	
	102A	102					3.52	8.81	8.81	15.0	83.0	60.0	731.3	60.0	Conc.	300	305	1.00	59.0	100.9	1.38	0.71	
														471.0									
	102	101						0.00	27.16	15.8	80.0		2173.0	298.6	Conc.	750	762	1.94	92.0	1617.7	3.55	0.43	
	117	116				0.57	1.14	3.80	3.80	15.0	83.0	60.0	315.5	60.0	Conc.	250	254	6.00	93.0	152.0	3.00	0.52	
	116	115						0.00	3.80	15.5	81.0		307.7	60.0	Conc.	200	203	0.80	90.0	30.8	0.94	1.60	
	115	101						0.00	3.80	17.1	75.4		286.5	60.0	Conc.	200	203	0.30	90.0	18.7			
														591.0									
	101	Outlet						0.00	30.96	16.2	78.5	60.0	2429.1	418.6	Conc.	750	762	0.40	72.0	734.5	1.61	0.75	
		Total		0.86	0.41	0.57	11.90																

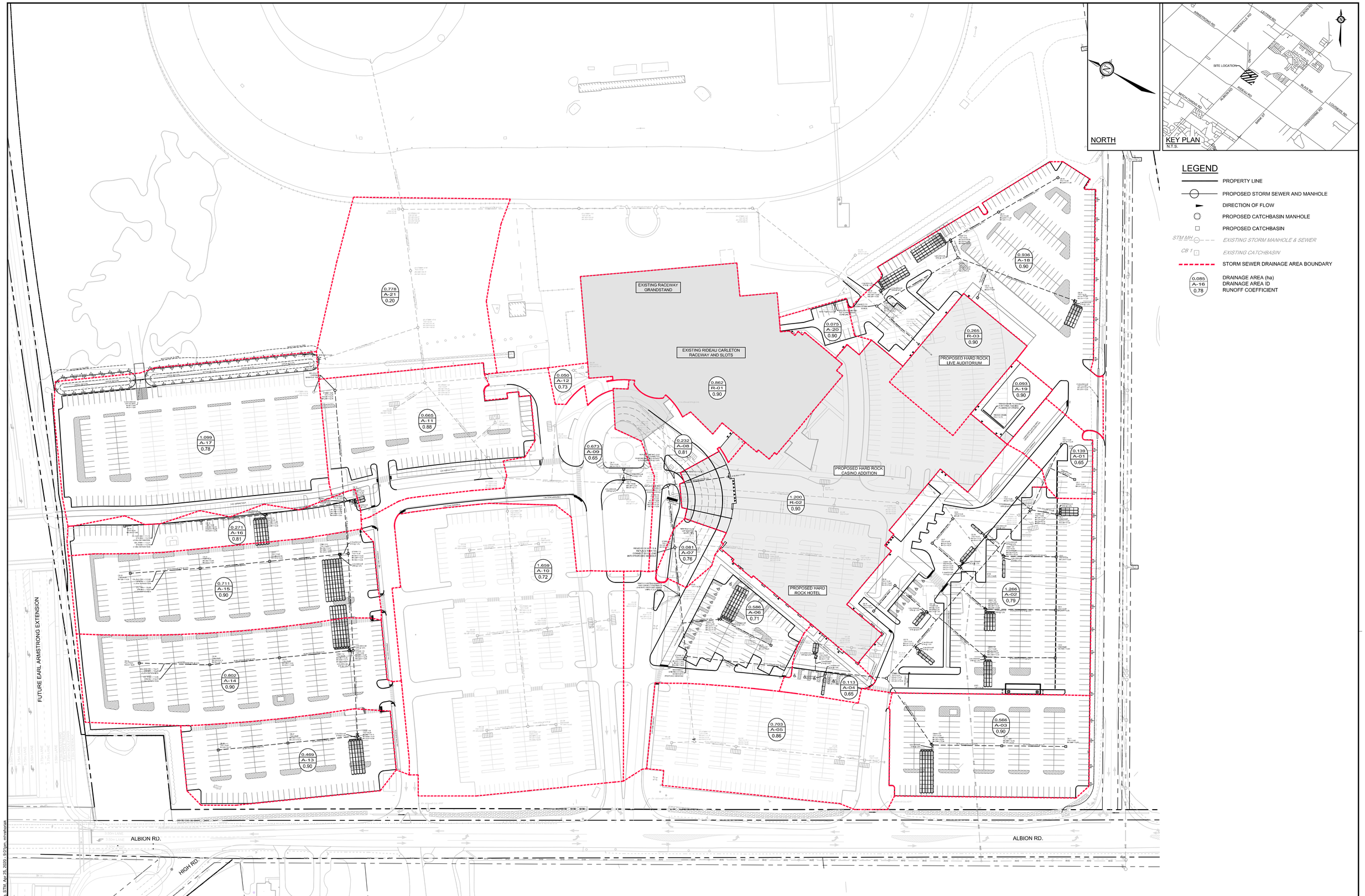
Shaded area show pipe segments that will surcharge during storms less than 1:5 years.

Should have been
351.0 + 60 = 411.0

This number is incorrect, added
178.6+20+40 = 238.6

Recomended Pipe size in front of the grandsatnd.

Area	From MH	To MH	Roof Flow (L/s)	Roof Area (ha)	AREA (ha) R 0.2	0.6	0.9	Ind. 2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall Intensity (mm/hr) (I)	Flow Restriction (L/s)	Peak Flow Q(L/sec)	Flow in Sewer (L/s)	Type of Pipe	SEWER DATA Diameter (mm) (nom.)	(act.)	Slope (%)	Length (m)	Capacity (L/sec)	Velocity (m/sec)	Time of Flow (min)	REMARKS
	117	116				0.63	1.10	3.80	7.60	15.0	83.0	60.0	630.9	60.0	Conc.	250	254	6.00	93.0	152.0	3.00	0.52	
	116	115						0.00	7.60	15.5	81.0		615.5	60.0	Conc.	300	305	0.50	90.0	71.3	0.98	1.53	
	115	101						0.00	7.60	17.1	75.6		574.8	60.0	Conc.	300	305	0.50	90.0	71.3			



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	APR 24/20	CJR
1	ISSUED FOR SITE PLAN APPROVAL	NOV 20/19	CJR

SCALE
1:750
1:750
0 10 20 30

DESIGN	MJH
CHECKED	CJR
DRAWN	MJH
CHECKED	CJR
APPROVED	JLS

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
4837 ALBION ROAD, CITY OF OTTAWA
HARD ROCK OTTAWA

DRAWING NAME
STORM SEWER DRAINAGE AREA PLAN

PROJECT No. 116111
REV REV # 1
DRAWING No. 116111-STM

M:\2019\116111\CAD\Design\116111-STM.dwg, STM, Apr 25, 2020 - 5:51pm, mmenotek
FILENAME: 116111-STM.dwg - 1:750mm/750mm

Project No. 116111
Project Name: Hard Rock Ottawa
Project Location: 4837 Albion Road

NOVATECH
Engineers, Planners & Landscape Architects

Date: November 2019
Revised Date: April 2020

2 Year Storm Sewer Design Sheet

LOCATION			AREA (Ha)				FLOW					PROPOSED SEWER							
AREA ID	FROM	TO	TOTAL AREA (ha)	R= 0.2	R= 0.9	R	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
A-01	CB 1	STMMH 100	0.139	0.050	0.089	0.65	0.25	0.25	10.00	76.81	19.24	304.8	0.50	37.9	71.41	0.98	0.65	52.17	0.27
A-02	STMMH 100	STMMH 101	1.266	0.197	1.069	0.79	2.78	3.03	10.65	74.41	225.81	457.2	0.30	116.8	163.08	0.99	1.96	-62.73	1.38
A-03	CBMH 109	STMMH 101	0.566	0.000	0.566	0.90	1.42	1.42	10.00	76.81	108.77	304.8	0.50	42.5	71.41	0.98	0.72	-37.36	1.52
A-04	STMMH 101	STMMH 102	0.113	0.040	0.073	0.65	0.20	4.66	12.61	68.06	316.85	533.0	0.30	106.0	245.50	1.10	1.61	-71.36	1.29
A-05	EX STMMH 112	STMMH 102	0.703	0.044	0.659	0.86	1.67	1.67	10.00	76.81	128.52	304.8	0.10	78.9	31.93	0.44	3.01	-96.58	4.02
A-06	STMMH 102	STMMH 103	0.586	0.156	0.430	0.71	1.16	7.49	14.22	63.68	477.09	610.0	0.30	57.6	351.82	1.20	0.80	-125.27	1.36
A-07	STMMH 103	STMMH 99	0.081	0.016	0.065	0.76	0.17	7.66	15.01	61.74	473.09	610.0	0.30	32.7	351.82	1.20	0.45	-121.27	1.34
R-01	EXSTMMH 108	STMMH 99	0.862	0.000	0.862	0.90	2.16	2.16	10.00	76.81	165.65	381.0	1.00	32.9	183.10	1.60	0.34	17.45	0.90
R-02	Building Service	STMMH 99	1.200	0.000	1.200	0.90					147.10								
A-08	Building Service	STMMH 99	0.232	0.030	0.202	0.81	0.52	0.52	10.00	76.81	187.20	304.8	1.00	32.2	100.98	1.38	0.39	-86.21	1.85
A-09	STMMH 99	EX STMMH 104	0.673	0.242	0.431	0.65	1.21	11.55	15.47	60.69	848.33	610.0	0.30	86.3	351.82	1.20	1.20	-496.52	2.41
A-10	EX STMMH 105	EX STMMH 104	1.659	0.432	1.227	0.72	3.31	3.31	10.00	76.81	254.24	457.2	0.20	17.8	133.15	0.81	0.37	-121.09	1.91
A-11	EX STMMH 104	EX STMMH 102	0.665	0.019	0.646	0.88	1.63	16.49	16.66	58.10	1105.32	610.0	1.30	65.2	732.37	2.50	0.43	-372.96	1.51
A-12	EX STMMH 103	EX STMMH 102	0.050	0.012	0.038	0.73	0.10	0.10	10.00	76.81	7.81	304.8	1.10	78.2	105.91	1.45	0.90	98.10	0.07
A-13	CBMH 115	STMMH 120	0.469	0.000	0.469	0.90	1.17	1.17	10.00	76.81	90.13	304.8	1.00	45.1	100.98	1.38	0.54	10.86	0.89
A-14	STMMH 120	STMMH 113	0.802	0.000	0.802	0.90	2.01	3.18	10.54	74.78	237.80	304.8	0.80	51.0	90.32	1.24	0.69	-147.48	2.63
A-15	STMMH 113	STMMH 119	0.711	0.000	0.711	0.90	1.78	4.96	11.23	72.38	358.93	304.8	1.00	51.0	100.98	1.38	0.61	-257.95	3.55
A-16	STMMH119	EX STMH 102A	0.271	0.035	0.236	0.81	0.61	5.57	11.85	70.38	391.92	304.8	1.00	86.3	100.98	1.38	1.04	-290.94	3.88
	EX STMH 102A	EX STM 102	0.000	0.000	0.000	0.00	0.00	5.57	12.89	67.25	374.53	304.8	0.90	59.0	95.80	1.31	0.75	-278.72	3.91
	EX STMMH 102	EX STMMH 101A	0.000	0.000	0.000	0.00	0.00	22.16	17.10	57.22	1415.34	762.0	1.60	29.5	1470.57	3.22	0.15	55.23	0.96
A-17	EX STMMH 101A	EX STMMH 101B	1.099	0.191	0.908	0.78	2.38	24.54	17.25	56.92	1544.01	762.0	1.40	30.1	1375.59	3.01	0.17	-168.42	1.12
	EX STMMH 101B	EX STMMH 101	0.000	0.000	0.000	0.00	0.00	24.54	17.42	56.60	1536.03	762.0	2.30	32.6	1763.15	3.86	0.14	227.12	0.87
A-18	STMMH 117	STMMH 116	0.936	0.000	0.936	0.90	2.34	2.34	10.00	76.81	179.87	304.8	0.80	52.9	90.32	1.24	0.71	-89.54	1.99
R-03, A-19	Building Service	STMMH 116	0.358	0.000	0.358	0.90					41.00	254.0	2.00	20.3	87.82	1.73	0.20	46.82	0.47
A-20	STMMH 116	EX STMMH 116	0.075	0.000	0.075	0.90	0.19	2.53	10.71	74.17	228.62	254.0	5.90	93.9	150.84	2.97	0.53	-77.78	1.52
	EX STMMH 116	EX STMMH 115	0.000	0.000	0.000	0.00	0.00	2.53	11.24	72.35	224.02	304.8	0.50	91.3	71.41	0.98	1.56	-152.61	3.14
	EX STMMH 115	EX STMMH 101	0.000	0.000	0.000	0.00	0.00	2.53	12.80	67.51	211.77	304.8	0.50	92.7	71.41	0.98	1.58	-140.37	2.97
A-21	EX STMMH 101	POND	0.778	0.778	0.000	0.20	0.43	27.50	17.56	56.33	1737.20	762.0	2.00	80.9	1644.14	3.60	0.37	-93.06	1.06

***Note: Storm sewer design sheet flows are peak uncontrolled flows. Flows will be attenuated with ICD's which will increase the excess capacity in the pipes**

Definitions
Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
I = 2 YEAR Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min Velocity = 0.76 m/sec.
3) 2 Year intensity = $732.951 / (time + 6.199)^{0.810}$

RD-1 3/4 OPEN
RD-2 3/4 OPEN
RD-3 3/4 OPEN
RD-4 3/4 OPEN
RD-5 3/4 OPEN
RD-6 3/4 OPEN
RD-7 3/4 OPEN
RD-8 3/4 OPEN
RD-9 3/4 OPEN
RD-10 3/4 OPEN
RD-11 3/4 OPEN
RD-12 3/4 OPEN
RD-13
RD-14
RD-15
RD-16
RD-17
RD-18
RD-19
RD-20
RD-21
RD-22
RD-23
RD-24
RD-25
RD-26
RD-27
RD-28
RD-29
RD-30

0.189 R-1 0.90
0.089 R-2 0.90
0.119 R-3 0.90
0.294 R-4 0.90
0.511 R-5 0.90
0.132 R-6 0.90
0.132 R-7 0.90

PROPOSED GATE

M:\2016\116111\CAD\Design\116111-ROOF.dwg, Roof Drains, Apr 21, 2020 - 3:55pm, mhrehoriak

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

HARD ROCK OTTAWA

ROOD DRAINAGE AREA PLAN

SCALE 1 : 750 (0 10 20 30)

DATE APR 2020 | JOB 116111 | FIGURE 4

SHT11X17.DWG 279mmX432mm

HOTEL ROOF

TABLE 1A: Post-Development Runoff Coefficient "C" - R1 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.189	Roof	0.189	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.189 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	50	37.65	17.81	3.5	14.34	43.01
	55	35.12	16.61	3.5	13.14	43.36
	60	**32.94**	**15.58**	**3.5**	**12.11**	**43.59**
	65	31.04	14.68	3.5	11.21	43.72
	70	29.37	13.89	3.5	10.42	43.76

TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.189 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	65	52.65	27.66	5.8	21.83	85.12
	70	49.79	26.16	5.8	20.32	85.36
	75	**47.26**	**24.83**	**5.8**	**18.99**	**85.47**
	80	44.99	23.64	5.8	17.80	85.46
	85	42.95	22.57	5.8	16.73	85.34

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 1D: Roof Drain Flows

Roof Drains		
Roof Area	1890	m²
Qty	4	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 1E: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m²)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m³)	Total Volume (m³) Required
5 Year	RD-1	472.5	0.076	12.00	43.59
	RD-2	472.5	0.076	12.00	
	RD-3	472.5	0.076	12.00	
	RD-4	472.5	0.076	12.00	
				Total **48.01**	**43.59**
100 Year	RD-1	472.5	0.140	22.00	85.47
	RD-2	472.5	0.140	22.00	
	RD-3	472.5	0.140	22.00	
	RD-4	472.5	0.140	22.00	
				Total **88.01**	**85.47**

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area\ X\ Depth}{3}$$

PORT COCHERE ROOF

TABLE 2A: Post-Development Runoff Coefficient "C" - R2 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.089	Roof	0.089	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 2B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R2 Controlled Roof Area

0.089 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	35	48.52	10.80	2.6	8.20	17.22
	40	44.18	9.84	2.6	7.24	17.37
	45	**40.63**	**9.05**	**2.6**	**6.44**	**17.40**
	50	37.65	8.38	2.6	5.78	17.35
	55	35.12	7.82	2.6	5.22	17.22

TABLE 2C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R2 Controlled Roof Area

0.089 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	45	69.05	17.08	4.0	13.06	35.27
	50	63.95	15.82	4.0	11.80	35.40
	55	**59.62**	**14.75**	**4.0**	**10.73**	**35.41**
	60	55.89	13.83	4.0	9.81	35.31
	65	52.65	13.03	4.0	9.00	35.11

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 2D: Roof Drain Flows

Roof Drains		
Roof Area	890	m^2
Qty	3	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 2E: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-5	164	0.076	4.17	-
	RD-6	563	0.076	14.30	-
	RD-7	164	0.076	4.17	-
				Total	**22.63**	**17.40**
100 Year	RD-5	164	0.127	6.94	-
	RD-6	563	0.127	23.83	-
	RD-7	164	0.127	6.94	-
				Total	**37.72**	**35.41**

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area\ X\ Depth}{3}$$

LOWER CASINO ROOF

TABLE 3A: Post-Development Runoff Coefficient "C" - R3 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.119	Roof	0.119	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 3B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R3 Controlled Roof Area

0.119 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	25	60.90	18.13	4.3	13.83	20.75
	30	53.93	16.06	4.3	11.76	21.16
	35	**48.52**	**14.45**	**4.3**	**10.15**	**21.31**
	40	44.18	13.16	4.3	8.86	21.25
	45	40.63	12.10	4.3	7.80	21.05

TABLE 3C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R3 Controlled Roof Area

0.119 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	30	91.87	30.39	7.3	23.09	41.57
	35	82.58	27.32	7.3	20.02	42.04
	40	**75.15**	**24.86**	**7.3**	**17.56**	**42.14**
	45	69.05	22.84	7.3	15.54	41.97
	50	63.95	21.16	7.3	13.86	41.57

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 3D: Roof Drain Flows

Roof Drains		
Roof Area	1190	m²
Qty	5	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 3E: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m²)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m³)	Total Volume (m³) Required
5 Year	RD-8	200	0.076	5.08	
	RD-9	200	0.076	5.08	
	RD-10	200	0.076	5.08	
	RD-11	156	0.076	3.96	
	RD-12	156	0.076	3.96	
			Total	**23.16**	**21.31**
5 Year	RD-8	200	0.140	9.31	
	RD-9	200	0.140	9.31	
	RD-10	200	0.140	9.31	
	RD-11	156	0.140	7.26	
	RD-12	156	0.140	7.26	
			Total	**42.47**	**42.14**

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area\ X\ Depth}{3}$$

MAIN CASINO ROOF NORTH

TABLE 4A: Post-Development Runoff Coefficient "C" - R4 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.294	Roof	0.294	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 4B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R4 Controlled Roof Area

0.294 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	10	104.19	76.64	20.0	56.64	33.99
	15	83.56	61.46	20.0	41.46	37.32
	20	**70.25**	**51.68**	**20.0**	**31.68**	**38.01**
	25	60.90	44.79	20.0	24.79	37.19
	30	53.93	39.67	20.0	19.67	35.40

TABLE 4C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R4 Controlled Roof Area

0.294 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	116.79	30.0	86.79	78.11
	20	119.95	98.04	30.0	68.04	81.65
	25	**103.85**	**84.88**	**30.0**	**54.88**	**82.31**
	30	91.87	75.09	30.0	45.09	81.15
	35	82.58	67.49	30.0	37.49	78.74

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 4D: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-13	280	0.076	10.67	
	RD-14	280	0.076	10.67	
	RD-15	260	0.076	9.91	
	RD-16	262	0.076	9.98	
			Total	**41.22**	**38.01**
Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
100 Year	RD-13	280	0.152	21.34	
	RD-14	280	0.152	21.34	
	RD-15	260	0.152	19.81	
	RD-16	262	0.152	19.96	
			Total	**82.45**	**82.31**

*Note: Ponding volumes calculated using End Area Equation: $V = \frac{Area\ X\ Depth}{2}$

MAIN CASINO ROOF SOUTH

TABLE 5A: Post-Development Runoff Coefficient "C" - R4 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.511	Roof	0.511	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 5B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R4 Controlled Roof Area

0.511 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230.48	294.68	55.0	239.68	0.00
	5	141.18	180.50	55.0	125.50	37.65
	10	**104.19**	**133.21**	**55.0**	**78.21**	**46.93**
	15	83.56	106.83	55.0	51.83	46.65
	20	70.25	89.82	55.0	34.82	41.78

TABLE 5C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R4 Controlled Roof Area

0.511 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	5	242.70	344.78	100.0	244.78	73.43
	10	178.56	253.66	100.0	153.66	92.19
	15	**142.89**	**202.99**	**100.0**	**102.99**	**92.69**
	20	119.95	170.40	100.0	70.40	84.48
	25	103.85	147.52	100.0	47.52	71.28

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 5D: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-17	175	0.076	6.67	
	RD-18	139	0.076	5.30	
	RD-19	193	0.076	7.35	
	RD-20	191	0.076	7.28	
	RD-21	158	0.076	6.02	
	RD-22	135	0.076	5.14	
	RD-23	133	0.076	5.07	
	RD-24	111	0.076	4.23	
			Total	**47.05**	**46.93**

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
100 Year	RD-17	175	0.152	13.34	
	RD-18	139	0.152	10.59	
	RD-19	193	0.152	14.71	
	RD-20	191	0.152	14.55	
	RD-21	158	0.152	12.04	
	RD-22	135	0.152	10.29	
	RD-23	133	0.152	10.13	
	RD-24	111	0.152	8.46	
			Total	**94.11**	**92.69**

*Note: Ponding volumes calculated using End Area equation: $V = \frac{Area\ X\ Depth}{2}$

HARD ROCK LIVE ROOF NORTH

TABLE 6A: Post-Development Runoff Coefficient "C" - R5 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.132	Roof	0.132	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 6B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R5 Controlled Roof Area

0.132 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	10	104.19	34.41	8.5	25.91	15.55
	15	83.56	27.60	8.5	19.10	17.19
	20	**70.25**	**23.20**	**8.5**	**14.70**	**17.64**
	25	60.90	20.11	8.5	11.61	17.42
	30	53.93	17.81	8.5	9.31	16.76

TABLE 6C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R5 Controlled Roof Area

0.132 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	52.44	14.0	38.44	34.59
	20	119.95	44.02	14.0	30.02	36.02
	25	**103.85**	**38.11**	**14.0**	**24.11**	**36.16**
	30	91.87	33.71	14.0	19.71	35.48
	35	82.58	30.30	14.0	16.30	34.24

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 6D: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-25	190	0.076	7.24	
	RD-26	156	0.076	5.94	
	RD-27	130	0.076	4.95	
			Total	**18.14**	**17.64**
100 Year	RD-25	190	0.152	14.48	
	RD-26	156	0.152	11.89	
	RD-27	130	0.152	9.91	
			Total	**36.27**	**36.16**

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{2}$

HARD ROCK LIVE ROOF SOUTH

TABLE 7A: Post-Development Runoff Coefficient "C" - R5 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.132	Roof	0.132	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 7B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R5 Controlled Roof Area

0.132 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	10	104.19	34.41	8.5	25.91	15.55
	15	83.56	27.60	8.5	19.10	17.19
	20	**70.25**	**23.20**	**8.5**	**14.70**	**17.64**
	25	60.90	20.11	8.5	11.61	17.42
	30	53.93	17.81	8.5	9.31	16.76

TABLE 7C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R5 Controlled Roof Area

0.132 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	52.44	14.0	38.44	34.59
	20	119.95	44.02	14.0	30.02	36.02
	25	**103.85**	**38.11**	**14.0**	**24.11**	**36.16**
	30	91.87	33.71	14.0	19.71	35.48
	35	82.58	30.30	14.0	16.30	34.24

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 7D: Total Roof Storage

Storm Event	Roof Drain ID	Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-28	130	0.076	4.95	
	RD-29	156	0.076	5.94	
	RD-30	190	0.076	7.24	
			Total	**18.14**	**17.64**
100 Year	RD-28	130	0.152	9.91	
	RD-29	156	0.152	11.89	
	RD-30	190	0.152	14.48	
			Total	**36.27**	**36.16**

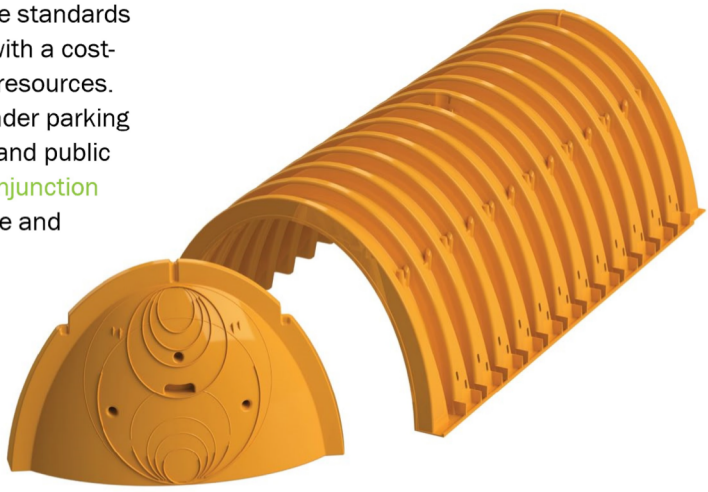
*Note: Ponding volumes calculated using End Area equation: $V = \frac{Area\ X\ Depth}{2}$

Table 8: Post-Development Stormwater Management Summary (Roof Only)

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Outlet Location	5 Year Storm Event				100 Year Storm Event			
					Release (L/s)	Ponding Depth (m)	Required Volumed (cu.m)	Volume Provided (cu.m.)	Release (L/s)	Ponding Depth (m)	Required Volume (cu.m)	Volume Provided (cu.m.)
R1	0.189	0.90	1.00	BLDG Service	3.5	0.0762	43.6	48.0	5.8	0.1397	85.5	88.0
R2	0.089	0.90	1.00	BLDG Service	2.6	0.0762	17.4	22.6	4.0	0.1270	35.4	37.7
R3	0.119	0.90	1.00	BLDG Service	4.3	0.0762	21.3	23.2	7.3	0.1397	42.1	42.5
R4	0.294	0.90	1.00	BLDG Service	20.0	0.0762	38.0	41.2	30.0	0.1270	82.3	82.4
R5	0.511	0.90	1.00	BLDG Service	55.0	0.0762	46.9	47.1	100.0	0.1524	92.7	94.1
R6	0.132	0.90	1.00	BLDG Service	8.5	0.0762	17.6	18.1	14.0	0.1524	36.2	36.3
R7	0.132	0.90	1.00	BLDG Service	8.5	0.0762	17.6	18.1	14.0	0.1524	36.2	36.3
Total					**102.4**				**175.2**			

StormTech SC-740 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



StormTech SC-740 Chamber (not to scale)

Nominal Chamber Specifications

Size (Lx W x H)	85.4" x 51.0" x 30.0" (2,170 x 1,295 x 762 mm)
Chamber Storage	45.9 ft³ (1.30 m³)
Min. Installed Storage*	74.9 ft³ (2.12 m³)
Weight	74.0 lbs (33.6 kg)

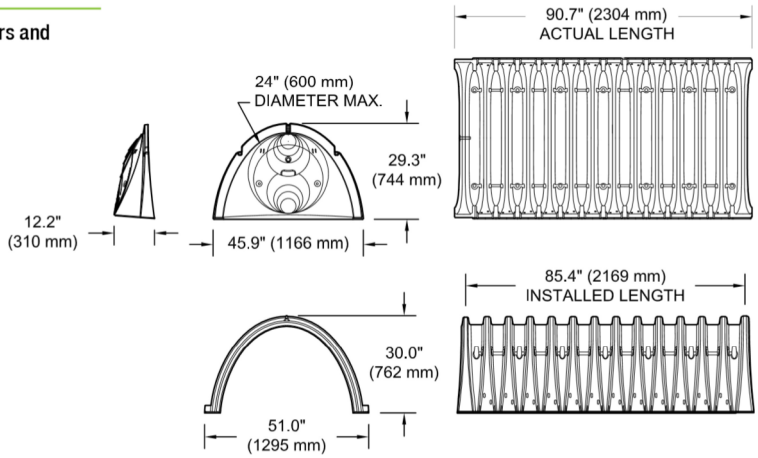
*Assumes 6" (150 mm) stone above, below and between chambers and 40% stone porosity.

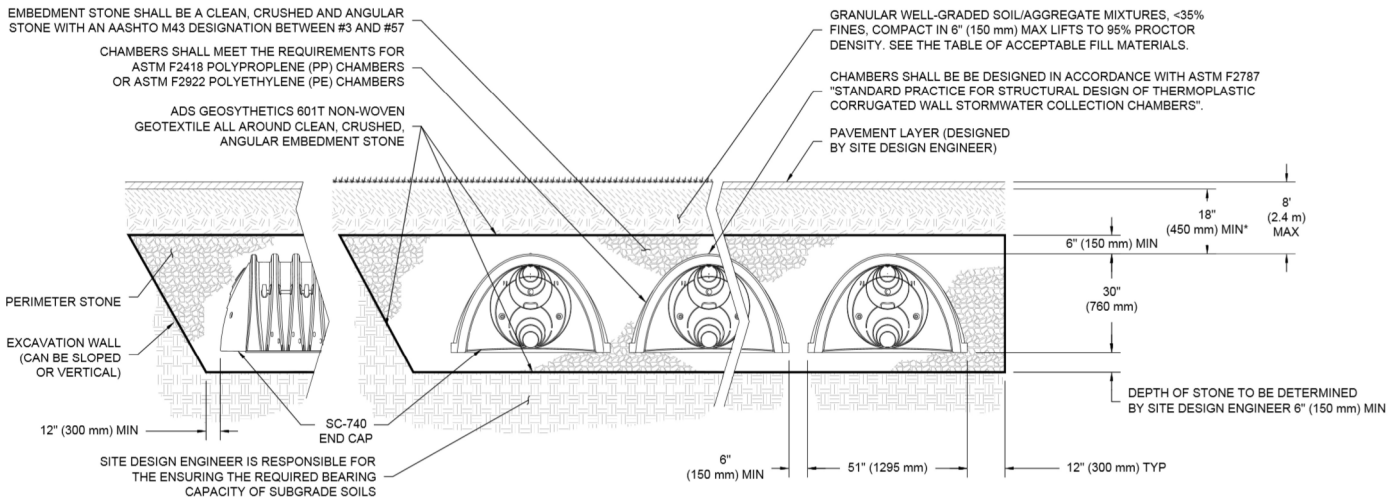
Shipping

30 chambers/pallet

60 end caps/pallet

12 pallets/truck





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

SC-740 CUMLATIVE STORAGE VOLUMES PER CHAMBER

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
42 (1067)	45.90 (1.300)	74.90 (2.121)
41 (1041)	45.90 (1.300)	73.77 (2.089)
40 (1016)	Stone 45.90 (1.300)	72.64 (2.057)
39 (991)	Cover 45.90 (1.300)	71.52 (2.025)
38 (965)	45.90 (1.300)	70.39 (1.993)
37 (940)	45.90 (1.300)	69.26 (1.961)
36 (914)	45.90 (1.300)	68.14 (1.929)
35 (889)	45.85 (1.298)	66.98 (1.897)
34 (864)	45.69 (1.294)	65.75 (1.862)
33 (838)	45.41 (1.286)	64.46 (1.825)
32 (813)	44.81 (1.269)	62.97 (1.783)
31 (787)	44.01 (1.246)	61.36 (1.737)
30 (762)	43.06 (1.219)	59.66 (1.689)
29 (737)	41.98 (1.189)	57.89 (1.639)
28 (711)	40.80 (1.155)	56.05 (1.587)
27 (686)	39.54 (1.120)	54.17 (1.534)
26 (660)	38.18 (1.081)	52.23 (1.479)
25 (635)	36.74 (1.040)	50.23 (1.422)
24 (610)	35.22 (0.977)	48.19 (1.365)
23 (584)	33.64 (0.953)	46.11 (1.306)
22 (559)	31.99 (0.906)	44.00 (1.246)
21 (533)	30.29 (0.858)	1.85 (1.185)
20 (508)	28.54 (0.808)	39.67 (1.123)
19 (483)	26.74 (0.757)	37.47 (1.061)
18 (457)	24.89 (0.705)	35.23 (0.997)
17 (432)	23.00 (0.651)	32.96 (0.939)
16 (406)	21.06 (0.596)	30.68 (0.869)
15 (381)	19.09 (0.541)	28.36 (0.803)
14 (356)	17.08 (0.484)	26.03 (0.737)
13 (330)	15.04 (0.426)	23.68 (0.670)
12 (305)	12.97 (0.367)	21.31 (0.608)
11 (279)	10.87 (0.309)	18.92 (0.535)
10 (254)	8.74 (0.247)	16.51 (0.468)
9 (229)	6.58 (0.186)	14.09 (0.399)
8 (203)	4.41 (0.125)	11.66 (0.330)
7 (178)	2.21 (0.063)	9.21 (0.264)
6 (152)	0 (0)	6.76 (0.191)
5 (127)	0 (0)	5.63 (0.160)
4 (102)	Stone 0 (0)	4.51 (0.128)
3 (76)	Foundation 0 (0)	3.38 (0.096)
2 (51)	0 (0)	2.25 (0.064)
1 (25)	0 (0)	1.13 (0.032)

Note: Add 1.13 ft³ (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-740 Chamber	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6" (150 mm) stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

Amount of Stone Per Chamber

ENGLISH TONS (yds³)	Stone Foundation Depth		
	6"	12"	16"
SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
METRIC KILOGRAMS (m³)	150 mm	300 mm	450 mm
SC-740	3,450 (2.1)	4,170 (2.5)	4,490 (3.0)

Note: Assumes 6" (150 mm) of stone above and between chambers.

Volume Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as depth of cover increases.



StormTech
Detention • Retention • Water Quality
An ADS company

Isolator® Row O&M Manual







THE MOST ADVANCED NAME IN WATER MANAGEMENT SOLUTIONS™

ADS®

THE ISOLATOR® ROW

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-160LP, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160LP, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

The Isolator Row is typically designed to capture the “first flush” and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

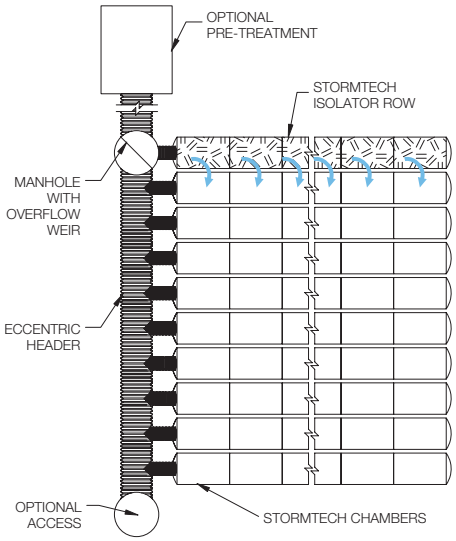
Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.



Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.



StormTech Isolator Row with Overflow Spillway (not to scale)





ISOLATOR ROW INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

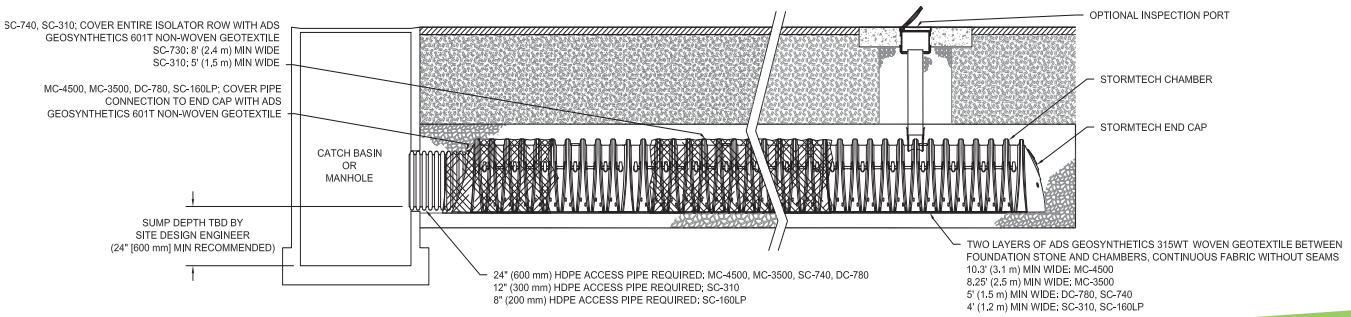
MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.



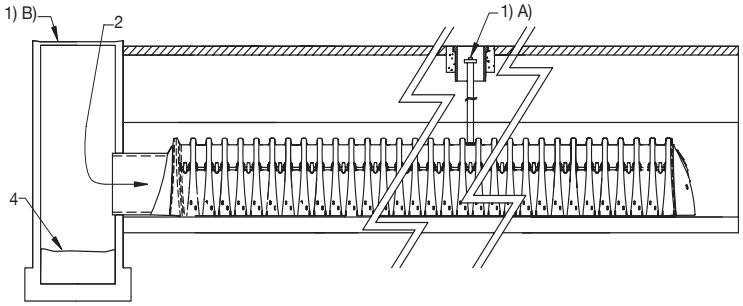
ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

STEP 1
Inspect Isolator Row for sediment.
- A) Inspection ports (if present)
  - i. Remove lid from floor box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
  - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.
- B) All Isolator Rows
  - i. Remove cover from manhole at upstream end of Isolator Row
  - ii. Using a flashlight, inspect down Isolator Row through outlet pipe
    1. Mirrors on poles or cameras may be used to avoid a confined space entry
    2. Follow OSHA regulations for confined space entry if entering manhole
  - iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2
Clean out Isolator Row using the JetVac process.
- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

STEP 3
Replace all caps, lids and covers, record observations and actions.

STEP 4
Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings		Sediment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

ADS "Terms and Conditions of Sale" are available on the ADS website, www.ads-pipe.com
The ADS logo and the Green Stripe are registered trademarks of Advanced Drainage Systems, Inc.
Stormtech® and the Isolator® Row are registered trademarks of StormTech, Inc.
© 2017 Advanced Drainage Systems, Inc. #11011 03/17 CS

StormTech® Detention • Retention • Water Quality
A division of ADS

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

October 20, 2010

Subject: StormTech Isolator Row

To whom it may concern,

Isolator™ Row, which is a patented filtration type BMP manufactured by StormTech. The Isolator Row is covered under US Patent No.: US 6,991,734 B1.

1. a. Description:

The Isolator Row is a row or rows of StormTech thermoplastic chambers that are wrapped in filter fabric and installed below grade. Stormwater enters the chambers and must pass through the filter fabric media where sediments and other contaminants are filtered out as stormwater exits the Isolator Row through the fabric.

Some of the unique features of the Isolator Row that contribute to its effectiveness and practicality include:

- Vast filtration area – each SC-740 chamber has 27.8 square feet of filtration area through the bottom filter fabric
- Large sediment storage volume
- Entire bottom area accessible for cleaning without obstructions within the row
- A state-of-the-art structural design that meets AASHTO safety factors for both live loads and permanent dead loads

1. b. Applicable Sites:

The Isolator Row can be effectively used for essentially all developed sites. The most common applications are highly impervious sites such as paved parking areas, roads as well as developed sites that include grassy or other landscaped areas. It is not intended to be used for construction sediments.

1. c. Isolator Row Approvals:

The Isolator Row has been approved on a project by project basis for thousands of projects around the United States. Following are some examples:

- In Massachusetts, approvals for the State DEP requirement of 80% TSS removal on an annual load basis are issued at the Conservation Commission level, and the Isolator Row is commonly used to meet this criteria.
- In 2004 the Maine DEP approved the Isolator Row based on laboratory testing of 110 micron (US Silica OK-110) particle size
- Under the New Environmental Technology Evaluation program, the Ontario (Canada) Ministry of the Environment has evaluated the Isolator row and issued a Certificate of Technology Assessment

1.d. Manufacturer History:

After many years developing and providing chamber systems for both septic and stormwater applications, StormTech owners formed StormTech, LLC in 2003 as a joint venture Company to focus exclusively on stormwater. All StormTech chambers are produced in the United States. As of this date, StormTech has millions of chambers installed, primarily for commercial applications within the United States, but installation locations also include Canada, Europe, Australia and the Middle East.

The Isolator Row was developed in 2003 initially as a maintenance feature, essentially to capture sediments that could otherwise accumulate in the open graded stone that surrounds the chambers. This open graded stone serves two roles; 1) to provide the important structural soil support of the soil–structure interaction system and 2) to provide open porosity to store stormwater. The Isolator Row was found to be so effective at capturing sediments that many regulators began allowing the Isolator Row as a sediment removal BMP for water quality.

StormTech engineering personnel include decades of experience in water quality. Our collective in-house engineering experience includes years with manufacturers of hydrodynamic separators, filter systems, consulting engineering and regulators. For performance evaluations relative to water quality, StormTech has gone to qualified outside researchers such as Vincent Neary, PhD, PE from Tennessee Tech University and Robert Roseen, PhD from the University of New Hampshire.

History of Isolator Row Testing:

- February 23, 2005 - Tennessee Tech University summarized laboratory testing on the Isolator Row in accordance with Maine DEP testing protocol. Tests demonstrated the following:
    - 95% TSS overall removal at 8.1 gpm/sqft for US Silica OK-110 (110 micron).
    - 80% captured on fabric, 15% captured in stone

- October 20, 2006 - Tennessee Tech University summarized laboratory testing on the Isolator Row in accordance with New Jersey Center for Advanced Technologies (NJCAT) testing protocol. Tests demonstrated the following:
    - 60% TSS Removal at 3.2 gpm/sqft for Sil-Co-Sil 106 with accumulated fines (D_{50} = 10 microns)
    - 66% TSS Removal at 3.2 gpm/sqft for Sil-Co-Sil 106 (D_{50} = 22 microns)
    - 71% TSS Removal at 3.2 gpm/sqft for Sil-Co-Sil 250 (D_{50} = 45 microns)
    - 88% TSS Removal at 1.7 gpm/sqft for Sil-Co-Sil 250 (D_{50} = 45 microns)

- August, 2007 – NJCAT summarized its third party evaluation of the Tennessee Tech test results and produced the “NJCAT Technology Verification Report StormTech Isolator Row”. Their verification is summarized as follows:

    - **Claim 1:** A StormTech® SC-740 Isolator™ Row, sized at a treatment rate of no more than 2.5 gpm/ft^2 of bottom area, using two layers of woven geotextile fabric under the base of the system and one layer of non-woven fabric wrapped over the top of the system and a mean event influent concentration of 270 mg/L (range of 139 – 361 mg/L) has been shown to have a TSS removal efficiency (measured as SSC) of at least 60% for SIL-CO-SIL 106, a manufactured silica product with an average particle size of 22 microns, in laboratory studies using simulated stormwater.

    - **Claim 2:** A StormTech® SC-740 Isolator™ Row, sized at a treatment rate of no more than 2.5 gpm/ft^2 of bottom area, using two layers of woven geotextile fabric

under the base of the system and one layer of non-woven fabric wrapped over the top of the system and a mean event influent concentration of 318 mg/L (range of 129 – 441 mg/L) has been shown to have a TSS removal efficiency (measured as SSC) of 84% for SIL-CO-SIL 250, a manufactured silica product with an average particle size of 45 microns, in laboratory studies using simulated stormwater.

- **Claim 3:** A StormTech® SC-740 Isolator™ Row, sized at a treatment rate of no more than 6.5 gpm/ft^2 of bottom area, using a single layer of woven geotextile fabric under the base of the system and one layer of non-woven fabric wrapped over the top of the system and a mean event influent concentration of 371 mg/L (range of 116 – 614 mg/L) has been shown to have a TSS removal efficiency (measured as SSC) of greater than 95% for OK-110, a manufactured silica product with an average particle size of 110 microns, in laboratory studies using simulated stormwater.

- June 2008 – The University of New Hampshire Stormwater Center released the Final Report on Field Verification Testing of the StormTech Isolator Row Treatment Unit. Testing consisted of determining the water quality performance for multiple stormwater pollutants in accordance with TARP Tier II protocol. As of the June report, data was recorded for 17 storm events.
  - TSS median removal efficiency – 80%
  - Petroleum Hydrocarbons median removal efficiency – 90%
  - Zinc median removal efficiency – 53%
  - Phosphorus median removal efficiency – 49%

1.e. Requested Use Level Designation Approval:

StormTech requests approval at the General Use Level (GUL). In support of this request, StormTech is providing test results from both laboratory and field studies by other that demonstrate that the "performance requirement" is met. However, we request an exception to the "certification requirement" of the application that specifies only an NJDEP or Washington DOE certification. StormTech has gone to qualified third parties for evaluation of the Isolator Row performance to provide regulators with an objective performance assessment.

StormTech has chosen to pursue field testing in accordance with TARP Tier 2 protocol and has not pursued Washington DOE approval. The NJDEP has delayed action on the Isolator Row and other BMPs while they reassess their performance and testing requirements which may or may not be relevant to MSD criteria. We therefore respectfully request that the MSD evaluate the Isolator Row based on MSD performance requirements.

I trust this provides sufficient information on the StormTech Isolator Row to enable your evaluation. However, should you have any questions or require additional information. Please do not hesitate to contact me or Susan McNamee directly.

Sincerely,

By: David J Mailhot, PE
National Engineering Manager
StormTech
Phone: (860) 257-2150
e-mail:dmailhot@stormtech.com

Susan McNamee
Regional Product Manager
StormTech
Phone: (866) 405-9316
e-mail:smcnamee@stormtech.com

TEMPEST Product Submittal Package



Date: April 24, 2020

Customer: Novatech

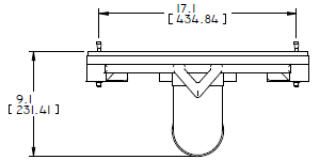
Contact: Conrad Stang

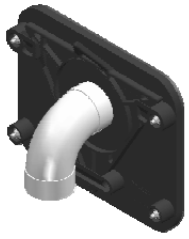
Location: Ottawa

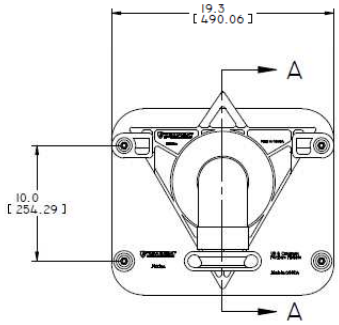
Project Name: Hard Rock

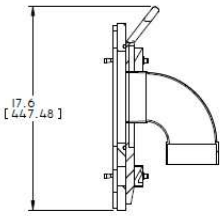
IPEX

<u>Tempest HF ICD Sq</u> Shop Drawing







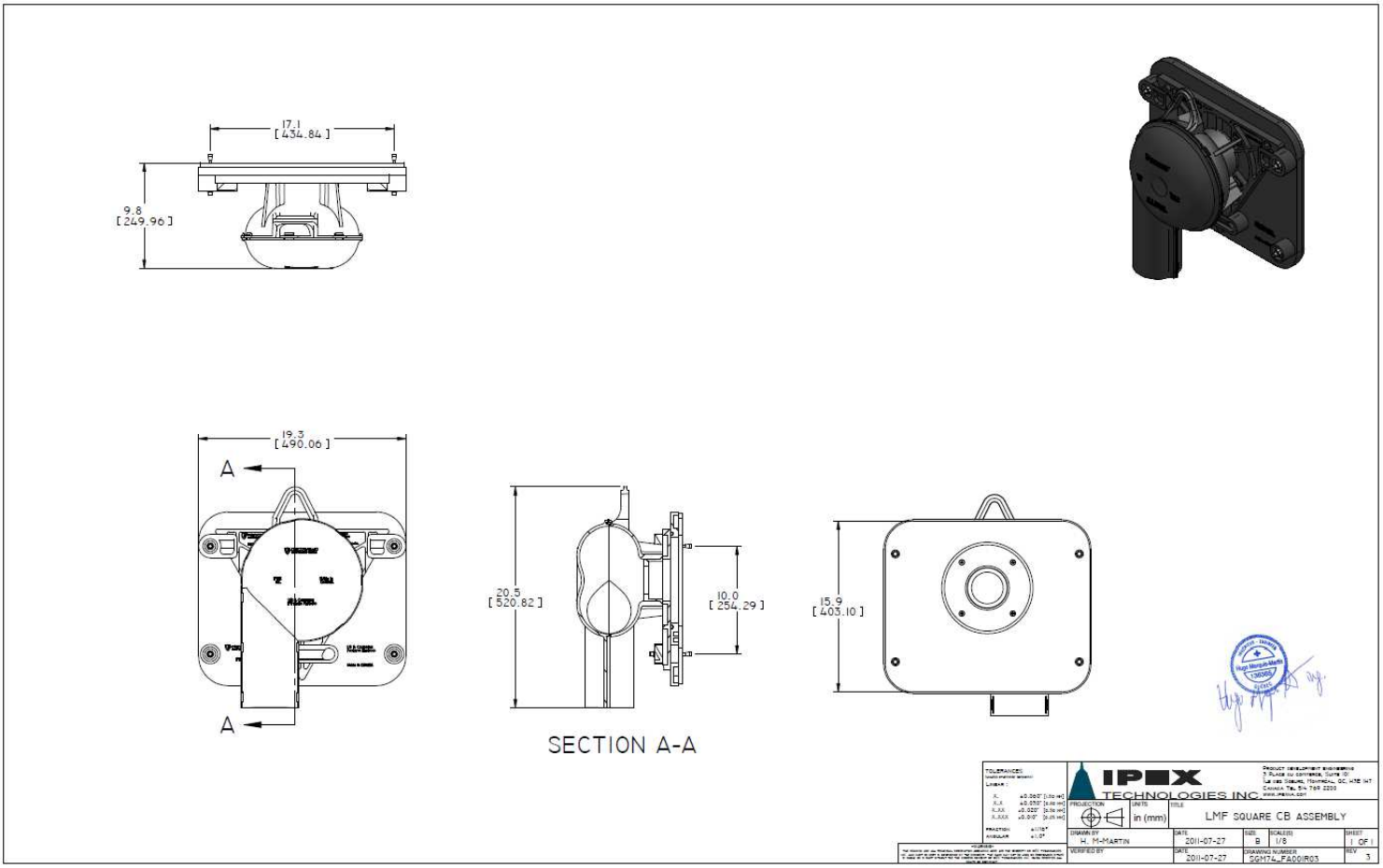


SECTION A-A

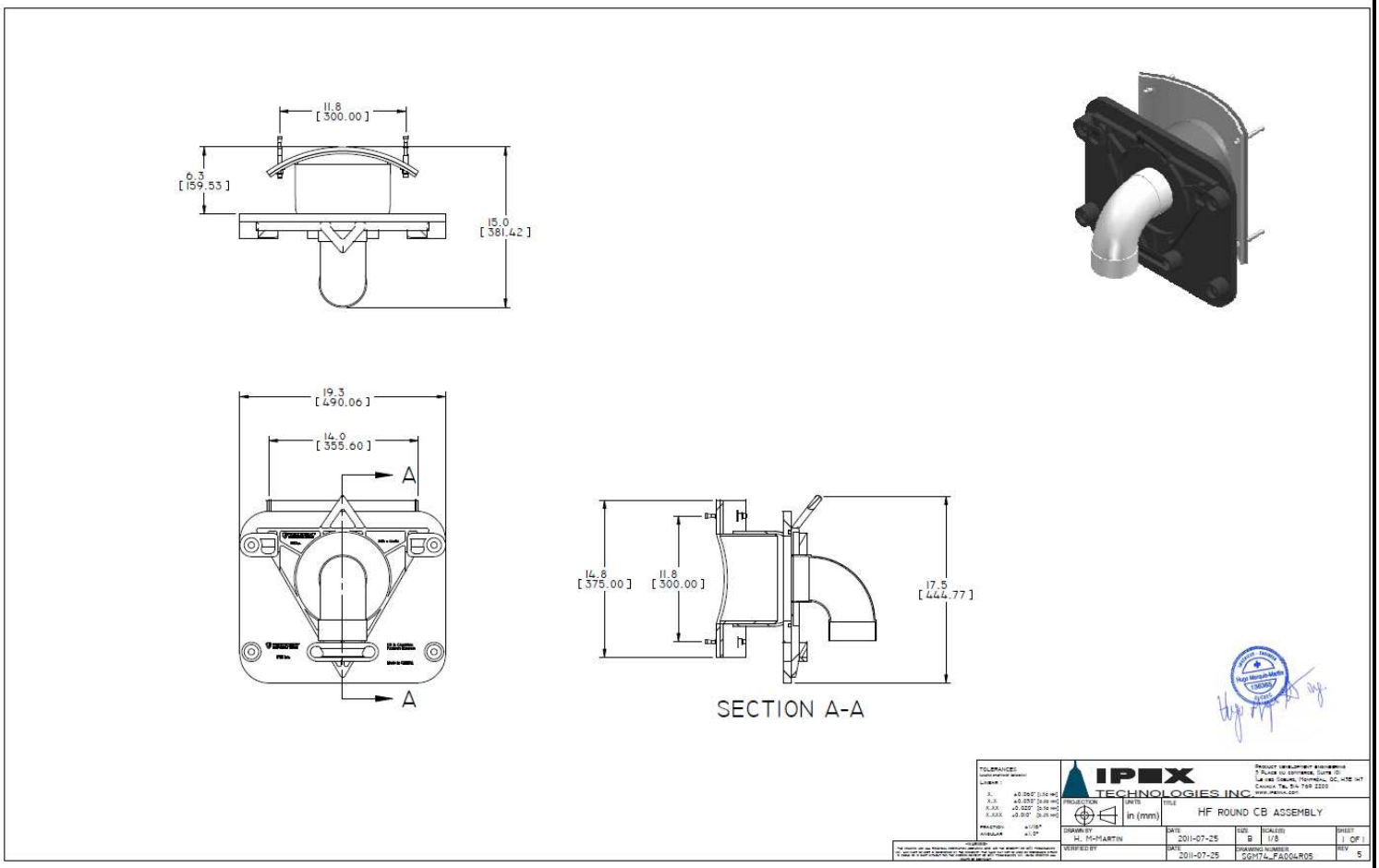
IPEX TECHNOLOGIES INC.				
PROJECTION	UNITS: in (mm)	TITLE: HF SQUARE CB ASSEMBLY		
DRAWN BY: H. M-MARTIN	DATE: 2011-07-25	SIZE: B	SCALE(S): 1/8	SHEET: 1 OF 1
VERIFIED BY	DATE: 2011-07-25	DRAWING NUMBER: SGHT4_FA003R04		REV: 4

IPEX

Tempest LMF ICD Sq Shop Drawing

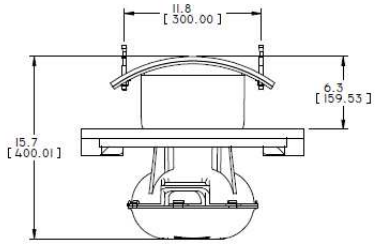


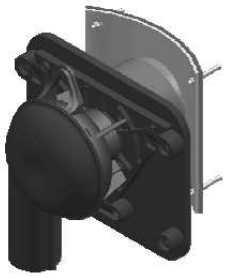
<u>Tempest HF ICD Rd</u> Shop Drawing

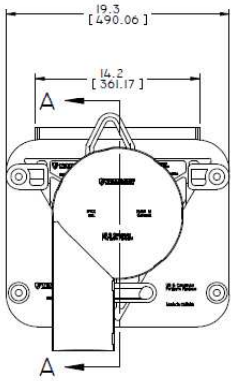


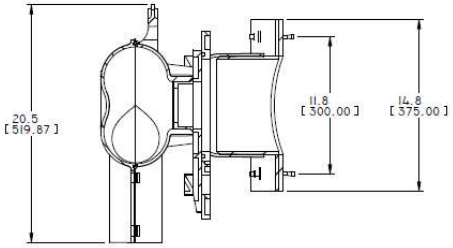
IPEX

Tempest LMF ICD Rd Shop Drawing







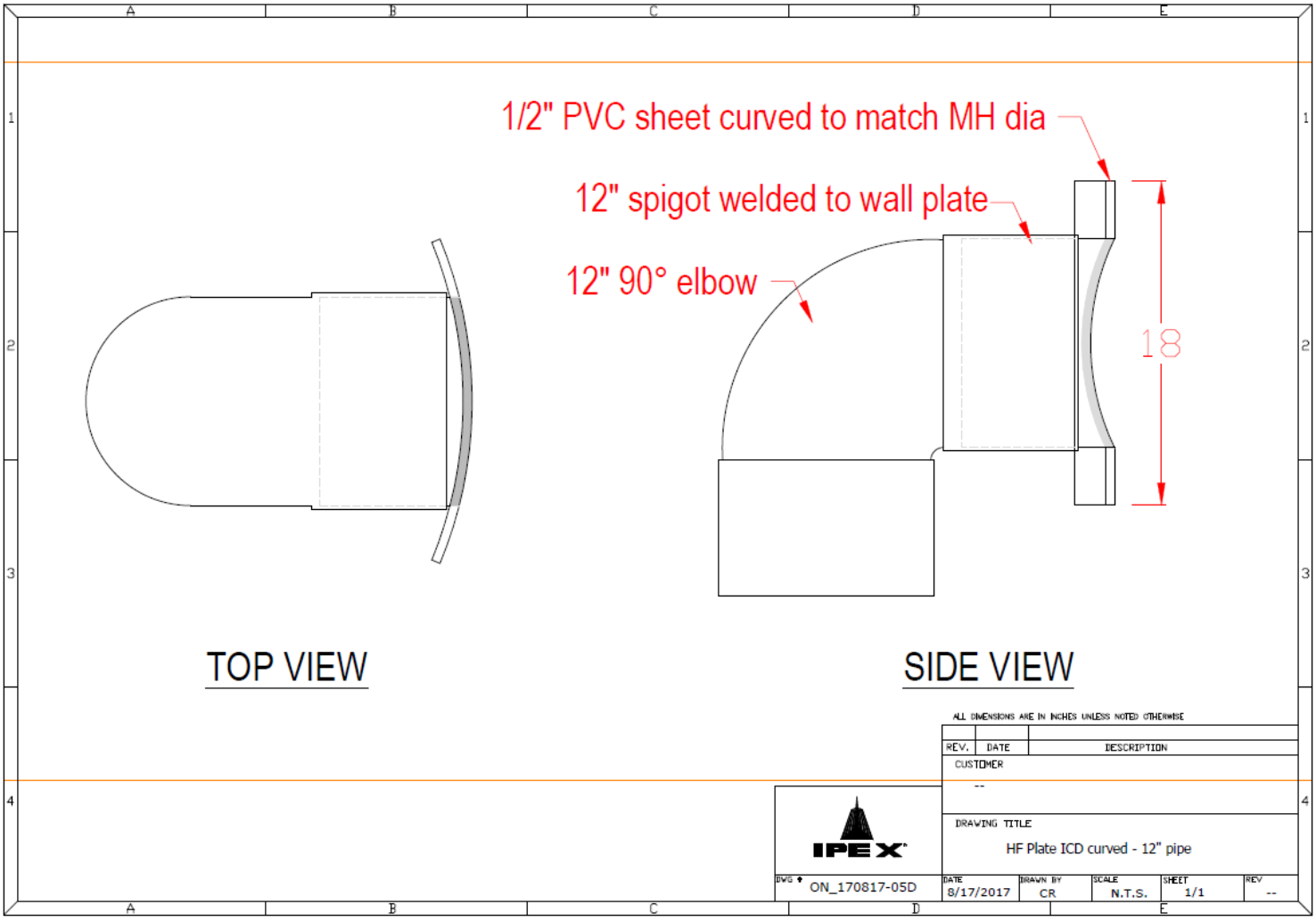


SECTION A-A

IPEX TECHNOLOGIES INC.			
PROJECTION	UNITS: in (mm)	TITLE: LMF ROUND CB ASSEMBLY	
DRAWN BY: M. McMARTIN	DATE: 2011-07-26	SIZE: B	SCALE(S): 1/8
VERIFIED BY	DATE: 2011-07-26	DRAWING NUMBER: SGM74_FA002R01	REV: 3

IPEX

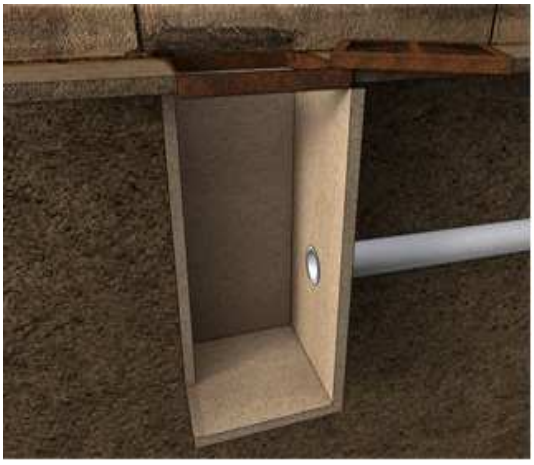
Tempest Plate ICD Rd Shop Drawing

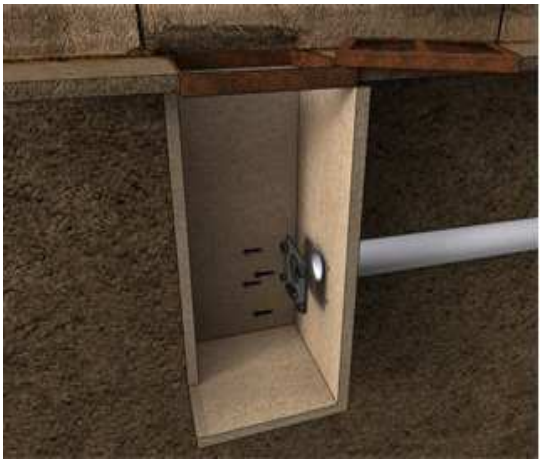


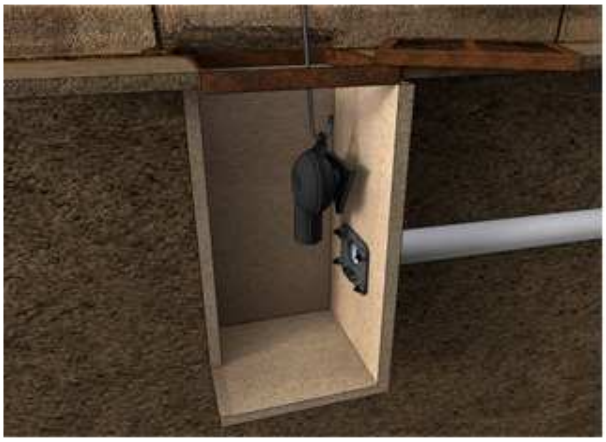
IPEX

Square CB Installation Notes:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8'' concrete bit, torque wrench for 9/16''nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8x3-1/2, (4) washers, (4) nuts
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8'' concrete bit to make the four holes at a minimum of 1-1/2'' depth up to 2-1/2''. Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you will hit the anchors with the hammer. Remove the nuts on the ends of the anchors
5. Install the wall mounting plate on the anchors and screw the nut in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the LMF device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.





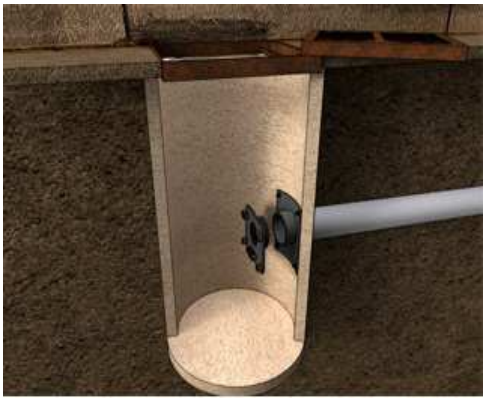


IPEX

Round CB Installation Notes: (Refer to square install notes above for steps 1 , 3, & 4)

2. Use spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lb-ft). There should be no gap between the CB spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate and the spigot of the spigot CB wall plate. Slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered into the mounting plate and has created a seal.






CAUTION/WARNING/DISCLAIM:

- Verify that the inlet(s) pipe(s) is not protruding into the catch basin. If it is, cut it back so that the inlet pipe is flush with the catch basin wall.
- Any required cement in the installation must be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Please refer to the IPEX solvent cement guide to confirm required curing times or attend the IPEX **Online Solvent Cement Training Course**.
- Call your IPEX representative for more information or if you have any questions about our products.

IPEX

IPEX TEMPEST Inlet Control Devices Technical Specification

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's must have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

patersongroup memorandum

consulting engineers

re:	**Permeameter Test Investigation** **Proposed Infiltration System** **Hard Rock Ottawa - 4837 Albion Road - Ottawa**
to:	Novatech Engineering - **Mr. Lee Sheets** - l.sheets@novatech-eng.com
cc:	A2S Consulting Engineers - **Mr. Albert Celli** - albert@a2s.ca
date:	November 26, 2019
file:	PG4315-MEMO.02

Further to your request, Paterson Group (Paterson) conducted a permeameter test investigation for the proposed infiltration system to be installed in conjunction with the proposed building expansion. The purpose of the investigation was to provide field saturated hydraulic conductivity values and estimated infiltration rates to be encountered within the subsoils below the proposed infiltration system at the aforementioned site. This memorandum report should be read in conjunction with Paterson Report PG4315-2 Revision 1 dated December 6, 2019.

Proposed Project

It is our understanding that the proposed development will consist of a multi-storey building expansion. An associated parking garage, car parking areas, access lanes and landscaped areas are also anticipated for the expansion. Furthermore, it is understood that an underground infiltration system will be installed within the at-grade car parking areas of the proposed development with an approximate invert elevations ranging between 110.7 and 114.0 m.

Field Investigation

Field Program

The field program conducted by Paterson for the investigation was completed on November 8, 2019. At that time, 7 test holes locations were selected for permeameter testing at depths ranging from 0.4 and 0.9 m below existing ground surface. The test hole locations were selected by Paterson and distributed in a manner to avoid disturbing existing hard surfaces as well as taking into consideration existing site features. Previous geotechnical investigations were completed at the subject site by Paterson between November 9, 2017 and October 8, 2019. At that time, a total of 22 boreholes and 12 test pits were completed to a maximum depth of 22.5 and 1.9 m below existing grade, respectively. The test hole locations are presented on Drawing PG4315-1 - Test Hole Location Plan attached to this report.

In-Situ Testing

Permeameter testing was conducted using a Pask (Constant Head Well) Permeameter. An 83 mm diameter hole was excavated using a Riverside/Bucket auger to a depth of 0.4 to 0.7 m and 0.7 to 0.9 m below existing ground surface at each location. All soil from the auger flights were visually inspected and initially classified on site. The permeameter reservoir was filled with water and inverted into the hole, ensuring it was relatively vertical and rests on the bottom of the hole. The water level of the reservoir was monitored at 1 minute intervals until the rate of fall of water in the permeameter reservoir reached equilibrium, known as *quasi "steady state"* flow rate. Quasi steady state flow can be considered to have been obtained after measuring 3 to 5 consecutive rate of fall readings with identical values. The values for the quasi steady state rate of fall were recorded for each location.

Field Observations

Surface Conditions

Currently the subject site is occupied by a two-storey building with a walk-out basement and horse track, as well as access lanes, parking and landscaped areas. The ground surface at the subject site is at similar grade to Albion Road and slopes down southward along Albion Road as well as eastward towards the horse track within the grass/treed area.

Subsurface Profile

Generally, the subsurface profile at the test hole locations within the parking area of the development consists of topsoil or asphalt underlain by a crushed stone fill material with silty sand. The above noted material is primarily underlain by a silty sand and/or glacial till deposit. The glacial till deposit was observed to consist of a silty sand with gravel, cobbles and boulders. A stiff to very stiff silty clay was observed in select boreholes underlying the fill material. Practical refusal to DCPT was observed at depths ranging between 11.1 and 16.1 m below existing ground surface.

Groundwater

Based on field observations such as moisture levels, colouring and consistency, the long-term groundwater level can be expected at a depth greater than 7 m bgs. Groundwater levels are subject to seasonal fluctuations and could vary at the time of construction.

Permeameter Results

A total of 14 constant head Pask permeameter tests were conducted in softscaped areas within the existing parking area of the subject site. Permeameter testing was completed to verify the hydraulic conductivities and estimate the infiltration rates of the silty sand, glacial till and silty clay at the subject site. It is our understanding that the invert levels of the proposed infiltration system at the subject site will be installed within the silty sand, glacial till or silty clay deposit depending on location across the subject site. Preparation and testing of this investigation are in accordance with the Canadian Standards Association (CSA) B65-12 - Annex E. The hydraulic conductivity (K_{fs}) values and estimated infiltration rates for each test hole location is presented in Table 1. It should be noted that permeameter testing could not be completed within the silty clay material due to the depth of the silty clay and limitations of the testing equipment.

Hydraulic conductivity values were determined using Engineering Technologies Canada (ETC) Ltd. reference tables provided in the most recent ETC Pask Permeameter User Guide dated March 2016. Infiltration rates have been determined based on approximate relationships between field saturated hydraulic conductivity, percolation time and infiltration rate. The above noted relationship has been provided by the Ontario Ministry of Municipal Affairs and Housing - Supplementary Guidelines to the Ontario Building Code, 1997 - SG-6 - Percolation Time and Soil Descriptions.

The field saturated hydraulic conductivity values that are calculated based upon Pask Permeameter testing are known to provide values that are less than or equal to half of the saturated hydraulic conductivity. The reduced hydraulic conductivity values are encountered due to air entrapment within the soils as shown by W.D. Reynolds (1993).

Table 1 - Field Saturated Hydraulic Conductivity and Infiltration Results

Test Hole ID	Depth bgs (m)	Material	Kfs (m/sec)	Infiltration Rate mm/hr
HA 1A	0.4	Silty Sand	1.3E-06	49
HA 1B	0.7	Silty Sand	3.8E-06	64
HA 2A	0.7	Silty Sand	6.9E-06	78
HA 2B	0.9	Silty Sand	6.3E-05	139
HA 3A	0.6	Silty Sand	3.8E-06	66
HA 3B	0.9	Silty Sand	1.5E-05	96
HA 4A	0.45	Glacial Till	6.9E-06	78
HA 4B	0.75	Glacial Till	3.4E-05	118
HA 5A	0.45	Glacial Till	2.1E-06	55
HA 5B	0.75	Glacial Till	5.3E-06	73
HA 6A	0.55	Silty Sand	3.1E-06	61
HA 6B	0.85	Silty Sand	4.4E-06	67
HA 7A	0.4	Glacial Till	3.2E-06	62
HA 7B	0.7	Glacial Till	2.1E-06	55

Based on the above testing, field saturated hydraulic conductivity values for the silty sand at the test hole locations ranged from 1.3 x 10^{-6} to 6.3 x 10^{-5} m/sec with estimated infiltration rates between 49 to 139 mm/hr. Field Saturated hydraulic conducting values for the glacial till ranged from 2.1 x 10^{-6} to 3.4 x 10^{-5} m/sec with estimated infiltration rates between 55 to 118 mm/hr. Permeameter testing was not completed within the silty clay as part of the current investigations. However, based upon previous experience at similar sites in the area with similar stratigraphy and typical published values, hydraulic conductivity values and infiltration rates for the silty clay has been estimated to range from 1 x 10^{-9} to 1 x 10^{-7} m/sec and 7 to 26 mm/hr, respectively.

Based on the permeameter test investigation at the test hole locations, we have provided estimated infiltration rates to be encountered within the subsoils of the proposed infiltration system at the aforementioned site. Our estimated infiltration rates are listed below and presented in Drawing PG4315-2 - Estimated Infiltration Rate Plan attached to the current report.

- ❏ Area 1 - Estimated infiltration rate of **110 mm/hr**
- ❏ Area 2 - Estimated infiltration rate of **90 mm/hr**
- ❏ Area 3 - Estimated infiltration rate of **60 mm/hr**
- ❏ Area 4 - Estimated infiltration rate of **25 mm/hr** if silty clay is encountered at the invert elevation, otherwise **60 mm/hr**

The values measured within the test holes are generally consistent with similar material Paterson has encountered on other sites and typical values for brown silty sand and glacial till. These values typically range from 1 x 10^{-6} to 1 x 10^{-4} m/sec for silty sand and 1 x 10^{-8} to 1 x 10^{-6} m/sec for glacial till due to the variability of the material encountered.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

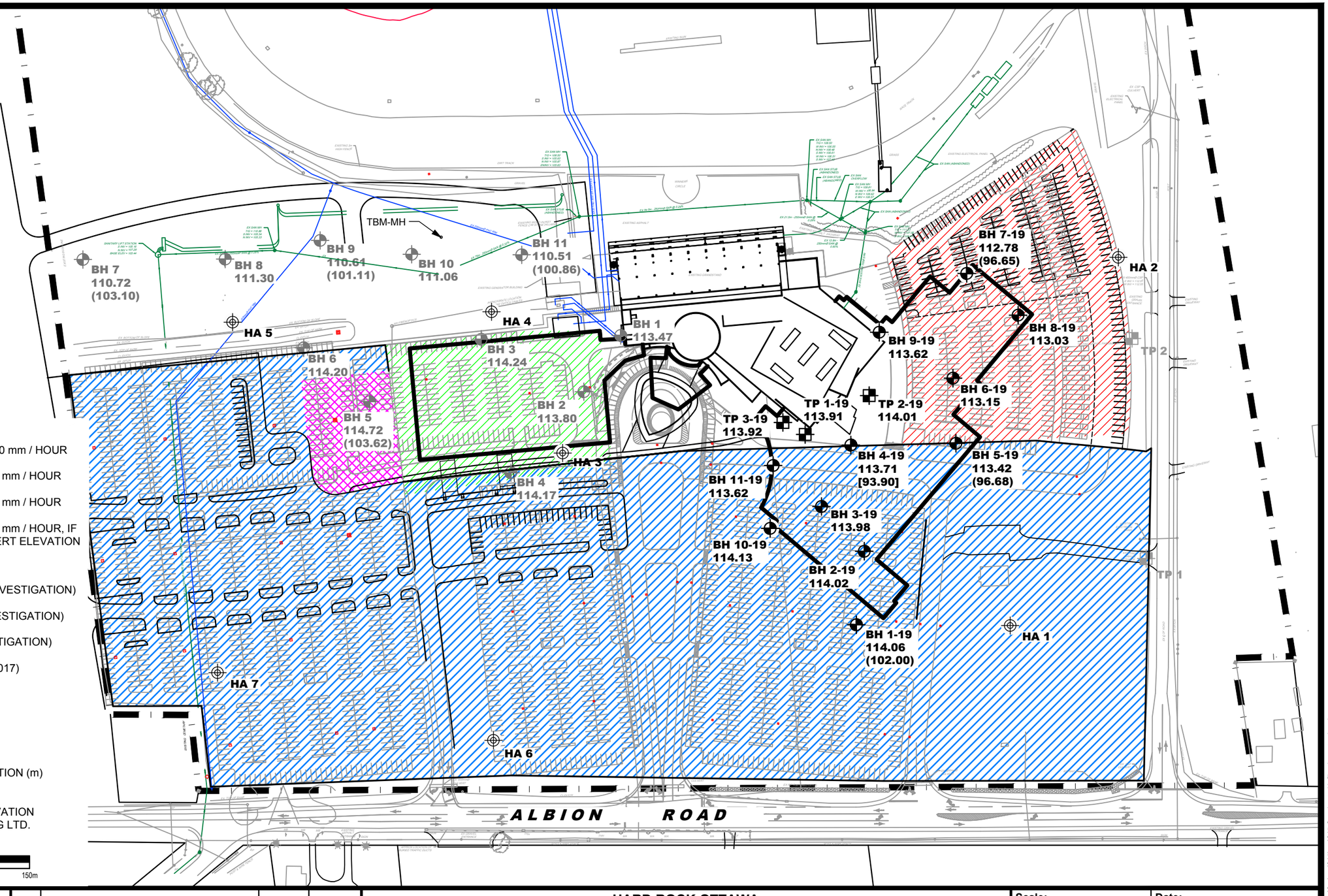


Nicholas Zulinski, P.Geo.

Michael S. Killam, P.Eng.

Attachments

- ❏ Drawing PG4315-2 - Estimated Infiltration Rate Plan



ESTIMATED INFILTRATION RATE:

- ESTIMATED INFILTRATION RATE OF 110 mm / HOUR
- ESTIMATED INFILTRATION RATE OF 90 mm / HOUR
- ESTIMATED INFILTRATION RATE OF 60 mm / HOUR
- ESTIMATED INFILTRATION RATE OF 25 mm / HOUR, IF SILTY CLAY IS ENCOUNTERED AT INVERT ELEVATION

LEGEND:

- HAND AUGER LOCATION (CURRENT INVESTIGATION)
- BOREHOLE LOCATION (CURRENT INVESTIGATION)
- TEST PIT LOCATION (CURRENT INVESTIGATION)
- BOREHOLE LOCATION (NOVEMBER, 2017)
- TEST PIT LOCATION (AUGUST, 2018)
- 114.06 GROUND SURFACE ELEVATION (m)
- [93.90] BEDROCK SURFACE ELEVATION (m)
- (102.0) PRACTICAL REFUSAL TO DCPT ELEVATION (m)

TBM - TOP OF MANHOLE COVER . GEODETIC ELEVATION =112.16m. PROVIDED BY NOVATECH ENGINEERING LTD.

SCALE: 1:2000

0 25 50 75 100 125 150m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

HARD ROCK OTTAWA

PERMEAMETER TEST INVESTIGATION
PROPOSED BUILDING EXPANSION - 4837 ALBION ROAD

OTTAWA, ONTARIO

Title:

ESTIMATED INFILTRATION RATE PLAN

Scale: 1:2000	Date: 11/2017
Drawn by: YA	Report No.: PG4315-1
Checked by: NZ	Dwg. No.: PG4315-2
Approved by: DJG	Revision No.: 0

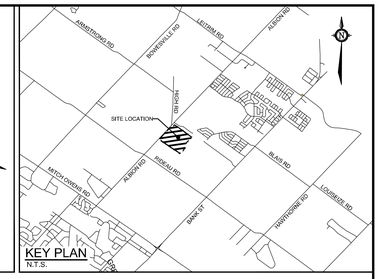
p:\autocad drawings\geotechnical\pg4xxx\pg4315\pg4315-2-estimated infiltration rate plan.dwg

Appendix D

Stormwater Management Modeling

NORTH

KEY PLAN
N.T.S.



LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER AND MANHOLE
- DIRECTION OF FLOW
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- STM MH — EXISTING STORM MANHOLE & SEWER
- CB 1 — EXISTING CATCHBASIN
- STORM SEWER DRAINAGE AREA BOUNDARY
- 100YR PONDING LIMITS
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha) / DRAINAGE AREA ID / RUNOFF COEFFICIENT

WATTS ACCUTROL RD-100-A-ADJ ROOF DRAIN TABLE		
ROOF AREA ID	ROOF DRAIN ID	WEIR SETTING
R-1	RD1 - RD4	3/4 Open
R-2	RD5 - RD7	3/4 Open
R-3	RD8 - RD12	3/4 Open
R-4	RD13 - RD16	N/A
R-5	RD17 - RD24	N/A
R-6	RD25 - RD27	N/A
R-7	RD28 - RD30	N/A

TEMPEST INLET CONTROL DEVICE TABLE			
		100-YR EVENT	
STRUCTURE ID	TEMPEST ICD MODEL	Release Rate (L/s)	Head (m)
EX-CB117	HF-77	14.3	1.47
EX-CB134	HF-85	19.6	1.84
EX-CB137	HF-137	46.9	1.58
EX-CB14	HF-130	57.5	2.89
EX-CB60	HF-110	31.5	1.70
EX-CB64	LMF-100	10.9	1.51
EX-CB72	LMF-100	11.6	1.70
EX-CB82	HF-202	96.3	1.39
EX-CB84	HF-118	35.5	1.66
EX-MH105	HF-199	121.7	2.40
EX-MH112	HF-218	116.9	1.53
PR-CB10	LMF-80	6.5	1.51
PR-CB13	LMF-85	8.0	1.58
PR-CB14	LMF-85	7.4	1.60
PR-CB16/17	HF-202	96.6	1.41
PR-CB18	LMF-95	9.0	1.43
PR-CB29	LMF-100	10.5	1.44
PR-CB32	LMF-85	8.9	2.05
PR-CB33	No ICD	15.7	0.14
PR-CB36	LMF-80	4.2	0.73
PR-CBMH104	LMF-85	6.1	1.34
PR-CBMH105	LMF-85	6.1	1.35
PR-CBMH106	LMF-85	6.2	1.38
PR-CBMH107	LMF-85	7.8	1.52
PR-CBMH108	LMF-95	6.4	1.49
PR-CBMH109	LMF-95	9.4	1.60
PR-CBMH110	LMF-85	8.4	1.73
PR-CBMH111	LMF-72	14.3	1.93
PR-CBMH112	LMF-72	14.7	2.03
PR-CBMH114	LMF-95	10.8	2.02
PR-CBMH115	LMF-95	10.5	1.94
PR-CBMH118	LMF-100	11.3	1.65
PR-MH100	LMF-105	10.1	1.40
PR-TD01	HF-105	13.0	0.40

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	APRIL 24/20	CJR
1	ISSUED FOR SITE PLAN APPROVAL	NOV 20/19	CJR

SCALE 1:750

1:750
0 10 20 30

DESIGN MJH
CHECKED CJR
DRAWN MJH
CHECKED CJR
APPROVED JLS

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
4837 ALBION ROAD, CITY OF OTTAWA
HARD ROCK OTTAWA

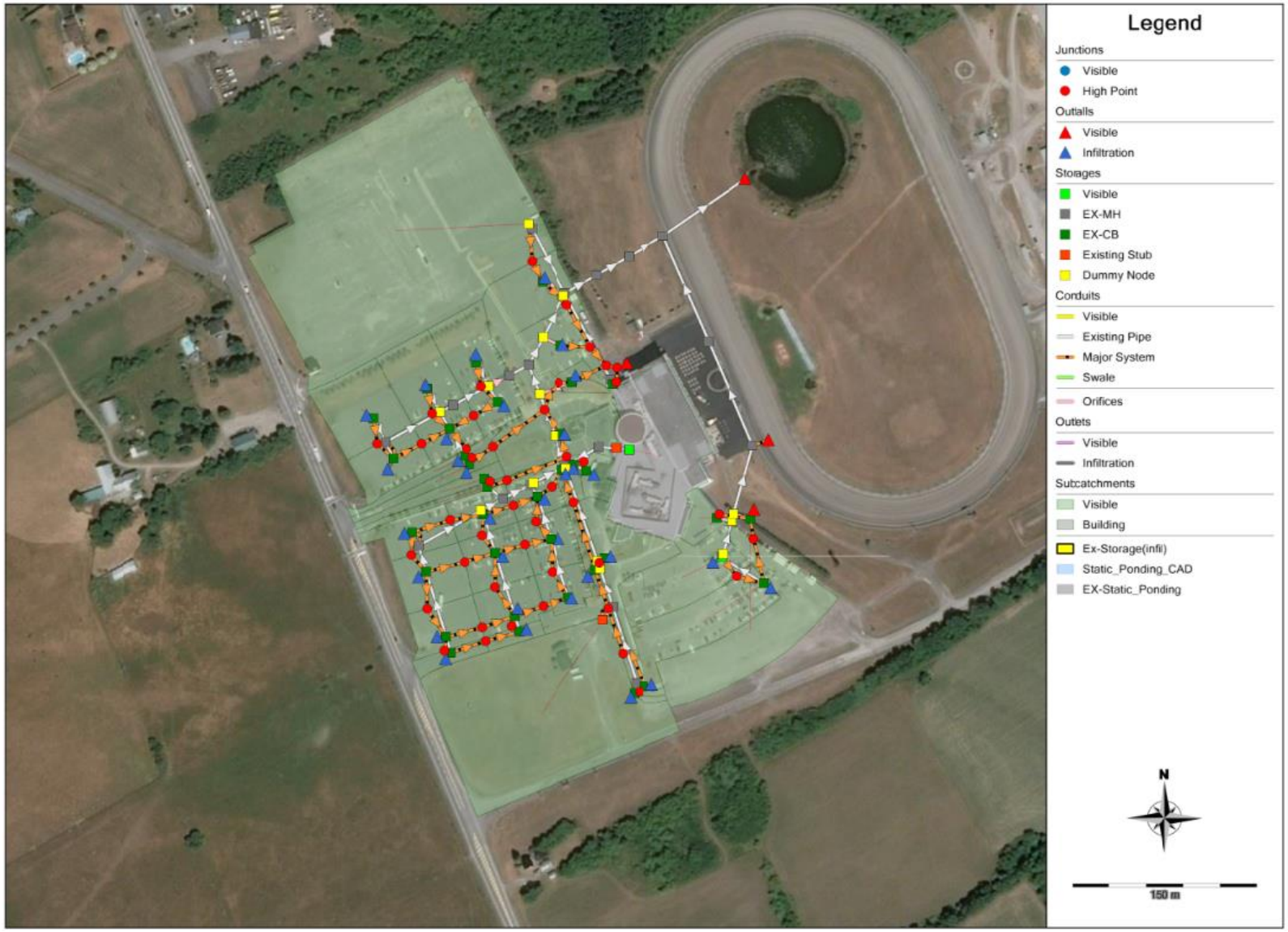
DRAWING NAME
STORMWATER MANAGEMENT
DRAINAGE AREA PLAN

PROJECT No. 116111
REV REV # 1
DRAWING No. 116111-SWM

M:\2019\116111\CAD\Design\116111-SWM.dwg, SWM, Apr 25, 2020 - 9:05pm, mhancock

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Schematics - Existing

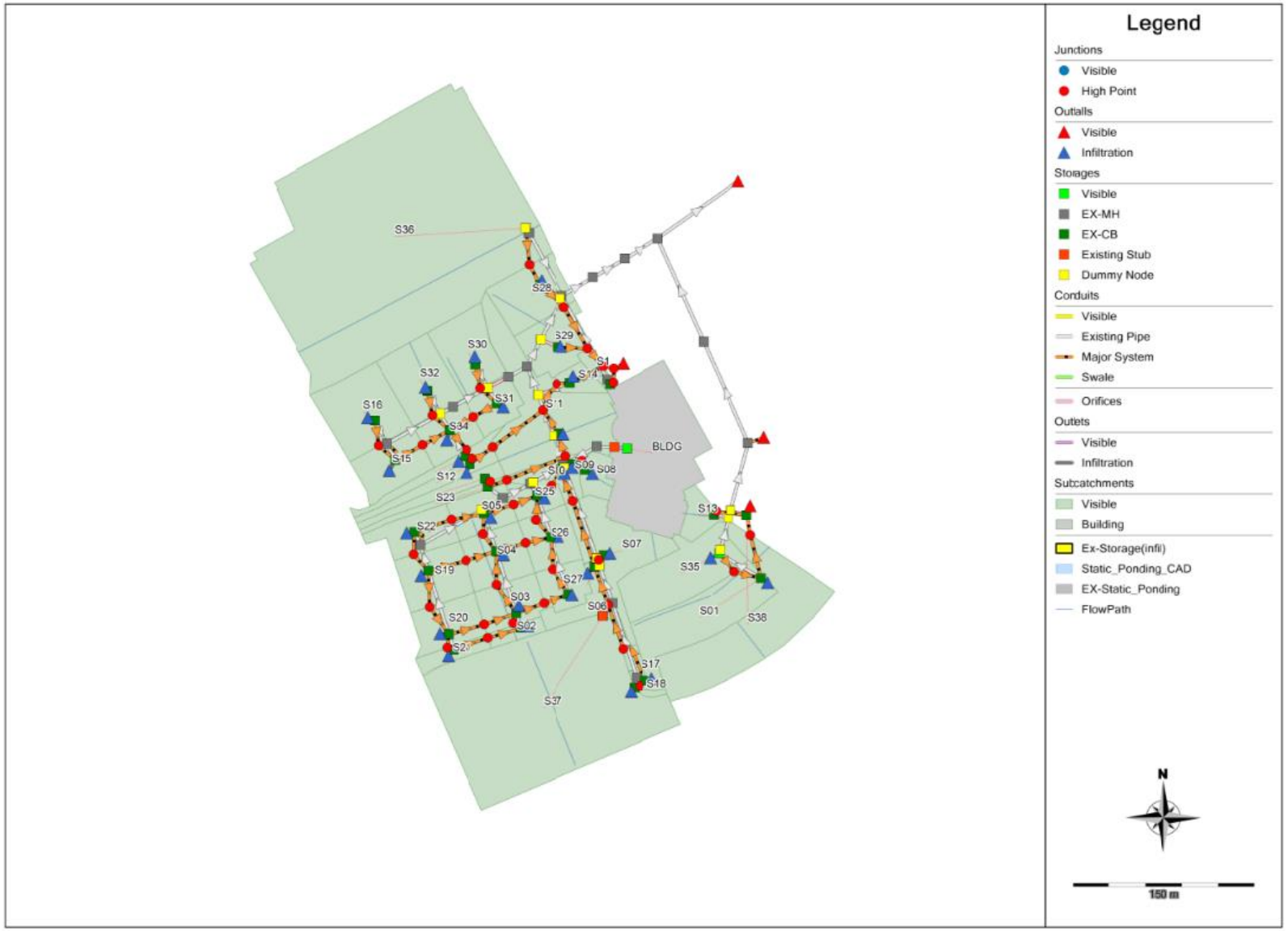
Overall Model Schematic



Date: 2020-04-23
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\116111-PCSWMM Model Schematics - Existing.docx

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Schematics - Existing

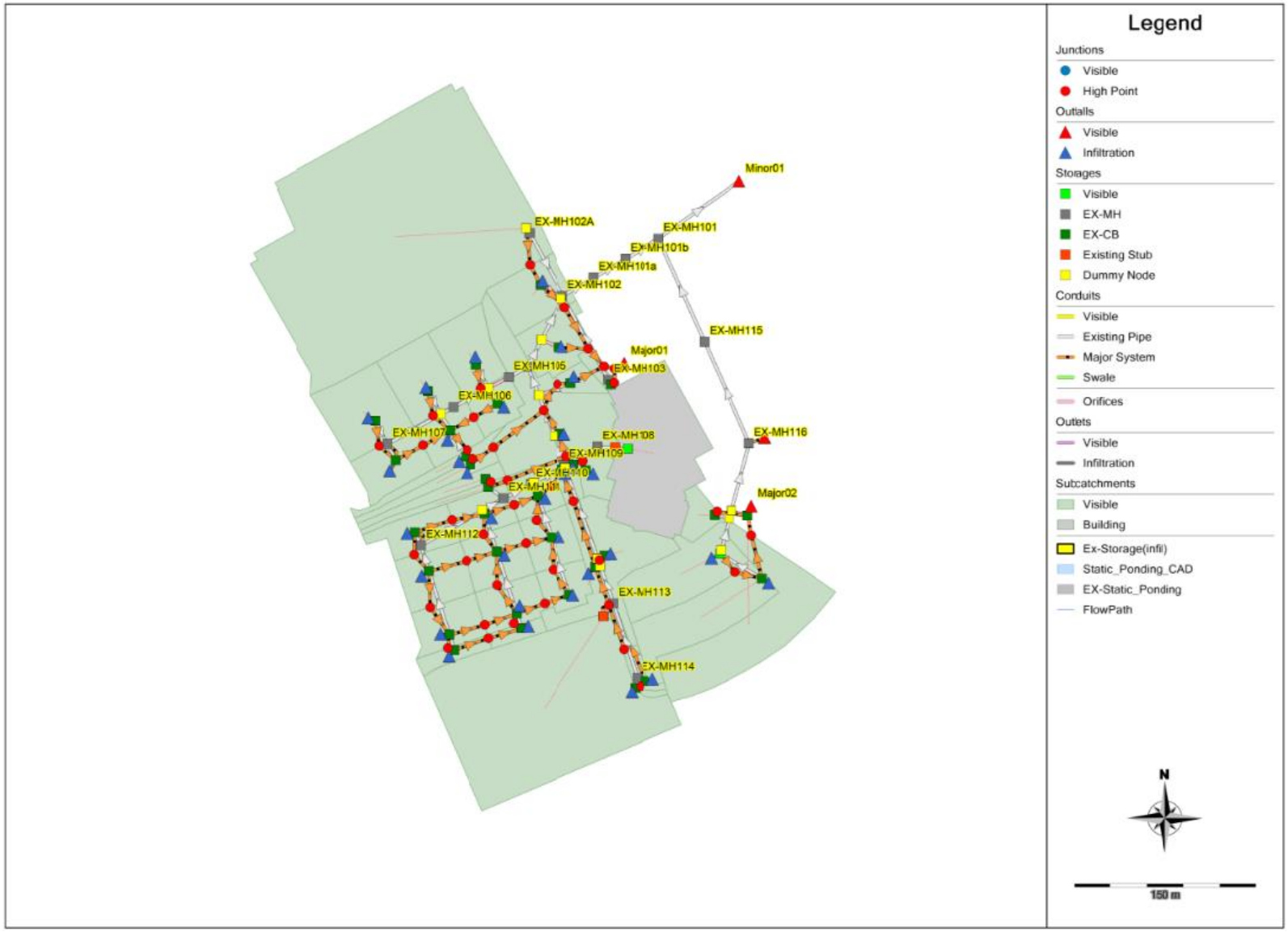
Subcatchments and Flow Paths



Date: 2020-04-23
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\116111-PCSWMM Model Schematics - Existing.docx

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Schematics - Existing

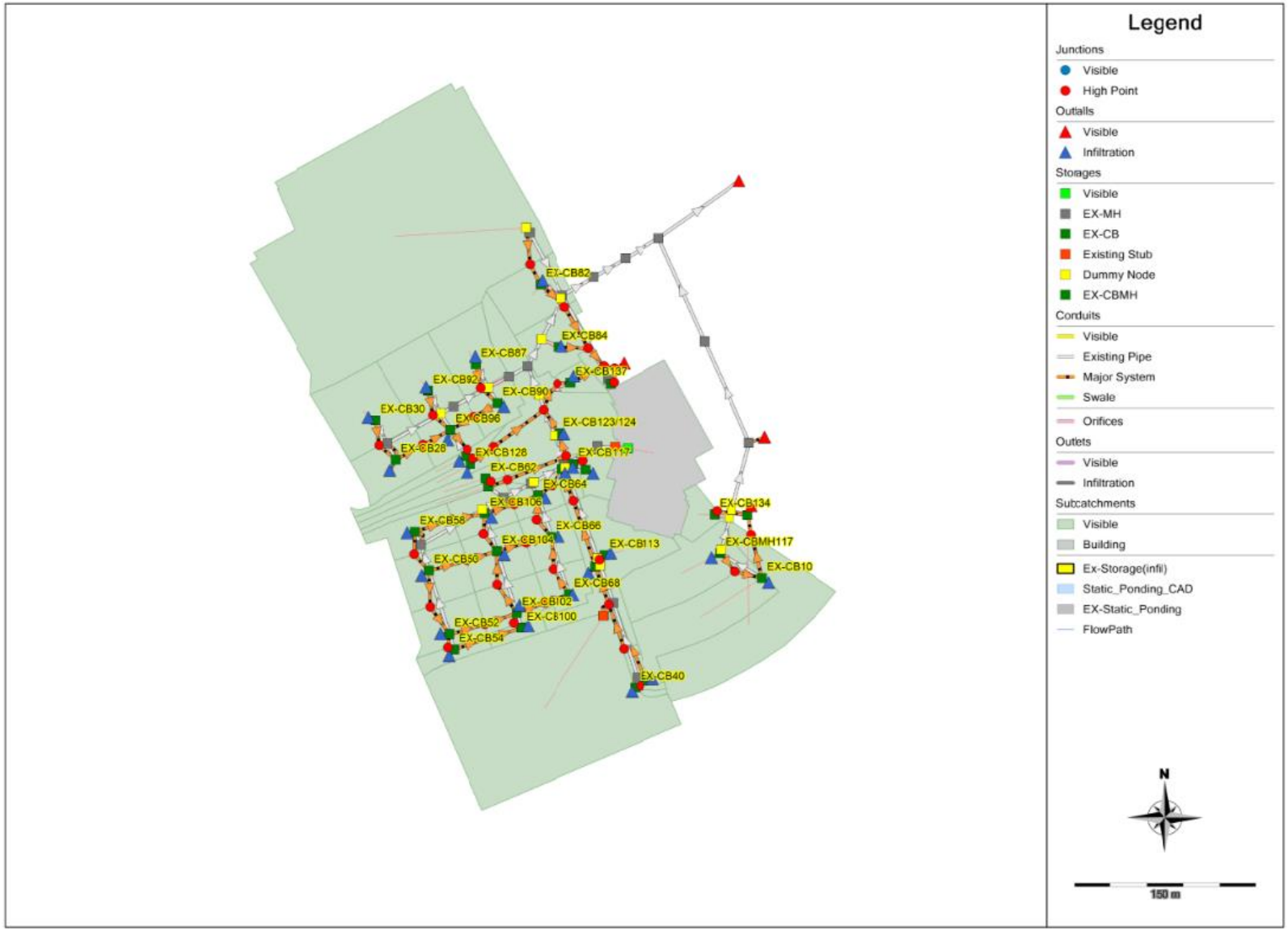
Manholes and Outfalls



Date: 2020-04-23
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\116111-PCSWMM Model Schematics - Existing.docx

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Schematics - Existing

Catchbasins



Date: 2020-04-23
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\116111-PCSWMM Model Schematics - Existing.docx

4837 Albion Road - Hard Rock Ottawa (116111)
Subcatchment Parameters - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

Area ID	Catchment Area (ha)	Runoff Coefficient	Percent Impervious (%)	Zero Impervious (%)	Equivalent Width (m)	Flow Length (m)	Average Slope (%)
BLDG	0.864	0.90	100	100	66.5	130.0	1.5
S01	0.450	0.90	100	0	162.0	27.8	1.5
S02	0.060	0.90	100	0	120.0	5.0	1.5
S03	0.180	0.90	100	0	180.0	10.0	1.5
S04	0.220	0.90	100	0	200.0	11.0	1.5
S05	0.170	0.90	100	0	188.9	9.0	1.5
S06	0.210	0.90	100	0	350.0	6.0	1.5
S07	0.300	0.90	100	0	282.3	10.6	1.5
S08	0.090	0.90	100	0	90.0	10.0	1.5
S09	0.040	0.90	100	0	80.0	5.0	1.5
S1	0.040	0.90	100	0	4.0	100.0	1.5
S10	0.080	0.90	100	0	88.9	9.0	1.5
S11	0.700	0.90	100	0	145.8	48.0	1.5
S12	0.100	0.90	100	0	200.0	5.0	1.5
S13	0.100	0.90	100	0	40.0	25.0	1.5
S14	0.090	0.90	100	0	52.9	17.0	1.5
S15	0.230	0.90	100	0	115.0	20.0	1.5
S16	0.380	0.62	60	0	152.0	25.0	1.5
S17	0.030	0.90	100	0	60.0	5.0	1.5
S18	0.030	0.90	100	0	60.0	5.0	1.5
S19	0.250	0.90	100	0	192.3	13.0	1.5
S20	0.200	0.90	100	0	181.8	11.0	1.5
S21	0.080	0.90	100	0	160.0	5.0	1.5
S22	0.190	0.90	100	0	190.0	10.0	1.5
S23	0.070	0.90	100	0	140.0	5.0	1.5
S24	0.110	0.90	100	0	220.0	5.0	1.5
S25	0.110	0.90	100	0	220.0	5.0	1.5
S26	0.190	0.90	100	0	190.0	10.0	1.5
S27	0.140	0.90	100	0	200.0	7.0	1.5
S28	0.270	0.90	100	0	100.0	27.0	1.5
S29	0.230	0.90	100	0	95.8	24.0	1.5
S30	0.280	0.62	60	0	112.0	25.0	1.5
S31	0.140	0.90	100	0	70.0	20.0	1.5
S32	0.290	0.62	60	0	116.0	25.0	1.5
S33	0.100	0.90	100	0	200.0	5.0	1.5
S34	0.180	0.90	100	0	90.0	20.0	1.5
S35	0.420	0.90	100	0	165.5	25.4	1.5
S36	3.520	0.80	86	0	167.6	210.0	1.5
S37	1.910	0.34	20	0	176.9	108.0	1.5
S38	0.740	0.65	65	0	234.6	31.5	1.5
Total	**13.78**	**0.76**	**81**	-	-	-	-

4837 Albion Road - Hard Rock Ottawa (116111)
Underground and Surface Storage Provided - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	STM ID	Drainage Area (ha)	Elevations (m)			Depths (m)			Provided Storage (m^3)		
			Invert	RIM	Ponding	CB	Ponding	Total	UG	Surface[1]	Total
EX-CB10	S01	0.45	111.51	112.61	112.77	1.10	0.16	1.26	6.8	44.4	51.2
EX-CB100	S02	0.06	112.77	113.72	113.95	0.95	0.23	1.18	6.8	0.0	6.8
EX-CB102	S03	0.18	112.69	113.63	113.89	0.94	0.26	1.20	6.8	63.4	70.2
EX-CB104	S04	0.22	112.40	113.67	114.06	1.27	0.39	1.66	6.8	263.4	270.2
EX-CB106	S05	0.17	112.31	113.71	114.00	1.40	0.29	1.69	6.8	111.2	118.0
EX-CB110	S06	0.21	112.00	113.24	113.50	1.24	0.26	1.50	6.8	72.3	79.1
EX-CB113	S07	0.30	112.00	113.26	113.50	1.26	0.24	1.50	6.8	66.8	73.6
EX-CB116	S08	0.09	112.99	113.42	113.61	0.43	0.19	0.62	6.8	37.2	44.0
EX-CB117	S09	0.04	112.09	113.45	113.61	1.36	0.16	1.52	6.8	31.3	38.1
EX-CB121	S10	0.08	112.15	113.41	113.61	1.26	0.20	1.46	6.8	39.2	46.0
EX-CB123/124	S11	0.70	111.80	113.36	113.61	1.56	0.25	1.81	13.6	48.9	62.5
EX-CB128	S12	0.10	112.51	113.71	113.96	1.20	0.25	1.45	6.8	37.3	44.1
EX-CB132	S38	0.74	108.88	111.31	112.61	2.43	1.30	3.73	-	0.0	0.0
EX-CB134	S13	0.10	111.60	113.36	113.51	1.76	0.15	1.91	-	7.9	7.9
EX-CB137	S14	0.09	112.00	113.41	113.60	1.41	0.19	1.60	6.8	9.5	16.3
EX-CB28	S15	0.23	112.43	113.65	114.00	1.22	0.35	1.57	6.8	230.3	237.1
EX-CB30	S16	0.38	112.50	113.69	114.00	1.19	0.31	1.50	6.8	168.9	175.7
EX-CB38	S17	0.03	112.86	113.63	113.90	0.77	0.27	1.04	6.8	60.2	67.0
EX-CB40	S18	0.03	112.92	113.64	113.90	0.72	0.26	0.98	6.8	58.0	64.8
EX-CB50	S19	0.25	112.32	113.71	114.00	1.39	0.29	1.68	6.8	164.2	171.0
EX-CB52	S20	0.20	112.44	113.71	113.98	1.27	0.27	1.54	6.8	149.2	156.0
EX-CB54	S21	0.08	112.52	113.83	113.83	1.31	0.00	1.31	6.8	0.0	6.8
EX-CB58	S22	0.19	112.44	113.73	114.00	1.29	0.27	1.56	6.8	118.8	125.6
EX-CB60	S23	0.07	112.15	113.73	113.96	1.58	0.23	1.81	-	36.6	36.6
EX-CB62	S24	0.11	112.64	113.76	113.96	1.12	0.20	1.32	-	31.8	31.8
EX-CB64	S25	0.11	112.10	113.73	113.98	1.63	0.25	1.88	6.8	86.5	93.3
EX-CB66	S26	0.19	112.37	113.66	114.04	1.29	0.38	1.67	6.8	225.8	232.6
EX-CB68	S27	0.14	112.57	113.72	114.00	1.15	0.28	1.43	6.8	102.1	108.9
EX-CB82	S28	0.27	112.62	113.84	114.05	1.22	0.21	1.43	6.8	78.7	85.5
EX-CB84	S29	0.23	112.12	113.65	114.01	1.53	0.36	1.89	6.8	156.5	163.3
EX-CB87	S30	0.28	112.50	113.68	113.95	1.18	0.27	1.45	6.8	124.3	131.1
EX-CB90	S31	0.14	112.51	113.79	113.95	1.28	0.16	1.44	6.8	91.5	98.3
EX-CB92	S32	0.29	112.49	113.67	113.95	1.18	0.28	1.46	6.8	110.7	117.5
EX-CB95	S33	0.10	112.45	113.67	113.96	1.22	0.29	1.51	6.8	43.3	50.1
EX-CB96	S34	0.18	112.22	113.62	113.95	1.40	0.33	1.73	6.8	211.8	218.6
EX-CBMH117	S35	0.42	111.26	112.74	112.85	1.48	0.11	1.59	6.8	39.3	46.1
EX-MH102Aa	S36	3.52	112.42	114.16	114.31	1.74	0.15	1.89	6.8	0.0	6.8
TOTAL		**10.97**		**-**			**-**		**231.2**	**3121.3**	**3352.5**

[1] *Based on existing 1:1000 topographic mapping product from the City of Ottawa survey.*

[2] *Based on storage indicated in 1999 Stormwater Management Report (Trow, 1999); 10x chambers providing total of 6.8 m^3.*

4837 Albion Road - Hard Rock Ottawa (116111)
Underground and Surface Storage Provided - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

Storage Provided by StormTech STC-740 Chambers		System Length (m)[1]	
Number	Storage (m^3)[1]	1 Row	2 Rows
1	2.1	3.27	3.27
2	4.2	5.44	3.27
3	6.3	7.61	5.44
4	8.4	9.78	5.44
5	10.6	11.95	7.61
6	12.7	14.12	7.61
7	14.8	16.29	9.78
8	16.9	18.46	9.78
9	19.0	20.63	11.95
10	21.2	22.80	11.95
11	23.3	24.97	14.12
12	25.4	27.14	14.12
13	27.5	29.31	16.29
14	29.6	31.48	16.29
15	31.8	33.65	18.46
16	33.9	35.82	18.46
17	36.0	37.99	20.63
18	38.1	40.16	20.63
19	40.2	42.33	22.80
20	42.4	44.50	22.80
21	44.5	46.67	24.97
22	46.6	48.84	24.97
23	48.7	51.01	27.14
24	50.8	53.18	27.14
25	53.0	55.35	29.31
26	55.1	57.52	29.31
27	57.2	59.69	31.48
28	59.3	61.86	31.48
30	63.6	66.20	33.65
40	84.8	87.90	44.50
50	106.0	109.60	55.35
EX-10	6.8	-	-

[1] *Based on Stormtech site calculator for SC-740 chambers*
- 150mm stone above chambers
- 40% void ratio for surrounding stone
- 1 row; Width = 1.90m
- 2 rows; Width = 3.35m
- Includes end caps

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB10	S01	6.8	44.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.10	0.00	0.0	7.0
1.26	555.00	44.4	51.4
1.27	0.00	2.8	54.1
2.10	0.00	0.0	54.1

EX-10x Infiltration Storage Chambers (6.8 m3)
0.16m Static Ponding Depth (44.4 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB100	S02	6.8	0.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
0.95	0.00	0.0	7.0
1.18	0.00	0.0	7.0
1.19	0.00	0.0	7.0
1.95	0.00	0.0	7.0

EX-10x Infiltration Storage Chambers (6.8 m3)
0.23m Static Ponding Depth (0 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB102	S03	6.8	63.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
0.94	0.00	0.0	7.0
1.20	487.69	63.4	70.4
1.21	0.00	2.4	72.8
1.94	0.00	0.0	72.8

EX-10x Infiltration Storage Chambers (6.8 m3)
0.26m Static Ponding Depth (63.4 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB104	**S04**	**6.8**	**263.4**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.27	0.00	0.0	7.0
1.66	1350.77	263.4	270.4
1.67	0.00	6.8	277.1
2.27	0.00	0.0	277.1

EX-10x Infiltration Storage Chambers (6.8 m3)
0.39m Static Ponding Depth (263.4 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB106	**S05**	**6.8**	**111.2**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.40	0.00	0.0	7.0
1.69	766.90	111.2	118.2
1.70	0.00	3.8	122.0
2.40	0.00	0.0	122.0

EX-10x Infiltration Storage Chambers (6.8 m3)
0.29m Static Ponding Depth (111.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB110	**S06**	**6.8**	**72.3**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.24	0.00	0.0	7.0
1.50	556.15	72.3	79.3
1.51	0.00	2.8	82.1
2.24	0.00	0.0	82.1

EX-10x Infiltration Storage Chambers (6.8 m3)
0.26m Static Ponding Depth (72.3 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB113	S07	6.8	66.8
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.26	0.00	0.0	7.0
1.50	556.67	66.8	73.8
1.51	0.00	2.8	76.6
2.26	0.00	0.0	76.6

EX-10x Infiltration Storage Chambers (6.8 m3)
0.24m Static Ponding Depth (66.8 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB116	S08	6.8	37.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
0.43	0.00	0.0	7.0
0.62	391.58	37.2	44.2
0.63	0.00	2.0	46.1
1.43	0.00	0.0	46.1

EX-10x Infiltration Storage Chambers (6.8 m3)
0.19m Static Ponding Depth (37.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB117	S09	6.8	31.3
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.36	0.00	0.0	7.0
1.52	391.25	31.3	38.3
1.53	0.00	2.0	40.2
2.36	0.00	0.0	40.2

EX-10x Infiltration Storage Chambers (6.8 m3)
0.16m Static Ponding Depth (31.3 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB121	S10	6.8	39.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.26	0.00	0.0	7.0
1.46	392.00	39.2	46.2
1.47	0.00	2.0	48.1
2.26	0.00	0.0	48.1

EX-10x Infiltration Storage Chambers (6.8 m3)
0.2m Static Ponding Depth (39.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB123/124	S11	13.6	48.9
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	68.00	13.6	13.6
0.41	0.00	0.3	13.9
1.56	0.00	0.0	13.9
1.81	391.20	48.9	62.8
1.82	0.00	2.0	64.8
2.56	0.00	0.0	64.8

EX-10 (x2)x Infiltration Storage Chambers (13.6 m3)
0.25m Static Ponding Depth (48.9 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB128	S12	6.8	37.3
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.20	0.00	0.0	7.0
1.45	298.40	37.3	44.3
1.46	0.00	1.5	45.8
2.20	0.00	0.0	45.8

EX-10x Infiltration Storage Chambers (6.8 m3)
0.25m Static Ponding Depth (37.3 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB132	S38	0.0	0.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
2.43	0.00	0.0	0.0
3.73	0.00	0.0	0.0
3.74	0.00	0.0	0.0
3.43	0.00	0.0	0.0

-x Infiltration Storage Chambers (- m3)
1.3m Static Ponding Depth (0 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB134	S13	0.0	7.9
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
1.76	0.00	0.0	0.0
1.91	105.33	7.9	7.9
1.92	0.00	0.5	8.4
2.76	0.00	0.0	8.4

-x Infiltration Storage Chambers (- m3)
0.15m Static Ponding Depth (7.9 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB137	S14	6.8	9.5
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.41	0.00	0.0	7.0
1.60	100.00	9.5	16.5
1.61	0.00	0.5	17.0
2.41	0.00	0.0	17.0

EX-10x Infiltration Storage Chambers (6.8 m3)
0.19m Static Ponding Depth (9.5 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB28	**S15**	**6.8**	**230.3**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.22	0.00	0.0	7.0
1.57	1316.00	230.3	237.3
1.58	0.00	6.6	243.9
2.22	0.00	0.0	243.9

EX-10x Infiltration Storage Chambers (6.8 m3)
0.35m Static Ponding Depth (230.3 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB30	**S16**	**6.8**	**168.9**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.19	0.00	0.0	7.0
1.50	1089.68	168.9	175.9
1.51	0.00	5.4	181.3
2.19	0.00	0.0	181.3

EX-10x Infiltration Storage Chambers (6.8 m3)
0.31m Static Ponding Depth (168.9 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB38	**S17**	**6.8**	**60.2**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
0.77	0.00	0.0	7.0
1.04	445.93	60.2	67.2
1.05	0.00	2.2	69.4
1.77	0.00	0.0	69.4

EX-10x Infiltration Storage Chambers (6.8 m3)
0.27m Static Ponding Depth (60.2 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB40	**S18**	**6.8**	**58.0**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
0.72	0.00	0.0	7.0
0.98	446.15	58.0	65.0
0.99	0.00	2.2	67.2
1.72	0.00	0.0	67.2

EX-10x Infiltration Storage Chambers (6.8 m3)
0.26m Static Ponding Depth (58 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB50	**S19**	**6.8**	**164.2**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.39	0.00	0.0	7.0
1.68	1132.41	164.2	171.2
1.69	0.00	5.7	176.8
2.39	0.00	0.0	176.8

EX-10x Infiltration Storage Chambers (6.8 m3)
0.29m Static Ponding Depth (164.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB52	**S20**	**6.8**	**149.2**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.27	0.00	0.0	7.0
1.54	1105.19	149.2	156.2
1.55	0.00	5.5	161.7
2.27	0.00	0.0	161.7

EX-10x Infiltration Storage Chambers (6.8 m3)
0.27m Static Ponding Depth (149.2 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB54	**S21**	**6.8**	**0.0**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.31	0.00	0.0	7.0
1.31	0.00	0.0	7.0
1.32	0.00	0.0	7.0
2.31	0.00	0.0	7.0

EX-10x Infiltration Storage Chambers (6.8 m3)
0m Static Ponding Depth (0 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB58	**S22**	**6.8**	**118.8**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.29	0.00	0.0	7.0
1.56	880.00	118.8	125.8
1.57	0.00	4.4	130.2
2.29	0.00	0.0	130.2

EX-10x Infiltration Storage Chambers (6.8 m3)
0.27m Static Ponding Depth (118.8 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB60	**S23**	**0.0**	**36.6**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
1.58	0.00	0.0	0.0
1.81	318.26	36.6	36.6
1.82	0.00	1.6	38.2
2.58	0.00	0.0	38.2

-x Stormtech STC-740 Storage Chambers (- m3)
0.23m Static Ponding Depth (36.6 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB62	**S24**	**0.0**	**31.8**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
1.12	0.00	0.0	0.0
1.32	318.00	31.8	31.8
1.33	0.00	1.6	33.4
2.12	0.00	0.0	33.4

-x Stormtech STC-740 Storage Chambers (- m3)
0.2m Static Ponding Depth (31.8 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB64	**S25**	**6.8**	**86.5**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.63	0.00	0.0	7.0
1.88	692.00	86.5	93.5
1.89	0.00	3.5	96.9
2.63	0.00	0.0	96.9

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.25m Static Ponding Depth (86.5 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB66	**S26**	**6.8**	**225.8**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.29	0.00	0.0	7.0
1.67	1188.42	225.8	232.8
1.68	0.00	5.9	238.7
2.29	0.00	0.0	238.7

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.38m Static Ponding Depth (225.8 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB68	**S27**	**6.8**	**102.1**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.15	0.00	0.0	7.0
1.43	729.29	102.1	109.1
1.44	0.00	3.6	112.7
2.15	0.00	0.0	112.7

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.28m Static Ponding Depth (102.1 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB82	**S28**	**6.8**	**78.7**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.22	0.00	0.0	7.0
1.43	749.52	78.7	85.7
1.44	0.00	3.7	89.4
2.22	0.00	0.0	89.4

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.21m Static Ponding Depth (78.7 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB84	**S29**	**6.8**	**156.5**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.53	0.00	0.0	7.0
1.89	869.44	156.5	163.5
1.90	0.00	4.3	167.8
2.53	0.00	0.0	167.8

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.36m Static Ponding Depth (156.5 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB87	**S30**	**6.8**	**124.3**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.18	0.00	0.0	7.0
1.45	920.74	124.3	131.3
1.46	0.00	4.6	135.9
2.18	0.00	0.0	135.9

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.27m Static Ponding Depth (124.3 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB90	**S31**	**6.8**	**91.5**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.28	0.00	0.0	7.0
1.44	1143.75	91.5	98.5
1.45	0.00	5.7	104.2
2.28	0.00	0.0	104.2

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.16m Static Ponding Depth (91.5 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB92	**S32**	**6.8**	**110.7**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.18	0.00	0.0	7.0
1.46	790.71	110.7	117.7
1.47	0.00	4.0	121.6
2.18	0.00	0.0	121.6

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.28m Static Ponding Depth (110.7 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Existing Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB95	S33	6.8	43.3
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.22	0.00	0.0	7.0
1.51	298.62	43.3	50.3
1.52	0.00	1.5	51.8
2.22	0.00	0.0	51.8

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.29m Static Ponding Depth (43.3 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB96	S34	6.8	211.8
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.40	0.00	0.0	7.0
1.73	1283.64	211.8	218.8
1.74	0.00	6.4	225.2
2.40	0.00	0.0	225.2

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.33m Static Ponding Depth (211.8 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CBMH117	S35	6.8	39.3
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.48	0.00	0.0	7.0
1.59	714.55	39.3	46.3
1.60	0.00	3.6	49.8
2.48	0.00	0.0	49.8

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.11m Static Ponding Depth (39.3 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-MH102Aa	S36	6.8	0.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.74	0.00	0.0	7.0
1.89	0.00	0.0	7.0
1.90	0.00	0.0	7.0
2.74	0.00	0.0	7.0

EX-10x Stormtech STC-740 Storage Chambers (6.8 m3)
0.15m Static Ponding Depth (0 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Results - Existing Conditions (ICDs)

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	PCSWMM Orifice Dia. (mm)	Release Rate (L/s)[1]				Head (m)[1]			
		2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)
EX-CB110	70	11.3	11.5	13.2	13.3	1.40	1.46	1.92	1.97
EX-CB113	70	11.3	11.5	13.4	13.5	1.40	1.46	1.96	2.00
EX-CB117	70	12.5	12.7	14.1	14.2	1.47	1.52	1.87	1.91
EX-CB121	70	12.2	12.7	13.9	14.1	1.42	1.53	1.82	1.87
EX-CB123/124	80	17.8	18.6	19.5	19.7	1.76	1.91	2.10	2.14
EX-CB132	80	21.2	21.3	21.9	22.1	2.78	2.81	2.95	2.99
EX-CB134	83	19.3	19.7	20.0	20.1	1.78	1.85	1.92	1.92
EX-CB137	80	17.1	17.2	18.4	18.4	1.62	1.65	1.88	1.87
EX-CB14	140	109.3	110.9	115.4	117.8	1.82	1.87	2.05	2.15
EX-CB38	70	4.1	4.8	6.1	9.4	0.19	0.25	0.38	0.85
EX-CB40	70	4.1	4.8	6.1	8.8	0.19	0.25	0.38	0.76
EX-CB72	65	7.1	9.5	13.1	13.1	0.65	1.15	2.15	2.16
EX-CB82	83	18.1	18.4	18.9	19.0	1.57	1.62	1.71	1.73
EX-CB84	80	18.1	19.0	19.9	20.0	1.82	1.99	2.19	2.21
EX-CBMH117	83	18.0	18.3	18.6	18.7	1.57	1.62	1.68	1.69
EX-MH106a	83	21.3	21.5	22.0	22.2	2.16	2.21	2.30	2.35
EX-MH110	83	18.9	19.1	19.6	19.7	1.74	1.78	1.87	1.89
EX-STM43	140	35.6	41.9	49.7	49.8	0.80	1.09	1.50	1.51

[1] *3-hour Chicago Storm.*

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Results - Existing Conditions (Ponding)

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	Invert Elev. (m)	Rim Elev. (m)	Spill Elev. (m)	Ponding Depth (m)	HGL Elev. (m)[1]				Ponding Depth (m)				Spill Depth (m)			
					2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)
EX-CB10	111.51	113.24	113.50	0.26	112.81	112.84	112.90	112.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX-CB100	112.77	113.26	113.50	0.24	113.83	113.88	113.98	114.01	0.57	0.62	0.72	0.75	0.33	0.38	0.48	0.51
EX-CB102	112.69	113.42	113.61	0.19	113.83	113.88	113.98	114.01	0.41	0.46	0.56	0.59	0.22	0.27	0.37	0.40
EX-CB104	112.40	113.45	113.61	0.16	113.83	113.88	113.97	114.00	0.38	0.43	0.52	0.55	0.22	0.27	0.36	0.39
EX-CB106	112.31	113.41	113.61	0.20	113.83	113.87	113.96	113.99	0.42	0.46	0.55	0.58	0.22	0.26	0.35	0.38
EX-CB110	112.00	113.36	113.61	0.25	113.40	113.46	113.92	113.97	0.04	0.10	0.56	0.61	0.00	0.00	0.31	0.36
EX-CB113	112.00	113.71	113.96	0.25	113.40	113.46	113.96	114.00	0.00	0.00	0.25	0.29	0.00	0.00	0.00	0.04
EX-CB116	112.99	111.31	112.61	1.30	113.56	113.62	113.95	114.00	2.25	2.31	2.64	2.69	0.95	1.01	1.34	1.39
EX-CB117	112.09	113.36	113.51	0.15	113.56	113.61	113.96	114.00	0.20	0.25	0.60	0.64	0.05	0.10	0.45	0.49
EX-CB121	112.15	113.41	113.60	0.19	113.57	113.68	113.97	114.02	0.16	0.27	0.56	0.61	0.00	0.08	0.37	0.42
EX-CB123/124	111.80	113.65	114.00	0.35	113.56	113.71	113.90	113.94	0.00	0.06	0.25	0.29	0.00	0.00	0.00	0.00
EX-CB128	112.51	113.69	114.00	0.31	113.78	113.82	113.92	113.95	0.09	0.13	0.23	0.26	0.00	0.00	0.00	0.00
EX-CB132	108.88	113.63	113.90	0.27	111.66	111.69	111.83	111.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX-CB134	111.60	113.64	113.90	0.26	113.38	113.45	113.52	113.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX-CB137	112.00	113.71	114.00	0.29	113.62	113.65	113.88	113.87	0.00	0.00	0.17	0.16	0.00	0.00	0.00	0.00
EX-CB28	112.43	113.71	113.98	0.27	113.78	113.83	113.92	113.96	0.07	0.12	0.21	0.25	0.00	0.00	0.00	0.00
EX-CB30	112.50	113.83	113.83	0.00	113.79	113.84	113.94	113.99	0.00	0.01	0.11	0.16	0.00	0.01	0.11	0.16
EX-CB38	112.86	113.73	114.00	0.27	113.05	113.11	113.24	113.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX-CB40	112.92	113.73	113.96	0.23	113.11	113.17	113.30	113.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX-CB50	112.32	113.76	113.96	0.20	113.84	113.88	113.97	114.00	0.08	0.12	0.21	0.24	0.00	0.00	0.01	0.04
EX-CB52	112.44	113.73	113.98	0.25	113.84	113.88	113.97	114.01	0.11	0.15	0.24	0.28	0.00	0.00	0.00	0.03
EX-CB54	112.52	113.66	114.04	0.38	113.84	113.88	113.99	114.01	0.18	0.22	0.33	0.35	0.00	0.00	0.00	0.00
EX-CB58	112.44	113.72	114.00	0.28	113.84	113.88	114.00	114.05	0.12	0.16	0.28	0.33	0.00	0.00	0.00	0.05

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Results - Existing Conditions (Ponding)

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	Invert Elev. (m)	Rim Elev. (m)	Spill Elev. (m)	Ponding Depth (m)	HGL Elev. (m)[1]				Ponding Depth (m)				Spill Depth (m)			
					2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)
EX-CB60	112.15	113.84	114.05	0.21	113.83	113.87	113.96	113.97	0.00	0.03	0.12	0.13	0.00	0.00	0.00	0.00
EX-CB62	112.64	113.65	114.01	0.36	113.83	113.87	113.96	113.97	0.18	0.22	0.31	0.32	0.00	0.00	0.00	0.00
EX-CB64	112.10	113.68	113.95	0.27	113.82	113.86	113.95	113.97	0.14	0.18	0.27	0.29	0.00	0.00	0.00	0.02
EX-CB66	112.37	113.79	113.95	0.16	113.82	113.86	113.95	113.98	0.03	0.07	0.16	0.19	0.00	0.00	0.00	0.03
EX-CB68	112.57	113.67	113.95	0.28	113.82	113.86	113.95	113.98	0.15	0.19	0.28	0.31	0.00	0.00	0.00	0.03
EX-CB82	112.62	113.67	113.96	0.29	114.19	114.24	114.33	114.35	0.52	0.57	0.66	0.68	0.23	0.28	0.37	0.39
EX-CB84	112.12	113.62	113.95	0.33	113.94	114.11	114.31	114.33	0.32	0.49	0.69	0.71	0.00	0.16	0.36	0.38
EX-CB87	112.50	112.74	112.85	0.11	113.77	113.82	113.91	113.94	1.03	1.08	1.17	1.20	0.92	0.97	1.06	1.09
EX-CB90	112.51	114.16	114.31	0.15	113.81	113.84	113.91	113.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX-CB92	112.49	113.45	113.75	0.30	113.78	113.83	113.92	113.95	0.33	0.38	0.47	0.50	0.03	0.08	0.17	0.20
EX-CB95	112.45	113.60	113.85	0.25	113.78	113.82	113.92	113.95	0.18	0.22	0.32	0.35	0.00	0.00	0.07	0.10
EX-CB96	112.22	113.60	113.87	0.27	113.78	113.82	113.92	113.95	0.18	0.22	0.32	0.35	0.00	0.00	0.05	0.08
EX-CBMH117	111.26	113.65	113.72	0.07	112.83	112.88	112.94	112.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX-MH102A	112.42	113.55	113.65	0.10	112.87	112.89	112.96	112.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[1] *3-hour Chicago Storm.*

4837 Albion Road - Hard Rock Ottawa (116111)
Existing Conditions - Summary of Hydraulic Grade Line (HGL) Elevations

NOVATECH
Engineers, Planners & Landscape Architects

MH ID	Obvert Elevation (m)	T/G Elevation (m)	HGL Elevation[1] (m)	Surcharge (m)	Clearance from T/G (m)	HGL in Stress Test[1] (m)
EX-MH101	105.32	106.91	104.89	0.00	2.02	104.89
EX-MH101a	107.93	112.19	107.51	0.00	4.68	107.52
EX-MH101b	106.08	110.41	105.62	0.00	4.79	105.62
EX-MH102	110.13	114.07	109.70	0.00	4.37	109.70
EX-MH102A	112.72	114.16	112.96	0.24	1.20	112.99
EX-MH103	111.01	113.00	110.78	0.00	2.22	110.78
EX-MH104	111.25	113.90	110.96	0.00	2.94	110.96
EX-MH105	111.28	114.02	111.41	0.13	2.61	111.41
EX-MH106	112.60	113.99	113.91	1.31	0.08	113.97
EX-MH107	114.95	114.95	113.92	0.00	1.03	113.99
EX-MH108	111.70	113.67	111.92	0.23	1.75	111.93
EX-MH109	111.58	113.56	111.43	0.00	2.13	111.44
EX-MH110	112.15	114.91	113.95	1.80	0.96	113.97
EX-MH111	112.37	114.18	113.96	1.59	0.22	113.98
EX-MH112	114.94	114.94	114.06	0.00	0.88	114.07
EX-MH113	112.16	113.59	112.39	0.23	1.20	112.41
EX-MH114	112.76	113.70	112.60	0.00	1.10	112.63
EX-MH115	105.35	106.87	105.27	0.00	1.60	105.27
EX-MH116	107.87	107.87	105.72	0.00	2.15	105.72

[1] *3-hour Chicago Storm.*

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

WARNING 10: crest elevation raised to downstream invert for regulator Link X-CB-112_(X-CB)
WARNING 10: crest elevation raised to downstream invert for regulator Link X-CB-115_(X-CB)
WARNING 10: crest elevation raised to downstream invert for regulator Link X-CB-131_(X-CB)

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 40
Number of nodes ........... 155
Number of links ........... 198
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
------------------------------------------------------------------------
Design_Storms        C3hr-100yr                  INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                         Area     Width   %Imperv    %Slope Rain Gage            Outlet
------------------------------------------------------------------------------------------
BLDG                         0.86     66.46    100.00    1.5000 Design_Storms        EX-BLDG01
S01                          0.45    161.96    100.00    1.5000 Design_Storms        EX-CB10
S02                          0.06    120.00    100.00    1.5000 Design_Storms        EX-CB100
S03                          0.18    180.00    100.00    1.5000 Design_Storms        EX-CB102
S04                          0.22    200.00    100.00    1.5000 Design_Storms        EX-CB104
S05                          0.17    188.89    100.00    1.5000 Design_Storms        EX-CB106
S06                          0.21    350.00    100.00    1.5000 Design_Storms        EX-CB110
S07                          0.30    282.27    100.00    1.5000 Design_Storms        EX-CB113
S08                          0.09     90.00    100.00    1.5000 Design_Storms        EX-CB116
S09                          0.04     80.00    100.00    1.5000 Design_Storms        EX-CB117
S1                           0.04      4.00    100.00    1.5000 Design_Storms        EX-CB72
S10                          0.08     88.89    100.00    1.5000 Design_Storms        EX-CB121
S11                          0.70    145.83    100.00    1.5000 Design_Storms        EX-CB123/124
S12                          0.10    200.00    100.00    1.5000 Design_Storms        EX-CB128
S13                          0.10     40.00    100.00    1.5000 Design_Storms        EX-CB134
S14                          0.09     52.94    100.00    1.5000 Design_Storms        EX-CB137
S15                          0.23    115.00    100.00    1.5000 Design_Storms        EX-CB28
S16                          0.38    152.00     60.00    1.5000 Design_Storms        EX-CB30
S17                          0.03     60.00    100.00    1.5000 Design_Storms        EX-CB38
S18                          0.03     60.00    100.00    1.5000 Design_Storms        EX-CB40
S19                          0.25    192.31    100.00    1.5000 Design_Storms        EX-CB50
S20                          0.20    181.82    100.00    1.5000 Design_Storms        EX-CB52
S21                          0.08    160.00    100.00    1.5000 Design_Storms        EX-CB54
S22                          0.19    190.00    100.00    1.5000 Design_Storms        EX-CB58
S23                          0.07    140.00    100.00    1.5000 Design_Storms        EX-CB60
S24                          0.11    220.00    100.00    1.5000 Design_Storms        EX-CB62
S25                          0.11    220.00    100.00    1.5000 Design_Storms        EX-CB64
S26                          0.19    190.00    100.00    1.5000 Design_Storms        EX-CB66
S27                          0.14    200.00    100.00    1.5000 Design_Storms        EX-CB68
S28                          0.27    100.00    100.00    1.5000 Design_Storms        EX-CB82
S29                          0.23     95.83    100.00    1.5000 Design_Storms        EX-CB84
S30                          0.28    112.00     60.00    1.5000 Design_Storms        EX-CB87
S31                          0.14     70.00    100.00    1.5000 Design_Storms        EX-CB90
S32                          0.29    116.00     60.00    1.5000 Design_Storms        EX-CB92
S33                          0.10    200.00    100.00    1.5000 Design_Storms        EX-CB95
S34                          0.18     90.00    100.00    1.5000 Design_Storms        EX-CB96
S35                          0.42    165.50    100.00    1.5000 Design_Storms        EX-CBMH117
S36                          3.52    167.62     85.70    1.5000 Design_Storms        EX-CB14
S37                          1.91    176.85     20.00    1.5000 Design_Storms        EX-STM43
S38                          0.74    234.62     64.91    1.5000 Design_Storms        EX-CB132


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
------------------------------------------------------------------------
HP01                 JUNCTION         114.00      1.00       0.0
HP-EX-CB10           JUNCTION         112.77      1.00       0.0
HP-EX-CB100          JUNCTION         113.89      1.00       0.0
HP-EX-CB102          JUNCTION         114.12      1.00       0.0
HP-EX-CB102a         JUNCTION         114.00      1.00       0.0
HP-EX-CB104          JUNCTION         114.06      1.00       0.0
HP-EX-CB104a         JUNCTION         114.10      1.00       0.0
HP-EX-CB106          JUNCTION         114.00      1.00       0.0
HP-EX-CB110          JUNCTION         113.63      1.00       0.0
HP-EX-CB113          JUNCTION         113.30      1.00       0.0
HP-EX-CB116          JUNCTION         113.52      1.00       0.0
```

HP-EX-CB117	JUNCTION	113.50	1.00	0.0
HP-EX-CB123/124	JUNCTION	113.61	1.00	0.0
HP-EX-CB123/124a	JUNCTION	113.60	1.00	0.0
HP-EX-CB128	JUNCTION	113.96	1.00	0.0
HP-EX-CB131	JUNCTION	112.90	1.00	0.0
HP-EX-CB134	JUNCTION	113.51	1.00	0.0
HP-EX-CB137	JUNCTION	113.60	1.00	0.0
HP-EX-CB28	JUNCTION	114.00	1.00	0.0
HP-EX-CB30	JUNCTION	114.00	1.00	0.0
HP-EX-CB38	JUNCTION	113.90	1.00	0.0
HP-EX-CB40	JUNCTION	113.70	1.00	0.0
HP-EX-CB50	JUNCTION	114.03	1.00	0.0
HP-EX-CB50a	JUNCTION	114.09	1.00	0.0
HP-EX-CB52	JUNCTION	114.00	1.00	0.0
HP-EX-CB52a	JUNCTION	113.98	1.00	0.0
HP-EX-CB54	JUNCTION	113.98	1.00	0.0
HP-EX-CB54a	JUNCTION	113.95	1.00	0.0
HP-EX-CB58	JUNCTION	114.00	1.00	0.0
HP-EX-CB60	JUNCTION	113.96	1.00	0.0
HP-EX-CB62	JUNCTION	113.82	1.00	0.0
HP-EX-CB64	JUNCTION	113.98	1.00	0.0
HP-EX-CB66	JUNCTION	114.04	1.00	0.0
HP-EX-CB68	JUNCTION	114.14	1.00	0.0
HP-EX-CB72	JUNCTION	113.00	1.00	0.0
HP-EX-CB82	JUNCTION	114.05	1.00	0.0
HP-EX-CB84	JUNCTION	114.01	1.00	0.0
HP-EX-CB87	JUNCTION	113.95	1.00	0.0
HP-EX-CB90	JUNCTION	114.05	1.00	0.0
HP-EX-CB92	JUNCTION	113.95	1.00	0.0
HP-EX-CB95	JUNCTION	113.96	1.00	0.0
HP-EX-CB96	JUNCTION	113.97	1.00	0.0
HP-EX-CBMH117	JUNCTION	112.85	1.00	0.0
HP-EXMH102Aa	JUNCTION	114.15	1.00	0.0
HP-EX-STM43	JUNCTION	113.50	1.00	0.0
IF-EX-CB10	OUTFALL	0.00	0.00	0.0
IF-EX-CB100	OUTFALL	0.00	0.00	0.0
IF-EX-CB102	OUTFALL	0.00	0.00	0.0
IF-EX-CB104	OUTFALL	0.00	0.00	0.0
IF-EX-CB106	OUTFALL	0.00	0.00	0.0
IF-EX-CB110	OUTFALL	0.00	0.00	0.0
IF-EX-CB113	OUTFALL	0.00	0.00	0.0
IF-EX-CB116	OUTFALL	0.00	0.00	0.0
IF-EX-CB117	OUTFALL	0.00	0.00	0.0
IF-EX-CB121	OUTFALL	0.00	0.00	0.0
IF-EX-CB123/124	OUTFALL	0.00	0.00	0.0
IF-EX-CB128	OUTFALL	0.00	0.00	0.0
IF-EX-CB137	OUTFALL	0.00	0.00	0.0
IF-EX-CB28	OUTFALL	0.00	0.00	0.0
IF-EX-CB30	OUTFALL	0.00	0.00	0.0
IF-EX-CB38	OUTFALL	0.00	0.00	0.0
IF-EX-CB40	OUTFALL	0.00	0.00	0.0
IF-EX-CB50	OUTFALL	0.00	0.00	0.0
IF-EX-CB52	OUTFALL	0.00	0.00	0.0
IF-EX-CB54	OUTFALL	0.00	0.00	0.0
IF-EX-CB58	OUTFALL	0.00	0.00	0.0
IF-EX-CB64	OUTFALL	0.00	0.00	0.0
IF-EX-CB66	OUTFALL	0.00	0.00	0.0
IF-EX-CB68	OUTFALL	0.00	0.00	0.0
IF-EX-CB82	OUTFALL	0.00	0.00	0.0
IF-EX-CB84	OUTFALL	0.00	0.00	0.0
IF-EX-CB87	OUTFALL	0.00	0.00	0.0
IF-EX-CB90	OUTFALL	0.00	0.00	0.0
IF-EX-CB92	OUTFALL	0.00	0.00	0.0
IF-EX-CB95	OUTFALL	0.00	0.00	0.0
IF-EX-CB96	OUTFALL	0.00	0.00	0.0
IF-EX-CBMH117	OUTFALL	0.00	0.00	0.0
Major01	OUTFALL	112.87	1.00	0.0
Major02	OUTFALL	111.61	1.00	0.0
Major03	OUTFALL	106.80	1.04	0.0
Minor01	OUTFALL	102.95	0.75	0.0
EX-BLDG01	STORAGE	120.00	1.00	0.0
EX-CB10	STORAGE	111.51	2.10	0.0
EX-CB100	STORAGE	112.77	1.95	0.0
EX-CB102	STORAGE	112.69	1.94	0.0
EX-CB104	STORAGE	112.40	2.27	0.0
EX-CB106	STORAGE	112.31	2.40	0.0
EX-CB110	STORAGE	112.00	2.24	0.0
EX-CB113	STORAGE	112.00	2.26	0.0
EX-CB116	STORAGE	112.99	1.43	0.0
EX-CB117	STORAGE	112.09	2.36	0.0
EX-CB121	STORAGE	112.15	2.26	0.0
EX-CB123/124	STORAGE	111.80	2.56	0.0
EX-CB128	STORAGE	112.51	2.20	0.0
EX-CB132	STORAGE	108.88	3.43	0.0
EX-CB134	STORAGE	111.60	2.76	0.0
EX-CB137	STORAGE	112.00	2.41	0.0
EX-CB14	STORAGE	112.42	3.08	0.0
EX-CB28	STORAGE	112.43	2.22	0.0
EX-CB30	STORAGE	112.50	2.19	0.0
EX-CB38	STORAGE	112.86	1.77	0.0
EX-CB40	STORAGE	112.92	1.72	0.0
EX-CB50	STORAGE	112.34	2.37	0.0

EX-CB52	STORAGE	112.44	2.27	0.0
EX-CB54	STORAGE	112.52	2.31	0.0
EX-CB58	STORAGE	112.44	2.29	0.0
EX-CB60	STORAGE	112.15	2.58	0.0
EX-CB62	STORAGE	112.64	2.12	0.0
EX-CB64	STORAGE	112.10	2.63	0.0
EX-CB66	STORAGE	112.37	2.29	0.0
EX-CB68	STORAGE	112.57	2.15	0.0
EX-CB72	STORAGE	111.18	2.49	0.0
EX-CB82	STORAGE	112.62	2.22	0.0
EX-CB84	STORAGE	112.12	2.53	0.0
EX-CB87	STORAGE	112.50	2.18	0.0
EX-CB90	STORAGE	112.51	2.28	0.0
EX-CB92	STORAGE	112.49	2.18	0.0
EX-CB95	STORAGE	112.45	2.22	0.0
EX-CB96	STORAGE	112.22	2.40	0.0
EX-CBMH117	STORAGE	111.26	2.48	0.0
EX-CBMH117a	STORAGE	111.26	1.48	0.0
EX-CBMH117b	STORAGE	109.47	3.53	0.0
EX-CBMH117c	STORAGE	109.12	3.88	0.0
EX-MH101	STORAGE	104.57	2.34	0.0
EX-MH101a	STORAGE	107.18	5.01	0.0
EX-MH101b	STORAGE	105.33	5.08	0.0
EX-MH102	STORAGE	109.38	4.69	0.0
EX-MH102A	STORAGE	112.42	1.74	0.0
EX-MH103	STORAGE	110.71	2.29	0.0
EX-MH104	STORAGE	110.65	3.25	0.0
EX-MH104a	STORAGE	110.32	3.64	0.0
EX-MH104b	STORAGE	109.82	4.24	0.0
EX-MH105	STORAGE	111.28	2.74	0.0
EX-MH106	STORAGE	112.15	1.84	0.0
EX-MH106a	STORAGE	111.61	3.39	0.0
EX-MH107	STORAGE	112.35	2.60	0.0
EX-MH107a	STORAGE	112.20	1.78	0.0
EX-MH108	STORAGE	111.32	2.35	0.0
EX-MH109	STORAGE	110.98	2.58	0.0
EX-MH109a	STORAGE	110.89	2.77	0.0
EX-MH109b	STORAGE	110.77	3.03	0.0
EX-MH110	STORAGE	112.08	2.83	0.0
EX-MH110a	STORAGE	112.08	1.83	0.0
EX-MH111	STORAGE	112.07	2.11	0.0
EX-MH112	STORAGE	112.15	2.79	0.0
EX-MH112a	STORAGE	112.10	2.02	0.0
EX-MH113	STORAGE	112.19	1.40	0.0
EX-MH113a	STORAGE	111.77	2.79	0.0
EX-MH113b	STORAGE	112.05	1.53	0.0
EX-MH113c	STORAGE	112.07	1.51	0.0
EX-MH114	STORAGE	112.51	1.19	0.0
EX-MH115	STORAGE	105.05	1.82	0.0
EX-MH116	STORAGE	105.50	2.37	0.0
EX-STM43	STORAGE	112.50	2.00	0.0
EX-STUB	STORAGE	111.38	2.28	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	EX-CB132	Major02	CONDUIT	3.0	-10.0504	0.0150
C10	EX-CB10	HP-EX-CB10	CONDUIT	3.0	-5.3409	0.0150
C100	EX-CB72	HP-EX-CB72	CONDUIT	3.0	-11.0672	0.0150
C11	HP-EX-CB10	EX-CB132	CONDUIT	3.0	55.7090	0.0150
C12	EX-MH116	Major03	CONDUIT	3.0	1.0001	0.0150
C13	EX-CB134	HP-EX-CB134	CONDUIT	3.0	-5.0063	0.0150
C136	HP-EX-CB72	HP-EX-CB131	CONDUIT	3.0	3.3352	0.0150
C14	EX-MH107	EX-CB28	CONDUIT	3.0	10.0504	0.0150
C15	EX-CBMH117	HP-EX-CBMH117	CONDUIT	3.0	-3.6691	0.0150
C16	HP-EX-CBMH117	EX-CB10	CONDUIT	3.0	8.0257	0.0150
C17	EX-CB82	HP-EX-CB82	CONDUIT	3.0	-7.0172	0.0150
C18	EX-CB87	HP-EX-CB87	CONDUIT	3.0	-9.0367	0.0150
C19	HP-EX-CB87	EX-CB90	CONDUIT	3.0	5.0063	0.0150
C2	HP-EX-CB134	EX-CB132	CONDUIT	3.0	107.8639	0.0150
C20	EX-STM43	HP-EX-STM43	CONDUIT	3.0	1.6669	0.0150
C21	EX-MH112	EX-CB58	CONDUIT	3.0	7.0172	0.0150
C22	HP-EX-CB131	Major01	CONDUIT	3.0	1.0001	0.0150
C24	EX-CB30	HP-EX-CB30	CONDUIT	3.0	-10.0504	0.0150
C25	HP-EX-CB30	EX-CB28	CONDUIT	3.0	11.7469	0.0150
C26	EX-CB28	HP-EX-CB28	CONDUIT	3.0	-11.7469	0.0150
C27	HP-EX-CB28	EX-CB96	CONDUIT	3.0	12.7695	0.0150
C28	EX-CB92	HP-EX-CB92	CONDUIT	3.0	-9.3743	0.0150
C29	HP-EX-CB92	EX-CB96	CONDUIT	3.0	11.0672	0.0150
C3	HP-EX-CB82	HP-EX-CB84	CONDUIT	3.0	1.3335	0.0150
C3_1	EX-CB128	HP-EX-CB128	CONDUIT	3.0	-8.3624	0.0150
C3_2	HP-EX-CB128	HP-EX-CB123/124	CONDUIT	3.0	11.7469	0.0150
C30	EX-CB90	HP-EX-CB90	CONDUIT	3.0	-8.3624	0.0150
C31	HP-EX-CB90	EX-CB96	CONDUIT	3.0	14.4829	0.0150
C32	EX-CB96	HP-EX-CB96	CONDUIT	3.0	-11.7469	0.0150
C33	HP-EX-CB96	EX-CB95	CONDUIT	3.0	10.0504	0.0150
C34	EX-CB95	HP-EX-CB95	CONDUIT	3.0	-9.7122	0.0150
C35	HP-EX-CB95	EX-CB128	CONDUIT	3.0	8.3624	0.0150
C36	EX-CB62	HP-EX-CB62	CONDUIT	3.0	-2.0004	0.0150

C37	HP-EX-CB62	EX-CB60	CONDUIT	3.0	3.0014	0.0150
C38	EX-CB58	HP-EX-CB50	CONDUIT	3.0	-10.0504	0.0150
C39	HP-EX-CB50	EX-CB50	CONDUIT	3.0	10.7279	0.0150
C4	EX-CB40	HP-EX-CB40	CONDUIT	3.0	-2.0004	0.0150
C4_1	HP-EX-CB123/124	HP-EX-CB123/124a	CONDUIT	3.0	0.3333	0.0150
C4_2	HP-EX-CB123/124a	EX-CB137	CONDUIT	3.0	6.3461	0.0150
C40	EX-CB54	HP-EX-CB54	CONDUIT	3.0	-5.0063	0.0150
C41	HP-EX-CB54	EX-CB52	CONDUIT	3.0	9.0367	0.0150
C42	EX-CB50	HP-EX-CB52	CONDUIT	3.0	-9.7122	0.0150
C43	HP-EX-CB52	EX-CB52	CONDUIT	3.0	9.7122	0.0150
C44	EX-CB54	HP-EX-CB54a	CONDUIT	3.0	-4.0032	0.0150
C45	HP-EX-CB54a	EX-CB100	CONDUIT	3.0	7.6893	0.0150
C46	EX-CB52	HP-EX-CB52a	CONDUIT	3.0	-9.0367	0.0150
C47	HP-EX-CB52a	EX-CB102	CONDUIT	3.0	11.7469	0.0150
C48	EX-CB50	HP-EX-CB50a	CONDUIT	3.0	-12.7695	0.0150
C49	HP-EX-CB50a	EX-CB104	CONDUIT	3.0	14.1393	0.0150
C5	EX-CB137	HP-EX-CB137	CONDUIT	3.0	-6.3461	0.0150
C50	EX-CB58	HP-EX-CB58	CONDUIT	3.0	-9.0367	0.0150
C51	HP-EX-CB58	EX-CB106	CONDUIT	3.0	9.7122	0.0150
C52	EX-CB106	HP-EX-CB106	CONDUIT	3.0	-9.7122	0.0150
C53	HP-EX-CB106	EX-CB64	CONDUIT	3.0	9.0367	0.0150
C54	EX-CB104	HP-EX-CB104a	CONDUIT	3.0	-14.4829	0.0150
C55	HP-EX-CB104a	EX-CB66	CONDUIT	3.0	14.8270	0.0150
C56	EX-CB102	HP-EX-CB102a	CONDUIT	3.0	-12.4282	0.0150
C57	HP-EX-CB102a	EX-CB68	CONDUIT	3.0	9.3743	0.0150
C58	EX-CB100	HP-EX-CB100	CONDUIT	3.0	-5.6758	0.0150
C59	HP-EX-CB100	EX-CB102	CONDUIT	3.0	8.6994	0.0150
C6	HP-EX-CB84	HP-EX-CB137	CONDUIT	3.0	13.7961	0.0150
C60	EX-CB102	HP-EX-CB102	CONDUIT	3.0	-16.5557	0.0150
C61	HP-EX-CB102	EX-CB104	CONDUIT	3.0	15.1717	0.0150
C62	EX-CB104	HP-EX-CB104	CONDUIT	3.0	-13.1113	0.0150
C63	HP-EX-CB104	EX-CB106	CONDUIT	3.0	11.7469	0.0150
C64	EX-CB68	HP-EX-CB68	CONDUIT	3.0	-14.1393	0.0150
C65	HP-EX-CB68	EX-CB66	CONDUIT	3.0	16.2088	0.0150
C66	EX-CB66	HP-EX-CB66	CONDUIT	3.0	-12.7695	0.0150
C67	HP-EX-CB66	EX-CB64	CONDUIT	3.0	10.3889	0.0150
C68	EX-CB64	HP-EX-CB64	CONDUIT	3.0	-8.3624	0.0150
C69	HP-EX-CB64	EX-CB121	CONDUIT	3.0	19.0006	0.0150
C7	EX-CB84	HP-EX-CB84	CONDUIT	3.0	-12.0873	0.0150
C70	EX-CB116	HP-EX-CB116	CONDUIT	3.0	-3.0014	0.0150
C71	HP-EX-CB116	EX-CB117	CONDUIT	3.0	2.3340	0.0150
C72	EX-CB60	HP-EX-CB60	CONDUIT	3.0	-7.6893	0.0150
C73	HP-EX-CB60	HP-EX-CB117	CONDUIT	3.0	15.5168	0.0150
C76	EX-CB121	HP-EX-CB117	CONDUIT	3.0	-3.0014	0.0150
C77	EX-CB117	HP-EX-CB117	CONDUIT	3.0	-1.6669	0.0150
C79	HP-EX-CB117	EX-CB123/124	CONDUIT	3.0	4.6718	0.0150
C8	HP-EX-CB137	HP-EX-CB131	CONDUIT	3.0	23.9957	0.0150
C81	EX-CB123/124	HP-EX-CB123/124	CONDUIT	3.0	-8.3624	0.0150
C82	HP-EX-CB40	EX-CB38	CONDUIT	3.0	2.3340	0.0150
C83	EX-CB38	HP-EX-CB38	CONDUIT	3.0	-9.0367	0.0150
C84_1	HP-EX-CB38	HP-EX-STM43	CONDUIT	3.0	13.4535	0.0150
C84_2	HP-EX-STM43	EX-CB110	CONDUIT	3.0	8.6994	0.0150
C85	EX-CB110	HP-EX-CB110	CONDUIT	3.0	-13.1113	0.0150
C86	HP-EX-CB113	EX-CB110	CONDUIT	3.0	2.0004	0.0150
C87	EX-CB113	HP-EX-CB113	CONDUIT	3.0	-1.3335	0.0150
C88	HP-EX-CB110	EX-CB121	CONDUIT	3.0	7.0172	0.0150
C89	HP-EXMH102Aa	EX-CB82	CONDUIT	3.0	10.3889	0.0150
C9	EX-CB14	HP-EXMH102Aa	CONDUIT	3.0	-25.8199	0.0150
EXCBMH117a-117b	EX-CBMH117a	EX-CBMH117b	CONDUIT	30.4	5.8947	0.0130
EXCBMH117b-117c	EX-CBMH117b	EX-CBMH117c	CONDUIT	6.0	5.8975	0.0130
EX-Ditch	HP01	EX-CB14	CONDUIT	120.0	0.5000	0.0450
EXMH101-OUT	EX-MH101	Minor01	CONDUIT	80.9	2.0021	0.0130
EXMH102-101a	EX-MH102	EX-MH101a	CONDUIT	29.4	1.5648	0.0130
EXMH102a-102	EX-MH102A	EX-MH102	CONDUIT	58.6	0.8873	0.0130
EXMH103-102	EX-MH103	EX-MH102	CONDUIT	78.6	1.0942	0.0130
EXMH104-104a	EX-MH104	EX-MH104a	CONDUIT	25.0	1.3163	0.0130
EXMH104a-104b	EX-MH104a	EX-MH104b	CONDUIT	37.8	1.3186	0.0130
EXMH104b-102	EX-MH104b	EX-MH102	CONDUIT	2.5	1.3045	0.0130
EXMH105-104	EX-MH105	EX-MH104	CONDUIT	17.4	0.1722	0.0130
EXMH108-109	EX-MH108	EX-MH109	CONDUIT	30.7	1.1076	0.0130
EXMH109-109a	EX-MH109	EX-MH109a	CONDUIT	25.4	0.3344	0.0130
EXMH109a-109b	EX-MH109a	EX-MH109b	CONDUIT	36.0	0.3360	0.0130
EXMH109b-104	EX-MH109b	EX-MH104	CONDUIT	25.1	0.3349	0.0130
EXMH110-109	EX-MH110a	EX-MH109	CONDUIT	32.8	2.4673	0.0130
EXMH111-110	EX-MH111	EX-MH110	CONDUIT	24.7	-0.0405	0.0130
EXMH112-112a	EX-MH112	EX-MH112a	CONDUIT	58.1	0.0894	0.0130
EXMH112a-111	EX-MH112a	EX-MH111	CONDUIT	19.9	0.0907	0.0130
EXMH113-113c	EX-MH113	EX-MH113c	CONDUIT	32.4	0.3553	0.0130
EXMH113a-109	EX-MH113a	EX-MH109	CONDUIT	2.7	0.3704	0.0130
EXMH113b-113a	EX-MH113b	EX-MH113a	CONDUIT	79.2	0.3548	0.0130
EXMH113c-113b	EX-MH113c	EX-MH113b	CONDUIT	6.6	0.3622	0.0130
EXMH114-113	EX-MH114	EX-MH113	CONDUIT	64.4	0.4816	0.0130
EXMh115-101	EX-MH115	EX-MH101	CONDUIT	92.7	0.4962	0.0130
EXMH116-115	EX-MH116	EX-MH115	CONDUIT	91.3	0.4929	0.0130
EXMH117c-116	EX-CBMH117c	EX-MH116	CONDUIT	57.5	5.8993	0.0130
EXSTUB-108	EX-STUB	EX-MH108	CONDUIT	14.1	0.4255	0.0130
X-CB-103_(X-CB)	EX-CB100	EX-CB102	CONDUIT	12.9	0.4651	0.0130
X-CB-105_(X-CB)	EX-CB102	EX-CB104	CONDUIT	53.4	0.4120	0.0130
X-CB-107_(X-CB)	EX-CB104	EX-CB106	CONDUIT	32.4	0.2778	0.0130
X-CB-109_(X-CB)	EX-CB106	EX-MH112a	CONDUIT	3.2	0.9375	0.0130
X-CB-118_(X-CB)	EX-CB116	EX-CB117	CONDUIT	11.4	7.3001	0.0130
X-CB-129_(X-CB)	EX-CB128	EX-CB95	CONDUIT	7.2	0.6945	0.0130

X-CB-89_(X-CB)	EX-CB87	EX-MH106a	CONDUIT	20.8	3.8008	0.0130
X-CB-91_(X-CB)	EX-CB90	EX-MH106a	CONDUIT	15.6	5.1350	0.0130
X-CB-94_(X-CB)	EX-CB92	EX-MH107a	CONDUIT	21.4	1.3553	0.0130
X-CB-97_(X-CB)	EX-CB95	EX-CB96	CONDUIT	25.5	0.7059	0.0130
X-CB-98_(X-CB)	EX-CB96	EX-MH107a	CONDUIT	15.6	0.1282	0.0130
X-STM-11_(X-STM)	EX-CB10	EX-CBMH117	CONDUIT	40.1	0.5985	0.0130
X-STM-13_(1)_(X-STM)	EX-MH101a	EX-MH101b	CONDUIT	30.1	1.3955	0.0130
X-STM-13_(X-STM)	EX-MH101b	EX-MH101	CONDUIT	32.6	2.2705	0.0130
X-STM-25_(X-STM)_1	EX-MH106	EX-MH106a	CONDUIT	33.3	1.6218	0.0130
X-STM-27_(X-STM)_1	EX-MH107	EX-MH107a	CONDUIT	50.2	0.2988	0.0130
X-STM-27_(X-STM)_2	EX-MH107a	EX-MH106	CONDUIT	11.9	0.1681	0.0130
X-STM-29_(X-STM)	EX-CB28	EX-MH107	CONDUIT	14.8	0.0676	0.0130
X-STM-31_(X-STM)	EX-CB30	EX-MH107	CONDUIT	21.7	0.4608	0.0130
X-STM-51_(X-STM)	EX-CB50	EX-MH112	CONDUIT	22.1	0.0905	0.0130
X-STM-53_(X-STM)	EX-CB52	EX-CB50	CONDUIT	55.0	0.1818	0.0130
X-STM-55_(X-STM)	EX-CB54	EX-CB52	CONDUIT	13.1	0.6107	0.0130
X-STM-59_(X-STM)	EX-CB58	EX-MH112	CONDUIT	11.9	1.0085	0.0130
X-STM-61_(X-STM)	EX-CB60	EX-MH111	CONDUIT	15.3	0.4575	0.0130
X-STM-63_(X-STM)	EX-CB62	EX-CB60	CONDUIT	7.2	0.5556	0.0130
X-STM-65_(X-STM)	EX-CB64	EX-MH110	CONDUIT	11.0	0.1818	0.0130
X-STM-67_(X-STM)	EX-CB66	EX-CB64	CONDUIT	36.2	0.7459	0.0130
X-STM-69_(X-STM)	EX-CB68	EX-CB66	CONDUIT	49.6	0.3629	0.0130
OR1	EX-STM43	EX-MH113	ORIFICE			
OR2	EX-CB14	EX-MH102A	ORIFICE			
OR3	EX-CBMH117	EX-CBMH117a	ORIFICE			
OR4	EX-MH110	EX-MH110a	ORIFICE			
X-CB-112_(X-CB)	EX-CB110	EX-MH113c	ORIFICE			
X-CB-115_(X-CB)	EX-CB113	EX-MH113b	ORIFICE			
X-CB-120_(X-CB)	EX-CB117	EX-MH113a	ORIFICE			
X-CB-122_(X-CB)	EX-CB121	EX-MH113a	ORIFICE			
X-CB-127_(X-CB)	EX-CB123/124	EX-MH109a	ORIFICE			
X-CB-131_(X-CB)	EX-CB132	EX-CBMH117c	ORIFICE			
X-CB-133_(X-CB)	EX-CB134	EX-CBMH117b	ORIFICE			
X-CB-135_(X-CB)	EX-CB137	EX-MH109b	ORIFICE			
X-CB-83_(X-CB)	EX-CB82	EX-MH104b	ORIFICE			
X-CB-86_(X-CB)	EX-CB84	EX-MH104a	ORIFICE			
X-STM-25_(X-STM)_2	EX-MH106a	EX-MH105	ORIFICE			
X-STM-39_(X-STM)	EX-CB38	EX-MH114	ORIFICE			
X-STM-41_(X-STM)	EX-CB40	EX-MH114	ORIFICE			
X-STM-73_(X-STM)	EX-CB72	EX-MH103	ORIFICE			
EX-BLDG01-OUT	EX-BLDG01	EX-STUB	OUTLET			
INFIL-EX-CB10	EX-CB10	IF-EX-CB10	OUTLET			
INFIL-EX-CB100	EX-CB100	IF-EX-CB100	OUTLET			
INFIL-EX-CB102	EX-CB102	IF-EX-CB102	OUTLET			
INFIL-EX-CB104	EX-CB104	IF-EX-CB104	OUTLET			
INFIL-EX-CB106	EX-CB106	IF-EX-CB106	OUTLET			

INFIL-EX-CB110	EX-CB110	IF-EX-CB110	OUTLET
INFIL-EX-CB113	EX-CB113	IF-EX-CB113	OUTLET
INFIL-EX-CB116	EX-CB116	IF-EX-CB116	OUTLET
INFIL-EX-CB117	EX-CB117	IF-EX-CB117	OUTLET
INFIL-EX-CB121	EX-CB121	IF-EX-CB121	OUTLET
INFIL-EX-CB123/124	EX-CB123/124	IF-EX-CB123/124	OUTLET
INFIL-EX-CB128	EX-CB128	IF-EX-CB128	OUTLET
INFIL-EX-CB137	EX-CB137	IF-EX-CB137	OUTLET
INFIL-EX-CB28	EX-CB28	IF-EX-CB28	OUTLET
INFIL-EX-CB30	EX-CB30	IF-EX-CB30	OUTLET
INFIL-EX-CB38	EX-CB38	IF-EX-CB38	OUTLET
INFIL-EX-CB40	EX-CB40	IF-EX-CB40	OUTLET
INFIL-EX-CB50	EX-CB50	IF-EX-CB50	OUTLET
INFIL-EX-CB52	EX-CB52	IF-EX-CB52	OUTLET
INFIL-EX-CB54	EX-CB54	IF-EX-CB54	OUTLET
INFIL-EX-CB58	EX-CB58	IF-EX-CB58	OUTLET
INFIL-EX-CB64	EX-CB64	IF-EX-CB64	OUTLET
INFIL-EX-CB66	EX-CB66	IF-EX-CB66	OUTLET
INFIL-EX-CB68	EX-CB68	IF-EX-CB68	OUTLET
INFIL-EX-CB82	EX-CB82	IF-EX-CB82	OUTLET
INFIL-EX-CB84	EX-CB84	IF-EX-CB84	OUTLET
INFIL-EX-CB87	EX-CB87	IF-EX-CB87	OUTLET
INFIL-EX-CB90	EX-CB90	IF-EX-CB90	OUTLET
INFIL-EX-CB92	EX-CB92	IF-EX-CB92	OUTLET
INFIL-EX-CB95	EX-CB95	IF-EX-CB95	OUTLET
INFIL-EX-CB96	EX-CB96	IF-EX-CB96	OUTLET
INFIL-EX-CBMH117	EX-CBMH117	IF-EX-CBMH117	OUTLET

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C10	RECT_OPEN	1.00	3.00	0.60	3.00	1	32882.56
C100	RECT_OPEN	1.00	3.00	0.60	3.00	1	47334.20
C11	RECT_OPEN	1.00	3.00	0.60	3.00	1	106198.78
C12	RECT_OPEN	1.00	3.00	0.60	3.00	1	14228.79
C13	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C136	RECT_OPEN	1.00	3.00	0.60	3.00	1	25984.66
C14	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C15	RECT_OPEN	1.00	3.00	0.60	3.00	1	27254.53
C16	RECT_OPEN	1.00	3.00	0.60	3.00	1	40308.73
C17	RECT_OPEN	1.00	3.00	0.60	3.00	1	37691.14

C18	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C19	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C2	RECT_OPEN	1.00	3.00	0.60	3.00	1	147772.96
C20	RECT_OPEN	1.00	3.00	0.60	3.00	1	18370.10
C21	RECT_OPEN	1.00	3.00	0.60	3.00	1	37691.14
C22	RECT_OPEN	1.00	3.00	0.60	3.00	1	14228.79
C24	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C25	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C26	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C27	RECT_OPEN	1.00	3.00	0.60	3.00	1	50844.53
C28	RECT_OPEN	1.00	3.00	0.60	3.00	1	43563.76
C29	RECT_OPEN	1.00	3.00	0.60	3.00	1	47334.20
C3	RECT_OPEN	1.00	3.00	0.60	3.00	1	16430.31
C3_1	RECT_OPEN	1.00	3.00	0.60	3.00	1	41145.56
C3_2	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C30	RECT_OPEN	1.00	3.00	0.60	3.00	1	41145.56
C31	RECT_OPEN	1.00	3.00	0.60	3.00	1	54148.25
C32	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C33	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C34	RECT_OPEN	1.00	3.00	0.60	3.00	1	44341.94
C35	RECT_OPEN	1.00	3.00	0.60	3.00	1	41145.56
C36	RECT_OPEN	1.00	3.00	0.60	3.00	1	20124.05
C37	RECT_OPEN	1.00	3.00	0.60	3.00	1	24649.91
C38	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C39	RECT_OPEN	1.00	3.00	0.60	3.00	1	46602.99
C4	RECT_OPEN	1.00	3.00	0.60	3.00	1	20124.05
C4_1	RECT_OPEN	1.00	3.00	0.60	3.00	1	8214.81
C4_2	RECT_OPEN	1.00	3.00	0.60	3.00	1	35843.43
C40	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C41	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C42	RECT_OPEN	1.00	3.00	0.60	3.00	1	44341.94
C43	RECT_OPEN	1.00	3.00	0.60	3.00	1	44341.94
C44	RECT_OPEN	1.00	3.00	0.60	3.00	1	28468.25
C45	RECT_OPEN	1.00	3.00	0.60	3.00	1	39454.84
C46	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C47	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C48	RECT_OPEN	1.00	3.00	0.60	3.00	1	50844.53
C49	RECT_OPEN	1.00	3.00	0.60	3.00	1	53502.02
C5	RECT_OPEN	1.00	3.00	0.60	3.00	1	35843.43
C50	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C51	RECT_OPEN	1.00	3.00	0.60	3.00	1	44341.94
C52	RECT_OPEN	1.00	3.00	0.60	3.00	1	44341.94
C53	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C54	RECT_OPEN	1.00	3.00	0.60	3.00	1	54148.25
C55	RECT_OPEN	1.00	3.00	0.60	3.00	1	54787.78
C56	RECT_OPEN	1.00	3.00	0.60	3.00	1	50160.45
C57	RECT_OPEN	1.00	3.00	0.60	3.00	1	43563.76
C58	RECT_OPEN	1.00	3.00	0.60	3.00	1	33897.68
C59	RECT_OPEN	1.00	3.00	0.60	3.00	1	41966.39
C6	RECT_OPEN	1.00	3.00	0.60	3.00	1	52848.83
C60	RECT_OPEN	1.00	3.00	0.60	3.00	1	57893.56
C61	RECT_OPEN	1.00	3.00	0.60	3.00	1	55420.88
C62	RECT_OPEN	1.00	3.00	0.60	3.00	1	51520.40
C63	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C64	RECT_OPEN	1.00	3.00	0.60	3.00	1	53502.02
C65	RECT_OPEN	1.00	3.00	0.60	3.00	1	57283.91
C66	RECT_OPEN	1.00	3.00	0.60	3.00	1	50844.53
C67	RECT_OPEN	1.00	3.00	0.60	3.00	1	45860.92
C68	RECT_OPEN	1.00	3.00	0.60	3.00	1	41145.56
C69	RECT_OPEN	1.00	3.00	0.60	3.00	1	62021.32
C7	RECT_OPEN	1.00	3.00	0.60	3.00	1	49467.78
C70	RECT_OPEN	1.00	3.00	0.60	3.00	1	24649.91
C71	RECT_OPEN	1.00	3.00	0.60	3.00	1	21737.24
C72	RECT_OPEN	1.00	3.00	0.60	3.00	1	39454.84
C73	RECT_OPEN	1.00	3.00	0.60	3.00	1	56047.78
C76	RECT_OPEN	1.00	3.00	0.60	3.00	1	24649.91
C77	RECT_OPEN	1.00	3.00	0.60	3.00	1	18370.10
C79	RECT_OPEN	1.00	3.00	0.60	3.00	1	30753.68
C8	RECT_OPEN	1.00	3.00	0.60	3.00	1	69698.53
C81	RECT_OPEN	1.00	3.00	0.60	3.00	1	41145.56
C82	RECT_OPEN	1.00	3.00	0.60	3.00	1	21737.24
C83	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C84_1	RECT_OPEN	1.00	3.00	0.60	3.00	1	52188.39
C84_2	RECT_OPEN	1.00	3.00	0.60	3.00	1	41966.39
C85	RECT_OPEN	1.00	3.00	0.60	3.00	1	51520.40
C86	RECT_OPEN	1.00	3.00	0.60	3.00	1	20124.05
C87	RECT_OPEN	1.00	3.00	0.60	3.00	1	16430.31
C88	RECT_OPEN	1.00	3.00	0.60	3.00	1	37691.14
C89	RECT_OPEN	1.00	2.00	0.50	2.00	1	27074.72
C9	RECT_OPEN	1.00	2.00	0.50	2.00	1	42683.05
EXCBMH117a-117b	CIRCULAR	0.25	0.05	0.06	0.25	1	144.39
EXCBMH117b-117c	CIRCULAR	0.25	0.05	0.06	0.25	1	144.42
EX-Ditch	TRAPEZOIDAL	1.00	3.10	0.48	6.10	1	2996.92
EXMH101-OUT	CIRCULAR	0.75	0.44	0.19	0.75	1	1575.34
EXMH102-101a	CIRCULAR	0.75	0.44	0.19	0.75	1	1392.71
EXMH102a-102	CIRCULAR	0.30	0.07	0.07	0.30	1	91.09
EXMH103-102	CIRCULAR	0.30	0.07	0.07	0.30	1	101.16
EXMH104-104a	CIRCULAR	0.60	0.28	0.15	0.60	1	704.49
EXMH104a-104b	CIRCULAR	0.60	0.28	0.15	0.60	1	705.10
EXMH104b-102	CIRCULAR	0.60	0.28	0.15	0.60	1	701.32
EXMH105-104	CIRCULAR	0.45	0.16	0.11	0.45	1	118.32
EXMH108-109	CIRCULAR	0.38	0.11	0.09	0.38	1	184.53

EXMH109-109a	CIRCULAR	0.60	0.28	0.15	0.60	1	355.11
EXMH109a-109b	CIRCULAR	0.60	0.28	0.15	0.60	1	355.94
EXMH109b-104	CIRCULAR	0.60	0.28	0.15	0.60	1	355.37
EXMH110-109	CIRCULAR	0.30	0.07	0.07	0.30	1	151.90
EXMH111-110	CIRCULAR	0.30	0.07	0.07	0.30	1	19.46
EXMH112-112a	CIRCULAR	0.30	0.07	0.07	0.30	1	28.92
EXMH112a-111	CIRCULAR	0.30	0.07	0.07	0.30	1	29.12
EXMH113-113c	CIRCULAR	0.38	0.11	0.09	0.38	1	104.51
EXMH113a-109	CIRCULAR	0.38	0.11	0.09	0.38	1	106.71
EXMH113b-113a	CIRCULAR	0.38	0.11	0.09	0.38	1	104.44
EXMH113c-113b	CIRCULAR	0.38	0.11	0.09	0.38	1	105.52
EXMH114-113	CIRCULAR	0.25	0.05	0.06	0.25	1	41.27
EXMh115-101	CIRCULAR	0.30	0.07	0.07	0.30	1	68.12
EXMH116-115	CIRCULAR	0.30	0.07	0.07	0.30	1	67.89
EXMH117c-116	CIRCULAR	0.25	0.05	0.06	0.25	1	144.45
EXSTUB-108	CIRCULAR	0.38	0.11	0.09	0.38	1	114.38
X-CB-103_(X-CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	40.56
X-CB-105_(X-CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	38.17
X-CB-107_(X-CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	31.34
X-CB-109_(X-CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	57.58
X-CB-118_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	88.62
X-CB-129_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	27.33
X-CB-89_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	63.95
X-CB-91_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	74.33
X-CB-94_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	38.18
X-CB-97_(X-CB)	CIRCULAR	0.30	0.07	0.07	0.30	1	81.25
X-CB-98_(X-CB)	CIRCULAR	0.30	0.07	0.07	0.30	1	34.63
X-STM-11_(X-STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	46.01
X-STM-13_(1)_(X-STM)	CIRCULAR	0.75	0.44	0.19	0.75	1	1315.20
X-STM-13_(X-STM)	CIRCULAR	0.75	0.44	0.19	0.75	1	1677.62
X-STM-25_(X-STM)_1	CIRCULAR	0.45	0.16	0.11	0.45	1	363.11
X-STM-27_(X-STM)_1	CIRCULAR	0.30	0.07	0.07	0.30	1	52.86
X-STM-27_(X-STM)_2	CIRCULAR	0.30	0.07	0.07	0.30	1	39.65
X-STM-29_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	25.14
X-STM-31_(X-STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	22.27
X-STM-51_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	29.09
X-STM-53_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	41.24
X-STM-55_(X-STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	46.48
X-STM-59_(X-STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	32.94
X-STM-61_(X-STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	40.23
X-STM-63_(X-STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	24.45
X-STM-65_(X-STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	25.36
X-STM-67_(X-STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	51.36
X-STM-69_(X-STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	35.83

```
***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

***************
Analysis Options
***************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/02/2020 00:00:00
Ending Date .............. 03/03/2020 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.988        71.667
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.130         9.408
Surface Runoff ...........         0.848        61.508
Final Storage ............         0.016         1.170
Continuity Error (%) .....        -0.585
```

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.848	8.478
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.002	0.016
External Outflow	0.850	8.496
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	0.001
Continuity Error (%)	-0.028	

Time-Step Critical Elements

Link EXMH104b-102 (91.76%)

Highest Flow Instability Indexes

Link EX-BLDG01-OUT (15)
Link INFIL-EX-CB123/124 (11)
Link INFIL-EX-CB10 (5)
Link INFIL-EX-CB82 (4)
Link INFIL-EX-CBMH117 (4)

Routing Time Step Summary

Minimum Time Step	:	0.16 sec
Average Time Step	:	0.95 sec
Maximum Time Step	:	2.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.03
Percent Not Converging	:	0.22

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
BLDG	71.67	0.00	0.00	0.00	72.27	0.00	72.27	0.62	413.51	1.008
S01	71.67	0.00	0.00	0.00	70.49	0.00	70.49	0.32	223.17	0.984
S02	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.04	29.76	0.979
S03	71.67	0.00	0.00	0.00	70.30	0.00	70.30	0.13	89.28	0.981
S04	71.67	0.00	0.00	0.00	70.24	0.00	70.24	0.15	109.12	0.980
S05	71.67	0.00	0.00	0.00	70.22	0.00	70.22	0.12	84.32	0.980
S06	71.67	0.00	0.00	0.00	70.18	0.00	70.18	0.15	104.16	0.979
S07	71.67	0.00	0.00	0.00	70.24	0.00	70.24	0.21	148.80	0.980
S08	71.67	0.00	0.00	0.00	70.30	0.00	70.30	0.06	44.64	0.981
S09	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.03	19.84	0.979
S1	71.67	0.00	0.00	0.00	70.73	0.00	70.73	0.03	19.47	0.987
S10	71.67	0.00	0.00	0.00	70.22	0.00	70.22	0.06	39.68	0.980
S11	71.67	0.00	0.00	0.00	70.65	0.00	70.65	0.49	346.59	0.986
S12	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.07	49.60	0.979
S13	71.67	0.00	0.00	0.00	70.46	0.00	70.46	0.07	49.60	0.983
S14	71.67	0.00	0.00	0.00	70.34	0.00	70.34	0.06	44.64	0.981
S15	71.67	0.00	0.00	0.00	70.39	0.00	70.39	0.16	114.08	0.982
S16	71.67	0.00	0.00	17.93	42.18	11.30	53.48	0.20	162.64	0.746
S17	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.02	14.88	0.979
S18	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.02	14.88	0.979
S19	71.67	0.00	0.00	0.00	70.28	0.00	70.28	0.18	124.00	0.981
S20	71.67	0.00	0.00	0.00	70.24	0.00	70.24	0.14	99.20	0.980
S21	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.06	39.68	0.979
S22	71.67	0.00	0.00	0.00	70.30	0.00	70.30	0.13	94.24	0.981
S23	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.05	34.72	0.979
S24	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.08	54.56	0.979
S25	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.08	54.56	0.979
S26	71.67	0.00	0.00	0.00	70.30	0.00	70.30	0.13	94.24	0.981
S27	71.67	0.00	0.00	0.00	70.19	0.00	70.19	0.10	69.44	0.979
S28	71.67	0.00	0.00	0.00	70.48	0.00	70.48	0.19	133.90	0.983
S29	71.67	0.00	0.00	0.00	70.44	0.00	70.44	0.16	114.07	0.983
S30	71.67	0.00	0.00	17.93	42.18	11.30	53.48	0.15	119.84	0.746
S31	71.67	0.00	0.00	0.00	70.39	0.00	70.39	0.10	69.44	0.982
S32	71.67	0.00	0.00	17.93	42.18	11.30	53.48	0.16	124.12	0.746
S33	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.07	49.60	0.979
S34	71.67	0.00	0.00	0.00	70.39	0.00	70.39	0.13	89.28	0.982
S35	71.67	0.00	0.00	0.00	70.46	0.00	70.46	0.30	208.30	0.983
S36	71.67	0.00	0.00	6.69	60.57	3.64	64.21	2.26	1483.97	0.896
S37	71.67	0.00	0.00	40.53	14.08	16.99	31.07	0.59	306.07	0.434

S38	71.67	0.00	0.00	15.77	45.70	9.84	55.53	0.41	319.62	0.775

****
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
HP01	JUNCTION	0.03	0.48	114.48	0 01:11	0.48
HP-EX-CB10	JUNCTION	0.00	0.04	112.81	0 01:06	0.03
HP-EX-CB100	JUNCTION	0.02	0.09	113.98	0 01:14	0.09
HP-EX-CB102	JUNCTION	0.00	0.00	114.12	0 00:00	0.00
HP-EX-CB102a	JUNCTION	0.00	0.00	114.00	0 00:00	0.00
HP-EX-CB104	JUNCTION	0.00	0.00	114.06	0 00:00	0.00
HP-EX-CB104a	JUNCTION	0.00	0.00	114.10	0 00:00	0.00
HP-EX-CB106	JUNCTION	0.00	0.00	114.00	0 00:00	0.00
HP-EX-CB110	JUNCTION	0.00	0.33	113.96	0 01:11	0.30
HP-EX-CB113	JUNCTION	0.05	0.62	113.92	0 01:10	0.60
HP-EX-CB116	JUNCTION	0.02	0.41	113.93	0 01:10	0.36
HP-EX-CB117	JUNCTION	0.02	0.39	113.89	0 01:10	0.36
HP-EX-CB123/124	JUNCTION	0.00	0.23	113.84	0 01:10	0.20
HP-EX-CB123/124a	JUNCTION	0.00	0.21	113.81	0 01:10	0.14
HP-EX-CB128	JUNCTION	0.00	0.00	113.96	0 00:00	0.00
HP-EX-CB131	JUNCTION	0.01	0.35	113.25	0 01:10	0.28
HP-EX-CB134	JUNCTION	0.00	0.00	113.51	0 01:09	0.00
HP-EX-CB137	JUNCTION	0.00	0.13	113.73	0 01:09	0.11
HP-EX-CB28	JUNCTION	0.00	0.00	114.00	0 00:00	0.00
HP-EX-CB30	JUNCTION	0.00	0.00	114.00	0 00:00	0.00
HP-EX-CB38	JUNCTION	0.00	0.00	113.90	0 01:10	0.00
HP-EX-CB40	JUNCTION	0.00	0.00	113.70	0 00:00	0.00
HP-EX-CB50	JUNCTION	0.00	0.00	114.03	0 00:00	0.00
HP-EX-CB50a	JUNCTION	0.00	0.00	114.09	0 00:00	0.00
HP-EX-CB52	JUNCTION	0.00	0.00	114.00	0 00:00	0.00
HP-EX-CB52a	JUNCTION	0.00	0.00	113.98	0 01:14	0.00
HP-EX-CB54	JUNCTION	0.00	0.01	113.99	0 01:13	0.00
HP-EX-CB54a	JUNCTION	0.00	0.03	113.98	0 01:14	0.03
HP-EX-CB58	JUNCTION	0.00	0.00	114.00	0 05:56	0.00
HP-EX-CB60	JUNCTION	0.00	0.00	113.96	0 00:00	0.00
HP-EX-CB62	JUNCTION	0.05	0.14	113.96	0 03:12	0.14
HP-EX-CB64	JUNCTION	0.00	0.00	113.98	0 00:00	0.00
HP-EX-CB66	JUNCTION	0.00	0.00	114.04	0 00:00	0.00
HP-EX-CB68	JUNCTION	0.00	0.00	114.14	0 00:00	0.00
HP-EX-CB72	JUNCTION	0.00	0.28	113.28	0 01:10	0.21
HP-EX-CB82	JUNCTION	0.01	0.19	114.24	0 01:04	0.18
HP-EX-CB84	JUNCTION	0.00	0.16	114.17	0 01:09	0.09
HP-EX-CB87	JUNCTION	0.00	0.00	113.95	0 00:00	0.00
HP-EX-CB90	JUNCTION	0.00	0.00	114.05	0 00:00	0.00
HP-EX-CB92	JUNCTION	0.00	0.00	113.95	0 00:00	0.00
HP-EX-CB95	JUNCTION	0.00	0.00	113.96	0 00:00	0.00
HP-EX-CB96	JUNCTION	0.00	0.00	113.97	0 00:00	0.00
HP-EX-CBMH117	JUNCTION	0.00	0.04	112.89	0 01:05	0.03
HP-EXMH102Aa	JUNCTION	0.00	0.18	114.33	0 01:11	0.18
HP-EX-STM43	JUNCTION	0.01	0.40	113.90	0 01:09	0.37
IF-EX-CB10	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB100	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB102	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB104	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB106	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB110	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB113	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB116	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB117	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB121	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB123/124	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB128	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB137	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB28	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB30	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB38	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB40	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB50	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB52	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB54	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB58	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB64	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB66	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB68	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB82	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB84	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB87	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB90	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB92	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB95	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CB96	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
IF-EX-CBMH117	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Major01	OUTFALL	0.01	0.32	113.19	0 01:10	0.28
Major02	OUTFALL	0.00	0.08	111.69	0 01:09	0.08
Major03	OUTFALL	0.00	0.00	106.80	0 00:00	0.00

Minor01	OUTFALL	0.11	0.32	103.27	0	01:15	0.32
EX-BLDG01	STORAGE	0.01	0.11	120.11	0	01:16	0.11
EX-CB10	STORAGE	0.28	1.39	112.90	0	01:05	1.39
EX-CB100	STORAGE	0.90	1.21	113.98	0	01:13	1.21
EX-CB102	STORAGE	0.97	1.29	113.98	0	01:14	1.29
EX-CB104	STORAGE	1.22	1.57	113.97	0	03:10	1.57
EX-CB106	STORAGE	1.30	1.65	113.96	0	03:11	1.65
EX-CB110	STORAGE	0.38	1.92	113.92	0	01:11	1.91
EX-CB113	STORAGE	0.38	1.96	113.96	0	01:11	1.92
EX-CB116	STORAGE	0.12	0.96	113.95	0	01:11	0.86
EX-CB117	STORAGE	0.31	1.87	113.96	0	01:11	1.80
EX-CB121	STORAGE	0.28	1.82	113.97	0	01:11	1.71
EX-CB123/124	STORAGE	0.38	2.10	113.90	0	01:10	2.09
EX-CB128	STORAGE	0.81	1.41	113.92	0	02:53	1.41
EX-CB132	STORAGE	0.60	2.95	111.83	0	01:09	2.92
EX-CB134	STORAGE	0.10	1.92	113.52	0	01:08	1.92
EX-CB137	STORAGE	0.15	1.88	113.88	0	01:10	1.82
EX-CB14	STORAGE	0.29	2.05	114.47	0	01:11	2.05
EX-CB28	STORAGE	0.86	1.49	113.92	0	02:44	1.49
EX-CB30	STORAGE	0.82	1.44	113.94	0	01:43	1.44
EX-CB38	STORAGE	0.02	0.38	113.24	0	01:14	0.38
EX-CB40	STORAGE	0.02	0.38	113.30	0	01:14	0.38
EX-CB50	STORAGE	1.28	1.63	113.97	0	03:01	1.63
EX-CB52	STORAGE	1.19	1.53	113.97	0	02:52	1.53
EX-CB54	STORAGE	1.12	1.47	113.99	0	01:13	1.46
EX-CB58	STORAGE	1.20	1.56	114.00	0	05:56	1.56
EX-CB60	STORAGE	1.44	1.81	113.96	0	03:12	1.81
EX-CB62	STORAGE	1.00	1.32	113.96	0	03:11	1.32
EX-CB64	STORAGE	1.48	1.85	113.95	0	03:14	1.85
EX-CB66	STORAGE	1.24	1.58	113.95	0	03:14	1.58
EX-CB68	STORAGE	1.06	1.38	113.95	0	03:14	1.38
EX-CB72	STORAGE	0.12	2.15	113.33	0	01:10	2.01
EX-CB82	STORAGE	0.30	1.71	114.33	0	01:10	1.71
EX-CB84	STORAGE	0.48	2.19	114.31	0	01:09	2.19
EX-CB87	STORAGE	0.81	1.41	113.91	0	03:01	1.41
EX-CB90	STORAGE	0.80	1.40	113.91	0	03:03	1.40
EX-CB92	STORAGE	0.82	1.43	113.92	0	01:50	1.43
EX-CB95	STORAGE	0.85	1.47	113.92	0	02:54	1.47
EX-CB96	STORAGE	1.00	1.70	113.92	0	02:56	1.70
EX-CBMH117	STORAGE	0.35	1.68	112.94	0	01:05	1.67
EX-CBMH117a	STORAGE	0.02	0.06	111.32	0	01:06	0.06
EX-CBMH117b	STORAGE	0.02	0.09	109.56	0	01:09	0.09
EX-CBMH117c	STORAGE	0.03	0.11	109.23	0	01:09	0.11
EX-MH101	STORAGE	0.11	0.32	104.89	0	01:14	0.32
EX-MH101a	STORAGE	0.11	0.33	107.51	0	01:14	0.33
EX-MH101b	STORAGE	0.10	0.29	105.62	0	01:14	0.29
EX-MH102	STORAGE	0.11	0.32	109.70	0	01:14	0.32
EX-MH102A	STORAGE	0.08	0.54	112.96	0	01:12	0.54
EX-MH103	STORAGE	0.01	0.07	110.78	0	01:12	0.07
EX-MH104	STORAGE	0.11	0.31	110.96	0	01:14	0.31
EX-MH104a	STORAGE	0.11	0.32	110.64	0	01:14	0.32
EX-MH104b	STORAGE	0.12	0.33	110.15	0	01:14	0.33
EX-MH105	STORAGE	0.09	0.13	111.41	0	02:58	0.13
EX-MH106	STORAGE	1.05	1.76	113.91	0	02:56	1.76
EX-MH106a	STORAGE	1.42	2.30	113.91	0	02:58	2.30
EX-MH107	STORAGE	0.91	1.57	113.92	0	02:43	1.57
EX-MH107a	STORAGE	1.02	1.71	113.91	0	02:53	1.71
EX-MH108	STORAGE	0.04	0.60	111.92	0	01:15	0.60
EX-MH109	STORAGE	0.13	0.45	111.43	0	01:14	0.45
EX-MH109a	STORAGE	0.13	0.46	111.36	0	01:14	0.46
EX-MH109b	STORAGE	0.14	0.47	111.25	0	01:14	0.47
EX-MH110	STORAGE	1.50	1.87	113.95	0	03:13	1.87
EX-MH110a	STORAGE	0.06	0.07	112.15	0	03:13	0.07
EX-MH111	STORAGE	1.51	1.89	113.96	0	03:12	1.89
EX-MH112	STORAGE	1.42	1.91	114.06	0	05:57	1.91
EX-MH112a	STORAGE	1.49	1.86	113.96	0	03:11	1.86
EX-MH113	STORAGE	0.03	0.20	112.39	0	01:11	0.20
EX-MH113a	STORAGE	0.05	0.25	112.02	0	01:12	0.25
EX-MH113b	STORAGE	0.05	0.26	112.31	0	01:12	0.26
EX-MH113c	STORAGE	0.05	0.25	112.32	0	01:12	0.25
EX-MH114	STORAGE	0.01	0.09	112.60	0	01:14	0.09
EX-MH115	STORAGE	0.05	0.22	105.27	0	01:11	0.22
EX-MH116	STORAGE	0.05	0.22	105.72	0	01:10	0.22
EX-STM43	STORAGE	0.15	1.50	114.00	0	01:11	1.38
EX-STUB	STORAGE	0.05	0.72	112.10	0	01:15	0.72

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
HP01	JUNCTION	0.00	160.30	0 01:03	0	0.0722	5.251
HP-EX-CB10	JUNCTION	0.00	666.44	0 01:06	0	0.384	0.031
HP-EX-CB100	JUNCTION	0.00	38.29	0 01:13	0	0.0367	-0.017
HP-EX-CB102	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 ltr
HP-EX-CB102a	JUNCTION	0.00	0.00	0 00:00	0	0	0.000 ltr

HP-EX-CB104	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB104a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB106	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB110	JUNCTION	0.00	1044.30	0	01:11	0	0.355	0.830	
HP-EX-CB113	JUNCTION	0.00	571.52	0	01:10	0	0.272	-0.465	
HP-EX-CB116	JUNCTION	0.00	607.80	0	01:09	0	0.209	-0.988	
HP-EX-CB117	JUNCTION	0.00	1003.42	0	01:11	0	0.537	-0.362	
HP-EX-CB123/124	JUNCTION	0.00	998.37	0	01:10	0	0.489	0.062	
HP-EX-CB123/124a	JUNCTION	0.00	1014.86	0	01:10	0	0.49	0.108	
HP-EX-CB128	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB131	JUNCTION	0.00	2812.67	0	01:10	0	1.68	0.091	
HP-EX-CB134	JUNCTION	0.00	29.91	0	01:09	0	0.00686	0.001	
HP-EX-CB137	JUNCTION	0.00	2765.19	0	01:10	0	1.67	0.010	
HP-EX-CB28	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB30	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB38	JUNCTION	0.00	6.19	0	01:09	0	9.98e-06	-1.084	ltr
HP-EX-CB40	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB50	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB50a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB52	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB52a	JUNCTION	0.00	8.61	0	01:14	0	5.26e-05	0.359	
HP-EX-CB54	JUNCTION	0.00	17.48	0	01:13	0	0.000158	0.120	
HP-EX-CB54a	JUNCTION	0.00	45.80	0	01:13	0	0.0312	0.041	
HP-EX-CB58	JUNCTION	0.00	10.57	0	05:56	0	9.37e-05	0.946	
HP-EX-CB60	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB62	JUNCTION	0.00	36.90	0	07:28	0	0.183	-0.006	
HP-EX-CB64	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB66	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB68	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB72	JUNCTION	0.00	758.59	0	01:09	0	0.0541	-0.301	
HP-EX-CB82	JUNCTION	0.00	1265.81	0	01:10	0	1.31	0.004	
HP-EX-CB84	JUNCTION	0.00	1701.21	0	01:09	0	1.34	0.001	
HP-EX-CB87	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB90	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB92	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB95	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB96	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CBMH117	JUNCTION	0.00	194.74	0	01:05	0	0.0855	0.016	
HP-EXMH102Aa	JUNCTION	0.00	1166.48	0	01:11	0	1.31	-0.000	
HP-EX-STM43	JUNCTION	0.00	664.01	0	01:09	0	0.329	-0.748	
IF-EX-CB10	OUTFALL	0.00	0.26	0	00:25	0	0.00403	0.000	
IF-EX-CB100	OUTFALL	0.00	0.14	0	00:24	0	0.00917	0.000	
IF-EX-CB102	OUTFALL	0.00	0.14	0	00:22	0	0.0094	0.000	
IF-EX-CB104	OUTFALL	0.00	0.14	0	00:22	0	0.01	0.000	
IF-EX-CB106	OUTFALL	0.00	0.14	0	00:22	0	0.0101	0.000	
IF-EX-CB110	OUTFALL	0.00	0.14	0	00:21	0	0.00278	0.000	
IF-EX-CB113	OUTFALL	0.00	0.14	0	00:21	0	0.00264	0.000	
IF-EX-CB116	OUTFALL	0.00	0.14	0	00:25	0	0.00177	0.000	
IF-EX-CB117	OUTFALL	0.00	0.14	0	00:25	0	0.00199	0.000	
IF-EX-CB121	OUTFALL	0.00	0.14	0	00:25	0	0.00186	0.000	
IF-EX-CB123/124	OUTFALL	0.00	0.28	0	00:25	0	0.00488	0.000	
IF-EX-CB128	OUTFALL	0.00	0.14	0	00:22	0	0.0066	0.000	
IF-EX-CB137	OUTFALL	0.00	0.21	0	00:25	0	0.00239	0.000	
IF-EX-CB28	OUTFALL	0.00	0.14	0	00:24	0	0.00667	0.000	
IF-EX-CB30	OUTFALL	0.00	0.14	0	00:23	0	0.00661	0.000	
IF-EX-CB38	OUTFALL	0.00	0.14	0	00:25	0	0.00147	0.000	
IF-EX-CB40	OUTFALL	0.00	0.14	0	00:25	0	0.00147	0.000	
IF-EX-CB50	OUTFALL	0.00	0.14	0	00:22	0	0.0101	0.000	
IF-EX-CB52	OUTFALL	0.00	0.14	0	00:22	0	0.00998	0.000	
IF-EX-CB54	OUTFALL	0.00	0.14	0	00:23	0	0.00978	0.000	
IF-EX-CB58	OUTFALL	0.00	0.14	0	00:22	0	0.00995	0.000	
IF-EX-CB64	OUTFALL	0.00	0.14	0	00:22	0	0.0105	0.000	
IF-EX-CB66	OUTFALL	0.00	0.14	0	00:22	0	0.0101	0.000	
IF-EX-CB68	OUTFALL	0.00	0.14	0	00:22	0	0.00969	0.000	
IF-EX-CB82	OUTFALL	0.00	0.21	0	00:25	0	0.00303	0.000	
IF-EX-CB84	OUTFALL	0.00	0.21	0	00:25	0	0.00367	0.000	
IF-EX-CB87	OUTFALL	0.00	0.14	0	00:24	0	0.0066	0.000	
IF-EX-CB90	OUTFALL	0.00	0.14	0	00:25	0	0.00658	0.000	
IF-EX-CB92	OUTFALL	0.00	0.14	0	00:24	0	0.00661	0.000	
IF-EX-CB95	OUTFALL	0.00	0.14	0	00:22	0	0.00666	0.000	
IF-EX-CB96	OUTFALL	0.00	0.14	0	00:25	0	0.0068	0.000	
IF-EX-CBMH117	OUTFALL	0.00	0.26	0	00:25	0	0.00417	0.000	
Major01	OUTFALL	0.00	2647.43	0	01:10	0	1.64	0.000	
Major02	OUTFALL	0.00	951.89	0	01:09	0	0.655	0.000	
Major03	OUTFALL	0.00	0.00	0	00:00	0	0	0.000	ltr
Minor01	OUTFALL	0.00	590.70	0	01:15	0	6.02	0.000	
EX-BLDG01	STORAGE	413.51	413.51	0	01:10	0.624	0.624	-0.009	
EX-CB10	STORAGE	223.17	477.33	0	01:05	0.317	0.479	-0.068	
EX-CB100	STORAGE	29.76	60.25	0	00:57	0.0421	0.0779	0.008	
EX-CB102	STORAGE	89.28	118.05	0	01:09	0.127	0.197	0.106	
EX-CB104	STORAGE	109.12	132.30	0	01:10	0.155	0.344	-0.064	
EX-CB106	STORAGE	84.32	91.24	0	01:06	0.119	0.519	0.014	
EX-CB110	STORAGE	104.16	1348.66	0	01:11	0.147	0.637	-0.035	
EX-CB113	STORAGE	148.80	411.65	0	01:11	0.211	0.29	0.319	
EX-CB116	STORAGE	44.64	561.57	0	01:09	0.0633	0.16	0.525	
EX-CB117	STORAGE	19.84	775.53	0	01:11	0.0281	0.334	0.646	
EX-CB121	STORAGE	39.68	1178.62	0	01:11	0.0562	0.472	-0.350	
EX-CB123/124	STORAGE	346.59	1057.21	0	01:10	0.495	0.821	-0.025	
EX-CB128	STORAGE	49.60	49.60	0	01:05	0.0702	0.0725	-0.005	
EX-CB132	STORAGE	319.62	988.63	0	01:09	0.411	0.818	0.003	
EX-CB134	STORAGE	49.60	49.60	0	01:10	0.0705	0.0705	-0.002	
EX-CB137	STORAGE	44.64	1122.71	0	01:10	0.0633	0.562	-0.220	

EX-CB14	STORAGE	1483.97	1483.97	0	01:10	2.26	2.33	-0.158
EX-CB28	STORAGE	114.08	119.53	0	01:10	0.162	0.18	0.081
EX-CB30	STORAGE	162.64	162.64	0	01:10	0.203	0.204	0.056
EX-CB38	STORAGE	14.88	15.14	0	01:09	0.0211	0.0211	-0.037
EX-CB40	STORAGE	14.88	14.88	0	01:05	0.0211	0.0211	-0.037
EX-CB50	STORAGE	124.00	124.78	0	01:10	0.176	0.787	-0.015
EX-CB52	STORAGE	99.20	139.96	0	01:05	0.14	0.286	-0.023
EX-CB54	STORAGE	39.68	68.06	0	01:13	0.0561	0.0933	-0.042
EX-CB58	STORAGE	94.24	608.13	0	05:56	0.134	1.15	0.669
EX-CB60	STORAGE	34.72	70.83	0	01:05	0.0491	0.254	0.007
EX-CB62	STORAGE	54.56	54.56	0	01:05	0.0772	0.147	0.010
EX-CB64	STORAGE	54.56	59.89	0	01:10	0.0772	0.323	0.010
EX-CB66	STORAGE	94.24	113.54	0	01:05	0.134	0.241	-0.039
EX-CB68	STORAGE	69.44	69.44	0	01:10	0.0983	0.104	0.081
EX-CB72	STORAGE	19.47	556.25	0	01:09	0.0283	0.06	-0.121
EX-CB82	STORAGE	133.90	1284.88	0	01:10	0.19	1.5	-0.041
EX-CB84	STORAGE	114.07	697.04	0	01:04	0.162	0.299	-0.111
EX-CB87	STORAGE	119.84	119.84	0	01:10	0.15	0.15	0.005
EX-CB90	STORAGE	69.44	69.44	0	01:10	0.0985	0.101	0.003
EX-CB92	STORAGE	124.12	124.12	0	01:10	0.155	0.155	-0.014
EX-CB95	STORAGE	49.60	67.27	0	01:05	0.0702	0.14	0.015
EX-CB96	STORAGE	89.28	141.61	0	01:07	0.127	0.291	-0.022
EX-CBMH117	STORAGE	208.30	212.17	0	01:05	0.296	0.388	-0.021
EX-CBMH117a	STORAGE	0.00	18.60	0	01:05	0	0.221	0.000
EX-CBMH117b	STORAGE	0.00	38.55	0	01:08	0	0.285	-0.000
EX-CBMH117c	STORAGE	0.00	60.45	0	01:09	0	0.464	0.004
EX-MH101	STORAGE	0.00	590.69	0	01:14	0	6.02	0.002
EX-MH101a	STORAGE	0.00	530.82	0	01:14	0	5.56	-0.000
EX-MH101b	STORAGE	0.00	530.85	0	01:14	0	5.56	-0.009
EX-MH102	STORAGE	0.00	530.79	0	01:14	0	5.56	-0.000
EX-MH102A	STORAGE	0.00	115.35	0	01:10	0	0.947	0.001
EX-MH103	STORAGE	0.00	13.05	0	01:10	0	0.0427	-0.003
EX-MH104	STORAGE	0.00	366.40	0	01:14	0	4.11	0.000
EX-MH104a	STORAGE	0.00	385.28	0	01:14	0	4.37	0.000
EX-MH104b	STORAGE	0.00	404.03	0	01:14	0	4.57	-0.000
EX-MH105	STORAGE	0.00	21.97	0	02:58	0	0.982	-0.000
EX-MH106	STORAGE	0.00	61.25	0	00:58	0	0.753	-0.024
EX-MH106a	STORAGE	0.00	57.73	0	00:59	0	0.988	-0.000
EX-MH107	STORAGE	0.00	55.00	0	01:00	0	0.37	-0.081
EX-MH107a	STORAGE	0.00	87.58	0	00:58	0	0.784	0.031
EX-MH108	STORAGE	0.00	178.63	0	01:16	0	0.624	-0.010
EX-MH109	STORAGE	0.00	308.23	0	01:13	0	2.84	0.002
EX-MH109a	STORAGE	0.00	327.15	0	01:14	0	3.04	-0.000
EX-MH109b	STORAGE	0.00	345.03	0	01:14	0	3.13	0.000
EX-MH110	STORAGE	0.00	41.57	0	05:34	0	1.33	0.001
EX-MH110a	STORAGE	0.00	19.59	0	03:13	0	1.28	-0.000
EX-MH111	STORAGE	0.00	64.08	0	01:27	0	1.21	-0.001
EX-MH112	STORAGE	0.00	587.87	0	05:56	0	2.11	-0.608
EX-MH112a	STORAGE	0.00	141.38	0	05:34	0	1.36	0.320
EX-MH113	STORAGE	0.00	61.33	0	01:11	0	0.348	-0.012
EX-MH113a	STORAGE	0.00	111.12	0	01:12	0	0.935	-0.000
EX-MH113b	STORAGE	0.00	84.56	0	01:12	0	0.667	0.001
EX-MH113c	STORAGE	0.00	71.80	0	01:11	0	0.507	0.011
EX-MH114	STORAGE	0.00	12.19	0	01:14	0	0.0392	-0.042
EX-MH115	STORAGE	0.00	60.27	0	01:10	0	0.464	0.084
EX-MH116	STORAGE	0.00	60.31	0	01:09	0	0.464	-0.009
EX-STM43	STORAGE	306.07	537.33	0	01:11	0.593	0.632	0.359
EX-STUB	STORAGE	0.00	178.60	0	01:11	0	0.624	0.010

****
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 LPS
EX-BLDG01	0.007	0	0	0	0.166	4	0 01:16	178.60
EX-CB10	0.010	18	0	0	0.054	100	0 01:02	666.70
EX-CB100	0.006	81	0	0	0.007	100	0 00:58	49.69
EX-CB102	0.048	66	0	0	0.073	100	0 01:12	62.61
EX-CB104	0.077	28	0	0	0.161	58	0 03:10	38.86
EX-CB106	0.043	35	0	0	0.093	76	0 03:11	78.16
EX-CB110	0.015	18	0	0	0.082	100	0 01:09	862.15
EX-CB113	0.013	18	0	0	0.077	100	0 01:09	459.57
EX-CB116	0.007	14	0	0	0.046	100	0 01:08	481.95

EX-CB117	0.006	14	0	0	0.040	100	0	01:08	701.73
EX-CB121	0.007	14	0	0	0.048	100	0	01:08	1176.79
EX-CB123/124	0.011	16	0	0	0.065	100	0	01:07	1018.16
EX-CB128	0.013	28	0	0	0.032	70	0	02:53	21.25
EX-CB132	0.001	18	0	0	0.003	86	0	01:09	973.78
EX-CB134	0.000	2	0	0	0.008	100	0	01:08	49.94
EX-CB137	0.001	9	0	0	0.017	100	0	01:05	1433.51
EX-CB14	0.001	19	0	0	0.007	100	0	00:44	1365.42
EX-CB28	0.054	22	0	0	0.144	59	0	02:44	34.03
EX-CB30	0.040	22	0	0	0.121	67	0	01:43	26.06
EX-CB38	0.000	0	0	0	0.006	9	0	01:14	6.24
EX-CB40	0.000	0	0	0	0.006	9	0	01:14	6.23
EX-CB50	0.054	31	0	0	0.119	67	0	03:01	191.27
EX-CB52	0.069	43	0	0	0.145	90	0	02:52	44.48
EX-CB54	0.006	84	0	0	0.007	100	0	00:55	58.00
EX-CB58	0.055	42	0	0	0.129	99	0	05:56	269.35
EX-CB60	0.015	38	0	0	0.036	93	0	03:12	42.39
EX-CB62	0.012	35	0	0	0.031	92	0	03:11	39.46
EX-CB64	0.033	34	0	0	0.073	75	0	03:14	41.71
EX-CB66	0.067	28	0	0	0.137	57	0	03:14	22.07
EX-CB68	0.034	31	0	0	0.075	66	0	03:14	16.51
EX-CB72	0.000	4	0	0	0.010	100	0	01:09	378.86
EX-CB82	0.013	15	0	0	0.089	100	0	01:04	1284.91
EX-CB84	0.029	17	0	0	0.168	100	0	01:08	548.06
EX-CB87	0.037	27	0	0	0.097	72	0	03:01	22.61
EX-CB90	0.018	17	0	0	0.058	56	0	03:03	24.13
EX-CB92	0.036	29	0	0	0.094	77	0	01:50	22.35
EX-CB95	0.015	30	0	0	0.038	73	0	02:54	36.12
EX-CB96	0.069	31	0	0	0.176	78	0	02:56	37.46
EX-CBMH117	0.004	9	0	0	0.050	100	0	01:05	216.40
EX-CBMH117a	0.000	1	0	0	0.000	4	0	01:06	18.52
EX-CBMH117b	0.000	0	0	0	0.000	2	0	01:09	38.54
EX-CBMH117c	0.000	1	0	0	0.000	3	0	01:09	60.31
EX-MH101	0.000	5	0	0	0.000	14	0	01:14	590.70
EX-MH101a	0.000	2	0	0	0.000	7	0	01:14	530.85
EX-MH101b	0.000	2	0	0	0.000	6	0	01:14	530.85
EX-MH102	0.000	2	0	0	0.000	7	0	01:14	530.82
EX-MH102A	0.000	5	0	0	0.001	31	0	01:12	114.80
EX-MH103	0.000	0	0	0	0.000	3	0	01:12	12.54
EX-MH104	0.000	3	0	0	0.000	9	0	01:14	366.41
EX-MH104a	0.000	3	0	0	0.000	9	0	01:14	385.30
EX-MH104b	0.000	3	0	0	0.000	8	0	01:14	404.03
EX-MH105	0.000	3	0	0	0.000	5	0	02:58	21.97
EX-MH106	0.001	57	0	0	0.002	96	0	02:56	46.53
EX-MH106a	0.001	42	0	0	0.002	68	0	02:58	33.59
EX-MH107	0.001	35	0	0	0.002	60	0	02:43	37.44
EX-MH107a	0.001	57	0	0	0.002	96	0	02:53	61.25
EX-MH108	0.000	2	0	0	0.001	26	0	01:15	178.68
EX-MH109	0.000	5	0	0	0.000	17	0	01:14	308.15
EX-MH109a	0.000	5	0	0	0.000	17	0	01:14	327.04
EX-MH109b	0.000	5	0	0	0.000	16	0	01:14	344.73
EX-MH110	0.001	53	0	0	0.002	66	0	03:13	42.11
EX-MH110a	0.000	4	0	0	0.000	4	0	03:13	19.59
EX-MH111	0.002	72	0	0	0.002	89	0	03:12	65.17
EX-MH112	0.001	51	0	0	0.002	69	0	05:57	608.13
EX-MH112a	0.001	74	0	0	0.002	92	0	03:11	149.21
EX-MH113	0.000	2	0	0	0.000	14	0	01:11	58.66
EX-MH113a	0.000	2	0	0	0.000	9	0	01:12	110.96
EX-MH113b	0.000	3	0	0	0.000	17	0	01:12	84.12
EX-MH113c	0.000	3	0	0	0.000	16	0	01:12	71.31
EX-MH114	0.000	1	0	0	0.000	8	0	01:14	12.18
EX-MH115	0.000	3	0	0	0.000	12	0	01:11	60.24
EX-MH116	0.000	2	0	0	0.000	9	0	01:10	60.27
EX-STM43	0.006	12	0	0	0.051	100	0	01:05	660.22
EX-STUB	0.000	2	0	0	0.001	32	0	01:15	178.63

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
IF-EX-CB10	29.65	0.25	0.26	0.004
IF-EX-CB100	86.18	0.14	0.14	0.009
IF-EX-CB102	87.56	0.14	0.14	0.009
IF-EX-CB104	91.45	0.14	0.14	0.010
IF-EX-CB106	92.08	0.14	0.14	0.010
IF-EX-CB110	34.16	0.14	0.14	0.003
IF-EX-CB113	32.75	0.14	0.14	0.003
IF-EX-CB116	24.07	0.14	0.14	0.002
IF-EX-CB117	26.40	0.14	0.14	0.002
IF-EX-CB121	25.11	0.14	0.14	0.002
IF-EX-CB123/124	34.33	0.25	0.28	0.005
IF-EX-CB128	67.73	0.14	0.14	0.007
IF-EX-CB137	22.92	0.20	0.21	0.002
IF-EX-CB28	68.41	0.14	0.14	0.007
IF-EX-CB30	67.86	0.14	0.14	0.007
IF-EX-CB38	20.45	0.14	0.14	0.001

IF-EX-CB40	20.45	0.14	0.14	0.001
IF-EX-CB50	92.15	0.14	0.14	0.010
IF-EX-CB52	91.24	0.14	0.14	0.010
IF-EX-CB54	90.10	0.14	0.14	0.010
IF-EX-CB58	91.04	0.14	0.14	0.010
IF-EX-CB64	93.92	0.14	0.14	0.011
IF-EX-CB66	91.72	0.14	0.14	0.010
IF-EX-CB68	89.36	0.14	0.14	0.010
IF-EX-CB82	27.81	0.20	0.21	0.003
IF-EX-CB84	31.37	0.21	0.21	0.004
IF-EX-CB87	67.79	0.14	0.14	0.007
IF-EX-CB90	67.68	0.14	0.14	0.007
IF-EX-CB92	67.89	0.14	0.14	0.007
IF-EX-CB95	68.24	0.14	0.14	0.007
IF-EX-CB96	69.53	0.14	0.14	0.007
IF-EX-CBMH117	30.08	0.25	0.26	0.004
Major01	8.45	424.77	2647.43	1.639
Major02	96.77	14.53	951.89	0.655
Major03	0.00	0.00	0.00	0.000
Minor01	99.24	106.90	590.70	6.021
System	58.50	551.18	2647.43	8.513

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	951.89	0	01:09	1.06	0.02	0.30
C10	CONDUIT	666.44	0	01:06	1.79	0.02	0.16
C100	CONDUIT	537.15	0	01:09	1.10	0.01	0.46
C11	CONDUIT	667.57	0	01:06	0.82	0.01	0.28
C12	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C13	CONDUIT	29.91	0	01:09	0.12	0.00	0.08
C136	CONDUIT	537.33	0	01:09	1.57	0.02	0.30
C14	CONDUIT	0.00	0	00:00	0.00	0.00	0.14
C15	CONDUIT	194.74	0	01:05	0.58	0.01	0.12
C16	CONDUIT	254.10	0	01:05	0.60	0.01	0.16
C17	CONDUIT	1265.81	0	01:10	1.25	0.03	0.34
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C19	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C2	CONDUIT	29.91	0	01:09	0.04	0.00	0.26
C20	CONDUIT	611.94	0	01:11	1.87	0.03	0.41
C21	CONDUIT	608.13	0	05:56	1.18	0.02	0.19
C22	CONDUIT	2647.43	0	01:10	2.75	0.19	0.33
C24	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C25	CONDUIT	0.00	0	00:00	0.00	0.00	0.14
C26	CONDUIT	0.00	0	00:00	0.00	0.00	0.14
C27	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
C28	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C29	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
C3	CONDUIT	1265.81	0	01:10	3.36	0.08	0.17
C3_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C3_2	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C30	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C31	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
C32	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
C33	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C34	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C35	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C36	CONDUIT	36.90	0	07:28	0.19	0.00	0.17
C37	CONDUIT	37.65	0	07:28	0.14	0.00	0.18
C38	CONDUIT	0.00	0	00:00	0.00	0.00	0.14
C39	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C4	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C4_1	CONDUIT	1014.86	0	01:10	1.96	0.12	0.21
C4_2	CONDUIT	1079.04	0	01:10	1.91	0.03	0.31
C40	CONDUIT	17.48	0	01:13	0.07	0.00	0.08
C41	CONDUIT	12.00	0	01:13	0.04	0.00	0.13
C42	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C43	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C44	CONDUIT	48.81	0	01:13	0.20	0.00	0.09
C45	CONDUIT	45.80	0	01:13	0.11	0.00	0.15
C46	CONDUIT	3.57	0	01:14	0.01	0.00	0.13
C47	CONDUIT	8.61	0	01:14	0.02	0.00	0.18
C48	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C49	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
C5	CONDUIT	1415.50	0	01:10	2.28	0.04	0.29
C50	CONDUIT	10.57	0	05:56	0.03	0.00	0.14
C51	CONDUIT	7.71	0	05:56	0.02	0.00	0.13
C52	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C53	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C54	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
C55	CONDUIT	0.00	0	00:00	0.00	0.00	0.14
C56	CONDUIT	0.00	0	00:00	0.00	0.00	0.18
C57	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C58	CONDUIT	40.58	0	01:13	0.08	0.00	0.18

C59	CONDUIT	38.29	0	01:13	0.07	0.00	0.22
C6	CONDUIT	1985.74	0	01:09	5.40	0.04	0.13
C60	CONDUIT	0.00	0	00:00	0.00	0.00	0.18
C61	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
C62	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
C63	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C64	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C65	CONDUIT	0.00	0	00:00	0.00	0.00	0.14
C66	CONDUIT	0.00	0	00:00	0.00	0.00	0.14
C67	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C68	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C69	CONDUIT	0.00	0	00:00	0.00	0.00	0.28
C7	CONDUIT	587.36	0	01:04	2.15	0.01	0.38
C70	CONDUIT	508.17	0	01:09	0.78	0.02	0.44
C71	CONDUIT	480.68	0	01:11	0.62	0.02	0.42
C72	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C73	CONDUIT	0.00	0	00:00	0.00	0.00	0.20
C76	CONDUIT	1003.42	0	01:11	1.25	0.04	0.46
C77	CONDUIT	409.08	0	01:12	0.86	0.02	0.44
C79	CONDUIT	748.42	0	01:10	0.68	0.02	0.46
C8	CONDUIT	2812.67	0	01:10	3.99	0.04	0.23
C81	CONDUIT	998.37	0	01:10	0.87	0.02	0.38
C82	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C83	CONDUIT	0.27	0	01:10	0.00	0.00	0.00
C84_1	CONDUIT	6.19	0	01:09	0.01	0.00	0.20
C84_2	CONDUIT	721.18	0	01:10	0.71	0.02	0.53
C85	CONDUIT	832.17	0	01:09	0.80	0.02	0.50
C86	CONDUIT	849.04	0	01:11	0.49	0.04	0.62
C87	CONDUIT	446.38	0	01:11	0.30	0.03	0.66
C88	CONDUIT	1127.98	0	01:11	1.16	0.03	0.35
C89	CONDUIT	1166.46	0	01:11	2.06	0.04	0.33
C9	CONDUIT	1166.48	0	01:11	0.99	0.03	0.59
EXCBMH117a-117b	CONDUIT	18.52	0	01:06	1.97	0.13	0.30
EXCBMH117b-117c	CONDUIT	38.54	0	01:09	2.09	0.27	0.40
EX-Ditch	CONDUIT	160.30	0	01:03	0.20	0.05	0.74
EXMH101-OUT	CONDUIT	590.70	0	01:15	3.31	0.37	0.42
EXMH102-101a	CONDUIT	530.82	0	01:14	2.94	0.38	0.43
EXMH102a-102	CONDUIT	114.80	0	01:12	1.67	1.26	0.93
EXMH103-102	CONDUIT	12.54	0	01:12	0.96	0.12	0.24
EXMH104-104a	CONDUIT	366.41	0	01:14	2.46	0.52	0.52
EXMH104a-104b	CONDUIT	385.30	0	01:14	2.50	0.55	0.54
EXMH104b-102	CONDUIT	404.03	0	01:14	2.57	0.58	0.54
EXMH105-104	CONDUIT	21.97	0	02:58	0.68	0.19	0.26
EXMH108-109	CONDUIT	178.68	0	01:16	1.62	0.97	1.00
EXMH109-109a	CONDUIT	308.15	0	01:14	1.34	0.87	0.76
EXMH109a-109b	CONDUIT	327.04	0	01:14	1.38	0.92	0.78
EXMH109b-104	CONDUIT	344.73	0	01:14	1.59	0.97	0.71
EXMH110-109	CONDUIT	19.59	0	03:14	1.48	0.13	0.38
EXMH111-110	CONDUIT	25.37	0	01:12	0.36	1.30	1.00
EXMH112-112a	CONDUIT	149.21	0	05:34	3.01	5.16	1.00
EXMH112a-111	CONDUIT	65.17	0	05:34	0.92	2.24	1.00
EXMH113-113c	CONDUIT	58.66	0	01:11	0.86	0.56	0.60
EXMH113a-109	CONDUIT	110.96	0	01:12	1.43	1.04	0.66
EXMH113b-113a	CONDUIT	84.12	0	01:12	1.06	0.81	0.68
EXMH113c-113b	CONDUIT	71.31	0	01:12	0.92	0.68	0.67
EXMH114-113	CONDUIT	12.18	0	01:14	0.42	0.30	0.57
EXMh115-101	CONDUIT	60.24	0	01:11	0.97	0.88	0.86
EXMH116-115	CONDUIT	60.27	0	01:10	1.09	0.89	0.73
EXMH117c-116	CONDUIT	60.31	0	01:09	2.81	0.42	0.45
EXSTUB-108	CONDUIT	178.63	0	01:16	1.62	1.56	1.00
X-CB-103_(X-CB)	CONDUIT	53.48	0	00:57	1.09	1.32	1.00
X-CB-105_(X-CB)	CONDUIT	38.72	0	00:58	0.79	1.01	1.00
X-CB-107_(X-CB)	CONDUIT	27.19	0	00:57	0.55	0.87	1.00
X-CB-109_(X-CB)	CONDUIT	78.02	0	01:27	1.59	1.35	1.00
X-CB-118_(X-CB)	CONDUIT	34.08	0	01:02	1.20	0.38	1.00
X-CB-129_(X-CB)	CONDUIT	24.07	0	00:57	0.77	0.88	1.00
X-CB-89_(X-CB)	CONDUIT	22.47	0	01:00	0.98	0.35	1.00
X-CB-91_(X-CB)	CONDUIT	23.99	0	01:02	0.99	0.32	1.00
X-CB-94_(X-CB)	CONDUIT	22.21	0	01:00	0.71	0.58	1.00
X-CB-97_(X-CB)	CONDUIT	35.98	0	01:01	0.60	0.44	1.00
X-CB-98_(X-CB)	CONDUIT	37.32	0	00:58	0.53	1.08	1.00
X-STM-11_(X-STM)	CONDUIT	26.67	0	01:10	0.54	0.58	1.00
X-STM-13_(1)_(X-STM)	CONDUIT	530.85	0	01:14	2.82	0.40	0.44
X-STM-13_(X-STM)	CONDUIT	530.85	0	01:14	3.30	0.32	0.39
X-STM-25_(X-STM)_1	CONDUIT	46.53	0	00:58	0.32	0.13	1.00
X-STM-27_(X-STM)_1	CONDUIT	37.44	0	00:58	0.53	0.71	1.00
X-STM-27_(X-STM)_2	CONDUIT	61.25	0	00:58	0.87	1.55	1.00
X-STM-29_(X-STM)	CONDUIT	33.89	0	01:00	0.48	1.35	1.00
X-STM-31_(X-STM)	CONDUIT	25.92	0	01:00	0.83	1.16	1.00
X-STM-51_(X-STM)	CONDUIT	188.64	0	01:27	2.67	6.48	1.00
X-STM-53_(X-STM)	CONDUIT	30.54	0	00:56	0.43	0.74	1.00
X-STM-55_(X-STM)	CONDUIT	44.34	0	00:55	0.90	0.95	1.00
X-STM-59_(X-STM)	CONDUIT	91.11	0	05:56	2.90	2.77	1.00
X-STM-61_(X-STM)	CONDUIT	42.39	0	01:27	0.86	1.05	1.00
X-STM-63_(X-STM)	CONDUIT	16.08	0	01:04	0.63	0.66	1.00
X-STM-65_(X-STM)	CONDUIT	41.57	0	05:34	0.85	1.64	1.00
X-STM-67_(X-STM)	CONDUIT	20.96	0	00:56	0.45	0.41	1.00
X-STM-69_(X-STM)	CONDUIT	21.93	0	00:55	0.49	0.61	1.00
OR1	ORIFICE	49.67	0	01:11			1.00
OR2	ORIFICE	115.35	0	01:10			1.00
OR3	ORIFICE	18.60	0	01:05			1.00
OR4	ORIFICE	19.59	0	03:13			1.00

X-CB-112_(X-CB)	ORIFICE	13.15	0	01:11	1.00
X-CB-115_(X-CB)	ORIFICE	13.39	0	01:10	1.00
X-CB-120_(X-CB)	ORIFICE	14.08	0	01:11	1.00
X-CB-122_(X-CB)	ORIFICE	13.88	0	01:11	1.00
X-CB-127_(X-CB)	ORIFICE	19.52	0	01:10	1.00
X-CB-131_(X-CB)	ORIFICE	21.91	0	01:09	1.00
X-CB-133_(X-CB)	ORIFICE	20.03	0	01:08	1.00
X-CB-135_(X-CB)	ORIFICE	18.39	0	01:10	1.00
X-CB-83_(X-CB)	ORIFICE	18.89	0	01:10	1.00
X-CB-86_(X-CB)	ORIFICE	19.89	0	01:09	1.00
X-STM-25_(X-STM)_2	ORIFICE	21.97	0	02:58	1.00
X-STM-39_(X-STM)	ORIFICE	6.10	0	01:14	1.00
X-STM-41_(X-STM)	ORIFICE	6.09	0	01:14	1.00
X-STM-73_(X-STM)	ORIFICE	13.05	0	01:10	1.00
EX-BLDG01-OUT	DUMMY	178.60	0	01:11	
INFIL-EX-CB10	DUMMY	0.26	0	00:25	
INFIL-EX-CB100	DUMMY	0.14	0	00:24	
INFIL-EX-CB102	DUMMY	0.14	0	00:22	
INFIL-EX-CB104	DUMMY	0.14	0	00:22	
INFIL-EX-CB106	DUMMY	0.14	0	00:22	
INFIL-EX-CB110	DUMMY	0.14	0	00:21	
INFIL-EX-CB113	DUMMY	0.14	0	00:21	
INFIL-EX-CB116	DUMMY	0.14	0	00:25	
INFIL-EX-CB117	DUMMY	0.14	0	00:25	
INFIL-EX-CB121	DUMMY	0.14	0	00:25	
INFIL-EX-CB123/124	DUMMY	0.28	0	00:25	
INFIL-EX-CB128	DUMMY	0.14	0	00:22	
INFIL-EX-CB137	DUMMY	0.21	0	00:25	
INFIL-EX-CB28	DUMMY	0.14	0	00:24	
INFIL-EX-CB30	DUMMY	0.14	0	00:23	
INFIL-EX-CB38	DUMMY	0.14	0	00:25	
INFIL-EX-CB40	DUMMY	0.14	0	00:25	
INFIL-EX-CB50	DUMMY	0.14	0	00:22	
INFIL-EX-CB52	DUMMY	0.14	0	00:22	
INFIL-EX-CB54	DUMMY	0.14	0	00:23	
INFIL-EX-CB58	DUMMY	0.14	0	00:22	
INFIL-EX-CB64	DUMMY	0.14	0	00:22	
INFIL-EX-CB66	DUMMY	0.14	0	00:22	
INFIL-EX-CB68	DUMMY	0.14	0	00:22	
INFIL-EX-CB82	DUMMY	0.21	0	00:25	
INFIL-EX-CB84	DUMMY	0.21	0	00:25	
INFIL-EX-CB87	DUMMY	0.14	0	00:24	
INFIL-EX-CB90	DUMMY	0.14	0	00:25	
INFIL-EX-CB92	DUMMY	0.14	0	00:24	
INFIL-EX-CB95	DUMMY	0.14	0	00:22	
INFIL-EX-CB96	DUMMY	0.14	0	00:25	

INFIL-EX-CBMH117	DUMMY	0.26	0	00:25	

****
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	0.03	0.00	0.00	0.11	0.00	0.00	0.85	0.01	0.00
C10	1.00	0.78	0.10	0.00	0.12	0.00	0.00	0.00	0.89	0.00
C100	1.00	0.94	0.02	0.00	0.03	0.00	0.00	0.00	0.94	0.00
C11	1.00	0.87	0.01	0.00	0.11	0.00	0.00	0.01	0.06	0.00
C12	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C13	1.00	0.96	0.03	0.00	0.01	0.00	0.00	0.00	0.95	0.00
C136	1.00	0.89	0.08	0.00	0.03	0.00	0.00	0.00	0.94	0.00
C14	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C15	1.00	0.84	0.13	0.00	0.03	0.00	0.00	0.00	0.94	0.00
C16	1.00	0.78	0.18	0.00	0.03	0.00	0.00	0.00	0.95	0.00
C17	1.00	0.80	0.12	0.00	0.09	0.00	0.00	0.00	0.91	0.00
C18	1.00	0.43	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C19	1.00	0.55	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.88	0.11	0.00	0.01	0.00	0.00	0.00	0.95	0.00
C20	1.00	0.90	0.02	0.00	0.08	0.00	0.00	0.00	0.00	0.00
C21	1.00	0.23	0.26	0.00	0.31	0.00	0.19	0.00	0.00	0.00
C22	1.00	0.89	0.00	0.00	0.05	0.06	0.00	0.00	0.01	0.00
C24	1.00	0.43	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C25	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C26	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C27	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C28	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C29	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3	1.00	0.91	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.00
C3_1	1.00	0.44	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3_2	1.00	0.92	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C30	1.00	0.55	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C31	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C32	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C33	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C34	1.00	0.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C35	1.00	0.44	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C36	1.00	0.26	0.09	0.00	0.65	0.00	0.00	0.00	0.43	0.00
C37	1.00	0.24	0.11	0.00	0.65	0.00	0.00	0.00	0.43	0.00

C38	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C39	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4_1	1.00	0.92	0.00	0.00	0.03	0.05	0.00	0.00	0.92	0.00
C4_2	1.00	0.92	0.00	0.00	0.08	0.00	0.00	0.00	0.93	0.00
C40	1.00	0.35	0.64	0.00	0.00	0.00	0.00	0.00	0.95	0.00
C41	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.95	0.00
C42	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C43	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C44	1.00	0.35	0.41	0.00	0.24	0.00	0.00	0.00	0.80	0.00
C45	1.00	0.22	0.54	0.00	0.24	0.00	0.00	0.00	0.81	0.00
C46	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.95	0.00
C47	1.00	0.21	0.78	0.00	0.00	0.00	0.00	0.00	0.95	0.00
C48	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C49	1.00	0.22	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.91	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.00
C50	1.00	0.23	0.76	0.00	0.00	0.00	0.00	0.00	0.75	0.00
C51	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.75	0.00
C52	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C53	1.00	0.24	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C54	1.00	0.22	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C55	1.00	0.22	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C56	1.00	0.21	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C57	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C58	1.00	0.22	0.34	0.00	0.44	0.00	0.00	0.00	0.63	0.00
C59	1.00	0.21	0.35	0.00	0.44	0.00	0.00	0.00	0.63	0.00
C6	1.00	0.91	0.00	0.00	0.00	0.08	0.00	0.00	0.93	0.00
C60	1.00	0.21	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C61	1.00	0.22	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C62	1.00	0.22	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C63	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C64	1.00	0.23	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C65	1.00	0.22	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C66	1.00	0.22	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C67	1.00	0.24	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C68	1.00	0.24	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C69	1.00	0.81	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C7	1.00	0.74	0.17	0.00	0.08	0.00	0.00	0.00	0.92	0.00
C70	1.00	0.81	0.02	0.00	0.17	0.00	0.00	0.00	0.87	0.00
C71	1.00	0.81	0.02	0.00	0.17	0.00	0.00	0.00	0.87	0.00
C72	1.00	0.24	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C73	1.00	0.82	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C76	1.00	0.81	0.01	0.00	0.18	0.00	0.00	0.00	0.86	0.00
C77	1.00	0.81	0.01	0.00	0.17	0.00	0.00	0.01	0.86	0.00
C79	1.00	0.80	0.02	0.00	0.18	0.00	0.00	0.00	0.86	0.00
C8	1.00	0.89	0.03	0.00	0.01	0.08	0.00	0.00	0.95	0.00

C81	1.00	0.80	0.12	0.00	0.08	0.00	0.00	0.00	0.92	0.00
C82	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C83	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C84_1	1.00	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.95	0.00
C84_2	1.00	0.76	0.15	0.00	0.10	0.00	0.00	0.00	0.91	0.00
C85	1.00	0.76	0.18	0.00	0.07	0.00	0.00	0.00	0.92	0.00
C86	1.00	0.76	0.00	0.00	0.24	0.00	0.00	0.00	0.82	0.00
C87	1.00	0.76	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00
C88	1.00	0.81	0.12	0.00	0.07	0.00	0.00	0.00	0.93	0.00
C89	1.00	0.80	0.12	0.00	0.08	0.00	0.00	0.00	0.95	0.00
C9	1.00	0.84	0.07	0.00	0.09	0.00	0.00	0.00	0.91	0.00
EXCBMH117a-117b	1.00	0.23	0.48	0.00	0.01	0.28	0.00	0.00	0.97	0.00
EXCBMH117b-117c	1.00	0.01	0.22	0.00	0.50	0.28	0.00	0.00	0.98	0.00
EX-Ditch	1.00	0.03	0.01	0.00	0.15	0.00	0.00	0.82	0.02	0.00
EXMH101-OUT	1.00	0.01	0.00	0.00	0.00	0.99	0.00	0.00	0.63	0.00
EXMH102-101a	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
EXMH102a-102	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
EXMH103-102	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
EXMH104-104a	1.00	0.01	0.00	0.00	0.05	0.95	0.00	0.00	0.53	0.00
EXMH104a-104b	1.00	0.01	0.00	0.00	0.05	0.95	0.00	0.00	0.95	0.00
EXMH104b-102	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
EXMH105-104	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
EXMH108-109	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.94	0.00
EXMH109-109a	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.28	0.00
EXMH109a-109b	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.85	0.00
EXMH109b-104	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
EXMH110-109	1.00	0.01	0.00	0.00	0.02	0.02	0.00	0.94	0.03	0.00
EXMH111-110	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00
EXMH112-112a	1.00	0.01	0.00	0.00	0.98	0.02	0.00	0.00	0.13	0.00
EXMH112a-111	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.12	0.00
EXMH113-113c	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.26	0.00
EXMH113a-109	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
EXMH113b-113a	1.00	0.01	0.53	0.00	0.46	0.00	0.00	0.00	0.93	0.00
EXMH113c-113b	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.03	0.00
EXMH114-113	1.00	0.01	0.00	0.00	0.23	0.00	0.00	0.76	0.14	0.00
EXMh115-101	1.00	0.01	0.00	0.00	0.93	0.00	0.00	0.06	0.82	0.00
EXMH116-115	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.29	0.00
EXMH117c-116	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
EXSTUB-108	1.00	0.00	0.00	0.00	0.83	0.17	0.00	0.00	0.00	0.00
X-CB-103_(X-CB)	1.00	0.13	0.01	0.00	0.86	0.00	0.00	0.00	0.02	0.00
X-CB-105_(X-CB)	1.00	0.09	0.03	0.00	0.86	0.00	0.00	0.01	0.22	0.00
X-CB-107_(X-CB)	1.00	0.08	0.01	0.00	0.91	0.00	0.00	0.00	0.16	0.00
X-CB-109_(X-CB)	1.00	0.08	0.00	0.00	0.91	0.00	0.00	0.01	0.00	0.00
X-CB-118_(X-CB)	1.00	0.74	0.02	0.00	0.22	0.01	0.00	0.01	0.86	0.00
X-CB-129_(X-CB)	1.00	0.32	0.00	0.00	0.66	0.00	0.00	0.01	0.44	0.00
X-CB-89_(X-CB)	1.00	0.30	0.02	0.00	0.67	0.00	0.00	0.00	0.45	0.00

X-CB-91_(X-CB)	1.00	0.30	0.02	0.00	0.67	0.00	0.00	0.00	0.45	0.00
X-CB-94_(X-CB)	1.00	0.01	0.31	0.00	0.68	0.00	0.00	0.00	0.45	0.00
X-CB-97_(X-CB)	1.00	0.31	0.01	0.00	0.68	0.00	0.00	0.00	0.44	0.00
X-CB-98_(X-CB)	1.00	0.01	0.30	0.00	0.70	0.00	0.00	0.00	0.42	0.00
X-STM-11_(X-STM)	1.00	0.70	0.01	0.00	0.27	0.00	0.00	0.03	0.83	0.00
X-STM-13_(1)_(X-STM)	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
X-STM-13_(X-STM)	1.00	0.01	0.00	0.00	0.00	0.13	0.00	0.87	0.05	0.00
X-STM-25_(X-STM)_1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.13	0.00
X-STM-27_(X-STM)_1	1.00	0.01	0.24	0.00	0.75	0.00	0.00	0.00	0.44	0.00
X-STM-27_(X-STM)_2	1.00	0.01	0.00	0.00	0.68	0.00	0.00	0.31	0.00	0.00
X-STM-29_(X-STM)	1.00	0.32	0.00	0.00	0.67	0.00	0.00	0.02	0.00	0.00
X-STM-31_(X-STM)	1.00	0.32	0.01	0.00	0.66	0.00	0.00	0.01	0.44	0.00
X-STM-51_(X-STM)	1.00	0.08	0.00	0.00	0.89	0.00	0.00	0.03	0.00	0.00
X-STM-53_(X-STM)	1.00	0.08	0.01	0.00	0.91	0.00	0.00	0.00	0.18	0.00
X-STM-55_(X-STM)	1.00	0.09	0.01	0.00	0.90	0.00	0.00	0.00	0.01	0.00
X-STM-59_(X-STM)	1.00	0.08	0.01	0.00	0.88	0.00	0.00	0.03	0.00	0.00
X-STM-61_(X-STM)	1.00	0.01	0.02	0.00	0.97	0.00	0.00	0.00	0.13	0.00
X-STM-63_(X-STM)	1.00	0.01	0.00	0.00	0.87	0.00	0.00	0.12	0.01	0.00
X-STM-65_(X-STM)	1.00	0.01	0.05	0.00	0.94	0.00	0.00	0.00	0.00	0.00
X-STM-67_(X-STM)	1.00	0.06	0.02	0.00	0.92	0.00	0.00	0.00	0.16	0.00
X-STM-69_(X-STM)	1.00	0.09	0.02	0.00	0.89	0.00	0.00	0.01	0.19	0.00

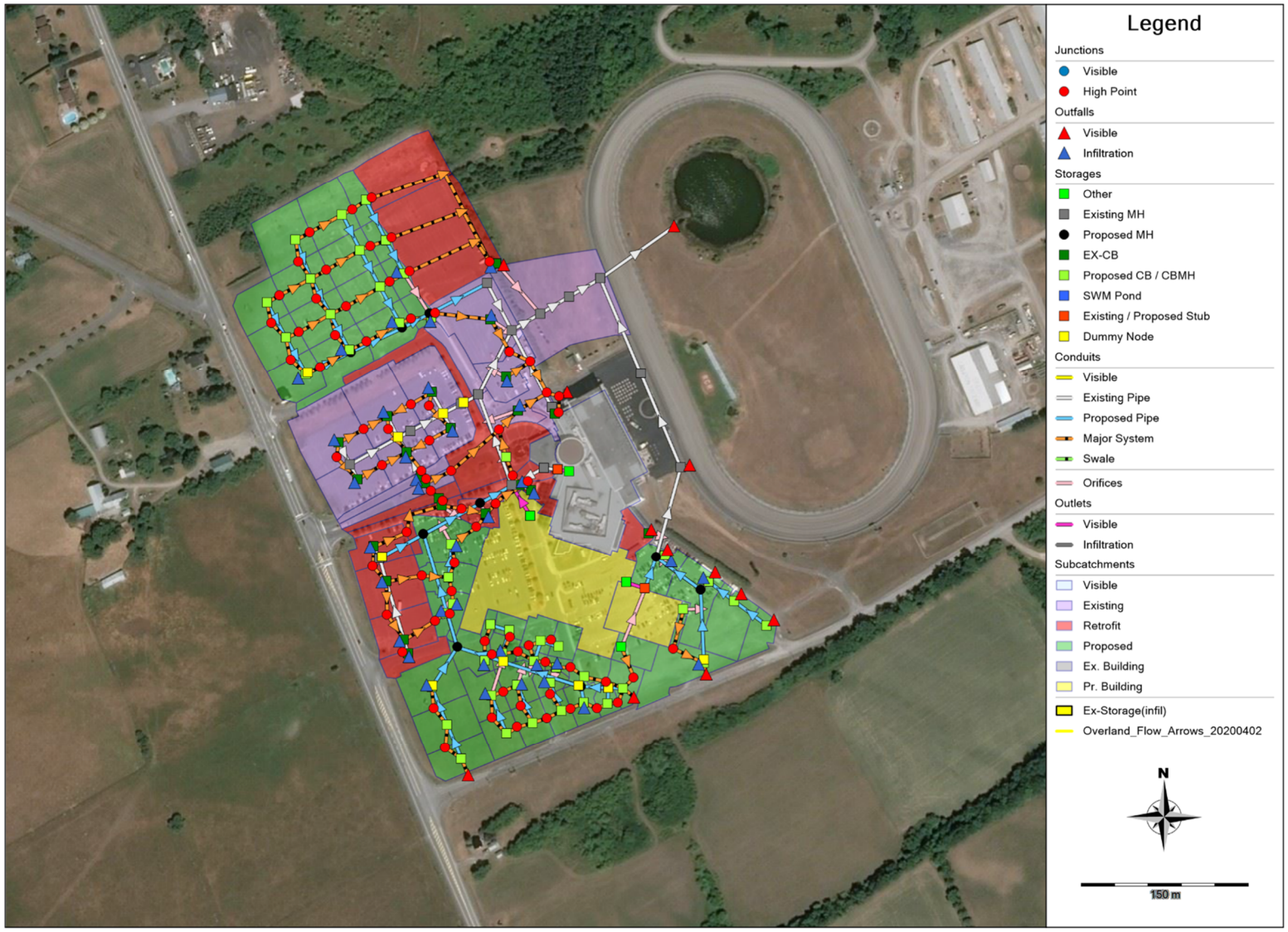
****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C9	0.01	0.01	0.12	0.01	0.01
EX-Ditch	0.01	0.01	0.12	0.01	0.01
EXMH102a-102	0.01	1.79	0.01	1.98	0.01
EXMH108-109	0.45	0.45	0.57	0.01	0.42
EXMH111-110	19.68	19.68	19.71	2.17	0.41
EXMH112-112a	19.08	19.08	19.63	1.77	1.34
EXMH112a-111	19.63	19.63	19.68	0.63	0.22
EXMH113a-109	0.01	0.01	0.01	0.23	0.01
EXSTUB-108	0.45	0.49	0.45	0.62	0.45
X-CB-103_(X-CB)	16.94	16.94	17.07	0.01	0.01
X-CB-105_(X-CB)	17.12	17.12	17.99	0.01	0.01
X-CB-107_(X-CB)	18.43	18.43	18.92	0.01	0.01
X-CB-109_(X-CB)	18.92	18.92	19.05	0.43	0.74
X-CB-118_(X-CB)	2.76	2.76	3.12	0.01	0.01
X-CB-129_(X-CB)	12.09	12.09	12.25	0.01	0.01
X-CB-89_(X-CB)	12.11	12.11	13.40	0.01	0.01
X-CB-91_(X-CB)	12.08	12.08	23.43	0.01	0.01
X-CB-94_(X-CB)	12.15	12.15	13.05	0.01	0.01
X-CB-97_(X-CB)	11.94	11.94	12.55	0.01	0.01
X-CB-98_(X-CB)	12.69	12.69	12.74	0.01	0.03
X-STM-11_(X-STM)	3.31	3.31	3.71	0.01	0.01
X-STM-25_(X-STM)_1	12.44	12.44	13.24	0.01	0.01
X-STM-27_(X-STM)_1	12.28	12.28	12.74	0.01	0.01
X-STM-27_(X-STM)_2	12.74	12.74	12.77	0.02	0.03
X-STM-29_(X-STM)	12.02	12.02	12.05	0.02	0.08
X-STM-31_(X-STM)	12.13	12.13	12.45	0.04	0.06
X-STM-51_(X-STM)	18.49	18.49	18.60	2.47	0.82
X-STM-53_(X-STM)	17.88	17.88	18.49	0.01	0.01
X-STM-55_(X-STM)	17.71	17.71	18.19	0.01	0.01
X-STM-59_(X-STM)	18.49	18.49	19.11	0.72	0.74
X-STM-61_(X-STM)	19.62	19.62	19.83	0.08	0.48
X-STM-63_(X-STM)	17.40	17.40	17.56	0.01	0.01
X-STM-65_(X-STM)	19.77	19.77	19.83	0.65	0.77
X-STM-67_(X-STM)	18.59	18.59	23.40	0.01	0.01
X-STM-69_(X-STM)	17.46	17.46	18.47	0.01	0.01

Analysis begun on: Fri Apr 24 11:52:34 2020
Analysis ended on: Fri Apr 24 11:52:46 2020
Total elapsed time: 00:00:12

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Schematics – Proposed Conditions

Overall Model Schematic



Date: 2020-04-25
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\116111-PCSWMM Model Schematics.docx

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Schematics – Proposed Conditions

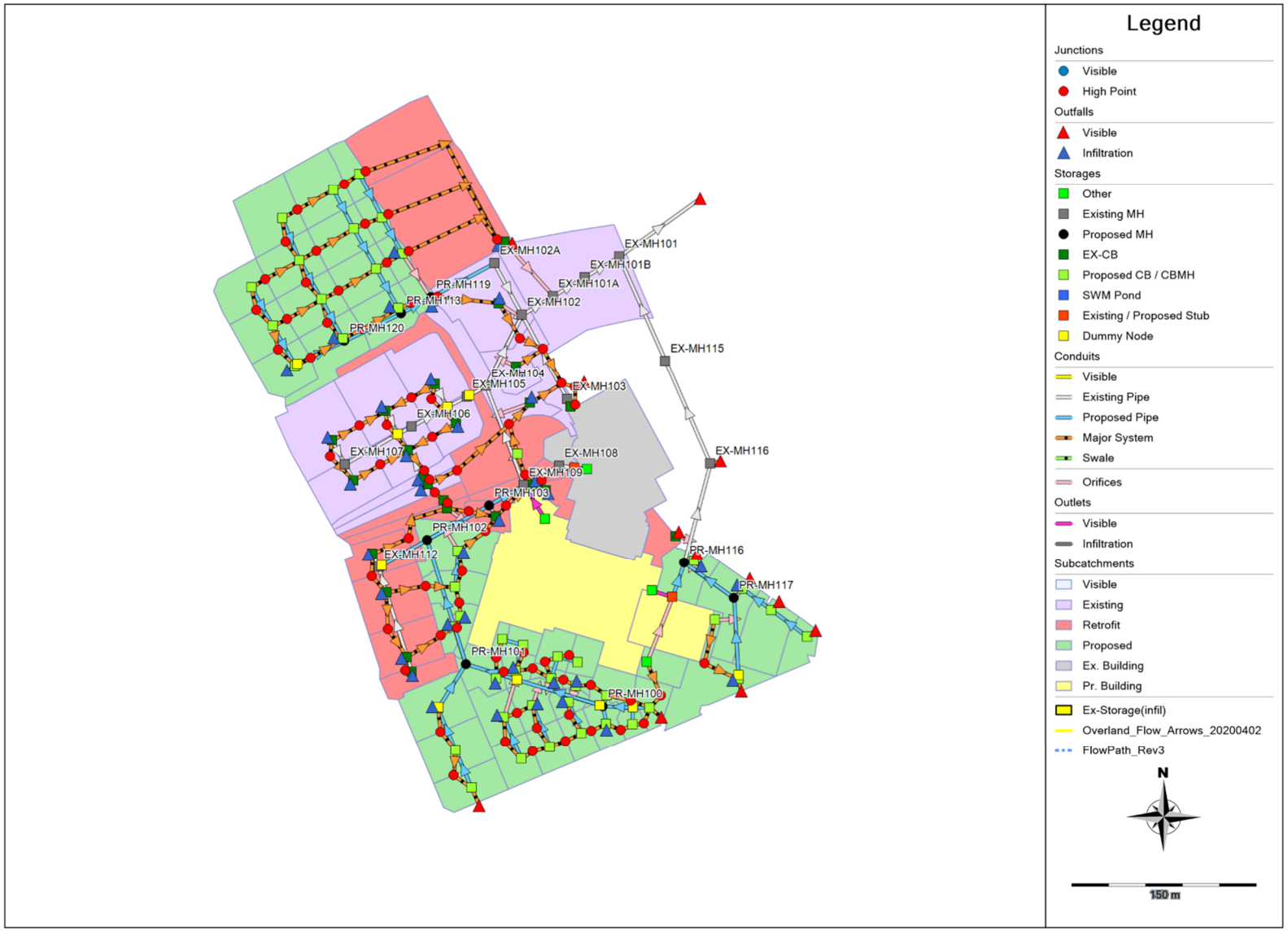
Subcatchments and Flow Paths



Date: 2020-04-25
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\116111-PCSWMM Model Schematics.docx

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Schematics – Proposed Conditions

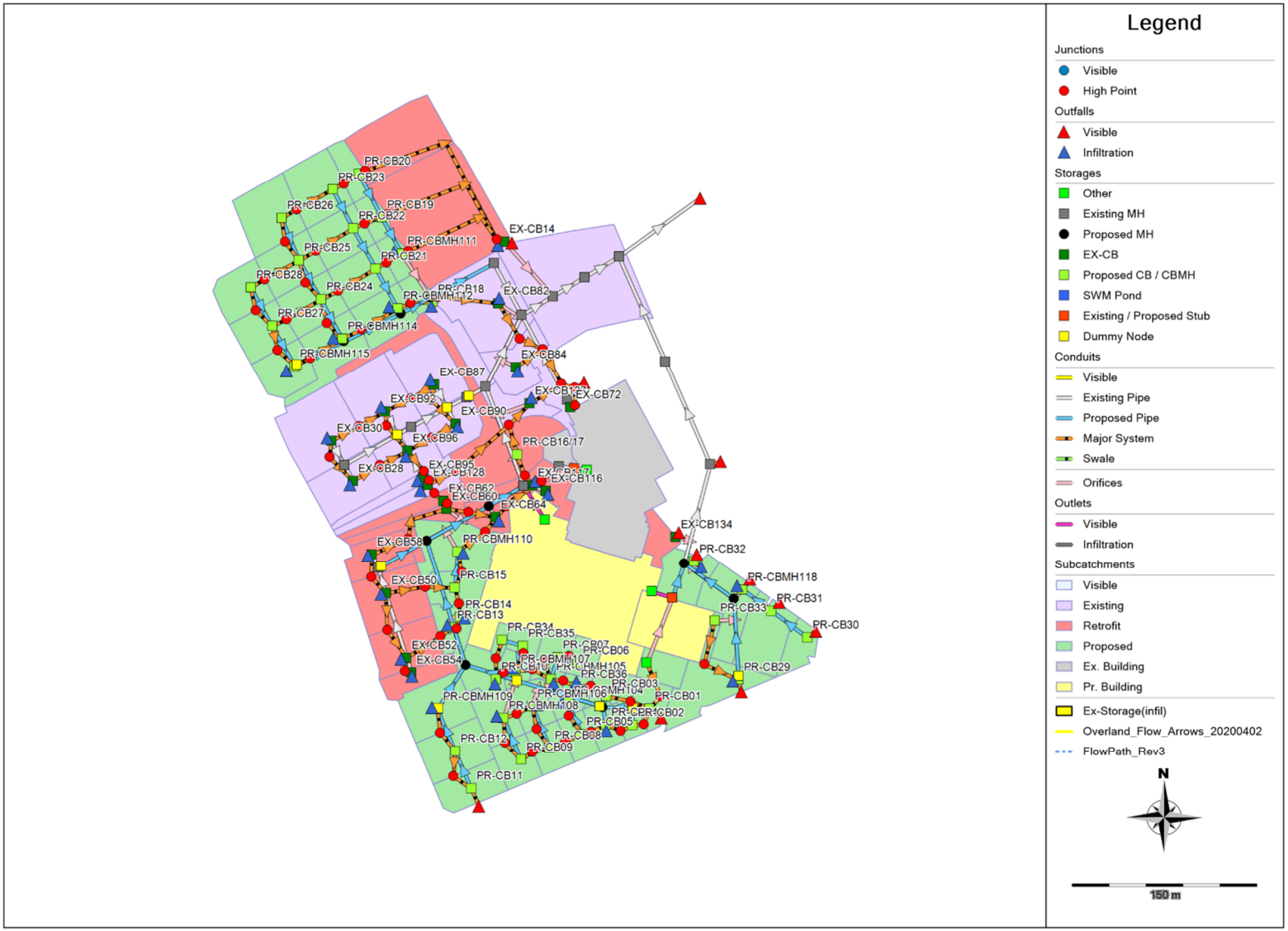
Maintenance Holes



Date: 2020-04-25
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\116111-PCSWMM Model Schematics.docx

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Schematics – Proposed Conditions

Catchbasins



Date: 2020-04-25
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\116111-PCSWMM Model Schematics.docx

4837 Albion Road - Hard Rock Ottawa (116111)
Subcatchment Parameters - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

Area ID	Catchment Area (ha)	Runoff Coefficient	Percent Impervious (%)	Zero Impervious (%)	Equivalent Width (m)	Flow Length (m)	Average Slope (%)
A-01	0.235	0.90	100	0	74.6	31.5	1.5
A-02	0.214	0.90	100	0	66.2	32.3	1.5
A-03	0.084	0.90	100	0	58.9	14.3	1.5
A-04a	0.340	0.78	83	0	48.8	69.7	1.5
A-04b	0.759	0.80	86	0	105.2	72.2	1.5
A-05	0.065	0.80	86	0	46.1	14.1	1.5
A-06	0.164	0.90	100	0	47.8	34.3	1.5
A-07	0.177	0.90	100	0	57.6	30.7	1.5
A-08	0.155	0.90	100	0	52.1	29.7	1.5
A-09	0.159	0.90	100	0	53.7	29.6	1.5
A-10	0.177	0.90	100	0	55.0	32.2	1.5
A-11	0.166	0.90	100	0	48.1	34.5	1.5
A-12	0.065	0.80	86	0	42.9	15.2	1.5
A-13	0.058	0.78	83	0	31.7	18.3	1.5
A-14	0.167	0.90	100	0	49.4	33.8	1.5
A-15	0.214	0.90	100	0	71.1	30.1	1.5
A-16	0.155	0.90	100	0	53.1	29.2	1.5
A-17a	0.259	0.62	60	0	68.2	38.0	1.5
A-17b	0.151	0.87	96	0	87.4	17.3	1.5
A-17c	0.293	0.69	70	0	68.8	42.6	1.5
A-17d	0.186	0.89	99	0	105.4	17.7	1.5
A-17e	0.356	0.62	60	0	86.0	41.4	1.5
A-17f	0.227	0.86	94	0	124.9	18.2	1.5
A-18	0.500	0.67	67	0	137.3	36.4	1.5
A-19a	0.102	0.67	67	0	51.0	20.0	1.5
A-19b	0.174	0.67	67	0	69.6	25.0	1.5
A-20	0.397	0.87	96	0	117.5	33.8	1.5
A-21	0.165	0.87	96	0	80.2	20.6	1.5
A-22	0.778	0.20	0	0	155.6	50.0	1.5
A-23	0.050	0.74	77	0	30.2	16.5	1.5
A-24	0.062	0.71	73	100	27.7	22.4	1.5
A-25	0.086	0.65	64	0	10.1	84.9	1.5
A-26	0.102	0.57	53	0	12.0	84.7	1.5
A-27	0.097	0.56	51	0	10.8	89.4	1.5
A-28	0.122	0.80	86	0	14.5	84.4	1.5
A-29	0.110	0.65	64	0	31.1	35.4	1.5
A-30	0.864	0.90	100	100	65.3	132.2	1.5
A-31	0.061	0.90	100	0	51.2	11.9	1.5
A-32	0.081	0.80	86	0	55.2	14.7	1.5
A-33	0.243	0.71	73	0	138.6	17.5	1.5
A-34a	0.152	0.89	99	0	64.8	23.5	1.5
A-34b	0.250	0.90	100	0	108.5	23.0	1.5
A-34c	0.198	0.87	96	0	83.7	23.7	1.5
A-35	0.124	0.76	80	0	97.7	12.7	1.5
A-36	0.052	0.90	100	0	49.1	10.6	1.5
A-37	0.061	0.48	40	0	22.2	27.4	1.5
A-38a(R1-R5)	1.200	0.90	100	100	100.0	120.0	1.5
A-38b(R6-R7)	0.265	0.90	100	100	44.2	60.0	1.5
A-39	0.075	0.90	100	0	19.7	38.2	1.5
A-40	0.151	0.90	100	0	29.8	50.7	1.5
A-41	0.210	0.90	100	0	36.0	58.4	1.5

4837 Albion Road - Hard Rock Ottawa (116111)
Subcatchment Parameters - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

Area ID	Catchment Area (ha)	Runoff Coefficient	Percent Impervious (%)	Zero Impervious (%)	Equivalent Width (m)	Flow Length (m)	Average Slope (%)
A-42	0.032	0.86	94	0	40.5	7.9	1.5
A-43	0.215	0.90	100	0	44.1	48.7	1.5
A-44	0.091	0.90	100	0	36.0	25.3	1.5
A-45	0.236	0.86	94	0	41.2	57.2	1.5
A-46	0.090	0.75	79	0	27.6	32.6	1.5
A-47	0.098	0.80	86	0	58.5	16.7	1.5
A-48	0.042	0.81	87	0	44.8	9.4	1.5
A-49	0.096	0.61	59	0	47.4	20.3	1.5
A-50	0.028	0.69	70	0	24.6	11.4	1.5
A-51	0.089	0.89	99	0	69.8	12.7	1.5
A-52	0.072	0.74	77	0	35.7	20.1	1.5
A-53	0.082	0.72	74	0	39.5	20.7	1.5
A-54	0.035	0.72	74	0	21.0	16.7	1.5
A-55	0.057	0.76	80	0	49.1	11.6	1.5
A-56	0.083	0.90	100	0	46.1	18.0	1.5
A-57	0.051	0.64	63	0	38.7	13.2	1.5
A-58	0.029	0.64	63	0	51.1	5.7	1.5
A-59	0.063	0.64	63	0	42.1	15.0	1.5
A-60	0.116	0.88	97	0	62.7	18.5	1.5
A-61	0.103	0.90	100	0	73.4	14.0	1.5
A-62	0.113	0.90	100	0	60.8	18.6	1.5
A-63	0.131	0.90	100	0	69.3	18.9	1.5
A-64	0.117	0.80	86	0	37.3	31.3	1.5
A-65	0.219	0.90	100	0	103.3	21.2	1.5
A-66	0.199	0.90	100	0	110.8	18.0	1.5
A-67	0.148	0.90	100	0	98.7	15.0	1.5
A-68	0.104	0.64	63	0	41.2	25.2	1.5
Total	**14.30**	**0.79**	**84**	-	-	-	-

4837 Albion Road - Hard Rock Ottawa (116111)
Summary of Underground and Surface Storage - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	STM ID	Drainage Area (ha)	Elevations (m)			Depths (m)			Provided Storage (m^3)			StormTech STC-740 Storage Chambers		Infil. Storage Volume (m^3)	Infil. Bottom Area (m^2)	Estimated Percolation Rate (mm/hr)	Design Percolation Rate (mm/hr)	Infiltration Rate (L/s)
			Invert	RIM	Ponding	CB	Ponding	Total	UG	Surface[1]	Total	Number	Storage (m^3)[2]					
EX-CB116	A-31	0.061	112.99	113.50	113.65	0.51	0.15	0.66	6.8	14.2	21.0	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB117	A-29	0.110	112.09	113.35	113.65	1.26	0.30	1.56	6.8	74.4	81.2	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB128	A-26	0.102	112.51	113.71	113.90	1.20	0.19	1.39	6.8	15.2	22.0	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB134	A-39	0.075	111.60	113.30	113.45	1.70	0.15	1.85	0.0	8.5	8.5	-	0.0	-	-	110	55	-
EX-CB137	A-19b	0.174	112.00	113.40	113.60	1.40	0.20	1.60	6.8	10.0	16.8	EX-10	6.8	2.04	17.0	90	45	0.21
EX-CB14	A-04a	0.340	111.19	113.40	114.10	2.21	0.70	2.91	6.8	147.1	153.9	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB28	A-17f	0.227	112.43	113.65	114.00	1.22	0.35	1.57	6.8	230.3	237.1	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB30	A-17e	0.356	112.50	113.70	114.00	1.20	0.30	1.50	6.8	163.5	170.3	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB50	A-34b	0.250	112.34	113.71	114.00	1.37	0.29	1.66	6.8	164.2	171.0	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB52	A-34c	0.198	112.44	113.71	113.98	1.27	0.27	1.54	6.8	149.2	156.0	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB54	A-68	0.104	112.52	113.83	114.00	1.31	0.17	1.48	6.8	35.5	42.3	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB58	A-34a	0.152	112.44	113.73	114.00	1.29	0.27	1.56	6.8	118.8	125.6	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB60	A-28	0.122	112.15	113.73	113.90	1.58	0.17	1.75	0.0	39.1	39.1	-	0.0	-	-	60	30	-
EX-CB62	A-27	0.097	112.64	113.76	113.90	1.12	0.14	1.26	0.0	22.2	22.2	-	0.0	-	-	60	30	-
EX-CB64	A-32	0.081	112.10	113.50	113.65	1.40	0.15	1.55	6.8	21.4	28.2	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB72	A-23	0.050	111.18	112.67	113.00	1.49	0.33	1.82	0.0	10.1	10.1	-	0.0	-	-	90	45	-
EX-CB82	A-20	0.397	112.62	113.84	114.05	1.22	0.21	1.43	6.8	78.7	85.5	EX-10	6.8	2.04	17.0	90	45	0.21
EX-CB84	A-21	0.165	112.12	113.65	114.00	1.53	0.35	1.88	6.8	168.4	175.2	EX-10	6.8	2.04	17.0	90	45	0.21
EX-CB87	A-17a	0.259	112.50	113.68	113.95	1.18	0.27	1.45	6.8	124.3	131.1	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB90	A-17b	0.151	112.51	113.80	113.95	1.29	0.15	1.44	6.8	85.8	92.6	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB92	A-17c	0.293	112.49	113.67	113.95	1.18	0.28	1.46	6.8	110.7	117.5	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB95	A-25	0.086	112.45	113.67	113.95	1.22	0.28	1.50	6.8	22.0	28.8	EX-10	6.8	2.04	17.0	60	30	0.14
EX-CB96	A-17d	0.186	112.22	113.62	113.95	1.40	0.33	1.73	6.8	211.8	218.6	EX-10	6.8	2.04	17.0	60	30	0.14

4837 Albion Road - Hard Rock Ottawa (116111)
Summary of Underground and Surface Storage - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	STM ID	Drainage Area (ha)	Elevations (m)			Depths (m)			Provided Storage (m^3)			StormTech STC-740 Storage Chambers		Infil. Storage Volume (m^3)	Infil. Bottom Area (m^2)	Estimated Percolation Rate (mm/hr)	Design Percolation Rate (mm/hr)	Infiltration Rate (L/s)
			Invert	RIM	Ponding	CB	Ponding	Total	UG	Surface[1]	Total	Number	Storage (m^3)[2]					
PR-CB01	A-47	0.098	112.40	113.40	113.63	1.00	0.23	1.23	0.0	35.4	35.4	-	0.0	-	-	110	55	-
PR-CB02	A-48	0.042	112.40	113.40	113.64	1.00	0.24	1.24	0.0	38.5	38.5	-	0.0	-	-	60	30	-
PR-CB03	A-49	0.096	112.40	113.40	113.65	1.00	0.25	1.25	0.0	29.7	29.7	-	0.0	-	-	60	30	-
PR-CB04	A-51	0.089	111.80	113.40	113.65	1.60	0.25	1.85	25.4	59.2	84.6	12	25.4	5.68	47.3	60	30	0.39
PR-CB05	A-56	0.083	112.45	113.45	113.70	1.00	0.25	1.25	0.0	60.4	60.4	-	0.0	-	-	60	30	-
PR-CB06	A-52	0.072	112.45	113.45	113.65	1.00	0.20	1.20	0.0	26.2	26.2	-	0.0	-	-	60	30	-
PR-CB07	A-53	0.082	112.36	113.45	113.65	1.09	0.20	1.29	0.0	33.1	33.1	-	0.0	-	-	60	30	-
PR-CB08	A-61	0.103	112.50	113.50	113.75	1.00	0.25	1.25	0.0	65.3	65.3	-	0.0	-	-	60	30	-
PR-CB09	A-62	0.113	112.50	113.60	113.85	1.10	0.25	1.35	0.0	72.9	72.9	-	0.0	-	-	60	30	-
PR-CB10	A-64	0.117	111.85	113.45	113.75	1.60	0.30	1.90	16.9	77.0	93.9	8	16.9	3.93	32.8	60	30	0.27
PR-CB11	A-67	0.148	112.60	113.60	113.85	1.00	0.25	1.25	0.0	64.0	64.0	-	0.0	-	-	60	30	-
PR-CB12	A-66	0.199	112.42	113.60	113.87	1.18	0.27	1.45	0.0	107.4	107.4	-	0.0	-	-	60	30	-
PR-CB13	A-36	0.052	111.90	113.65	113.72	1.75	0.07	1.82	8.4	0.8	9.2	4	8.4	2.19	18.2	60	30	0.15
PR-CB14	A-37	0.061	111.80	113.55	113.65	1.75	0.10	1.85	8.4	3.7	12.1	4	8.4	2.19	18.2	60	30	0.15
PR-CB15	A-35	0.124	112.20	113.40	113.67	1.20	0.27	1.47	0.0	56.4	56.4	-	0.0	-	-	60	30	-
PR-CB16/17	A-18	0.500	112.09	113.35	113.65	1.26	0.30	1.56	0.0	211.9	211.9	-	0.0	-	-	60	30	-
PR-CB18	A-13	0.058	113.49	115.05	115.20	1.56	0.15	1.71	8.4	4.2	12.6	4	8.4	2.19	18.2	60	30	0.15
PR-CB19	A-05	0.065	113.65	115.05	115.20	1.40	0.15	1.55	0.0	6.6	6.6	-	0.0	-	-	60	30	-
PR-CB20	A-03	0.084	113.85	115.05	115.20	1.20	0.15	1.35	0.0	4.5	4.5	-	0.0	-	-	60	30	-
PR-CB21	A-11	0.166	113.56	115.20	115.40	1.64	0.20	1.84	0.0	37.1	37.1	-	0.0	-	-	60	30	-
PR-CB22	A-06	0.164	113.80	115.20	115.40	1.40	0.20	1.60	0.0	37.4	37.4	-	0.0	-	-	60	30	-
PR-CB23	A-02	0.214	114.00	115.20	115.40	1.20	0.20	1.40	0.0	32.0	32.0	-	0.0	-	-	60	30	-
PR-CB24	A-10	0.177	113.95	115.55	115.85	1.60	0.30	1.90	0.0	121.5	121.5	-	0.0	-	-	60	30	-
PR-CB25	A-07	0.177	114.14	115.55	115.85	1.41	0.30	1.71	0.0	117.1	117.1	-	0.0	-	-	60	30	-
PR-CB26	A-01	0.235	114.35	115.55	115.85	1.20	0.30	1.50	0.0	96.0	96.0	-	0.0	-	-	60	30	-
PR-CB27	A-09	0.159	114.51	115.90	116.20	1.39	0.30	1.69	0.0	120.7	120.7	-	0.0	-	-	60	30	-
PR-CB28	A-08	0.155	114.70	115.90	116.20	1.20	0.30	1.50	0.0	112.4	112.4	-	0.0	-	-	60	30	-
PR-CB29	A-45	0.236	111.25	112.70	112.95	1.45	0.25	1.70	63.6	49.6	113.2	30	63.6	13.53	112.7	110	55	1.72
PR-CB30	A-44	0.091	111.40	112.40	112.65	1.00	0.25	1.25	0.0	39.2	39.2	-	0.0	-	-	110	55	-
PR-CB31	A-43	0.215	111.20	112.40	112.65	1.20	0.25	1.45	0.0	82.1	82.1	-	0.0	-	-	110	55	-
PR-CB32	A-40	0.151	110.65	112.90	113.00	2.25	0.10	2.35	59.3	3.1	62.4	28	59.3	12.65	105.5	110	55	1.61

4837 Albion Road - Hard Rock Ottawa (116111)
Summary of Underground and Surface Storage - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	STM ID	Drainage Area (ha)	Elevations (m)			Depths (m)			Provided Storage (m^3)			StormTech STC-740 Storage Chambers		Infil. Storage Volume (m^3)	Infil. Bottom Area (m^2)	Estimated Percolation Rate (mm/hr)	Design Percolation Rate (mm/hr)	Infiltration Rate (L/s)
			Invert	RIM	Ponding	CB	Ponding	Total	UG	Surface[1]	Total	Number	Storage (m^3)[2]					
PR-CB33	A-42	0.032	111.60	112.80	113.25	1.20	0.45	1.65	0.0	39.6	39.6	-	0.0	-	-	60	30	-
PR-CB34	A-58	0.029	112.30	113.50	113.75	1.20	0.25	1.45	0.0	14.7	14.7	-	0.0	-	-	60	30	-
PR-CB35	A-57	0.051	112.20	113.55	113.75	1.35	0.20	1.55	0.0	24.8	24.8	-	0.0	-	-	60	30	-
PR-CB36	A-50	0.028	111.85	113.45	113.65	1.60	0.20	1.80	6.3	22.6	28.9	3	6.3	2.19	18.2	60	30	0.15
PR-CBMH104	A-55	0.057	112.03	113.50	113.75	1.47	0.25	1.72	16.9	41.0	57.9	8	16.9	3.93	32.8	60	30	0.27
PR-CBMH105	A-54	0.035	111.85	113.45	113.70	1.60	0.25	1.85	21.2	24.2	45.4	10	21.2	4.80	40.0	60	30	0.33
PR-CBMH106	A-60	0.116	112.04	113.50	113.80	1.46	0.30	1.76	33.9	101.9	135.8	16	33.9	7.42	61.8	60	30	0.52
PR-CBMH107	A-59	0.063	111.83	113.45	113.70	1.62	0.25	1.87	12.7	53.0	65.7	6	12.7	3.06	25.5	60	30	0.21
PR-CBMH108	A-63	0.131	112.04	113.60	113.85	1.56	0.25	1.81	38.1	72.5	110.6	18	38.1	8.29	69.1	60	30	0.58
PR-CBMH109	A-65	0.219	111.96	113.60	113.90	1.64	0.30	1.94	106.0	137.4	243.4	50	106.0	22.25	185.4	60	30	1.55
PR-CBMH110	A-33	0.243	111.62	113.40	113.60	1.78	0.20	1.98	84.8	48.2	133.0	40	84.8	17.89	149.1	60	30	1.24
PR-CBMH111	A-12	0.065	113.00	115.05	115.20	2.05	0.15	2.20	63.6	7.3	70.9	30	63.6	13.53	112.7	60	30	0.94
PR-CBMH112	A-14	0.167	113.12	115.20	115.40	2.08	0.20	2.28	148.4	35.5	183.9	70	148.4	31.42	261.8	60	30	2.18
PR-CBMH114	A-15	0.214	113.51	115.55	115.85	2.04	0.30	2.34	148.4	118.8	267.2	70	148.4	31.42	261.8	60	30	2.18
PR-CBMH115	A-16	0.155	113.89	115.90	116.20	2.01	0.30	2.31	84.8	110.6	195.4	40	84.8	17.89	149.1	60	30	1.24
PR-CBMH118	A-41	0.210	110.74	112.40	112.70	1.66	0.30	1.96	84.8	70.6	155.4	40	84.8	17.89	149.1	110	55	2.28
PR-TD01	A-46	0.090	112.55	112.70	113.65	0.15	0.95	1.10	0.0	83.6	83.6	-	0.0	-	-	-	-	-
TOTAL		**10.267**	**-**			**-**			**1169.5**	**4837.1**	**6006.6**	**491**	**1169.5**	**224**	**1869.4**	**-**	**-**	**261**

[1] Based on Grading Design / Autodesk Civil 3D (refer to drawings 116111-GR & 116111-SWM)

[2] Based on StormTech Site Calculator for STC-740

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB116	**A-31**	**6.8**	**14.2**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
0.51	0.00	0.0	7.0
0.66	189.33	14.2	21.2
0.67	0.00	0.9	22.1
1.51	0.00	0.0	22.1

EX-10x Infiltration Storage Chambers (6.8 m3)
0.15m Static Ponding Depth (14.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB117	**A-29**	**6.8**	**74.4**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.26	0.00	0.0	7.0
1.56	496.00	74.4	81.4
1.57	0.00	2.5	83.9
2.26	0.00	0.0	83.9

EX-10x Infiltration Storage Chambers (6.8 m3)
0.3m Static Ponding Depth (74.4 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB128	**A-26**	**6.8**	**15.2**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.20	0.00	0.0	7.0
1.39	160.00	15.2	22.2
1.40	0.00	0.8	23.0
2.20	0.00	0.0	23.0

EX-10x Infiltration Storage Chambers (6.8 m3)
0.19m Static Ponding Depth (15.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB134	**A-39**	**0.0**	**8.5**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
1.70	0.00	0.0	0.0
1.85	113.33	8.5	8.5
1.86	0.00	0.6	9.1
2.70	0.00	0.0	9.1

-x Infiltration Storage Chambers (0 m3)
0.15m Static Ponding Depth (8.5 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB137	**A-19b**	**6.8**	**10.0**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.40	0.00	0.0	7.0
1.60	100.00	10.0	17.0
1.61	0.00	0.5	17.5
2.40	0.00	0.0	17.5

EX-10x Infiltration Storage Chambers (6.8 m3)
0.2m Static Ponding Depth (10 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB14	**A-04a**	**6.8**	**147.1**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
2.21	0.00	0.0	7.0
2.91	420.29	147.1	154.1
2.92	0.00	2.1	156.2
3.21	0.00	0.0	156.2

EX-10x Infiltration Storage Chambers (6.8 m3)
0.7m Static Ponding Depth (147.1 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB28	**A-17f**	**6.8**	**230.3**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.22	0.00	0.0	7.0
1.57	1316.00	230.3	237.3
1.58	0.00	6.6	243.9
2.22	0.00	0.0	243.9

EX-10x Infiltration Storage Chambers (6.8 m3)
0.35m Static Ponding Depth (230.3 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB30	**A-17e**	**6.8**	**163.5**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.20	0.00	0.0	7.0
1.50	1090.00	163.5	170.5
1.51	0.00	5.5	175.9
2.20	0.00	0.0	175.9

EX-10x Infiltration Storage Chambers (6.8 m3)
0.3m Static Ponding Depth (163.5 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB50	A-34b	6.8	164.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.37	0.00	0.0	7.0
1.66	1132.41	164.2	171.2
1.67	0.00	5.7	176.8
2.37	0.00	0.0	176.8

EX-10x Infiltration Storage Chambers (6.8 m3)
0.29m Static Ponding Depth (164.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB52	A-34c	6.8	149.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.27	0.00	0.0	7.0
1.54	1105.19	149.2	156.2
1.55	0.00	5.5	161.7
2.27	0.00	0.0	161.7

EX-10x Infiltration Storage Chambers (6.8 m3)
0.27m Static Ponding Depth (149.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB54	A-68	6.8	35.5
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.31	0.00	0.0	7.0
1.48	417.65	35.5	42.5
1.49	0.00	2.1	44.6
2.31	0.00	0.0	44.6

EX-10x Infiltration Storage Chambers (6.8 m3)
0.17m Static Ponding Depth (35.5 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB58	A-34a	6.8	118.8
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.29	0.00	0.0	7.0
1.56	880.00	118.8	125.8
1.57	0.00	4.4	130.2
2.29	0.00	0.0	130.2

EX-10x Infiltration Storage Chambers (6.8 m3)
0.27m Static Ponding Depth (118.8 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB60	A-28	0.0	39.1
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
1.58	0.00	0.0	0.0
1.75	460.00	39.1	39.1
1.76	0.00	2.3	41.4
2.58	0.00	0.0	41.4

-x Infiltration Storage Chambers (0 m3)
0.17m Static Ponding Depth (39.1 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB62	A-27	0.0	22.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
1.12	0.00	0.0	0.0
1.26	317.14	22.2	22.2
1.27	0.00	1.6	23.8
2.12	0.00	0.0	23.8

-x Infiltration Storage Chambers (0 m3)
0.14m Static Ponding Depth (22.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB64	A-32	6.8	21.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.40	0.00	0.0	7.0
1.55	285.33	21.4	28.4
1.56	0.00	1.4	29.8
2.40	0.00	0.0	29.8

EX-10x Infiltration Storage Chambers (6.8 m3)
0.15m Static Ponding Depth (21.4 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB72	A-23	0.0	10.1
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
1.49	0.00	0.0	0.0
1.82	61.21	10.1	10.1
1.83	0.00	0.3	10.4
2.49	0.00	0.0	10.4

-x Infiltration Storage Chambers (0 m3)
0.33m Static Ponding Depth (10.1 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB82	**A-20**	**6.8**	**78.7**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.22	0.00	0.0	7.0
1.43	749.52	78.7	85.7
1.44	0.00	3.7	89.4
2.22	0.00	0.0	89.4

EX-10x Infiltration Storage Chambers (6.8 m3)
0.21m Static Ponding Depth (78.7 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB84	**A-21**	**6.8**	**168.4**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.53	0.00	0.0	7.0
1.88	962.29	168.4	175.4
1.89	0.00	4.8	180.2
2.53	0.00	0.0	180.2

EX-10x Infiltration Storage Chambers (6.8 m3)
0.35m Static Ponding Depth (168.4 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB87	**A-17a**	**6.8**	**124.3**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.18	0.00	0.0	7.0
1.45	920.74	124.3	131.3
1.46	0.00	4.6	135.9
2.18	0.00	0.0	135.9

EX-10x Infiltration Storage Chambers (6.8 m3)
0.27m Static Ponding Depth (124.3 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB90	**A-17b**	**6.8**	**85.8**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.29	0.00	0.0	7.0
1.44	1144.00	85.8	92.8
1.45	0.00	5.7	98.5
2.29	0.00	0.0	98.5

EX-10x Infiltration Storage Chambers (6.8 m3)
0.15m Static Ponding Depth (85.8 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB92	**A-17c**	**6.8**	**110.7**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.18	0.00	0.0	7.0
1.46	790.71	110.7	117.7
1.47	0.00	4.0	121.6
2.18	0.00	0.0	121.6

EX-10x Infiltration Storage Chambers (6.8 m3)
0.28m Static Ponding Depth (110.7 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB95	**A-25**	**6.8**	**22.0**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.22	0.00	0.0	7.0
1.50	157.14	22.0	29.0
1.51	0.00	0.8	29.8
2.22	0.00	0.0	29.8

EX-10x Infiltration Storage Chambers (6.8 m3)
0.28m Static Ponding Depth (22 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
EX-CB96	**A-17d**	**6.8**	**211.8**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	34.00	6.8	6.8
0.41	0.00	0.2	7.0
1.40	0.00	0.0	7.0
1.73	1283.64	211.8	218.8
1.74	0.00	6.4	225.2
2.40	0.00	0.0	225.2

EX-10x Infiltration Storage Chambers (6.8 m3)
0.33m Static Ponding Depth (211.8 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB01	**A-47**	**0.0**	**35.4**
Depth (m)	**Equivalent Area (m^2)**	**Incremental Volume (m^3)**	**Total Volume (m^3)**
0.00	0.00	0.0	0.0
0.40	0.00	0.0	0.0
0.41	0.00	0.0	0.0
1.00	0.00	0.0	0.0
1.23	307.83	35.4	35.4
1.24	0.00	1.5	36.9
2.00	0.00	0.0	36.9

-x Stormtech STC-740 Storage Chambers (0 m3)
0.23m Static Ponding Depth (35.4 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB02	A-48	0.0	38.5
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.00	0.00	0.0	0.0
1.24	320.83	38.5	38.5
1.25	0.00	1.6	40.1
2.00	0.00	0.0	40.1

-x Stormtech STC-740 Storage Chambers (0 m3)
0.24m Static Ponding Depth (38.5 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB03	A-49	0.0	29.7
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.00	0.00	0.0	0.0
1.25	237.60	29.7	29.7
1.26	0.00	1.2	30.9
2.00	0.00	0.0	30.9

-x Stormtech STC-740 Storage Chambers (0 m3)
0.25m Static Ponding Depth (29.7 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB04	A-51	25.4	59.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	66.84	25.4	25.4
0.77	0.00	0.3	25.7
1.60	0.00	0.0	25.7
1.85	473.60	59.2	84.9
1.86	0.00	2.4	87.3
2.60	0.00	0.0	87.3

12x Stormtech STC-740 Storage Chambers (25.4 m3)
0.25m Static Ponding Depth (59.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB05	A-56	0.0	60.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.00	0.00	0.0	0.0
1.25	483.20	60.4	60.4
1.26	0.00	2.4	62.8
2.00	0.00	0.0	62.8

-x Stormtech STC-740 Storage Chambers (0 m3)
0.25m Static Ponding Depth (60.4 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB06	A-52	0.0	26.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.00	0.00	0.0	0.0
1.20	262.00	26.2	26.2
1.21	0.00	1.3	27.5
2.00	0.00	0.0	27.5

-x Stormtech STC-740 Storage Chambers (0 m3)
0.2m Static Ponding Depth (26.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB07	A-53	0.0	33.1
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.09	0.00	0.0	0.0
1.29	331.00	33.1	33.1
1.30	0.00	1.7	34.8
2.09	0.00	0.0	34.8

-x Stormtech STC-740 Storage Chambers (0 m3)
0.2m Static Ponding Depth (33.1 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB08	A-61	0.0	65.3
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.00	0.00	0.0	0.0
1.25	522.40	65.3	65.3
1.26	0.00	2.6	67.9
2.00	0.00	0.0	67.9

-x Stormtech STC-740 Storage Chambers (0 m3)
0.25m Static Ponding Depth (65.3 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB09	A-62	0.0	72.9
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.10	0.00	0.0	0.0
1.35	583.20	72.9	72.9
1.36	0.00	2.9	75.8
2.10	0.00	0.0	75.8

-x Stormtech STC-740 Storage Chambers (0 m3)
0.25m Static Ponding Depth (72.9 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB10	A-64	16.9	77.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	44.47	16.9	16.9
0.77	0.00	0.2	17.1
1.60	0.00	0.0	17.1
1.90	513.33	77.0	94.1
1.91	0.00	2.6	96.7
2.60	0.00	0.0	96.7

8x Stormtech STC-740 Storage Chambers (16.9 m3)
0.3m Static Ponding Depth (77 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB11	A-67	0.0	64.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.00	0.00	0.0	0.0
1.25	512.00	64.0	64.0
1.26	0.00	2.6	66.6
2.00	0.00	0.0	66.6

-x Stormtech STC-740 Storage Chambers (0 m3)
0.25m Static Ponding Depth (64 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB12	A-66	0.0	107.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.18	0.00	0.0	0.0
1.45	795.56	107.4	107.4
1.46	0.00	4.0	111.4
2.18	0.00	0.0	111.4

-x Stormtech STC-740 Storage Chambers (0 m3)
0.27m Static Ponding Depth (107.4 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB13	A-36	8.4	0.8
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	22.11	8.4	8.4
0.77	0.00	0.1	8.5
1.75	0.00	0.0	8.5
1.82	22.86	0.8	9.3
1.83	0.00	0.1	9.4
2.75	0.00	0.0	9.4

4x Stormtech STC-740 Storage Chambers (8.4 m3)
0.07m Static Ponding Depth (0.8 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB14	A-37	8.4	3.7
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	22.11	8.4	8.4
0.77	0.00	0.1	8.5
1.75	0.00	0.0	8.5
1.85	74.00	3.7	12.2
1.86	0.00	0.4	12.6
2.75	0.00	0.0	12.6

4x Stormtech STC-740 Storage Chambers (8.4 m3)
0.1m Static Ponding Depth (3.7 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB15	A-35	0.0	56.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.20	0.00	0.0	0.0
1.47	417.78	56.4	56.4
1.48	0.00	2.1	58.5
2.20	0.00	0.0	58.5

-x Stormtech STC-740 Storage Chambers (0 m3)
0.27m Static Ponding Depth (56.4 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB16/17	A-18	0.0	211.9
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.26	0.00	0.0	0.0
1.56	1412.67	211.9	211.9
1.57	0.00	7.1	219.0
2.26	0.00	0.0	219.0

-x Stormtech STC-740 Storage Chambers (0 m3)
0.3m Static Ponding Depth (211.9 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB18	A-13	8.4	4.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	22.11	8.4	8.4
0.77	0.00	0.1	8.5
1.56	0.00	0.0	8.5
1.71	56.00	4.2	12.7
1.72	0.00	0.3	13.0
2.56	0.00	0.0	13.0

4x Stormtech STC-740 Storage Chambers (8.4 m3)
0.15m Static Ponding Depth (4.2 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB19	A-05	0.0	6.6
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.40	0.00	0.0	0.0
1.55	88.00	6.6	6.6
1.56	0.00	0.4	7.0
2.40	0.00	0.0	7.0

-x Stormtech STC-740 Storage Chambers (0 m3)
0.15m Static Ponding Depth (6.6 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB20	A-03	0.0	4.5
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.20	0.00	0.0	0.0
1.35	60.00	4.5	4.5
1.36	0.00	0.3	4.8
2.20	0.00	0.0	4.8

-x Stormtech STC-740 Storage Chambers (0 m3)
0.15m Static Ponding Depth (4.5 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB21	A-11	0.0	37.1
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.64	0.00	0.0	0.0
1.84	371.00	37.1	37.1
1.85	0.00	1.9	39.0
2.64	0.00	0.0	39.0

-x Stormtech STC-740 Storage Chambers (0 m3)
0.2m Static Ponding Depth (37.1 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB22	A-06	0.0	37.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.40	0.00	0.0	0.0
1.60	374.00	37.4	37.4
1.61	0.00	1.9	39.3
2.40	0.00	0.0	39.3

-x Stormtech STC-740 Storage Chambers (0 m3)
0.2m Static Ponding Depth (37.4 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB23	A-02	0.0	32.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.20	0.00	0.0	0.0
1.40	320.00	32.0	32.0
1.41	0.00	1.6	33.6
2.20	0.00	0.0	33.6

-x Stormtech STC-740 Storage Chambers (0 m3)
0.2m Static Ponding Depth (32 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB24	A-10	0.0	121.5
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.60	0.00	0.0	0.0
1.90	810.00	121.5	121.5
1.91	0.00	4.1	125.6
2.60	0.00	0.0	125.6

-x Stormtech STC-740 Storage Chambers (0 m3)
0.3m Static Ponding Depth (121.5 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB25	A-07	0.0	117.1
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.41	0.00	0.0	0.0
1.71	780.67	117.1	117.1
1.72	0.00	3.9	121.0
2.41	0.00	0.0	121.0

-x Stormtech STC-740 Storage Chambers (0 m3)
0.3m Static Ponding Depth (117.1 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB26	A-01	0.0	96.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.20	0.00	0.0	0.0
1.50	640.00	96.0	96.0
1.51	0.00	3.2	99.2
2.20	0.00	0.0	99.2

-x Stormtech STC-740 Storage Chambers (0 m3)
0.3m Static Ponding Depth (96 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB27	A-09	0.0	120.7
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.39	0.00	0.0	0.0
1.69	804.67	120.7	120.7
1.70	0.00	4.0	124.7
2.39	0.00	0.0	124.7

-x Stormtech STC-740 Storage Chambers (0 m3)
0.3m Static Ponding Depth (120.7 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB28	A-08	0.0	112.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.20	0.00	0.0	0.0
1.50	749.33	112.4	112.4
1.51	0.00	3.7	116.1
2.20	0.00	0.0	116.1

-x Stormtech STC-740 Storage Chambers (0 m3)
0.3m Static Ponding Depth (112.4 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB29	A-45	63.6	49.6
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	167.37	63.6	63.6
0.77	0.00	0.8	64.4
1.45	0.00	0.0	64.4
1.70	396.80	49.6	114.0
1.71	0.00	2.0	116.0
2.45	0.00	0.0	116.0

30x Stormtech STC-740 Storage Chambers (63.6 m3)
0.25m Static Ponding Depth (49.6 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB30	A-44	0.0	39.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.00	0.00	0.0	0.0
1.25	313.60	39.2	39.2
1.26	0.00	1.6	40.8
2.00	0.00	0.0	40.8

-x Stormtech STC-740 Storage Chambers (0 m3)
0.25m Static Ponding Depth (39.2 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB31	A-43	0.0	82.1
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.20	0.00	0.0	0.0
1.45	656.80	82.1	82.1
1.46	0.00	3.3	85.4
2.20	0.00	0.0	85.4

-x Stormtech STC-740 Storage Chambers (0 m3)
0.25m Static Ponding Depth (82.1 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB32	A-40	59.3	3.1
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	156.05	59.3	59.3
0.77	0.00	0.8	60.1
2.25	0.00	0.0	60.1
2.35	62.00	3.1	63.2
2.36	0.00	0.3	63.5
3.25	0.00	0.0	63.5

28x Stormtech STC-740 Storage Chambers (59.3 m3)
0.1m Static Ponding Depth (3.1 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB33	A-42	0.0	39.6
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.20	0.00	0.0	0.0
1.65	176.00	39.6	39.6
1.66	0.00	0.9	40.5
2.20	0.00	0.0	40.5

-x Stormtech STC-740 Storage Chambers (0 m3)
0.45m Static Ponding Depth (39.6 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB34	A-58	0.0	14.7
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.20	0.00	0.0	0.0
1.45	117.60	14.7	14.7
1.46	0.00	0.6	15.3
2.20	0.00	0.0	15.3

-x Stormtech STC-740 Storage Chambers (0 m3)
0.25m Static Ponding Depth (14.7 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB35	A-57	0.0	24.8
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	0.00	0.0	0.0
0.77	0.00	0.0	0.0
1.35	0.00	0.0	0.0
1.55	248.00	24.8	24.8
1.56	0.00	1.2	26.0
2.35	0.00	0.0	26.0

-x Stormtech STC-740 Storage Chambers (0 m3)
0.2m Static Ponding Depth (24.8 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CB36	A-50	6.3	22.6
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	16.58	6.3	6.3
0.77	0.00	0.1	6.4
1.60	0.00	0.0	6.4
1.80	226.00	22.6	29.0
1.81	0.00	1.1	30.1
2.60	0.00	0.0	30.1

3x Stormtech STC-740 Storage Chambers (6.3 m3)
0.2m Static Ponding Depth (22.6 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH104	A-55	16.9	41.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	44.47	16.9	16.9
0.77	0.00	0.2	17.1
1.47	0.00	0.0	17.1
1.72	328.00	41.0	58.1
1.73	0.00	1.6	59.8
2.47	0.00	0.0	59.8

8x Stormtech STC-740 Storage Chambers (16.9 m3)
0.25m Static Ponding Depth (41 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH105	A-54	21.2	24.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	55.79	21.2	21.2
0.77	0.00	0.3	21.5
1.60	0.00	0.0	21.5
1.85	193.60	24.2	45.7
1.86	0.00	1.0	46.6
2.60	0.00	0.0	46.6

10x Stormtech STC-740 Storage Chambers (21.2 m3)
0.25m Static Ponding Depth (24.2 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH106	A-60	33.9	101.9
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	89.21	33.9	33.9
0.77	0.00	0.4	34.3
1.46	0.00	0.0	34.3
1.76	679.33	101.9	136.2
1.77	0.00	3.4	139.6
2.46	0.00	0.0	139.6

16x Stormtech STC-740 Storage Chambers (33.9 m3)
0.3m Static Ponding Depth (101.9 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH107	A-59	12.7	53.0
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	33.42	12.7	12.7
0.77	0.00	0.2	12.9
1.62	0.00	0.0	12.9
1.87	424.00	53.0	65.9
1.88	0.00	2.1	68.0
2.62	0.00	0.0	68.0

6x Stormtech STC-740 Storage Chambers (12.7 m3)
0.25m Static Ponding Depth (53 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH108	A-63	38.1	72.5
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	100.26	38.1	38.1
0.77	0.00	0.5	38.6
1.56	0.00	0.0	38.6
1.81	580.00	72.5	111.1
1.82	0.00	2.9	114.0
2.56	0.00	0.0	114.0

18x Stormtech STC-740 Storage Chambers (38.1 m3)
0.25m Static Ponding Depth (72.5 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH109	A-65	106.0	137.4
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	278.95	106.0	106.0
0.77	0.00	1.4	107.4
1.64	0.00	0.0	107.4
1.94	916.00	137.4	244.8
1.95	0.00	4.6	249.4
2.64	0.00	0.0	249.4

50x Stormtech STC-740 Storage Chambers (106 m3)
0.3m Static Ponding Depth (137.4 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH110	A-33	84.8	48.2
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	223.16	84.8	84.8
0.77	0.00	1.1	85.9
1.78	0.00	0.0	85.9
1.98	482.00	48.2	134.1
1.99	0.00	2.4	136.5
2.78	0.00	0.0	136.5

40x Stormtech STC-740 Storage Chambers (84.8 m3)
0.2m Static Ponding Depth (48.2 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH111	A-12	63.6	7.3
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	167.37	63.6	63.6
0.77	0.00	0.8	64.4
2.05	0.00	0.0	64.4
2.20	97.33	7.3	71.7
2.21	0.00	0.5	72.2
3.05	0.00	0.0	72.2

30x Stormtech STC-740 Storage Chambers (63.6 m3)
0.15m Static Ponding Depth (7.3 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH112	A-14	148.4	35.5
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	390.53	148.4	148.4
0.77	0.00	2.0	150.4
2.08	0.00	0.0	150.4
2.28	355.00	35.5	185.9
2.29	0.00	1.8	187.6
3.08	0.00	0.0	187.6

70x Stormtech STC-740 Storage Chambers (148.4 m3)
0.2m Static Ponding Depth (35.5 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH114	A-15	148.4	118.8
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	390.53	148.4	148.4
0.77	0.00	2.0	150.4
2.04	0.00	0.0	150.4
2.34	792.00	118.8	269.2
2.35	0.00	4.0	273.1
3.04	0.00	0.0	273.1

70x Stormtech STC-740 Storage Chambers (148.4 m3)
0.3m Static Ponding Depth (118.8 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Storage Curves - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH115	A-16	84.8	110.6
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	223.16	84.8	84.8
0.77	0.00	1.1	85.9
2.01	0.00	0.0	85.9
2.31	737.33	110.6	196.5
2.32	0.00	3.7	200.2
3.01	0.00	0.0	200.2

40x Stormtech STC-740 Storage Chambers (84.8 m3)
0.3m Static Ponding Depth (110.6 m3)

STM ID	CB ID	Provided Storage	
		Underground	Surface
PR-CBMH118	A-41	84.8	70.6
Depth (m)	Equivalent Area (m^2)	Incremental Volume (m^3)	Total Volume (m^3)
0.00	0.00	0.0	0.0
0.76	223.16	84.8	84.8
0.77	0.00	1.1	85.9
1.66	0.00	0.0	85.9
1.96	470.67	70.6	156.5
1.97	0.00	2.4	158.9
2.66	0.00	0.0	158.9

40x Stormtech STC-740 Storage Chambers (84.8 m3)
0.3m Static Ponding Depth (70.6 m3)

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Results - Proposed Conditions (ICDs)

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	PCSWMM Orifice Dia. (mm)	IPEX ICD Type (model)	Outlet Pipe Dia. (mm)	Structure Dia. (mm)	Release Rate (L/s)[1]				Head (m)[1]			
					2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)
EX-CB117	75	HF-77	250	600x600	12.8	13.5	14.2	14.2	1.19	1.32	1.45	1.48
EX-CB134	83	HF-85	200	600x600	15.2	19.0	19.6	19.8	1.12	1.73	1.84	1.87
EX-CB137	135	HF-137	200	600x600	19.8	36.2	46.9	47.4	0.33	0.95	1.58	1.62
EX-CB14	127	HF-130	200	600x600	53.8	55.0	57.6	58.4	2.53	2.64	2.89	2.97
EX-CB60	108	HF-110	250	600x600	29.1	31.0	31.5	31.6	1.44	1.62	1.70	1.72
EX-CB64	65	LMF-100	250	600x600	5.4	10.6	10.8	11.0	0.39	1.43	1.50	1.57
EX-CB72	65	LMF-100	200	600x600	7.9	10.8	11.6	11.8	0.80	1.49	1.70	1.76
EX-CB82	200	HF-202	200	600x600	80.7	92.2	96.3	97.8	1.00	1.28	1.39	1.43
EX-CB84	115	HF-118	200	600x600	31.9	34.6	35.5	35.8	1.35	1.58	1.66	1.69
EX-MH105	200	HF-199	450	1200	108.1	119.6	121.6	123.1	1.91	2.29	2.40	2.44
EX-MH112	250	HF-218	300	1200	95.4	112.8	116.7	117.5	1.05	1.39	1.54	1.58
PR-CB10	50	LMF-80	250	600x600	3.6	6.2	6.5	6.5	0.47	1.39	1.51	1.55
PR-CB13	55	LMF-85	250	600x600	3.9	5.2	8.0	8.0	0.40	0.68	1.58	1.59
PR-CB14	55	LMF-85	250	600x600	2.5	3.3	7.5	7.9	0.18	0.29	1.60	1.62
PR-CB16/17	200	HF-202	250	600x600	71.8	92.8	96.6	97.2	0.81	1.29	1.41	1.46
PR-CB18	60	LMF-95	250	600x600	4.3	5.2	9.1	9.2	0.35	0.48	1.46	1.47
PR-CB29	65	LMF-100	300	600x600	4.9	5.8	10.4	10.5	0.35	0.47	1.41	1.46
PR-CB32	55	LMF-85	250	600x600	2.4	3.1	8.9	9.0	0.25	0.35	2.09	2.12
PR-CB33	200	No ICD	250	600x600	6.5	9.1	15.7	18.9	0.08	0.10	0.14	0.16
PR-CB36	50	LMF-80	250	600x600	1.4	2.0	5.4	5.7	0.10	0.20	1.15	1.25
PR-CBMH104	55	LMF-85	250	1200	6.4	7.1	7.3	7.4	1.01	1.25	1.34	1.37
PR-CBMH105	55	LMF-85	250	1200	5.5	7.1	7.3	7.4	0.77	1.25	1.35	1.38
PR-CBMH106	55	LMF-85	250	1200	6.6	7.2	7.5	7.6	1.07	1.29	1.38	1.41
PR-CBMH107	55	LMF-85	250	1200	4.2	7.4	7.7	7.8	0.46	1.40	1.53	1.56
PR-CBMH108	60	LMF-95	250	1200	7.9	8.9	9.2	9.3	1.10	1.39	1.48	1.52
PR-CBMH109	60	LMF-95	300	1200	8.8	9.1	9.5	9.6	1.39	1.49	1.61	1.64
PR-CBMH110	55	LMF-85	250	1200	3.7	4.4	8.4	8.5	0.36	0.50	1.72	1.81
PR-CBMH111	70	LMF-72	300	1200	5.3	6.4	14.4	14.5	0.30	0.41	1.95	1.96
PR-CBMH112	70	LMF-72	300	1200	7.1	14.2	14.7	14.7	0.50	1.90	2.03	2.04
PR-CBMH114	60	LMF-95	300	1200	9.9	10.4	10.8	10.9	1.69	1.89	2.02	2.06
PR-CBMH115	60	LMF-95	300	1200	8.3	10.2	10.5	10.6	1.23	1.84	1.94	1.98
PR-CBMH118	65	LMF-100	300	1200	10.3	11.0	11.4	11.4	1.36	1.52	1.65	1.67
PR-MH100	70	LMF-105	450	1200	10.7	11.3	11.7	11.9	1.19	1.32	1.42	1.45
PR-TD01	100	HF-105	150	300x1400	9.0	9.9	11.6	12.3	0.23	0.27	0.35	0.38

[1] *3-hour Chicago Storm.*

**IPEX ICD's sized based on 100-year model results.*

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Results - Proposed Conditions (Ponding)

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	Invert Elev. (m)	Rim Elev. (m)	Spill Elev. (m)	Ponding Depth (m)	HGL Elev. (m)[1]				Ponding Depth (m)				Spill Depth (m)			
					2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)
EX-CB116	112.99	113.50	113.65	0.15	113.28	113.44	113.55	113.58	0.00	0.00	0.05	0.08	0.00	0.00	0.00	0.00
EX-CB117	112.09	113.35	113.65	0.30	113.28	113.41	113.54	113.57	0.00	0.06	0.19	0.22	0.00	0.00	0.00	0.00
EX-CB128	112.51	113.71	113.90	0.19	113.36	113.71	113.82	113.86	0.00	0.00	0.11	0.15	0.00	0.00	0.00	0.00
EX-CB134	111.60	113.30	113.45	0.15	112.72	113.33	113.44	113.47	0.00	0.03	0.14	0.17	0.00	0.00	0.00	0.02
EX-CB137	112.00	113.40	113.60	0.20	112.33	112.95	113.58	113.62	0.00	0.00	0.18	0.22	0.00	0.00	0.00	0.02
EX-CB14	111.19	113.40	114.10	0.70	113.72	113.83	114.08	114.16	0.32	0.43	0.68	0.76	0.00	0.00	0.00	0.06
EX-CB28	112.43	113.65	114.00	0.35	113.45	113.75	113.85	113.89	0.00	0.10	0.20	0.24	0.00	0.00	0.00	0.00
EX-CB30	112.50	113.70	114.00	0.30	113.46	113.76	113.88	113.92	0.00	0.06	0.18	0.22	0.00	0.00	0.00	0.00
EX-CB50	112.34	113.71	114.00	0.29	113.40	113.75	113.83	113.87	0.00	0.04	0.12	0.16	0.00	0.00	0.00	0.00
EX-CB52	112.44	113.71	113.98	0.27	113.48	113.79	113.88	113.91	0.00	0.08	0.17	0.20	0.00	0.00	0.00	0.00
EX-CB54	112.52	113.83	114.00	0.17	113.49	113.79	113.88	113.92	0.00	0.00	0.05	0.09	0.00	0.00	0.00	0.00
EX-CB58	112.44	113.73	114.00	0.27	113.29	113.76	113.83	113.86	0.00	0.03	0.10	0.13	0.00	0.00	0.00	0.00
EX-CB60	112.15	113.73	113.90	0.17	113.59	113.77	113.85	113.87	0.00	0.04	0.12	0.14	0.00	0.00	0.00	0.00
EX-CB62	112.64	113.76	113.90	0.14	113.59	113.78	113.85	113.88	0.00	0.02	0.09	0.12	0.00	0.00	0.00	0.00
EX-CB64	112.10	113.50	113.65	0.15	112.49	113.53	113.60	113.67	0.00	0.03	0.10	0.17	0.00	0.00	0.00	0.02
EX-CB72	111.18	112.67	113.00	0.33	111.98	112.67	112.88	112.94	0.00	0.00	0.21	0.27	0.00	0.00	0.00	0.00
EX-CB82	112.62	113.84	114.05	0.21	113.62	113.90	114.01	114.05	0.00	0.06	0.17	0.21	0.00	0.00	0.00	0.00
EX-CB84	112.12	113.65	114.00	0.35	113.47	113.70	113.78	113.81	0.00	0.05	0.13	0.16	0.00	0.00	0.00	0.00
EX-CB87	112.50	113.68	113.95	0.27	113.26	113.73	113.83	113.87	0.00	0.05	0.15	0.19	0.00	0.00	0.00	0.00
EX-CB90	112.51	113.80	113.95	0.15	113.24	113.81	113.87	113.88	0.00	0.01	0.07	0.08	0.00	0.00	0.00	0.00
EX-CB92	112.49	113.67	113.95	0.28	113.55	113.77	113.88	113.93	0.00	0.10	0.21	0.26	0.00	0.00	0.00	0.00
EX-CB95	112.45	113.67	113.95	0.28	113.36	113.70	113.81	113.85	0.00	0.03	0.14	0.18	0.00	0.00	0.00	0.00
EX-CB96	112.22	113.62	113.95	0.33	113.35	113.70	113.81	113.85	0.00	0.08	0.19	0.23	0.00	0.00	0.00	0.00

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Results - Proposed Conditions (Ponding)

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	Invert Elev. (m)	Rim Elev. (m)	Spill Elev. (m)	Ponding Depth (m)	HGL Elev. (m)[1]				Ponding Depth (m)				Spill Depth (m)			
					2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)
PR-CB01	112.40	113.40	113.63	0.23	113.35	113.48	113.58	113.61	0.00	0.08	0.18	0.21	0.00	0.00	0.00	0.00
PR-CB02	112.40	113.40	113.64	0.24	113.35	113.48	113.58	113.61	0.00	0.08	0.18	0.21	0.00	0.00	0.00	0.00
PR-CB03	112.40	113.40	113.65	0.25	113.35	113.48	113.58	113.61	0.00	0.08	0.18	0.21	0.00	0.00	0.00	0.00
PR-CB04	112.40	113.40	113.65	0.25	113.35	113.48	113.58	113.61	0.00	0.08	0.18	0.21	0.00	0.00	0.00	0.00
PR-CB05	112.45	113.45	113.70	0.25	113.29	113.53	113.62	113.65	0.00	0.08	0.17	0.20	0.00	0.00	0.00	0.00
PR-CB06	112.45	113.45	113.65	0.20	113.03	113.51	113.61	113.64	0.00	0.06	0.16	0.19	0.00	0.00	0.00	0.00
PR-CB07	112.36	113.45	113.65	0.20	113.03	113.51	113.61	113.64	0.00	0.06	0.16	0.19	0.00	0.00	0.00	0.00
PR-CB08	112.50	113.50	113.75	0.25	113.36	113.58	113.67	113.71	0.00	0.08	0.17	0.21	0.00	0.00	0.00	0.00
PR-CB09	112.50	113.60	113.85	0.25	113.39	113.68	113.78	113.81	0.00	0.08	0.18	0.21	0.00	0.00	0.00	0.00
PR-CB10	112.12	113.45	113.75	0.30	112.59	113.51	113.63	113.67	0.00	0.06	0.18	0.22	0.00	0.00	0.00	0.00
PR-CB11	112.60	113.60	113.85	0.25	113.60	113.70	113.82	113.85	0.00	0.10	0.22	0.25	0.00	0.00	0.00	0.00
PR-CB12	112.42	113.60	113.87	0.27	113.60	113.70	113.82	113.85	0.00	0.10	0.22	0.25	0.00	0.00	0.00	0.00
PR-CB13	112.15	113.65	113.72	0.07	112.55	112.83	113.73	113.74	0.00	0.00	0.08	0.09	0.00	0.00	0.01	0.02
PR-CB14	112.05	113.55	113.65	0.10	112.23	112.34	113.65	113.67	0.00	0.00	0.10	0.12	0.00	0.00	0.00	0.02
PR-CB15	112.20	113.40	113.67	0.27	112.31	112.37	113.59	113.66	0.00	0.00	0.19	0.26	0.00	0.00	0.00	0.00
PR-CB16/17	112.09	113.35	113.65	0.30	112.90	113.38	113.50	113.55	0.00	0.03	0.15	0.20	0.00	0.00	0.00	0.00
PR-CB18	113.74	115.05	115.20	0.15	114.09	114.22	115.20	115.21	0.00	0.00	0.15	0.16	0.00	0.00	0.00	0.01
PR-CB19	113.65	115.05	115.20	0.15	113.76	113.79	115.20	115.21	0.00	0.00	0.15	0.16	0.00	0.00	0.00	0.01
PR-CB20	113.85	115.05	115.20	0.15	113.96	113.97	115.20	115.24	0.00	0.00	0.15	0.19	0.00	0.00	0.00	0.04
PR-CB21	113.56	115.20	115.40	0.20	114.14	115.27	115.40	115.41	0.00	0.07	0.20	0.21	0.00	0.00	0.00	0.01
PR-CB22	113.80	115.20	115.40	0.20	114.36	115.28	115.41	115.41	0.00	0.08	0.21	0.21	0.00	0.00	0.01	0.01
PR-CB23	114.00	115.20	115.40	0.20	114.44	115.28	115.41	115.43	0.00	0.08	0.21	0.23	0.00	0.00	0.01	0.03
PR-CB24	113.95	115.55	115.85	0.30	115.45	115.66	115.78	115.82	0.00	0.11	0.23	0.27	0.00	0.00	0.00	0.00
PR-CB25	114.14	115.55	115.85	0.30	115.46	115.66	115.78	115.82	0.00	0.11	0.23	0.27	0.00	0.00	0.00	0.00
PR-CB26	114.35	115.55	115.85	0.30	115.46	115.66	115.78	115.82	0.00	0.11	0.23	0.27	0.00	0.00	0.00	0.00
PR-CB27	114.51	115.90	116.20	0.30	115.38	115.98	116.09	116.13	0.00	0.08	0.19	0.23	0.00	0.00	0.00	0.00
PR-CB28	114.70	115.90	116.20	0.30	115.38	115.99	116.09	116.13	0.00	0.09	0.19	0.23	0.00	0.00	0.00	0.00
PR-CB29	111.50	112.70	112.95	0.25	111.85	111.97	112.91	112.96	0.00	0.00	0.21	0.26	0.00	0.00	0.00	0.01
PR-CB30	111.40	112.40	112.65	0.25	112.35	112.52	112.64	112.66	0.00	0.12	0.24	0.26	0.00	0.00	0.00	0.01
PR-CB31	111.20	112.40	112.65	0.25	112.35	112.52	112.64	112.66	0.00	0.12	0.24	0.26	0.00	0.00	0.00	0.01
PR-CB32	110.90	112.90	113.00	0.10	111.15	111.25	112.99	113.02	0.00	0.00	0.09	0.12	0.00	0.00	0.00	0.02

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Results - Proposed Conditions (Ponding)

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH ID	Invert Elev. (m)	Rim Elev. (m)	Spill Elev. (m)	Ponding Depth (m)	HGL Elev. (m)[1]				Ponding Depth (m)				Spill Depth (m)			
					2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)	2-yr	5-yr	100-yr	100-yr (+20%)
PR-CB33	111.60	112.80	113.25	0.45	111.68	111.70	111.74	111.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PR-CB34	112.30	113.50	113.75	0.25	112.54	113.48	113.61	113.64	0.00	0.00	0.11	0.14	0.00	0.00	0.00	0.00
PR-CB35	112.20	113.55	113.75	0.20	112.54	113.48	113.61	113.64	0.00	0.00	0.06	0.09	0.00	0.00	0.00	0.00
PR-CB36	112.25	113.45	113.65	0.20	112.35	112.45	113.40	113.50	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
PR-CBMH104	112.28	113.50	113.75	0.25	113.29	113.53	113.62	113.65	0.00	0.03	0.12	0.15	0.00	0.00	0.00	0.00
PR-CBMH105	112.26	113.45	113.70	0.25	113.03	113.51	113.61	113.64	0.00	0.06	0.16	0.19	0.00	0.00	0.00	0.00
PR-CBMH106	112.29	113.50	113.80	0.30	113.36	113.58	113.67	113.70	0.00	0.08	0.17	0.20	0.00	0.00	0.00	0.00
PR-CBMH107	112.08	113.45	113.70	0.25	112.54	113.48	113.61	113.64	0.00	0.03	0.16	0.19	0.00	0.00	0.00	0.00
PR-CBMH108	112.29	113.60	113.85	0.25	113.39	113.68	113.77	113.81	0.00	0.08	0.17	0.21	0.00	0.00	0.00	0.00
PR-CBMH109	112.21	113.60	113.90	0.30	113.60	113.70	113.82	113.85	0.00	0.10	0.22	0.25	0.00	0.00	0.00	0.00
PR-CBMH110	111.87	113.40	113.60	0.20	112.23	112.37	113.59	113.68	0.00	0.00	0.19	0.28	0.00	0.00	0.00	0.08
PR-CBMH111	113.25	115.05	115.20	0.15	113.55	113.66	115.20	115.21	0.00	0.00	0.15	0.16	0.00	0.00	0.00	0.01
PR-CBMH112	113.37	115.20	115.40	0.20	113.87	115.27	115.40	115.41	0.00	0.07	0.20	0.21	0.00	0.00	0.00	0.01
PR-CBMH114	113.76	115.55	115.85	0.30	115.45	115.65	115.78	115.82	0.00	0.10	0.23	0.27	0.00	0.00	0.00	0.00
PR-CBMH115	114.14	115.90	116.20	0.30	115.37	115.98	116.08	116.12	0.00	0.08	0.18	0.22	0.00	0.00	0.00	0.00
PR-CBMH118	110.99	112.40	112.70	0.30	112.35	112.51	112.64	112.66	0.00	0.11	0.24	0.26	0.00	0.00	0.00	0.00
PR-TD01	112.55	112.70	113.65	0.95	112.78	112.82	112.90	112.93	0.08	0.12	0.20	0.23	0.00	0.00	0.00	0.00

[1] *3-hour Chicago Storm.*

4837 Albion Road - Hard Rock Ottawa (116111)
Summary of Hydraulic Grade Line (HGL) Elevations - Proposed Conditions

NOVATECH
Engineers, Planners & Landscape Architects

MH ID	Obvert Elevation (m)	T/G Elevation (m)	HGL Elevation[1] (m)	Surcharge (m)	Clearance from T/G (m)	HGL in Stress Test[1] (m)
EX-MH101	105.32	106.91	105.05	0.00	1.86	105.07
EX-MH101A	107.93	112.19	107.67	0.00	4.52	107.68
EX-MH101B	106.08	110.41	105.75	0.00	4.66	105.75
EX-MH102	110.13	114.07	109.83	0.00	4.24	109.84
EX-MH102A	112.72	114.25	112.61	0.00	1.64	112.61
EX-MH103	111.01	113.00	110.78	0.00	2.22	110.78
EX-MH104	111.25	113.90	111.77	0.52	2.13	111.81
EX-MH105	111.28	114.02	113.68	2.40	0.34	113.72
EX-MH106	112.60	114.99	113.73	1.13	1.26	113.77
EX-MH107	112.65	114.95	113.85	1.20	1.10	113.89
EX-MH108	111.70	113.67	113.28	1.59	0.39	113.34
EX-MH109	111.58	113.56	112.76	1.18	0.80	112.82
EX-MH112	112.15	114.94	113.69	1.54	1.25	113.73
EX-MH115	105.35	106.87	105.92	0.57	0.95	106.01
EX-MH116	105.80	107.87	106.68	0.88	1.19	106.85
PR-MH100	112.16	113.66	113.58	1.42	0.08	113.61
PR-MH101	112.23	113.93	112.90	0.67	1.03	112.96
PR-MH102	111.88	113.81	112.87	0.99	0.94	112.93
PR-MH103	111.70	113.68	112.82	1.12	0.86	112.88
PR-MH113	113.56	115.30	113.39	0.00	1.91	113.39
PR-MH116	110.90	111.61	110.80	0.00	0.81	110.81
PR-MH117	111.20	112.70	111.07	0.00	1.63	111.08
PR-MH119	113.28	115.25	113.15	0.00	2.10	113.15
PR-MH120	113.98	115.60	113.78	0.00	1.82	113.78

[1] *3-hour Chicago Storm.*

4837 Albion Road - Hard Rock Ottawa (116111)
PCSWMM Model Results - Proposed Conditions (Historical Storms)

NOVATECH
Engineers, Planners & Landscape Architects

Max Computed Hydraulic Grade Line Elevations (m)

MH ID	T/G Elevation	100-year (+20%) Design Storms		Historical Storms		
		3-hour Chicago	12-hour SCS	July 1, 1979	August 4, 1988	August 8, 1996
EX-CB72	112.67	112.94	112.80	112.77	112.79	112.73
EX-CB116	113.50	113.58	113.56	113.57	113.55	113.47
EX-CB117	113.35	113.57	113.55	113.57	113.53	113.45
EX-CB64	113.50	113.67	113.65	113.66	113.61	113.56
PR-CBMH110	113.40	113.68	113.67	113.67	113.62	113.56
PR-CB13	113.65	113.74	113.73	113.73	113.73	113.69
PR-CB14	113.55	113.67	113.66	113.66	113.66	112.49
PR-CB15	113.40	113.66	113.65	113.66	113.61	113.56
PR-CB34	113.50	113.64	113.63	113.64	113.62	113.54
PR-CB35	113.55	113.64	113.63	113.64	113.61	113.54
PR-CBMH107	113.45	113.64	113.63	113.64	113.61	113.54
PR-CB06	113.45	113.64	113.64	113.64	113.62	113.56
PR-CB07	113.45	113.64	113.64	113.64	113.62	113.56
PR-CBMH105	113.45	113.64	113.63	113.64	113.62	113.55
PR-CB32	112.90	113.02	113.02	113.02	113.03	111.40
PR-CB33	112.80	111.76	111.69	111.70	111.73	111.71
EX-CB134	113.30	113.47	113.35	113.35	113.37	113.34

**Lowest building opening (finished floor elevation) = 114.00 m.*

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 78
Number of nodes ........... 236
Number of links ........... 307
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
----------------------------------------------------------------------
Design_Storms        C3hr-100yr                  INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
------------------------------------------------------------------------------------------
A-01                        0.23     74.56    100.00    1.5000 Design_Storms        PR-CB26
A-02                        0.21     66.18    100.00    1.5000 Design_Storms        PR-CB23
A-03                        0.08     58.88    100.00    1.5000 Design_Storms        PR-CB20
A-04a                       0.34     48.75     82.90    1.5000 Design_Storms        EX-CB14
A-04b                       0.76    105.17     85.70    1.5000 Design_Storms        EX-CB14
A-05                        0.07     46.07     85.70    1.5000 Design_Storms        PR-CB19
A-06                        0.16     47.81    100.00    1.5000 Design_Storms        PR-CB22
A-07                        0.18     57.59    100.00    1.5000 Design_Storms        PR-CB25
A-08                        0.15     52.13    100.00    1.5000 Design_Storms        PR-CB28
A-09                        0.16     53.70    100.00    1.5000 Design_Storms        PR-CB27
A-10                        0.18     54.98    100.00    1.5000 Design_Storms        PR-CB24
A-11                        0.17     48.08    100.00    1.5000 Design_Storms        PR-CB21
A-12                        0.07     42.88     85.70    1.5000 Design_Storms        PR-CBMH111
A-13                        0.06     31.74     82.90    1.5000 Design_Storms        PR-CB18
A-14                        0.17     49.42    100.00    1.5000 Design_Storms        PR-CBMH112
A-15                        0.21     71.14    100.00    1.5000 Design_Storms        PR-CBMH114
```

```
A-16                        0.15     53.10    100.00    1.5000 Design_Storms        PR-CBMH115
A-17a                       0.26     68.20     60.00    1.5000 Design_Storms        EX-CB87
A-17b                       0.15     87.40     95.70    1.5000 Design_Storms        EX-CB90
A-17c                       0.29     68.85     70.00    1.5000 Design_Storms        EX-CB92
A-17d                       0.19    105.36     98.60    1.5000 Design_Storms        EX-CB96
A-17e                       0.36     86.02     60.00    1.5000 Design_Storms        EX-CB30
A-17f                       0.23    124.94     94.30    1.5000 Design_Storms        EX-CB28
A-18                        0.50    137.27     67.10    1.5000 Design_Storms        PR-CB16/17
A-19a                       0.10     51.00     67.10    1.5000 Design_Storms        EX-MH104
A-19b                       0.17     69.60     67.10    1.5000 Design_Storms        EX-CB137
A-20                        0.40    117.54     95.70    1.5000 Design_Storms        EX-CB82
A-21                        0.17     80.22     95.70    1.5000 Design_Storms        EX-CB84
A-22                        0.78    155.60      0.00    1.5000 Design_Storms        EX-MH101
A-23                        0.05     30.23     77.10    1.5000 Design_Storms        EX-CB72
A-24                        0.06     27.65     72.90    1.5000 Design_Storms        EX-MH108
A-25                        0.09     10.13     64.30    1.5000 Design_Storms        EX-CB95
A-26                        0.10     12.04     52.90    1.5000 Design_Storms        EX-CB128
A-27                        0.10     10.85     51.40    1.5000 Design_Storms        EX-CB62
A-28                        0.12     14.46     85.70    1.5000 Design_Storms        EX-CB60
A-29                        0.11     31.07     64.30    1.5000 Design_Storms        EX-CB117
A-30                        0.86     65.34    100.00    1.5000 Design_Storms        EX-BLDG01
A-31                        0.06     51.23    100.00    1.5000 Design_Storms        EX-CB116
A-32                        0.08     55.19     85.70    1.5000 Design_Storms        EX-CB64
A-33                        0.24    138.61     72.90    1.5000 Design_Storms        PR-CBMH110
A-34a                       0.15     64.82     98.60    1.5000 Design_Storms        EX-CB58
A-34b                       0.25    108.53    100.00    1.5000 Design_Storms        EX-CB50
A-34c                       0.20     83.67     95.70    1.5000 Design_Storms        EX-CB52
A-35                        0.12     97.66     80.00    1.5000 Design_Storms        PR-CB15
A-36                        0.05     49.09    100.00    1.5000 Design_Storms        PR-CB13
A-37                        0.06     22.22     40.00    1.5000 Design_Storms        PR-CB14
A-38a(R1-R5)                1.20    100.00    100.00    1.5000 Design_Storms        PR-BLDG01
A-38b(R6-R7)                0.27     44.17    100.00    1.5000 Design_Storms        PR-BLDG02
A-39                        0.07     19.65    100.00    1.5000 Design_Storms        EX-CB134
A-40                        0.15     29.76    100.00    1.5000 Design_Storms        PR-CB32
A-41                        0.21     35.97    100.00    1.5000 Design_Storms        PR-CBMH118
A-42                        0.03     40.50     94.30    1.5000 Design_Storms        PR-CB33
A-43                        0.22     44.12    100.00    1.5000 Design_Storms        PR-CB31
A-44                        0.09     36.00    100.00    1.5000 Design_Storms        PR-CB30
A-45                        0.24     41.24     94.30    1.5000 Design_Storms        PR-CB29
A-46                        0.09     27.61     78.60    1.5000 Design_Storms        PR-TD01
A-47                        0.10     58.54     85.70    1.5000 Design_Storms        PR-CB01
A-48                        0.04     44.82     87.10    1.5000 Design_Storms        PR-CB02
A-49                        0.10     47.37     58.60    1.5000 Design_Storms        PR-CB03
A-50                        0.03     24.58     70.00    1.5000 Design_Storms        PR-CB36
A-51                        0.09     69.83     98.60    1.5000 Design_Storms        PR-CB04
A-52                        0.07     35.75     77.10    1.5000 Design_Storms        PR-CB06
```

A-53	0.08	39.54	74.30	1.5000	Design_Storms	PR-CB07
A-54	0.04	21.02	74.30	1.5000	Design_Storms	PR-CBMH105
A-55	0.06	49.14	80.00	1.5000	Design_Storms	PR-CBMH104
A-56	0.08	46.12	100.00	1.5000	Design_Storms	PR-CB05
A-57	0.05	38.72	62.90	1.5000	Design_Storms	PR-CB35
A-58	0.03	51.14	62.90	1.5000	Design_Storms	PR-CB34
A-59	0.06	42.09	62.90	1.5000	Design_Storms	PR-CBMH107
A-60	0.12	62.67	97.10	1.5000	Design_Storms	PR-CBMH106
A-61	0.10	73.37	100.00	1.5000	Design_Storms	PR-CB08
A-62	0.11	60.84	100.00	1.5000	Design_Storms	PR-CB09
A-63	0.13	69.25	100.00	1.5000	Design_Storms	PR-CBMH108
A-64	0.12	37.33	85.70	1.5000	Design_Storms	PR-CB10
A-65	0.22	103.25	100.00	1.5000	Design_Storms	PR-CBMH109
A-66	0.20	110.84	100.00	1.5000	Design_Storms	PR-CB12
A-67	0.15	98.70	100.00	1.5000	Design_Storms	PR-CB11
A-68	0.10	41.22	62.90	1.5000	Design_Storms	EX-CB54

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HP-01	JUNCTION	114.10	1.00	0.0	
HP-EX-CB116	JUNCTION	113.60	1.00	0.0	
HP-EX-CB117	JUNCTION	113.56	1.00	0.0	
HP-EX-CB128a	JUNCTION	113.90	1.00	0.0	
HP-EX-CB128b	JUNCTION	113.95	1.00	0.0	
HP-EX-CB131	JUNCTION	112.90	1.00	0.0	
HP-EX-CB137	JUNCTION	113.60	1.00	0.0	
HP-EX-CB28	JUNCTION	114.00	1.00	0.0	
HP-EX-CB30a	JUNCTION	114.00	1.00	0.0	
HP-EX-CB30b	JUNCTION	114.00	1.00	0.0	
HP-EX-CB50a	JUNCTION	114.00	1.00	0.0	
HP-EX-CB50b	JUNCTION	114.00	1.00	0.0	
HP-EX-CB52	JUNCTION	113.98	1.00	0.0	
HP-EX-CB54	JUNCTION	114.00	1.00	0.0	
HP-EX-CB58a	JUNCTION	114.00	1.00	0.0	
HP-EX-CB58b	JUNCTION	114.00	1.00	0.0	
HP-EX-CB60	JUNCTION	113.90	1.00	0.0	
HP-EX-CB62	JUNCTION	113.90	1.00	0.0	
HP-EX-CB64	JUNCTION	113.65	1.00	0.0	
HP-EX-CB72	JUNCTION	113.00	1.00	0.0	
HP-EX-CB82	JUNCTION	114.05	1.00	0.0	
HP-EX-CB84	JUNCTION	114.00	1.00	0.0	
HP-EX-CB87a	JUNCTION	113.95	1.00	0.0	
HP-EX-CB87b	JUNCTION	113.95	1.00	0.0	
HP-EX-CB90	JUNCTION	113.95	1.00	0.0	
HP-EX-CB92	JUNCTION	113.95	1.00	0.0	
HP-EX-CB95	JUNCTION	113.95	1.00	0.0	
HP-EX-CB96	JUNCTION	113.95	1.00	0.0	
HP-PR-CB02	JUNCTION	113.64	1.00	0.0	
HP-PR-CB03	JUNCTION	113.65	1.00	0.0	
HP-PR-CB04	JUNCTION	113.65	1.00	0.0	
HP-PR-CB05	JUNCTION	113.70	1.00	0.0	
HP-PR-CB06	JUNCTION	113.65	1.00	0.0	
HP-PR-CB07	JUNCTION	113.65	1.00	0.0	
HP-PR-CB08	JUNCTION	113.75	1.00	0.0	
HP-PR-CB09	JUNCTION	113.85	1.00	0.0	
HP-PR-CB10	JUNCTION	113.75	1.00	0.0	
HP-PR-CB12	JUNCTION	113.87	1.00	0.0	
HP-PR-CB13	JUNCTION	113.72	1.00	0.0	
HP-PR-CB14	JUNCTION	113.65	1.00	0.0	
HP-PR-CB15	JUNCTION	113.67	1.00	0.0	
HP-PR-CB16/17	JUNCTION	113.65	1.00	0.0	
HP-PR-CB18	JUNCTION	115.20	1.00	0.0	
HP-PR-CB19	JUNCTION	115.20	1.00	0.0	
HP-PR-CB20	JUNCTION	115.20	1.00	0.0	
HP-PR-CB21	JUNCTION	115.40	1.00	0.0	
HP-PR-CB22	JUNCTION	115.40	1.00	0.0	
HP-PR-CB23	JUNCTION	115.40	1.00	0.0	
HP-PR-CB24a	JUNCTION	115.85	1.00	0.0	
HP-PR-CB24b	JUNCTION	115.85	1.00	0.0	
HP-PR-CB25a	JUNCTION	115.85	1.00	0.0	
HP-PR-CB25b	JUNCTION	115.85	1.00	0.0	
HP-PR-CB26a	JUNCTION	115.85	1.00	0.0	
HP-PR-CB26b	JUNCTION	115.85	1.00	0.0	
HP-PR-CB27a	JUNCTION	116.20	1.00	0.0	
HP-PR-CB27b	JUNCTION	116.20	1.00	0.0	
HP-PR-CB28a	JUNCTION	116.20	1.00	0.0	
HP-PR-CB28b	JUNCTION	116.20	1.00	0.0	
HP-PR-CB33	JUNCTION	113.25	1.00	0.0	
HP-PR-CB34	JUNCTION	113.75	1.00	0.0	
HP-PR-CB35	JUNCTION	113.75	1.00	0.0	
HP-PR-CB36	JUNCTION	113.65	1.00	0.0	
HP-PR-CBMH104	JUNCTION	113.75	1.00	0.0	
HP-PR-CBMH105	JUNCTION	113.70	1.00	0.0	
HP-PR-CBMH106	JUNCTION	113.80	1.00	0.0	
HP-PR-CBMH107	JUNCTION	113.70	1.00	0.0	
HP-PR-CBMH108a	JUNCTION	113.85	1.00	0.0	
HP-PR-CBMH108b	JUNCTION	113.85	1.00	0.0	

HP-PR-CBMH109	JUNCTION	113.90	1.00	0.0
HP-PR-CBMH110	JUNCTION	113.60	1.00	0.0
HP-PR-CBMH111	JUNCTION	115.20	1.00	0.0
HP-PR-CBMH112	JUNCTION	115.40	1.00	0.0
HP-PR-CBMH114	JUNCTION	115.85	1.00	0.0
HP-PR-CBMH115	JUNCTION	116.20	1.00	0.0
HP-PR-TD01	JUNCTION	113.65	1.00	0.0
HP-EX-CB134	OUTFALL	113.45	1.00	0.0
HP-EX-CB14	OUTFALL	114.10	1.00	0.0
HP-PR-CB01	OUTFALL	113.63	1.00	0.0
HP-PR-CB11	OUTFALL	113.85	1.00	0.0
HP-PR-CB29	OUTFALL	112.95	1.00	0.0
HP-PR-CB30	OUTFALL	112.65	1.00	0.0
HP-PR-CB31	OUTFALL	112.65	1.00	0.0
HP-PR-CB32	OUTFALL	113.00	1.00	0.0
HP-PR-CBMH118	OUTFALL	112.70	1.00	0.0
IF-EX-CB116	OUTFALL	112.99	0.00	0.0
IF-EX-CB117	OUTFALL	112.09	0.00	0.0
IF-EX-CB128	OUTFALL	112.51	0.00	0.0
IF-EX-CB137	OUTFALL	112.00	0.00	0.0
IF-EX-CB14	OUTFALL	111.19	0.00	0.0
IF-EX-CB28	OUTFALL	112.43	0.00	0.0
IF-EX-CB30	OUTFALL	112.50	0.00	0.0
IF-EX-CB50	OUTFALL	112.34	0.00	0.0
IF-EX-CB52	OUTFALL	112.44	0.00	0.0
IF-EX-CB54	OUTFALL	112.52	0.00	0.0
IF-EX-CB58	OUTFALL	112.44	0.00	0.0
IF-EX-CB64	OUTFALL	112.10	0.00	0.0
IF-EX-CB82	OUTFALL	112.62	0.00	0.0
IF-EX-CB84	OUTFALL	112.12	0.00	0.0
IF-EX-CB87	OUTFALL	112.50	0.00	0.0
IF-EX-CB90	OUTFALL	112.51	0.00	0.0
IF-EX-CB92	OUTFALL	112.49	0.00	0.0
IF-EX-CB95	OUTFALL	112.45	0.00	0.0
IF-EX-CB96	OUTFALL	112.22	0.00	0.0
IF-PR-CB04	OUTFALL	111.80	0.00	0.0
IF-PR-CB10	OUTFALL	111.85	0.00	0.0
IF-PR-CB13	OUTFALL	111.90	0.00	0.0
IF-PR-CB14	OUTFALL	111.80	0.00	0.0
IF-PR-CB18	OUTFALL	113.49	0.00	0.0
IF-PR-CB29	OUTFALL	111.25	0.00	0.0
IF-PR-CB32	OUTFALL	110.65	0.00	0.0
IF-PR-CB36	OUTFALL	111.85	0.00	0.0
IF-PR-CBMH104	OUTFALL	112.03	0.00	0.0
IF-PR-CBMH105	OUTFALL	111.85	0.00	0.0
IF-PR-CBMH106	OUTFALL	112.04	0.00	0.0
IF-PR-CBMH107	OUTFALL	111.83	0.00	0.0
IF-PR-CBMH108	OUTFALL	112.04	0.00	0.0
IF-PR-CBMH109	OUTFALL	111.96	0.00	0.0
IF-PR-CBMH110	OUTFALL	111.62	0.00	0.0
IF-PR-CBMH111	OUTFALL	113.00	0.00	0.0
IF-PR-CBMH112	OUTFALL	113.12	0.00	0.0
IF-PR-CBMH114	OUTFALL	113.51	0.00	0.0
IF-PR-CBMH115	OUTFALL	113.89	0.00	0.0
IF-PR-CBMH118	OUTFALL	110.74	0.00	0.0
Major-01	OUTFALL	112.87	1.00	0.0
OF1	OUTFALL	0.00	107.84	0.0
SWM_Pond	OUTFALL	102.95	0.75	0.0
EX-BLDG01	STORAGE	120.00	1.00	0.0
EX-CB116	STORAGE	112.99	1.51	0.0
EX-CB117	STORAGE	112.09	2.26	0.0
EX-CB128	STORAGE	112.51	2.20	0.0
EX-CB134	STORAGE	111.60	2.70	0.0
EX-CB137	STORAGE	112.00	2.40	0.0
EX-CB14	STORAGE	111.19	3.21	0.0
EX-CB28	STORAGE	112.43	2.22	0.0
EX-CB30	STORAGE	112.50	2.20	0.0
EX-CB50	STORAGE	112.34	2.37	0.0
EX-CB52	STORAGE	112.44	2.27	0.0
EX-CB54	STORAGE	112.52	2.31	0.0
EX-CB58	STORAGE	112.44	2.29	0.0
EX-CB60	STORAGE	112.15	2.58	0.0
EX-CB62	STORAGE	112.64	2.12	0.0
EX-CB64	STORAGE	112.10	2.40	0.0
EX-CB72	STORAGE	111.18	2.49	0.0
EX-CB82	STORAGE	112.62	2.22	0.0
EX-CB84	STORAGE	112.12	2.53	0.0
EX-CB87	STORAGE	112.50	2.18	0.0
EX-CB90	STORAGE	112.51	2.29	0.0
EX-CB92	STORAGE	112.49	2.18	0.0
EX-CB95	STORAGE	112.45	2.22	0.0
EX-CB96	STORAGE	112.22	2.40	0.0
EX-MH101	STORAGE	104.57	2.34	0.0
EX-MH101A	STORAGE	107.18	5.01	0.0
EX-MH101B	STORAGE	105.33	5.08	0.0
EX-MH102	STORAGE	109.38	4.69	0.0
EX-MH102A	STORAGE	112.33	1.92	0.0
EX-MH103	STORAGE	110.71	2.29	0.0
EX-MH104	STORAGE	110.65	3.25	0.0
EX-MH105	STORAGE	111.28	2.74	0.0
EX-MH105a	STORAGE	111.28	2.74	0.0
EX-MH106	STORAGE	112.15	2.84	0.0

EX-MH106a	STORAGE	111.61	2.39	0.0
EX-MH107	STORAGE	112.35	2.60	0.0
EX-MH107a	STORAGE	112.20	2.78	0.0
EX-MH108	STORAGE	111.32	2.35	0.0
EX-MH109	STORAGE	110.98	2.58	0.0
EX-MH112	STORAGE	112.15	2.79	0.0
EX-MH112a	STORAGE	112.15	1.79	0.0
EX-MH115	STORAGE	105.05	1.82	0.0
EX-MH116	STORAGE	105.50	2.37	0.0
EX-STUB02	STORAGE	111.38	2.28	0.0
PR-BLDG01	STORAGE	120.00	1.00	0.0
PR-BLDG02	STORAGE	120.00	1.00	0.0
PR-CB01	STORAGE	112.40	2.00	0.0
PR-CB02	STORAGE	112.40	2.00	0.0
PR-CB02a	STORAGE	112.33	2.17	0.0
PR-CB03	STORAGE	112.40	2.00	0.0
PR-CB04	STORAGE	111.80	2.60	0.0
PR-CB05	STORAGE	112.45	2.00	0.0
PR-CB06	STORAGE	112.45	2.00	0.0
PR-CB07	STORAGE	112.36	2.09	0.0
PR-CB08	STORAGE	112.50	2.00	0.0
PR-CB09	STORAGE	112.50	2.10	0.0
PR-CB10	STORAGE	111.85	2.60	0.0
PR-CB11	STORAGE	112.60	2.00	0.0
PR-CB12	STORAGE	112.42	2.18	0.0
PR-CB13	STORAGE	111.90	2.75	0.0
PR-CB14	STORAGE	111.80	2.75	0.0
PR-CB15	STORAGE	112.20	2.20	0.0
PR-CB16/17	STORAGE	112.09	2.26	0.0
PR-CB18	STORAGE	113.49	2.56	0.0
PR-CB19	STORAGE	113.65	2.40	0.0
PR-CB20	STORAGE	113.85	2.20	0.0
PR-CB21	STORAGE	113.56	2.64	0.0
PR-CB22	STORAGE	113.80	2.40	0.0
PR-CB23	STORAGE	114.00	2.20	0.0
PR-CB24	STORAGE	113.95	2.60	0.0
PR-CB25	STORAGE	114.14	2.41	0.0
PR-CB26	STORAGE	114.35	2.20	0.0
PR-CB27	STORAGE	114.51	2.39	0.0
PR-CB28	STORAGE	114.70	2.20	0.0
PR-CB29	STORAGE	111.25	2.45	0.0
PR-CB29a	STORAGE	111.50	2.20	0.0
PR-CB30	STORAGE	111.40	2.00	0.0
PR-CB31	STORAGE	111.20	2.20	0.0
PR-CB32	STORAGE	110.65	3.25	0.0
PR-CB33	STORAGE	111.60	2.20	0.0
PR-CB34	STORAGE	112.30	2.20	0.0
PR-CB35	STORAGE	112.20	2.35	0.0
PR-CB36	STORAGE	111.85	2.60	0.0
PR-CBMH104	STORAGE	112.03	2.47	0.0
PR-CBMH105	STORAGE	111.85	2.60	0.0
PR-CBMH106	STORAGE	112.04	2.46	0.0
PR-CBMH107	STORAGE	111.83	2.62	0.0
PR-CBMH108	STORAGE	112.04	2.56	0.0
PR-CBMH109	STORAGE	111.96	2.64	0.0
PR-CBMH109a	STORAGE	112.21	2.39	0.0
PR-CBMH110	STORAGE	111.62	2.78	0.0
PR-CBMH111	STORAGE	113.00	3.05	0.0
PR-CBMH112	STORAGE	113.12	3.08	0.0
PR-CBMH114	STORAGE	113.51	3.04	0.0
PR-CBMH115	STORAGE	113.89	3.01	0.0
PR-CBMH115a	STORAGE	114.14	2.76	0.0
PR-CBMH118	STORAGE	110.74	2.66	0.0
PR-MH100	STORAGE	112.16	1.50	0.0
PR-MH100a	STORAGE	112.16	1.50	0.0
PR-MH100b	STORAGE	111.94	1.86	0.0
PR-MH101	STORAGE	111.70	2.23	0.0
PR-MH102	STORAGE	111.28	2.53	0.0
PR-MH103	STORAGE	111.10	2.58	0.0
PR-MH113	STORAGE	113.26	2.04	0.0
PR-MH116	STORAGE	110.65	0.96	0.0
PR-MH117	STORAGE	110.90	1.80	0.0
PR-MH119	STORAGE	112.98	2.27	0.0
PR-MH120	STORAGE	113.68	1.92	0.0
PR-STUB01	STORAGE	111.26	8.74	0.0
PR-TD01	STORAGE	112.55	1.15	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
102_(CB)	PR-CB07	PR-CBMH105	CONDUIT	18.8	0.4787	0.0130
104_(CB)	PR-CB06	PR-CB07	CONDUIT	16.8	0.4762	0.0130
108_(CB)	PR-CB03	PR-MH100	CONDUIT	9.6	0.4167	0.0130
115_(CB)	PR-CB19	PR-CBMH111	CONDUIT	33.8	1.0060	0.0130
121_(CB)	PR-CB20	PR-CB19	CONDUIT	40.3	0.4963	0.0130
126_(STM)	PR-CB30	PR-CB31	CONDUIT	36.1	0.5263	0.0130
138_(CB)_1	PR-CB01	PR-CB02a	CONDUIT	14.0	0.5000	0.0130
138_(CB)_2	PR-CB02a	PR-MH100	CONDUIT	24.0	0.5000	0.0130
14_(STM)	EX-MH112a	PR-MH102	CONDUIT	45.5	0.1978	0.0130

142_(STM)	PR-CB04	PR-MH100	CONDUIT	13.9	0.4317	0.0130
145_(CB)	PR-CB09	PR-CBMH108	CONDUIT	36.8	0.4891	0.0130
150_(STM)_1	PR-CB29a	PR-MH117	CONDUIT	66.0	0.8485	0.0130
154_(CB)	PR-CB31	PR-CBMH118	CONDUIT	29.4	0.5102	0.0130
156_(STM)	PR-CB02	PR-CB02a	CONDUIT	14.2	0.4225	0.0130
17_(1)_(STM)_4	PR-MH117	PR-MH116	CONDUIT	49.7	0.4829	0.0130
20_(STM)	PR-STUB01	PR-MH116	CONDUIT	30.0	2.0004	0.0130
226_(CB)	PR-CB34	PR-CB35	CONDUIT	17.5	0.5143	0.0130
230_(CB)	PR-CB35	PR-CBMH107	CONDUIT	21.5	0.5116	0.0130
28_(1)_(STM)	PR-MH113	PR-MH119	CONDUIT	27.4	0.9854	0.0130
28_(STM)	PR-MH119	EX-MH102A	CONDUIT	58.8	1.0035	0.0130
30_(STM)	PR-MH120	PR-MH113	CONDUIT	51.1	0.8024	0.0130
32_(STM)	PR-CBMH115a	PR-MH120	CONDUIT	44.7	1.0068	0.0130
34_(1)_(STM)	PR-CB28	PR-CB27	CONDUIT	36.8	0.4891	0.0130
34_(STM)	PR-CB27	PR-CBMH115	CONDUIT	36.8	0.8424	0.0130
36_(1)_(STM)	PR-CB25	PR-CB24	CONDUIT	36.8	0.4891	0.0130
36_(STM)	PR-CB24	PR-CBMH114	CONDUIT	36.8	0.4891	0.0130
42_(1)_(STM)	PR-CB23	PR-CB22	CONDUIT	36.8	0.5163	0.0130
42_(2)_(STM)	PR-CB22	PR-CB21	CONDUIT	36.8	0.4891	0.0130
49_(STM)	PR-CB26	PR-CB25	CONDUIT	37.1	0.4852	0.0130
5_(STM)_1	PR-MH100a	PR-MH100b	CONDUIT	72.3	0.3043	0.0130
5_(STM)_2	PR-MH100b	PR-MH101	CONDUIT	44.5	0.2921	0.0130
54_(STM)	PR-CB21	PR-CBMH112	CONDUIT	36.8	0.4891	0.0130
57_(STM)	PR-CBMH109a	PR-MH101	CONDUIT	42.5	0.4941	0.0130
59_(STM)	PR-CB12	PR-CBMH109	CONDUIT	36.7	0.4905	0.0130
61_(STM)	PR-CB11	PR-CB12	CONDUIT	33.7	0.5045	0.0130
64_(CB)	PR-CB15	PR-CBMH110	CONDUIT	29.9	1.0034	0.0130
7_(STM)	PR-MH101	PR-MH102	CONDUIT	106.0	0.2925	0.0130
86_(CB)	PR-CB08	PR-CBMH106	CONDUIT	36.8	0.4891	0.0130
9_(1)_(STM)	PR-MH103	EX-MH109	CONDUIT	32.9	0.3040	0.0130
9_(STM)_2	PR-MH102	PR-MH103	CONDUIT	57.6	0.2951	0.0130
94_(CB)	PR-CB05	PR-CBMH104	CONDUIT	27.6	0.5073	0.0130
C1	EX-CB116	EX-CB117	CONDUIT	11.4	7.3001	0.0130
C10	PR-CB26	HP-PR-CB26a	CONDUIT	3.0	-10.0504	0.0150
C100	EX-CB72	HP-EX-CB72	CONDUIT	3.0	-11.0672	0.0150
C101	EX-CB30	HP-EX-CB30b	CONDUIT	3.0	-10.0504	0.0150
C102	HP-EX-CB30b	EX-CB92	CONDUIT	3.0	11.0672	0.0150
C103	HP-EX-CB87a	EX-CB92	CONDUIT	3.0	9.3743	0.0150
C104	EX-CB87	HP-EX-CB87a	CONDUIT	3.0	-9.0367	0.0150
C105	EX-CB30	HP-EX-CB30a	CONDUIT	3.0	-10.0504	0.0150
C106	HP-EX-CB30a	EX-CB28	CONDUIT	3.0	11.7469	0.0150
C107	EX-CB28	HP-EX-CB28	CONDUIT	3.0	-11.7469	0.0150
C108	HP-EX-CB28	EX-CB96	CONDUIT	3.0	12.7695	0.0150
C109	HP-EX-CB90	EX-CB96	CONDUIT	3.0	11.0672	0.0150
C11	HP-PR-CB26a	PR-CB25	CONDUIT	3.0	10.0504	0.0150
C110	EX-CB90	HP-EX-CB90	CONDUIT	3.0	-5.0063	0.0150
C111	EX-CB92	HP-EX-CB92	CONDUIT	3.0	-9.3743	0.0150
C112	HP-EX-CB92	EX-CB96	CONDUIT	3.0	11.0672	0.0150
C113	HP-EX-CB87b	EX-CB90	CONDUIT	3.0	5.0063	0.0150
C114	EX-CB54	HP-EX-CB54	CONDUIT	3.0	-5.6758	0.0150
C115	HP-EX-CB54	EX-CB52	CONDUIT	3.0	9.7122	0.0150
C116	HP-EX-CB50a	EX-CB52	CONDUIT	3.0	9.7122	0.0150
C117	EX-CB50	HP-EX-CB50a	CONDUIT	3.0	-9.7122	0.0150
C118	HP-EX-CB58a	EX-CB50	CONDUIT	3.0	9.7122	0.0150
C119	EX-CB58	HP-EX-CB58a	CONDUIT	3.0	-9.0367	0.0150
C12	PR-CB25	HP-PR-CB25a	CONDUIT	3.0	-10.0504	0.0150
C120	EX-CB96	HP-EX-CB96	CONDUIT	3.0	-11.0672	0.0150
C121	HP-EX-CB96	EX-CB95	CONDUIT	3.0	9.3743	0.0150
C122	EX-CB95	HP-EX-CB95	CONDUIT	3.0	-9.3743	0.0150
C123	HP-EX-CB95	EX-CB128	CONDUIT	3.0	8.0257	0.0150
C124	EX-CB128	HP-EX-CB128a	CONDUIT	3.0	-6.3461	0.0150
C125	HP-EX-CB128a	EX-CB62	CONDUIT	3.0	4.6718	0.0150
C126	EX-CB52	HP-EX-CB52	CONDUIT	3.0	-9.0367	0.0150
C127	HP-EX-CB52	PR-CB13	CONDUIT	3.0	11.0672	0.0150
C128	PR-CB13	HP-PR-CB13	CONDUIT	3.0	-2.3340	0.0150
C129	HP-PR-CB13	PR-CB14	CONDUIT	3.0	5.6758	0.0150
C13	HP-PR-CB25a	PR-CB24	CONDUIT	3.0	10.0504	0.0150
C130	EX-CB50	HP-EX-CB50b	CONDUIT	3.0	-9.7122	0.0150
C131	HP-EX-CB50b	PR-CB15	CONDUIT	3.0	20.4124	0.0150
C132	EX-CB58	HP-EX-CB58b	CONDUIT	3.0	-9.0367	0.0150
C133	HP-EX-CB58b	EX-CB60	CONDUIT	3.0	9.0367	0.0150
C135	HP-EX-CB137	HP-EX-CB131	CONDUIT	3.0	23.9957	0.0150
C136	HP-EX-CB72	HP-EX-CB131	CONDUIT	3.0	3.3352	0.0150
C137	HP-EX-CB131	Major-01	CONDUIT	3.0	1.0001	0.0150
C138	EX-CB128	HP-EX-CB128b	CONDUIT	3.0	-8.0257	0.0150
C139	HP-EX-CB128b	HP-PR-CB16/17	CONDUIT	3.0	10.0504	0.0150
C14	HP-PR-CB24a	PR-CBMH114	CONDUIT	3.0	10.0504	0.0150
C142	PR-CBMH107	HP-PR-CBMH107	CONDUIT	3.0	-8.3624	0.0150
C143	HP-PR-CBMH107	PR-CBMH105	CONDUIT	3.0	8.3624	0.0150
C144	HP-PR-CBMH105	PR-CB36	CONDUIT	3.0	8.3624	0.0150
C145	PR-CB36	HP-PR-CB36	CONDUIT	3.0	-6.6815	0.0150
C146	PR-CB34	HP-PR-CB34	CONDUIT	3.0	-8.3624	0.0150
C147	HP-PR-CB34	PR-CB10	CONDUIT	3.0	10.0504	0.0150
C148	PR-CB35	HP-PR-CB35	CONDUIT	3.0	-6.6815	0.0150
C149	HP-PR-CB35	PR-CBMH107	CONDUIT	3.0	10.0504	0.0150
C15	PR-CB24	HP-PR-CB24a	CONDUIT	3.0	-10.0504	0.0150
C150	EX-CB134	HP-EX-CB134	CONDUIT	3.0	-5.0063	0.0150
C151	PR-CB33	HP-PR-CB33	CONDUIT	3.0	-15.1717	0.0150
C152	HP-PR-CB33	PR-CB29	CONDUIT	3.0	18.6494	0.0150
C16	PR-CBMH115	HP-PR-CBMH115	CONDUIT	3.0	-10.0504	0.0150
C17	HP-PR-CBMH115	PR-CBMH114	CONDUIT	3.0	22.1939	0.0150
C18	PR-CB26	HP-PR-CB26b	CONDUIT	3.0	-10.0504	0.0150

C19	HP-PR-CB26b	PR-CB23	CONDUIT	3.0	22.1939	0.0150
C2	PR-CB28	HP-PR-CB28a	CONDUIT	3.0	-10.0504	0.0150
C20	HP-PR-CB25b	PR-CB22	CONDUIT	3.0	22.1939	0.0150
C21	HP-PR-CB24b	PR-CB21	CONDUIT	3.0	22.1939	0.0150
C22	HP-PR-CBMH114	PR-CBMH112	CONDUIT	3.0	22.1939	0.0150
C23	HP-PR-CB23	PR-CB20	CONDUIT	3.0	11.7469	0.0150
C24	HP-PR-CB22	PR-CB19	CONDUIT	3.0	11.7469	0.0150
C25	HP-PR-CB21	PR-CBMH111	CONDUIT	3.0	11.7469	0.0150
C26	PR-CB30	HP-PR-CB30	CONDUIT	3.0	-8.3624	0.0150
C27	EX-CB137	HP-EX-CB137	CONDUIT	3.0	-6.6815	0.0150
C28	PR-CB31	HP-PR-CB31	CONDUIT	3.0	-8.3624	0.0150
C29	HP-PR-CB16/17	EX-CB137	CONDUIT	3.0	8.3624	0.0150
C3	HP-PR-CB28a	PR-CB27	CONDUIT	3.0	10.0504	0.0150
C30	PR-CB29	HP-PR-CB29	CONDUIT	3.0	-8.3624	0.0150
C31	PR-CB16/17	HP-PR-CB16/17	CONDUIT	3.0	-10.0504	0.0150
C32	PR-CBMH118	HP-PR-CBMH118	CONDUIT	3.0	-10.0504	0.0150
C33	EX-CB116	HP-EX-CB116	CONDUIT	3.0	-3.3352	0.0150
C34	PR-CBMH109	HP-PR-CBMH109	CONDUIT	3.0	-10.0504	0.0150
C35	HP-PR-CBMH109	PR-CB12	CONDUIT	3.0	10.0504	0.0150
C36	PR-CB12	HP-PR-CB12	CONDUIT	3.0	-9.0367	0.0150
C37	HP-PR-CB12	PR-CB11	CONDUIT	3.0	9.0367	0.0150
C38	PR-CB11	HP-PR-CB11	CONDUIT	3.0	-8.3624	0.0150
C39	PR-CBMH108	HP-PR-CBMH108a	CONDUIT	3.0	-8.3624	0.0150
C4	PR-CB27	HP-PR-CB27a	CONDUIT	3.0	-10.0504	0.0150
C40	HP-PR-CBMH108a	PR-CB09	CONDUIT	3.0	8.3624	0.0150
C41	PR-CBMH108	HP-PR-CBMH108b	CONDUIT	3.0	-8.3624	0.0150
C42	HP-PR-CBMH108b	PR-CBMH106	CONDUIT	3.0	11.7469	0.0150
C43	PR-CB09	HP-PR-CB09	CONDUIT	3.0	-8.3624	0.0150
C44	HP-PR-CB09	PR-CB08	CONDUIT	3.0	11.7469	0.0150
C45	PR-CBMH106	HP-PR-CBMH106	CONDUIT	3.0	-10.0504	0.0150
C46	HP-PR-CBMH106	PR-CB08	CONDUIT	3.0	10.0504	0.0150
C47	PR-CB08	HP-PR-CB08	CONDUIT	3.0	-8.3624	0.0150
C48	HP-PR-CB08	PR-CB05	CONDUIT	3.0	10.0504	0.0150
C49	PR-CBMH104	HP-PR-CBMH104	CONDUIT	3.0	-8.3624	0.0150
C5	HP-PR-CB27a	PR-CBMH115	CONDUIT	3.0	10.0504	0.0150
C50	HP-PR-CBMH104	PR-CB05	CONDUIT	3.0	10.0504	0.0150
C51	PR-CB05	HP-PR-CB05	CONDUIT	3.0	-8.3624	0.0150
C52	HP-PR-CB05	PR-CB04	CONDUIT	3.0	10.0504	0.0150
C53	PR-CB01	HP-PR-CB01	CONDUIT	3.0	-7.6893	0.0150
C53_1	PR-CB04	HP-PR-CB04	CONDUIT	3.0	-8.3624	0.0150
C53_2	HP-PR-CB04	PR-CB02	CONDUIT	3.0	8.3624	0.0150
C54	PR-CB14	HP-PR-CB14	CONDUIT	3.0	-3.3352	0.0150
C54_1	PR-CB02	HP-PR-CB02	CONDUIT	3.0	-8.0257	0.0150
C54_2	HP-PR-CB02	PR-CB01	CONDUIT	3.0	8.0257	0.0150
C55	PR-CB03	HP-PR-CB03	CONDUIT	3.0	-8.3624	0.0150
C56	HP-PR-CB03	PR-CB01	CONDUIT	3.0	8.3624	0.0150
C57	PR-CBMH105	HP-PR-CBMH105	CONDUIT	3.0	-8.3624	0.0150
C58	HP-PR-CB36	PR-CB03	CONDUIT	3.0	8.3624	0.0150
C59	PR-CB06	HP-PR-CB06	CONDUIT	3.0	-6.6815	0.0150
C6	PR-CB28	HP-PR-CB28b	CONDUIT	3.0	-10.0504	0.0150
C60	HP-PR-CB06	PR-CB07	CONDUIT	3.0	6.6815	0.0150
C61	PR-CB07	HP-PR-CB07	CONDUIT	3.0	-6.6815	0.0150
C62	HP-PR-CB07	PR-CBMH105	CONDUIT	3.0	6.6815	0.0150
C63	PR-CB10	HP-PR-CB10	CONDUIT	3.0	-10.0504	0.0150
C64	HP-PR-CB10	PR-CBMH107	CONDUIT	3.0	10.0504	0.0150
C65	HP-PR-CB14	PR-CB15	CONDUIT	3.0	8.3624	0.0150
C66	PR-CB15	HP-PR-CB15	CONDUIT	3.0	-9.0367	0.0150
C67	HP-PR-CB15	PR-CBMH110	CONDUIT	3.0	9.0367	0.0150
C68	PR-CBMH112	HP-PR-CBMH112	CONDUIT	3.0	-6.6815	0.0150
C69	HP-PR-CBMH112	PR-CB18	CONDUIT	3.0	11.7469	0.0150
C7	HP-PR-CB28b	PR-CB25	CONDUIT	3.0	22.1939	0.0150
C70	PR-TD01	HP-PR-TD01	CONDUIT	3.0	-33.3847	0.0150
C71	PR-CB20	HP-PR-CB20	CONDUIT	3.0	-5.0063	0.0150
C72	HP-PR-TD01	PR-CB01	CONDUIT	3.0	8.3624	0.0150
C73	PR-CB19	HP-PR-CB19	CONDUIT	3.0	-5.0063	0.0150
C74	PR-CBMH111	HP-PR-CBMH111	CONDUIT	3.0	-5.0063	0.0150
C75	PR-CB18	HP-PR-CB18	CONDUIT	3.0	-5.0063	0.0150
C76	HP-PR-CB18	EX-CB82	CONDUIT	3.0	50.8597	0.0150
C77	HP-PR-CB20	HP-01	CONDUIT	3.0	39.4116	0.0150
C78	EX-MH116	OF1	CONDUIT	3.0	1.0001	0.0150
C79	HP-PR-CB19	HP-01	CONDUIT	3.0	39.4116	0.0150
C8	PR-CB27	HP-PR-CB27b	CONDUIT	3.0	-10.0504	0.0150
C81	HP-PR-CBMH111	HP-01	CONDUIT	3.0	39.4116	0.0150
C82	HP-01	EX-CB14	CONDUIT	3.0	65.8553	0.0150
C83	EX-CB14	HP-EX-CB14	CONDUIT	3.0	-23.9957	0.0350
C84	EX-CB84	HP-EX-CB84	CONDUIT	3.0	-11.7469	0.0150
C84_2	EX-CB82	HP-EX-CB82	CONDUIT	3.0	-7.0172	0.0150
C85	HP-EX-CB84	HP-EX-CB137	CONDUIT	3.0	13.4535	0.0150
C87	HP-EX-CB82	HP-EX-CB84	CONDUIT	3.0	1.6669	0.0150
C88	PR-CB32	HP-PR-CB32	CONDUIT	3.0	-3.3352	0.0150
C89	HP-EX-CB116	EX-CB117	CONDUIT	3.0	8.3624	0.0150
C9	HP-PR-CB27b	PR-CB24	CONDUIT	3.0	22.1939	0.0150
C90	EX-CB117	HP-EX-CB117	CONDUIT	3.0	-7.0172	0.0150
C91	HP-EX-CB117	PR-CB16/17	CONDUIT	3.0	7.0172	0.0150
C92	EX-CB64	HP-EX-CB64	CONDUIT	3.0	-5.0063	0.0150
C93	HP-EX-CB64	EX-CB117	CONDUIT	3.0	10.0504	0.0150
C94	PR-CBMH110	HP-PR-CBMH110	CONDUIT	3.0	-6.6815	0.0150
C95	HP-PR-CBMH110	EX-CB64	CONDUIT	3.0	3.3352	0.0150
C96	EX-CB62	HP-EX-CB62	CONDUIT	3.0	-4.6718	0.0150
C97	HP-EX-CB62	EX-CB60	CONDUIT	3.0	5.6758	0.0150
C98	EX-CB60	HP-EX-CB60	CONDUIT	3.0	-5.6758	0.0150
C99	HP-EX-CB60	EX-CB64	CONDUIT	3.0	13.4535	0.0150

C-CB22	PR-CB22	HP-PR-CB22	CONDUIT	3.0	-6.6815	0.0150
C-CB23	PR-CB23	HP-PR-CB23	CONDUIT	3.0	-6.6815	0.0150
C-CB24	PR-CBMH114	HP-PR-CBMH114	CONDUIT	3.0	-10.0504	0.0150
C-CB25	PR-CB25	HP-PR-CB25b	CONDUIT	3.0	-10.0504	0.0150
C-CB87	EX-CB87	HP-EX-CB87b	CONDUIT	3.0	-9.0367	0.0150
C-CBMH112	PR-CB21	HP-PR-CB21	CONDUIT	3.0	-6.6815	0.0150
C-CBMH114	PR-CB24	HP-PR-CB24b	CONDUIT	3.0	-10.0504	0.0150
EXMH101-OUT	EX-MH101	SWM_Pond	CONDUIT	80.9	2.0029	0.0130
EXMH115-101	EX-MH115	EX-MH101	CONDUIT	92.7	0.4962	0.0130
EXMH116-115	EX-MH116	EX-MH115	CONDUIT	91.3	0.4929	0.0130
PRMH116-EX-MH116	PR-MH116	EX-MH116	CONDUIT	83.5	5.9025	0.0130
X-CB-129_(X-CB)	EX-CB128	EX-CB95	CONDUIT	7.2	0.6945	0.0130
X-CB-89_(X-CB)	EX-CB87	EX-MH106a	CONDUIT	20.8	3.8008	0.0130
X-CB-91_(X-CB)	EX-CB90	EX-MH106a	CONDUIT	15.6	5.1350	0.0130
X-CB-94_(X-CB)	EX-CB92	EX-MH107a	CONDUIT	21.4	1.3553	0.0130
X-CB-97_(X-CB)	EX-CB95	EX-CB96	CONDUIT	25.5	0.7059	0.0130
X-CB-98_(X-CB)	EX-CB96	EX-MH107a	CONDUIT	15.6	0.1282	0.0130
X-STM-13_(1)_(X-STM)	EX-MH101A	EX-MH101B	CONDUIT	30.1	1.3955	0.0130
X-STM-13_(X-STM)	EX-MH101B	EX-MH101	CONDUIT	32.6	2.2705	0.0130
X-STM-17_(X-STM)	EX-MH102	EX-MH101A	CONDUIT	29.4	1.5648	0.0130
X-STM-19_(X-STM)	EX-MH102A	EX-MH102	CONDUIT	58.6	0.8874	0.0130
X-STM-21_(X-STM)	EX-MH104	EX-MH102	CONDUIT	65.3	1.3171	0.0130
X-STM-23_(X-STM)	EX-MH105a	EX-MH104	CONDUIT	17.4	0.1724	0.0130
X-STM-25_(X-STM)_1	EX-MH106	EX-MH106a	CONDUIT	33.3	1.6218	0.0130
X-STM-25_(X-STM)_2	EX-MH106a	EX-MH105	CONDUIT	18.4	1.6850	0.0130
X-STM-27_(X-STM)_1	EX-MH107	EX-MH107a	CONDUIT	50.2	0.2988	0.0130
X-STM-27_(X-STM)_2	EX-MH107a	EX-MH106	CONDUIT	11.9	0.1681	0.0130
X-STM-29_(X-STM)	EX-CB28	EX-MH107	CONDUIT	14.8	0.0676	0.0130
X-STM-31_(X-STM)	EX-CB30	EX-MH107	CONDUIT	21.7	0.4608	0.0130
X-STM-33_(X-STM)	EX-MH109	EX-MH104	CONDUIT	86.5	0.3353	0.0130
X-STM-51_(X-STM)	EX-CB50	EX-MH112	CONDUIT	22.1	0.0905	0.0130
X-STM-53_(X-STM)	EX-CB52	EX-CB50	CONDUIT	55.0	0.1818	0.0130
X-STM-55_(X-STM)	EX-CB54	EX-CB52	CONDUIT	13.1	0.6107	0.0130
X-STM-59_(X-STM)	EX-CB58	EX-MH112	CONDUIT	11.9	1.0085	0.0130
X-STM-63_(X-STM)	EX-CB62	EX-CB60	CONDUIT	7.2	0.5556	0.0130
X-STM-71_(X-STM)	EX-MH103	EX-MH102	CONDUIT	78.6	1.0942	0.0130
X-STM-75_(X-STM)	EX-MH108	EX-MH109	CONDUIT	30.7	1.1076	0.0130
X-STM-77_(X-STM)	EX-STUB02	EX-MH108	CONDUIT	14.1	0.4255	0.0130
102_(5)_(CB)	PR-CBMH105	PR-MH100a	ORIFICE			
114_(CB)	PR-CBMH111	PR-MH119	ORIFICE			
124_(CB)	PR-CB18	PR-MH119	ORIFICE			
131_(CB)	PR-CBMH118	PR-MH117	ORIFICE			
147_(CB)	PR-CBMH108	PR-MH100b	ORIFICE			
151_(STM)	PR-CB29	PR-CB29a	ORIFICE			
42_(STM)	PR-CBMH112	PR-MH113	ORIFICE			
46_(STM)	PR-CBMH114	PR-MH120	ORIFICE			

66_(CB)	PR-CBMH110	PR-MH102	ORIFICE
69_(CB)	EX-CB117	EX-MH109	ORIFICE
78_(CB)	PR-CB13	PR-MH101	ORIFICE
81_(CB)	PR-CB14	PR-MH101	ORIFICE
88_(CB)	PR-CBMH106	PR-MH100a	ORIFICE
91_(CB)	PR-CB10	PR-MH100b	ORIFICE
96_(CB)	PR-CBMH104	PR-MH100a	ORIFICE
OR1	PR-CB32	PR-MH117	ORIFICE
OR10	PR-TD01	PR-STUB01	ORIFICE
OR11	EX-MH112	EX-MH112a	ORIFICE
OR12	PR-CB36	PR-MH100a	ORIFICE
OR13	PR-CB33	PR-CB29a	ORIFICE
OR14	EX-CB134	PR-MH116	ORIFICE
OR2	PR-CBMH115	PR-CBMH115a	ORIFICE
OR3	EX-CB60	PR-MH102	ORIFICE
OR4	PR-CBMH109	PR-CBMH109a	ORIFICE
OR5	PR-MH100	PR-MH100a	ORIFICE
OR6	PR-CB16/17	EX-MH109	ORIFICE
OR7	EX-MH105	EX-MH105a	ORIFICE
OR8	EX-CB64	PR-MH103	ORIFICE
OR9	PR-CBMH107	PR-MH100b	ORIFICE
X-CB-135_(X-CB)	EX-CB137	EX-MH109	ORIFICE
X-CB-83_(X-CB)	EX-CB82	EX-MH104	ORIFICE
X-CB-86_(X-CB)	EX-CB84	EX-MH104	ORIFICE
X-STM-15_(X-STM)	EX-CB14	EX-MH101A	ORIFICE
X-STM-73_(X-STM)	EX-CB72	EX-MH103	ORIFICE
EX-BLDG01-OUT	EX-BLDG01	EX-STUB02	OUTLET
INFIL-EX-CB116	EX-CB116	IF-EX-CB116	OUTLET
INFIL-EX-CB117	EX-CB117	IF-EX-CB117	OUTLET
INFIL-EX-CB128	EX-CB128	IF-EX-CB128	OUTLET
INFIL-EX-CB137	EX-CB137	IF-EX-CB137	OUTLET
INFIL-EX-CB14	EX-CB14	IF-EX-CB14	OUTLET
INFIL-EX-CB28	EX-CB28	IF-EX-CB28	OUTLET
INFIL-EX-CB30	EX-CB30	IF-EX-CB30	OUTLET
INFIL-EX-CB50	EX-CB50	IF-EX-CB50	OUTLET
INFIL-EX-CB52	EX-CB52	IF-EX-CB52	OUTLET
INFIL-EX-CB54	EX-CB54	IF-EX-CB54	OUTLET
INFIL-EX-CB58	EX-CB58	IF-EX-CB58	OUTLET
INFIL-EX-CB64	EX-CB64	IF-EX-CB64	OUTLET
INFIL-EX-CB82	EX-CB82	IF-EX-CB82	OUTLET
INFIL-EX-CB84	EX-CB84	IF-EX-CB84	OUTLET
INFIL-EX-CB87	EX-CB87	IF-EX-CB87	OUTLET
INFIL-EX-CB90	EX-CB90	IF-EX-CB90	OUTLET
INFIL-EX-CB92	EX-CB92	IF-EX-CB92	OUTLET
INFIL-EX-CB95	EX-CB95	IF-EX-CB95	OUTLET
INFIL-EX-CB96	EX-CB96	IF-EX-CB96	OUTLET

INFIL-PR-CB04	PR-CB04	IF-PR-CB04	OUTLET
INFIL-PR-CB10	PR-CB10	IF-PR-CB10	OUTLET
INFIL-PR-CB13	PR-CB13	IF-PR-CB13	OUTLET
INFIL-PR-CB14	PR-CB14	IF-PR-CB14	OUTLET
INFIL-PR-CB18	PR-CB18	IF-PR-CB18	OUTLET
INFIL-PR-CB29	PR-CB29	IF-PR-CB29	OUTLET
INFIL-PR-CB32	PR-CB32	IF-PR-CB32	OUTLET
INFIL-PR-CB36	PR-CB36	IF-PR-CB36	OUTLET
INFIL-PR-CBMH104	PR-CBMH104	IF-PR-CBMH104	OUTLET
INFIL-PR-CBMH105	PR-CBMH105	IF-PR-CBMH105	OUTLET
INFIL-PR-CBMH106	PR-CBMH106	IF-PR-CBMH106	OUTLET
INFIL-PR-CBMH107	PR-CBMH107	IF-PR-CBMH107	OUTLET
INFIL-PR-CBMH108	PR-CBMH108	IF-PR-CBMH108	OUTLET
INFIL-PR-CBMH109	PR-CBMH109	IF-PR-CBMH109	OUTLET
INFIL-PR-CBMH110	PR-CBMH110	IF-PR-CBMH110	OUTLET
INFIL-PR-CBMH111	PR-CBMH111	IF-PR-CBMH111	OUTLET
INFIL-PR-CBMH112	PR-CBMH112	IF-PR-CBMH112	OUTLET
INFIL-PR-CBMH114	PR-CBMH114	IF-PR-CBMH114	OUTLET
INFIL-PR-CBMH115	PR-CBMH115	IF-PR-CBMH115	OUTLET
INFIL-PR-CBMH118	PR-CBMH118	IF-PR-CBMH118	OUTLET
PR-BLDG01-OUT	PR-BLDG01	EX-MH109	OUTLET
PR-BLDG02-OUT	PR-BLDG02	PR-STUB01	OUTLET

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
102_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.15
104_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.04
108_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	38.39
115_(CB)	CIRCULAR	0.30	0.07	0.07	0.30	1	96.99
121_(CB)	CIRCULAR	0.30	0.07	0.07	0.30	1	68.13
126_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	70.16
138_(CB)_1	CIRCULAR	0.30	0.07	0.07	0.30	1	68.38
138_(CB)_2	CIRCULAR	0.30	0.07	0.07	0.30	1	68.38
14_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	43.01
142_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	63.54
145_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.59
150_(STM)_1	CIRCULAR	0.30	0.07	0.07	0.30	1	89.08
154_(CB)	CIRCULAR	0.30	0.07	0.07	0.30	1	69.08
156_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	38.66
17_(1)_(STM)_4	CIRCULAR	0.30	0.07	0.07	0.30	1	67.20
20_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	84.11
226_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	42.65
230_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	42.54
28_(1)_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	96.00
28_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	96.87
30_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	86.63
32_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	97.03
34_(1)_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.59
34_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	54.58
36_(1)_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	67.63
36_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	67.63
42_(1)_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	69.49
42_(2)_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	67.63
49_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	67.36
5_(STM)_1	CIRCULAR	0.45	0.16	0.11	0.45	1	157.28
5_(STM)_2	CIRCULAR	0.45	0.16	0.11	0.45	1	154.11
54_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	67.63
57_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	67.98
59_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.65
61_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	42.24
64_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	59.57
7_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	232.59
86_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.59
9_(1)_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	338.54
9_(STM)_2	CIRCULAR	0.60	0.28	0.15	0.60	1	333.59
94_(CB)	CIRCULAR	0.25	0.05	0.06	0.25	1	42.36
C1	CIRCULAR	0.20	0.03	0.05	0.20	1	88.62
C10	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C100	RECT_OPEN	1.00	3.00	0.60	3.00	1	47334.20
C101	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C102	RECT_OPEN	1.00	3.00	0.60	3.00	1	47334.20
C103	RECT_OPEN	1.00	3.00	0.60	3.00	1	43563.76
C104	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C105	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C106	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C107	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C108	RECT_OPEN	1.00	3.00	0.60	3.00	1	50844.53
C109	RECT_OPEN	1.00	3.00	0.60	3.00	1	47334.20
C11	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C110	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C111	RECT_OPEN	1.00	3.00	0.60	3.00	1	43563.76
C112	RECT_OPEN	1.00	3.00	0.60	3.00	1	47334.20
C113	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C114	RECT_OPEN	1.00	3.00	0.60	3.00	1	33897.68
C115	RECT_OPEN	1.00	3.00	0.60	3.00	1	44341.94
C116	RECT_OPEN	1.00	3.00	0.60	3.00	1	44341.94
C117	RECT_OPEN	1.00	3.00	0.60	3.00	1	44341.94

C118	RECT_OPEN	1.00	3.00	0.60	3.00	1 44341.94
C119	RECT_OPEN	1.00	3.00	0.60	3.00	1 42772.17
C12	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C120	RECT_OPEN	1.00	3.00	0.60	3.00	1 47334.20
C121	RECT_OPEN	1.00	3.00	0.60	3.00	1 43563.76
C122	RECT_OPEN	1.00	3.00	0.60	3.00	1 43563.76
C123	RECT_OPEN	1.00	3.00	0.60	3.00	1 40308.73
C124	RECT_OPEN	1.00	3.00	0.60	3.00	1 35843.43
C125	RECT_OPEN	1.00	3.00	0.60	3.00	1 30753.68
C126	RECT_OPEN	1.00	3.00	0.60	3.00	1 42772.17
C127	RECT_OPEN	1.00	3.00	0.60	3.00	1 47334.20
C128	RECT_OPEN	1.00	3.00	0.60	3.00	1 21737.24
C129	RECT_OPEN	1.00	3.00	0.60	3.00	1 33897.68
C13	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C130	RECT_OPEN	1.00	3.00	0.60	3.00	1 44341.94
C131	RECT_OPEN	1.00	3.00	0.60	3.00	1 64284.19
C132	RECT_OPEN	1.00	3.00	0.60	3.00	1 42772.17
C133	RECT_OPEN	1.00	3.00	0.60	3.00	1 42772.17
C135	RECT_OPEN	1.00	3.00	0.60	3.00	1 69698.53
C136	RECT_OPEN	1.00	3.00	0.60	3.00	1 25984.66
C137	RECT_OPEN	1.00	3.00	0.60	3.00	1 14228.79
C138	RECT_OPEN	1.00	3.00	0.60	3.00	1 40308.73
C139	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C14	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C142	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C143	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C144	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C145	RECT_OPEN	1.00	3.00	0.60	3.00	1 36778.58
C146	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C147	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C148	RECT_OPEN	1.00	3.00	0.60	3.00	1 36778.58
C149	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C15	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C150	RECT_OPEN	1.00	3.00	0.60	3.00	1 31835.65
C151	RECT_OPEN	1.00	3.00	0.60	3.00	1 55420.88
C152	RECT_OPEN	1.00	3.00	0.60	3.00	1 61445.45
C16	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C17	RECT_OPEN	1.00	3.00	0.60	3.00	1 67030.66
C18	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C19	RECT_OPEN	1.00	3.00	0.60	3.00	1 67030.66
C2	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C20	RECT_OPEN	1.00	3.00	0.60	3.00	1 67030.66
C21	RECT_OPEN	1.00	3.00	0.60	3.00	1 67030.66
C22	RECT_OPEN	1.00	3.00	0.60	3.00	1 67030.66
C23	RECT_OPEN	1.00	3.00	0.60	3.00	1 48766.13
C24	RECT_OPEN	1.00	3.00	0.60	3.00	1 48766.13
C25	RECT_OPEN	1.00	3.00	0.60	3.00	1 48766.13
C26	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C27	RECT_OPEN	1.00	3.00	0.60	3.00	1 36778.58
C28	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C29	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C3	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C30	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C31	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C32	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C33	RECT_OPEN	1.00	3.00	0.60	3.00	1 25984.66
C34	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C35	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C36	RECT_OPEN	1.00	3.00	0.60	3.00	1 42772.17
C37	RECT_OPEN	1.00	3.00	0.60	3.00	1 42772.17
C38	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C39	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C4	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C40	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C41	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C42	RECT_OPEN	1.00	3.00	0.60	3.00	1 48766.13
C43	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C44	RECT_OPEN	1.00	3.00	0.60	3.00	1 48766.13
C45	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C46	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C47	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C48	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C49	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C5	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C50	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C51	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C52	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C53	RECT_OPEN	1.00	3.00	0.60	3.00	1 39454.84
C53_1	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C53_2	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C54	RECT_OPEN	1.00	3.00	0.60	3.00	1 25984.66
C54_1	RECT_OPEN	1.00	3.00	0.60	3.00	1 40308.73
C54_2	RECT_OPEN	1.00	3.00	0.60	3.00	1 40308.73
C55	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C56	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C57	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C58	RECT_OPEN	1.00	3.00	0.60	3.00	1 41145.56
C59	RECT_OPEN	1.00	3.00	0.60	3.00	1 36778.58
C6	RECT_OPEN	1.00	3.00	0.60	3.00	1 45107.44
C60	RECT_OPEN	1.00	3.00	0.60	3.00	1 36778.58
C61	RECT_OPEN	1.00	3.00	0.60	3.00	1 36778.58
C62	RECT_OPEN	1.00	3.00	0.60	3.00	1 36778.58

C63	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C64	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C65	RECT_OPEN	1.00	3.00	0.60	3.00	1	41145.56
C66	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C67	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C68	RECT_OPEN	1.00	3.00	0.60	3.00	1	36778.58
C69	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C7	RECT_OPEN	1.00	3.00	0.60	3.00	1	67030.66
C70	RECT_OPEN	1.00	3.00	0.60	3.00	1	82211.21
C71	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C72	RECT_OPEN	1.00	3.00	0.60	3.00	1	41145.56
C73	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C74	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C75	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C76	RECT_OPEN	1.00	3.00	0.60	3.00	1	101471.45
C77	RECT_OPEN	1.00	3.00	0.60	3.00	1	89324.16
C78	RECT_OPEN	1.00	3.00	0.60	3.00	1	14228.79
C79	RECT_OPEN	1.00	3.00	0.60	3.00	1	89324.16
C8	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C81	RECT_OPEN	1.00	3.00	0.60	3.00	1	89324.16
C82	RECT_OPEN	1.00	3.00	0.60	3.00	1	115465.51
C83	RECT_OPEN	1.00	3.00	0.60	3.00	1	29870.80
C84	RECT_OPEN	1.00	3.00	0.60	3.00	1	48766.13
C84_2	RECT_OPEN	1.00	3.00	0.60	3.00	1	37691.14
C85	RECT_OPEN	1.00	3.00	0.60	3.00	1	52188.39
C87	RECT_OPEN	1.00	3.00	0.60	3.00	1	18370.10
C88	RECT_OPEN	1.00	3.00	0.60	3.00	1	25984.66
C89	RECT_OPEN	1.00	3.00	0.60	3.00	1	41145.56
C9	RECT_OPEN	1.00	3.00	0.60	3.00	1	67030.66
C90	RECT_OPEN	1.00	3.00	0.60	3.00	1	37691.14
C91	RECT_OPEN	1.00	3.00	0.60	3.00	1	37691.14
C92	RECT_OPEN	1.00	3.00	0.60	3.00	1	31835.65
C93	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C94	RECT_OPEN	1.00	3.00	0.60	3.00	1	36778.58
C95	RECT_OPEN	1.00	3.00	0.60	3.00	1	25984.66
C96	RECT_OPEN	1.00	3.00	0.60	3.00	1	30753.68
C97	RECT_OPEN	1.00	3.00	0.60	3.00	1	33897.68
C98	RECT_OPEN	1.00	3.00	0.60	3.00	1	33897.68
C99	RECT_OPEN	1.00	3.00	0.60	3.00	1	52188.39
C-CB22	RECT_OPEN	1.00	3.00	0.60	3.00	1	36778.58
C-CB23	RECT_OPEN	1.00	3.00	0.60	3.00	1	36778.58
C-CB24	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C-CB25	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44
C-CB87	RECT_OPEN	1.00	3.00	0.60	3.00	1	42772.17
C-CBMH112	RECT_OPEN	1.00	3.00	0.60	3.00	1	36778.58
C-CBMH114	RECT_OPEN	1.00	3.00	0.60	3.00	1	45107.44

EXMH101-OUT	CIRCULAR	0.75	0.44	0.19	0.75	1	1575.64
EXMH115-101	CIRCULAR	0.30	0.07	0.07	0.30	1	68.12
EXMH116-115	CIRCULAR	0.30	0.07	0.07	0.30	1	67.89
PRMH116-EX-MH116	CIRCULAR	0.25	0.05	0.06	0.25	1	144.49
X-CB-129_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	27.33
X-CB-89_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	63.95
X-CB-91_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	74.33
X-CB-94_(X-CB)	CIRCULAR	0.20	0.03	0.05	0.20	1	38.18
X-CB-97_(X-CB)	CIRCULAR	0.30	0.07	0.07	0.30	1	81.25
X-CB-98_(X-CB)	CIRCULAR	0.30	0.07	0.07	0.30	1	34.63
X-STM-13_(1)_(X-STM)	CIRCULAR	0.75	0.44	0.19	0.75	1	1315.20
X-STM-13_(X-STM)	CIRCULAR	0.75	0.44	0.19	0.75	1	1677.62
X-STM-17_(X-STM)	CIRCULAR	0.75	0.44	0.19	0.75	1	1392.71
X-STM-19_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	91.10
X-STM-21_(X-STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	704.72
X-STM-23_(X-STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	118.39
X-STM-25_(X-STM)_1	CIRCULAR	0.45	0.16	0.11	0.45	1	363.11
X-STM-25_(X-STM)_2	CIRCULAR	0.45	0.16	0.11	0.45	1	370.11
X-STM-27_(X-STM)_1	CIRCULAR	0.30	0.07	0.07	0.30	1	52.86
X-STM-27_(X-STM)_2	CIRCULAR	0.30	0.07	0.07	0.30	1	39.65
X-STM-29_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	25.14
X-STM-31_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	65.65
X-STM-33_(X-STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	355.55
X-STM-51_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	29.09
X-STM-53_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	41.24
X-STM-55_(X-STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	46.48
X-STM-59_(X-STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	32.94
X-STM-63_(X-STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	24.45
X-STM-71_(X-STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	101.16
X-STM-75_(X-STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	184.53
X-STM-77_(X-STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	114.38

```
**********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
**********************************************************

***************
Analysis Options
***************
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
```

```
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/24/2019 00:00:00
Ending Date .............. 10/25/2019 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 ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         1.025        71.667
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.104         7.240
Surface Runoff ...........         0.907        63.427
Final Storage ............         0.015         1.064
Continuity Error (%) .....        -0.090


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.907         9.069
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.909         9.091
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 (%) .....        -0.251


*************************
Highest Continuity Errors
*************************
Node PR-CBMH118 (-1.24%)
Node PR-CBMH112 (-1.13%)


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


********************************
Highest Flow Instability Indexes
********************************
Link INFIL-EX-CB14 (19)
Link EX-BLDG01-OUT (18)
Link OR11 (16)
Link INFIL-EX-CB82 (11)
Link OR5 (8)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     2.00 sec
Maximum Time Step           :     2.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.02
Percent Not Converging      :     0.16


***************************
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      LPS
```

A-01	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.16	116.53	0.979
A-02	71.67	0.00	0.00	0.00	70.16	0.00	70.16	0.15	106.11	0.979
A-03	71.67	0.00	0.00	0.00	70.19	0.00	70.19	0.06	41.66	0.979
A-04a	71.67	0.00	0.00	7.70	58.15	4.56	62.71	0.21	157.03	0.875
A-04b	71.67	0.00	0.00	6.41	60.11	3.84	63.96	0.49	356.29	0.892
A-05	71.67	0.00	0.00	6.28	60.16	3.99	64.15	0.04	31.56	0.895
A-06	71.67	0.00	0.00	0.00	70.16	0.00	70.16	0.12	81.31	0.979
A-07	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.12	87.77	0.979
A-08	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.11	76.87	0.979
A-09	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.11	78.85	0.979
A-10	71.67	0.00	0.00	0.00	70.16	0.00	70.16	0.12	87.77	0.979
A-11	71.67	0.00	0.00	0.00	70.16	0.00	70.16	0.12	82.30	0.979
A-12	71.67	0.00	0.00	6.28	60.16	3.98	64.14	0.04	31.56	0.895
A-13	71.67	0.00	0.00	7.53	58.19	4.74	62.93	0.04	27.96	0.878
A-14	71.67	0.00	0.00	0.00	70.16	0.00	70.16	0.12	82.80	0.979
A-15	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.15	106.12	0.979
A-16	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.11	76.87	0.979
A-17a	71.67	0.00	0.00	18.14	42.11	10.54	52.64	0.14	105.23	0.735
A-17b	71.67	0.00	0.00	1.88	67.17	1.21	68.38	0.10	74.45	0.954
A-17c	71.67	0.00	0.00	13.53	49.12	7.98	57.10	0.17	127.70	0.797
A-17d	71.67	0.00	0.00	0.61	69.20	0.40	69.60	0.13	92.08	0.971
A-17e	71.67	0.00	0.00	18.20	42.10	10.48	52.59	0.19	142.93	0.734
A-17f	71.67	0.00	0.00	2.50	66.19	1.60	67.79	0.15	111.69	0.946
A-18	71.67	0.00	0.00	14.81	47.09	8.78	55.87	0.28	216.43	0.780
A-19a	71.67	0.00	0.00	14.62	47.10	8.98	56.08	0.06	46.44	0.783
A-19b	71.67	0.00	0.00	14.68	47.10	8.92	56.01	0.10	77.94	0.782
A-20	71.67	0.00	0.00	1.89	67.15	1.20	68.35	0.27	195.65	0.954
A-21	71.67	0.00	0.00	1.88	67.16	1.21	68.37	0.11	81.35	0.954
A-22	71.67	0.00	0.00	48.36	0.00	23.32	23.32	0.18	94.60	0.325
A-23	71.67	0.00	0.00	10.10	54.12	6.33	60.45	0.03	23.79	0.843
A-24	71.67	0.00	0.00	12.03	52.31	7.41	59.72	0.04	28.79	0.833
A-25	71.67	0.00	0.00	16.70	45.10	8.89	53.99	0.05	32.81	0.753
A-26	71.67	0.00	0.00	22.41	37.11	11.35	48.46	0.05	33.71	0.676
A-27	71.67	0.00	0.00	23.26	36.06	11.57	47.63	0.05	31.10	0.665
A-28	71.67	0.00	0.00	6.44	60.11	3.81	63.92	0.08	56.76	0.892
A-29	71.67	0.00	0.00	16.10	45.12	9.50	54.62	0.06	46.74	0.762
A-30	71.67	0.00	0.00	0.00	71.69	0.00	71.69	0.62	412.94	1.000
A-31	71.67	0.00	0.00	0.00	70.20	0.00	70.20	0.04	30.26	0.980
A-32	71.67	0.00	0.00	6.28	60.16	3.98	64.15	0.05	39.33	0.895
A-33	71.67	0.00	0.00	11.99	51.17	7.46	58.63	0.14	113.98	0.818
A-34a	71.67	0.00	0.00	0.61	69.19	0.39	69.59	0.11	75.24	0.971
A-34b	71.67	0.00	0.00	0.00	70.18	0.00	70.18	0.18	124.00	0.979
A-34c	71.67	0.00	0.00	1.88	67.16	1.21	68.37	0.14	97.61	0.954
A-35	71.67	0.00	0.00	8.79	56.17	5.56	61.73	0.08	59.62	0.861
A-36	71.67	0.00	0.00	0.00	70.20	0.00	70.20	0.04	25.79	0.980
A-37	71.67	0.00	0.00	27.29	28.08	15.73	43.81	0.03	21.64	0.611
A-38a(R1-R5)	71.67	0.00	0.00	0.00	71.70	0.00	71.70	0.86	577.80	1.000
A-38b(R6-R7)	71.67	0.00	0.00	0.00	71.71	0.00	71.71	0.19	130.91	1.001
A-39	71.67	0.00	0.00	0.00	70.16	0.00	70.16	0.05	37.18	0.979
A-40	71.67	0.00	0.00	0.00	70.15	0.00	70.15	0.11	74.73	0.979
A-41	71.67	0.00	0.00	0.00	70.15	0.00	70.15	0.15	103.78	0.979
A-42	71.67	0.00	0.00	2.49	66.21	1.61	67.82	0.02	15.75	0.946
A-43	71.67	0.00	0.00	0.00	70.15	0.00	70.15	0.15	106.44	0.979
A-44	71.67	0.00	0.00	0.00	70.17	0.00	70.17	0.06	45.13	0.979
A-45	71.67	0.00	0.00	2.51	66.15	1.58	67.73	0.16	115.65	0.945
A-46	71.67	0.00	0.00	9.52	55.16	5.83	60.99	0.05	42.15	0.851
A-47	71.67	0.00	0.00	6.29	60.16	3.98	64.13	0.06	47.56	0.895
A-48	71.67	0.00	0.00	5.65	61.15	3.61	64.77	0.03	20.45	0.904
A-49	71.67	0.00	0.00	18.48	41.14	11.21	52.35	0.05	41.72	0.730
A-50	71.67	0.00	0.00	13.22	49.15	8.30	57.45	0.02	13.18	0.802
A-51	71.67	0.00	0.00	0.61	69.22	0.40	69.61	0.06	44.06	0.971
A-52	71.67	0.00	0.00	10.13	54.12	6.30	60.42	0.04	34.10	0.843
A-53	71.67	0.00	0.00	11.38	52.15	7.05	59.20	0.05	38.42	0.826
A-54	71.67	0.00	0.00	11.35	52.16	7.09	59.24	0.02	16.52	0.827
A-55	71.67	0.00	0.00	8.79	56.17	5.57	61.73	0.04	27.42	0.861
A-56	71.67	0.00	0.00	0.00	70.19	0.00	70.19	0.06	41.17	0.979
A-57	71.67	0.00	0.00	16.42	44.16	10.20	54.36	0.03	23.38	0.759
A-58	71.67	0.00	0.00	16.29	44.16	10.34	54.50	0.02	13.60	0.760
A-59	71.67	0.00	0.00	16.44	44.16	10.17	54.33	0.03	28.68	0.758
A-60	71.67	0.00	0.00	1.27	68.15	0.82	68.97	0.08	57.30	0.962
A-61	71.67	0.00	0.00	0.00	70.20	0.00	70.20	0.07	51.09	0.979
A-62	71.67	0.00	0.00	0.00	70.18	0.00	70.18	0.08	56.05	0.979
A-63	71.67	0.00	0.00	0.00	70.18	0.00	70.18	0.09	64.98	0.979
A-64	71.67	0.00	0.00	6.32	60.14	3.94	64.08	0.07	56.42	0.894
A-65	71.67	0.00	0.00	0.00	70.18	0.00	70.18	0.15	108.62	0.979
A-66	71.67	0.00	0.00	0.00	70.19	0.00	70.19	0.14	98.70	0.979
A-67	71.67	0.00	0.00	0.00	70.19	0.00	70.19	0.10	73.41	0.979
A-68	71.67	0.00	0.00	16.60	44.15	10.01	54.16	0.06	45.38	0.756

****
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
HP-01	JUNCTION	0.00	0.00	114.10	0 01:38	0.00
HP-EX-CB116	JUNCTION	0.00	0.00	113.60	0 00:00	0.00

HP-EX-CB117	JUNCTION	0.00	0.00	113.56	0	00:00	0.00
HP-EX-CB128a	JUNCTION	0.00	0.00	113.90	0	00:00	0.00
HP-EX-CB128b	JUNCTION	0.00	0.00	113.95	0	00:00	0.00
HP-EX-CB131	JUNCTION	0.00	0.00	112.90	0	00:00	0.00
HP-EX-CB137	JUNCTION	0.00	0.00	113.60	0	00:00	0.00
HP-EX-CB28	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB30a	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB30b	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB50a	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB50b	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB52	JUNCTION	0.00	0.00	113.98	0	00:00	0.00
HP-EX-CB54	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB58a	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB58b	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB60	JUNCTION	0.00	0.00	113.90	0	00:00	0.00
HP-EX-CB62	JUNCTION	0.00	0.00	113.90	0	00:00	0.00
HP-EX-CB64	JUNCTION	0.00	0.00	113.65	0	00:00	0.00
HP-EX-CB72	JUNCTION	0.00	0.00	113.00	0	00:00	0.00
HP-EX-CB82	JUNCTION	0.00	0.00	114.05	0	00:00	0.00
HP-EX-CB84	JUNCTION	0.00	0.00	114.00	0	00:00	0.00
HP-EX-CB87a	JUNCTION	0.00	0.00	113.95	0	00:00	0.00
HP-EX-CB87b	JUNCTION	0.00	0.00	113.95	0	00:00	0.00
HP-EX-CB90	JUNCTION	0.00	0.00	113.95	0	00:00	0.00
HP-EX-CB92	JUNCTION	0.00	0.00	113.95	0	00:00	0.00
HP-EX-CB95	JUNCTION	0.00	0.00	113.95	0	00:00	0.00
HP-EX-CB96	JUNCTION	0.00	0.00	113.95	0	00:00	0.00
HP-PR-CB02	JUNCTION	0.00	0.00	113.64	0	00:00	0.00
HP-PR-CB03	JUNCTION	0.00	0.00	113.65	0	00:00	0.00
HP-PR-CB04	JUNCTION	0.00	0.00	113.65	0	00:00	0.00
HP-PR-CB05	JUNCTION	0.00	0.00	113.70	0	00:00	0.00
HP-PR-CB06	JUNCTION	0.00	0.00	113.65	0	00:00	0.00
HP-PR-CB07	JUNCTION	0.00	0.00	113.65	0	00:00	0.00
HP-PR-CB08	JUNCTION	0.00	0.00	113.75	0	00:00	0.00
HP-PR-CB09	JUNCTION	0.00	0.00	113.85	0	00:00	0.00
HP-PR-CB10	JUNCTION	0.00	0.00	113.75	0	00:00	0.00
HP-PR-CB12	JUNCTION	0.00	0.00	113.87	0	00:00	0.00
HP-PR-CB13	JUNCTION	0.00	0.01	113.73	0	01:10	0.01
HP-PR-CB14	JUNCTION	0.00	0.00	113.65	0	01:20	0.00
HP-PR-CB15	JUNCTION	0.00	0.00	113.67	0	00:00	0.00
HP-PR-CB16/17	JUNCTION	0.00	0.00	113.65	0	00:00	0.00
HP-PR-CB18	JUNCTION	0.00	0.00	115.20	0	00:00	0.00
HP-PR-CB19	JUNCTION	0.00	0.00	115.20	0	01:38	0.00
HP-PR-CB20	JUNCTION	0.00	0.00	115.20	0	01:40	0.00
HP-PR-CB21	JUNCTION	0.00	0.00	115.40	0	01:30	0.00
HP-PR-CB22	JUNCTION	0.00	0.01	115.41	0	01:30	0.01
HP-PR-CB23	JUNCTION	0.00	0.01	115.41	0	01:20	0.01
HP-PR-CB24a	JUNCTION	0.00	0.00	115.85	0	00:00	0.00
HP-PR-CB24b	JUNCTION	0.00	0.00	115.85	0	00:00	0.00
HP-PR-CB25a	JUNCTION	0.00	0.00	115.85	0	00:00	0.00
HP-PR-CB25b	JUNCTION	0.00	0.00	115.85	0	00:00	0.00
HP-PR-CB26a	JUNCTION	0.00	0.00	115.85	0	00:00	0.00
HP-PR-CB26b	JUNCTION	0.00	0.00	115.85	0	00:00	0.00
HP-PR-CB27a	JUNCTION	0.00	0.00	116.20	0	00:00	0.00
HP-PR-CB27b	JUNCTION	0.00	0.00	116.20	0	00:00	0.00
HP-PR-CB28a	JUNCTION	0.00	0.00	116.20	0	00:00	0.00
HP-PR-CB28b	JUNCTION	0.00	0.00	116.20	0	00:00	0.00
HP-PR-CB33	JUNCTION	0.00	0.00	113.25	0	00:00	0.00
HP-PR-CB34	JUNCTION	0.00	0.00	113.75	0	00:00	0.00
HP-PR-CB35	JUNCTION	0.00	0.00	113.75	0	00:00	0.00
HP-PR-CB36	JUNCTION	0.00	0.00	113.65	0	00:00	0.00
HP-PR-CBMH104	JUNCTION	0.00	0.00	113.75	0	00:00	0.00
HP-PR-CBMH105	JUNCTION	0.00	0.00	113.70	0	00:00	0.00
HP-PR-CBMH106	JUNCTION	0.00	0.00	113.80	0	00:00	0.00
HP-PR-CBMH107	JUNCTION	0.00	0.00	113.70	0	00:00	0.00
HP-PR-CBMH108a	JUNCTION	0.00	0.00	113.85	0	00:00	0.00
HP-PR-CBMH108b	JUNCTION	0.00	0.00	113.85	0	00:00	0.00
HP-PR-CBMH109	JUNCTION	0.00	0.00	113.90	0	00:00	0.00
HP-PR-CBMH110	JUNCTION	0.00	0.00	113.60	0	01:12	0.00
HP-PR-CBMH111	JUNCTION	0.00	0.00	115.20	0	01:37	0.00
HP-PR-CBMH112	JUNCTION	0.00	0.00	115.40	0	01:31	0.00
HP-PR-CBMH114	JUNCTION	0.00	0.00	115.85	0	00:00	0.00
HP-PR-CBMH115	JUNCTION	0.00	0.00	116.20	0	00:00	0.00
HP-PR-TD01	JUNCTION	0.00	0.00	113.65	0	00:00	0.00
HP-EX-CB134	OUTFALL	0.00	0.00	113.45	0	00:00	0.00
HP-EX-CB14	OUTFALL	0.00	0.00	114.10	0	00:00	0.00
HP-PR-CB01	OUTFALL	0.00	0.00	113.63	0	00:00	0.00
HP-PR-CB11	OUTFALL	0.00	0.00	113.85	0	00:00	0.00
HP-PR-CB29	OUTFALL	0.00	0.00	112.95	0	00:00	0.00
HP-PR-CB30	OUTFALL	0.00	0.00	112.65	0	00:00	0.00
HP-PR-CB31	OUTFALL	0.00	0.00	112.65	0	00:00	0.00
HP-PR-CB32	OUTFALL	0.00	0.00	113.00	0	00:00	0.00
HP-PR-CBMH118	OUTFALL	0.00	0.00	112.70	0	00:00	0.00
IF-EX-CB116	OUTFALL	0.00	0.00	112.99	0	00:00	0.00
IF-EX-CB117	OUTFALL	0.00	0.00	112.09	0	00:00	0.00
IF-EX-CB128	OUTFALL	0.00	0.00	112.51	0	00:00	0.00
IF-EX-CB137	OUTFALL	0.00	0.00	112.00	0	00:00	0.00
IF-EX-CB14	OUTFALL	0.00	0.00	111.19	0	00:00	0.00
IF-EX-CB28	OUTFALL	0.00	0.00	112.43	0	00:00	0.00
IF-EX-CB30	OUTFALL	0.00	0.00	112.50	0	00:00	0.00
IF-EX-CB50	OUTFALL	0.00	0.00	112.34	0	00:00	0.00
IF-EX-CB52	OUTFALL	0.00	0.00	112.44	0	00:00	0.00
IF-EX-CB54	OUTFALL	0.00	0.00	112.52	0	00:00	0.00

IF-EX-CB58	OUTFALL	0.00	0.00	112.44	0	00:00	0.00
IF-EX-CB64	OUTFALL	0.00	0.00	112.10	0	00:00	0.00
IF-EX-CB82	OUTFALL	0.00	0.00	112.62	0	00:00	0.00
IF-EX-CB84	OUTFALL	0.00	0.00	112.12	0	00:00	0.00
IF-EX-CB87	OUTFALL	0.00	0.00	112.50	0	00:00	0.00
IF-EX-CB90	OUTFALL	0.00	0.00	112.51	0	00:00	0.00
IF-EX-CB92	OUTFALL	0.00	0.00	112.49	0	00:00	0.00
IF-EX-CB95	OUTFALL	0.00	0.00	112.45	0	00:00	0.00
IF-EX-CB96	OUTFALL	0.00	0.00	112.22	0	00:00	0.00
IF-PR-CB04	OUTFALL	0.00	0.00	111.80	0	00:00	0.00
IF-PR-CB10	OUTFALL	0.00	0.00	111.85	0	00:00	0.00
IF-PR-CB13	OUTFALL	0.00	0.00	111.90	0	00:00	0.00
IF-PR-CB14	OUTFALL	0.00	0.00	111.80	0	00:00	0.00
IF-PR-CB18	OUTFALL	0.00	0.00	113.49	0	00:00	0.00
IF-PR-CB29	OUTFALL	0.00	0.00	111.25	0	00:00	0.00
IF-PR-CB32	OUTFALL	0.00	0.00	110.65	0	00:00	0.00
IF-PR-CB36	OUTFALL	0.00	0.00	111.85	0	00:00	0.00
IF-PR-CBMH104	OUTFALL	0.00	0.00	112.03	0	00:00	0.00
IF-PR-CBMH105	OUTFALL	0.00	0.00	111.85	0	00:00	0.00
IF-PR-CBMH106	OUTFALL	0.00	0.00	112.04	0	00:00	0.00
IF-PR-CBMH107	OUTFALL	0.00	0.00	111.83	0	00:00	0.00
IF-PR-CBMH108	OUTFALL	0.00	0.00	112.04	0	00:00	0.00
IF-PR-CBMH109	OUTFALL	0.00	0.00	111.96	0	00:00	0.00
IF-PR-CBMH110	OUTFALL	0.00	0.00	111.62	0	00:00	0.00
IF-PR-CBMH111	OUTFALL	0.00	0.00	113.00	0	00:00	0.00
IF-PR-CBMH112	OUTFALL	0.00	0.00	113.12	0	00:00	0.00
IF-PR-CBMH114	OUTFALL	0.00	0.00	113.51	0	00:00	0.00
IF-PR-CBMH115	OUTFALL	0.00	0.00	113.89	0	00:00	0.00
IF-PR-CBMH118	OUTFALL	0.00	0.00	110.74	0	00:00	0.00
Major-01	OUTFALL	0.00	0.00	112.87	0	00:00	0.00
OF1	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SWM_Pond	OUTFALL	0.08	0.48	103.43	0	01:20	0.48
EX-BLDG01	STORAGE	0.00	0.11	120.11	0	01:16	0.11
EX-CB116	STORAGE	0.04	0.56	113.55	0	01:10	0.56
EX-CB117	STORAGE	0.11	1.45	113.54	0	01:30	1.45
EX-CB128	STORAGE	0.09	1.31	113.82	0	01:21	1.31
EX-CB134	STORAGE	0.04	1.84	113.44	0	01:11	1.84
EX-CB137	STORAGE	0.04	1.58	113.58	0	01:11	1.58
EX-CB14	STORAGE	0.39	2.89	114.08	0	01:42	2.89
EX-CB28	STORAGE	0.11	1.42	113.85	0	01:37	1.42
EX-CB30	STORAGE	0.10	1.38	113.88	0	01:24	1.38
EX-CB50	STORAGE	0.07	1.49	113.83	0	01:12	1.49
EX-CB52	STORAGE	0.06	1.44	113.88	0	01:22	1.44
EX-CB54	STORAGE	0.06	1.36	113.88	0	01:20	1.36
EX-CB58	STORAGE	0.05	1.39	113.83	0	01:11	1.39
EX-CB60	STORAGE	0.07	1.70	113.85	0	01:21	1.70
EX-CB62	STORAGE	0.05	1.21	113.85	0	01:22	1.21
EX-CB64	STORAGE	0.07	1.50	113.60	0	01:12	1.50
EX-CB72	STORAGE	0.04	1.70	112.88	0	01:11	1.70
EX-CB82	STORAGE	0.04	1.39	114.01	0	01:11	1.39
EX-CB84	STORAGE	0.05	1.66	113.78	0	01:11	1.66
EX-CB87	STORAGE	0.09	1.33	113.83	0	01:24	1.33
EX-CB90	STORAGE	0.09	1.36	113.87	0	01:11	1.36
EX-CB92	STORAGE	0.10	1.39	113.88	0	01:31	1.39
EX-CB95	STORAGE	0.10	1.36	113.81	0	01:31	1.36
EX-CB96	STORAGE	0.12	1.59	113.81	0	01:33	1.59
EX-MH101	STORAGE	0.08	0.48	105.05	0	01:20	0.48
EX-MH101A	STORAGE	0.08	0.49	107.67	0	01:25	0.49
EX-MH101B	STORAGE	0.07	0.42	105.75	0	01:25	0.42
EX-MH102	STORAGE	0.07	0.45	109.83	0	01:25	0.45
EX-MH102A	STORAGE	0.15	0.28	112.61	0	01:35	0.28
EX-MH103	STORAGE	0.00	0.07	110.78	0	01:12	0.07
EX-MH104	STORAGE	0.08	1.12	111.77	0	01:25	1.12
EX-MH105	STORAGE	0.20	2.40	113.68	0	01:25	2.40
EX-MH105a	STORAGE	0.04	0.53	111.81	0	01:25	0.53
EX-MH106	STORAGE	0.12	1.58	113.73	0	01:26	1.58
EX-MH106a	STORAGE	0.17	2.10	113.71	0	01:25	2.10
EX-MH107	STORAGE	0.12	1.50	113.85	0	01:34	1.50
EX-MH107a	STORAGE	0.12	1.59	113.79	0	01:30	1.59
EX-MH108	STORAGE	0.06	1.96	113.28	0	01:24	1.96
EX-MH109	STORAGE	0.12	1.78	112.76	0	01:24	1.78
EX-MH112	STORAGE	0.07	1.54	113.69	0	01:23	1.54
EX-MH112a	STORAGE	0.05	1.10	113.25	0	01:25	1.09
EX-MH115	STORAGE	0.06	0.87	105.92	0	01:29	0.87
EX-MH116	STORAGE	0.07	1.18	106.68	0	01:27	1.18
EX-STUB02	STORAGE	0.07	2.08	113.46	0	01:24	2.08
PR-BLDG01	STORAGE	0.01	0.15	120.15	0	01:23	0.15
PR-BLDG02	STORAGE	0.01	0.17	120.17	0	01:23	0.17
PR-CB01	STORAGE	0.18	1.18	113.58	0	01:45	1.18
PR-CB02	STORAGE	0.18	1.18	113.58	0	01:45	1.18
PR-CB02a	STORAGE	0.20	1.25	113.58	0	01:45	1.25
PR-CB03	STORAGE	0.18	1.18	113.58	0	01:43	1.18
PR-CB04	STORAGE	0.51	1.78	113.58	0	01:43	1.78
PR-CB05	STORAGE	0.14	1.17	113.62	0	01:40	1.17
PR-CB06	STORAGE	0.16	1.16	113.61	0	01:42	1.16
PR-CB07	STORAGE	0.18	1.25	113.61	0	01:42	1.25
PR-CB08	STORAGE	0.20	1.17	113.67	0	01:50	1.17
PR-CB09	STORAGE	0.20	1.28	113.78	0	01:49	1.28
PR-CB10	STORAGE	0.24	1.78	113.63	0	01:39	1.78
PR-CB11	STORAGE	0.36	1.22	113.82	0	02:30	1.22
PR-CB12	STORAGE	0.44	1.40	113.82	0	02:30	1.40
PR-CB13	STORAGE	0.10	1.83	113.73	0	01:09	1.83

PR-CB14	STORAGE	0.10	1.85	113.65	0	01:20	1.85
PR-CB15	STORAGE	0.23	1.39	113.59	0	01:53	1.39
PR-CB16/17	STORAGE	0.05	1.41	113.50	0	01:14	1.41
PR-CB18	STORAGE	0.09	1.71	115.20	0	01:13	1.71
PR-CB19	STORAGE	0.12	1.55	115.20	0	01:38	1.55
PR-CB20	STORAGE	0.10	1.35	115.20	0	01:40	1.35
PR-CB21	STORAGE	0.38	1.84	115.40	0	01:30	1.84
PR-CB22	STORAGE	0.31	1.61	115.41	0	01:30	1.61
PR-CB23	STORAGE	0.26	1.41	115.41	0	01:20	1.41
PR-CB24	STORAGE	0.67	1.83	115.78	0	02:50	1.83
PR-CB25	STORAGE	0.57	1.64	115.78	0	02:50	1.64
PR-CB26	STORAGE	0.49	1.43	115.78	0	02:50	1.43
PR-CB27	STORAGE	0.36	1.58	116.09	0	02:11	1.58
PR-CB28	STORAGE	0.32	1.39	116.09	0	02:11	1.39
PR-CB29	STORAGE	0.24	1.66	112.91	0	01:40	1.66
PR-CB29a	STORAGE	0.01	0.11	111.61	0	01:10	0.11
PR-CB30	STORAGE	0.27	1.24	112.64	0	02:10	1.24
PR-CB31	STORAGE	0.33	1.44	112.64	0	02:10	1.44
PR-CB32	STORAGE	0.21	2.34	112.99	0	01:31	2.34
PR-CB33	STORAGE	0.00	0.14	111.74	0	01:10	0.14
PR-CB34	STORAGE	0.12	1.31	113.61	0	01:35	1.31
PR-CB35	STORAGE	0.14	1.41	113.61	0	01:35	1.41
PR-CB36	STORAGE	0.14	1.55	113.40	0	01:11	1.55
PR-CBMH104	STORAGE	0.25	1.59	113.62	0	01:40	1.59
PR-CBMH105	STORAGE	0.38	1.76	113.61	0	01:41	1.76
PR-CBMH106	STORAGE	0.35	1.63	113.67	0	01:50	1.63
PR-CBMH107	STORAGE	0.21	1.78	113.61	0	01:33	1.78
PR-CBMH108	STORAGE	0.34	1.73	113.77	0	01:44	1.73
PR-CBMH109	STORAGE	0.69	1.86	113.82	0	02:30	1.86
PR-CBMH109a	STORAGE	0.05	0.69	112.90	0	01:26	0.69
PR-CBMH110	STORAGE	0.45	1.97	113.59	0	01:52	1.97
PR-CBMH111	STORAGE	0.27	2.20	115.20	0	01:37	2.20
PR-CBMH112	STORAGE	0.58	2.28	115.40	0	01:31	2.28
PR-CBMH114	STORAGE	0.96	2.27	115.78	0	02:50	2.27
PR-CBMH115	STORAGE	0.63	2.19	116.08	0	02:10	2.19
PR-CBMH115a	STORAGE	0.02	0.07	114.21	0	02:11	0.07
PR-CBMH118	STORAGE	0.51	1.90	112.64	0	02:06	1.90
PR-MH100	STORAGE	0.24	1.42	113.58	0	01:43	1.42
PR-MH100a	STORAGE	0.04	0.76	112.92	0	01:26	0.76
PR-MH100b	STORAGE	0.06	0.97	112.91	0	01:26	0.97
PR-MH101	STORAGE	0.08	1.20	112.90	0	01:25	1.20
PR-MH102	STORAGE	0.10	1.59	112.87	0	01:25	1.59
PR-MH103	STORAGE	0.11	1.72	112.82	0	01:25	1.72
PR-MH113	STORAGE	0.05	0.13	113.39	0	02:11	0.13
PR-MH116	STORAGE	0.02	0.15	110.80	0	01:11	0.15
PR-MH117	STORAGE	0.04	0.17	111.07	0	01:10	0.17
PR-MH119	STORAGE	0.06	0.17	113.15	0	01:34	0.17
PR-MH120	STORAGE	0.05	0.10	113.78	0	02:26	0.10
PR-STUB01	STORAGE	0.01	0.12	111.38	0	01:20	0.12
PR-TD01	STORAGE	0.02	0.35	112.90	0	01:20	0.35

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent	
HP-01	JUNCTION	0.00	16.58	0	01:38	0	0.0112	0.001	
HP-EX-CB116	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB117	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB128a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB128b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB131	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB137	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB28	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB30a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB30b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB50a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB50b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB52	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB54	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB58a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB58b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB60	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB62	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB64	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB72	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB82	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB84	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB87a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB87b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB90	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB92	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB95	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-EX-CB96	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-PR-CB02	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
HP-PR-CB03	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr

HP-PR-CB04	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB05	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB06	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB07	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB08	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB09	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB10	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB12	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB13	JUNCTION	0.00	17.83	0	01:09	0	0.00464	0.856
HP-PR-CB14	JUNCTION	0.00	4.01	0	01:20	0	0.00133	0.025
HP-PR-CB15	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB16/17	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB18	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB19	JUNCTION	0.00	6.93	0	01:38	0	0.00404	0.008
HP-PR-CB20	JUNCTION	0.00	8.41	0	01:40	0	0.00687	0.002
HP-PR-CB21	JUNCTION	0.00	8.19	0	01:30	0	0.00918	0.003
HP-PR-CB22	JUNCTION	0.00	10.78	0	01:30	0	0.0183	0.116
HP-PR-CB23	JUNCTION	0.00	17.04	0	01:20	0	0.0261	0.101
HP-PR-CB24a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB24b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB25a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB25b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB26a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB26b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB27a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB27b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB28a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB28b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB33	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB34	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB35	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB36	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH104	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH105	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH106	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH107	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH108a	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH108b	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH109	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH110	JUNCTION	0.00	3.79	0	01:12	0	0.00213	0.012
HP-PR-CBMH111	JUNCTION	0.00	2.11	0	01:37	0	0.000333	0.078
HP-PR-CBMH112	JUNCTION	0.00	2.52	0	01:31	0	0.000945	-0.374
HP-PR-CBMH114	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH115	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-TD01	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-EX-CB134	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-EX-CB14	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB01	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB11	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB29	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB30	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB31	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CB32	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-PR-CBMH118	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
IF-EX-CB116	OUTFALL	0.00	0.14	0	00:25	0	0.00158	0.000
IF-EX-CB117	OUTFALL	0.00	0.14	0	00:25	0	0.00169	0.000
IF-EX-CB128	OUTFALL	0.00	0.14	0	00:26	0	0.00177	0.000
IF-EX-CB137	OUTFALL	0.00	0.21	0	00:25	0	0.00252	0.000
IF-EX-CB14	OUTFALL	0.00	0.14	0	00:24	0	0.00311	0.000
IF-EX-CB28	OUTFALL	0.00	0.14	0	00:24	0	0.00184	0.000
IF-EX-CB30	OUTFALL	0.00	0.14	0	00:25	0	0.00193	0.000
IF-EX-CB50	OUTFALL	0.00	0.14	0	00:24	0	0.00201	0.000
IF-EX-CB52	OUTFALL	0.00	0.14	0	00:25	0	0.00189	0.000
IF-EX-CB54	OUTFALL	0.00	0.14	0	00:25	0	0.00162	0.000
IF-EX-CB58	OUTFALL	0.00	0.14	0	00:25	0	0.00183	0.000
IF-EX-CB64	OUTFALL	0.00	0.14	0	00:25	0	0.0016	0.000
IF-EX-CB82	OUTFALL	0.00	0.21	0	00:25	0	0.00321	0.000
IF-EX-CB84	OUTFALL	0.00	0.21	0	00:25	0	0.00264	0.000
IF-EX-CB87	OUTFALL	0.00	0.14	0	00:25	0	0.00183	0.000
IF-EX-CB90	OUTFALL	0.00	0.14	0	00:25	0	0.00174	0.000
IF-EX-CB92	OUTFALL	0.00	0.14	0	00:25	0	0.00198	0.000
IF-EX-CB95	OUTFALL	0.00	0.14	0	00:26	0	0.00182	0.000
IF-EX-CB96	OUTFALL	0.00	0.14	0	00:24	0	0.00181	0.000
IF-PR-CB04	OUTFALL	0.00	0.39	0	00:25	0	0.0242	0.000
IF-PR-CB10	OUTFALL	0.00	0.27	0	00:26	0	0.00707	0.000
IF-PR-CB13	OUTFALL	0.00	0.15	0	00:25	0	0.00264	0.000
IF-PR-CB14	OUTFALL	0.00	0.15	0	00:25	0	0.00257	0.000
IF-PR-CB18	OUTFALL	0.00	0.15	0	00:25	0	0.00265	0.000
IF-PR-CB29	OUTFALL	0.00	1.17	0	00:27	0	0.0343	0.000
IF-PR-CB32	OUTFALL	0.00	1.61	0	00:29	0	0.0557	0.000
IF-PR-CB36	OUTFALL	0.00	0.15	0	00:26	0	0.00436	0.000
IF-PR-CBMH104	OUTFALL	0.00	0.15	0	00:25	0	0.00481	0.000
IF-PR-CBMH105	OUTFALL	0.00	0.27	0	00:26	0	0.0125	0.000
IF-PR-CBMH106	OUTFALL	0.00	0.52	0	00:26	0	0.0181	0.000
IF-PR-CBMH107	OUTFALL	0.00	0.21	0	00:25	0	0.00481	0.000
IF-PR-CBMH108	OUTFALL	0.00	0.58	0	00:26	0	0.0194	0.000
IF-PR-CBMH109	OUTFALL	0.00	1.55	0	00:26	0	0.0893	0.000
IF-PR-CBMH110	OUTFALL	0.00	1.24	0	00:26	0	0.0544	0.000
IF-PR-CBMH111	OUTFALL	0.00	0.94	0	00:27	0	0.0282	0.000
IF-PR-CBMH112	OUTFALL	0.00	2.18	0	00:28	0	0.106	0.000
IF-PR-CBMH114	OUTFALL	0.00	2.18	0	00:27	0	0.146	0.000
IF-PR-CBMH115	OUTFALL	0.00	1.24	0	00:27	0	0.0602	0.000

IF-PR-CBMH118	OUTFALL	0.00	2.28	0	00:28	0	0.0909	0.000	
Major-01	OUTFALL	0.00	0.00	0	00:00	0	0	0.000	ltr
OF1	OUTFALL	0.00	0.00	0	00:00	0	0	0.000	ltr
SWM_Pond	OUTFALL	0.00	1163.80	0	01:20	0	8.29	0.000	
EX-BLDG01	STORAGE	412.94	412.94	0	01:10	0.619	0.619	-0.006	
EX-CB116	STORAGE	30.26	55.78	0	01:01	0.0428	0.0451	-0.161	
EX-CB117	STORAGE	46.74	70.68	0	01:04	0.0601	0.104	-0.104	
EX-CB128	STORAGE	33.71	89.27	0	01:03	0.0494	0.0532	-0.333	
EX-CB134	STORAGE	37.18	37.18	0	01:10	0.0526	0.0526	0.023	
EX-CB137	STORAGE	77.94	77.94	0	01:10	0.0975	0.0975	-0.274	
EX-CB14	STORAGE	513.32	513.32	0	01:10	0.699	0.71	-0.021	
EX-CB28	STORAGE	111.69	111.69	0	01:10	0.154	0.155	-0.108	
EX-CB30	STORAGE	142.93	142.93	0	01:10	0.187	0.187	-0.116	
EX-CB50	STORAGE	124.00	167.26	0	01:03	0.175	0.365	0.039	
EX-CB52	STORAGE	97.61	139.71	0	01:03	0.135	0.194	0.067	
EX-CB54	STORAGE	45.38	114.24	0	01:02	0.0563	0.0593	-0.313	
EX-CB58	STORAGE	75.24	75.24	0	01:10	0.106	0.106	-0.066	
EX-CB60	STORAGE	56.76	66.26	0	01:10	0.078	0.124	0.058	
EX-CB62	STORAGE	31.10	31.10	0	01:10	0.0462	0.0462	-0.151	
EX-CB64	STORAGE	39.33	39.33	0	01:10	0.052	0.052	-0.069	
EX-CB72	STORAGE	23.79	23.79	0	01:10	0.0302	0.0302	0.045	
EX-CB82	STORAGE	195.65	195.65	0	01:10	0.271	0.271	-0.078	
EX-CB84	STORAGE	81.35	81.35	0	01:10	0.113	0.113	-0.101	
EX-CB87	STORAGE	105.23	105.23	0	01:10	0.136	0.136	-0.055	
EX-CB90	STORAGE	74.45	74.45	0	01:10	0.103	0.103	-0.499	
EX-CB92	STORAGE	127.70	127.70	0	01:10	0.167	0.167	-0.055	
EX-CB95	STORAGE	32.81	91.03	0	01:02	0.0464	0.106	-0.328	
EX-CB96	STORAGE	92.08	132.46	0	01:04	0.129	0.23	0.035	
EX-MH101	STORAGE	94.60	1163.65	0	01:20	0.181	8.28	-0.013	
EX-MH101A	STORAGE	0.00	1004.68	0	01:25	0	7.33	-0.000	
EX-MH101B	STORAGE	0.00	1004.70	0	01:25	0	7.33	0.023	
EX-MH102	STORAGE	0.00	947.28	0	01:25	0	6.63	-0.000	
EX-MH102A	STORAGE	0.00	59.07	0	01:34	0	1.22	0.006	
EX-MH103	STORAGE	0.00	11.58	0	01:11	0	0.0302	-0.004	
EX-MH104	STORAGE	46.44	877.89	0	01:24	0.0572	5.38	0.037	
EX-MH105	STORAGE	0.00	132.60	0	01:03	0	0.961	0.001	
EX-MH105a	STORAGE	0.00	121.64	0	01:37	0	0.961	-0.004	
EX-MH106	STORAGE	0.00	134.77	0	01:03	0	0.724	-0.011	
EX-MH106a	STORAGE	0.00	192.57	0	01:03	0	0.96	-0.022	
EX-MH107	STORAGE	0.00	180.82	0	01:02	0	0.339	-0.063	
EX-MH107a	STORAGE	0.00	183.93	0	01:03	0	0.724	0.012	
EX-MH108	STORAGE	28.79	193.82	0	01:10	0.037	0.656	-0.014	
EX-MH109	STORAGE	0.00	625.90	0	01:24	0	3.97	-0.167	
EX-MH112	STORAGE	0.00	141.65	0	01:03	0	0.466	0.006	
EX-MH112a	STORAGE	0.00	116.69	0	01:03	0	0.466	0.133	
EX-MH115	STORAGE	0.00	88.92	0	01:27	0	0.772	-0.037	
EX-MH116	STORAGE	0.00	96.07	0	01:11	0	0.771	-0.041	
EX-STUB02	STORAGE	0.00	178.60	0	01:11	0	0.619	0.018	
PR-BLDG01	STORAGE	577.80	577.80	0	01:10	0.86	0.86	0.010	
PR-BLDG02	STORAGE	130.91	130.91	0	01:10	0.19	0.19	0.012	
PR-CB01	STORAGE	47.56	47.56	0	01:10	0.0629	0.0629	-0.294	
PR-CB02	STORAGE	20.45	31.26	0	01:07	0.0272	0.0347	0.108	
PR-CB02a	STORAGE	0.00	60.52	0	01:03	0	0.0993	0.027	
PR-CB03	STORAGE	41.72	46.14	0	01:04	0.0503	0.0505	0.190	
PR-CB04	STORAGE	44.06	108.89	0	01:02	0.062	0.0757	-0.553	
PR-CB05	STORAGE	41.17	57.75	0	01:04	0.0583	0.0614	0.324	
PR-CB06	STORAGE	34.10	40.88	0	01:03	0.0435	0.0438	-0.140	
PR-CB07	STORAGE	38.42	57.66	0	01:03	0.0486	0.0928	0.015	
PR-CB08	STORAGE	51.09	59.64	0	01:04	0.0723	0.0732	-0.440	
PR-CB09	STORAGE	56.05	66.76	0	01:04	0.0793	0.0807	-0.460	
PR-CB10	STORAGE	56.42	56.42	0	01:10	0.075	0.075	-0.557	
PR-CB11	STORAGE	73.41	73.41	0	01:10	0.104	0.105	-0.033	
PR-CB12	STORAGE	98.70	124.17	0	01:01	0.14	0.245	0.348	
PR-CB13	STORAGE	25.79	25.79	0	01:10	0.0365	0.0365	0.004	
PR-CB14	STORAGE	21.64	39.46	0	01:10	0.0267	0.0313	-0.168	
PR-CB15	STORAGE	59.62	91.82	0	01:08	0.0765	0.0818	0.275	
PR-CB16/17	STORAGE	216.43	216.43	0	01:10	0.279	0.279	0.062	
PR-CB18	STORAGE	27.96	27.96	0	01:10	0.0365	0.0374	-0.172	
PR-CB19	STORAGE	31.56	95.86	0	01:10	0.0417	0.143	0.699	
PR-CB20	STORAGE	41.66	58.06	0	01:10	0.059	0.0872	-0.132	
PR-CB21	STORAGE	82.30	183.31	0	01:03	0.116	0.339	0.250	
PR-CB22	STORAGE	81.31	143.67	0	01:02	0.115	0.24	0.277	
PR-CB23	STORAGE	106.11	106.11	0	01:10	0.15	0.15	0.103	
PR-CB24	STORAGE	87.77	184.51	0	01:02	0.124	0.417	0.133	
PR-CB25	STORAGE	87.77	146.62	0	01:02	0.124	0.29	-0.085	
PR-CB26	STORAGE	116.53	116.53	0	01:10	0.165	0.165	0.221	
PR-CB27	STORAGE	78.85	121.08	0	01:02	0.112	0.221	0.231	
PR-CB28	STORAGE	76.87	76.87	0	01:10	0.109	0.109	0.027	
PR-CB29	STORAGE	115.65	115.65	0	01:10	0.16	0.16	-0.305	
PR-CB29a	STORAGE	0.00	25.41	0	01:10	0	0.148	0.400	
PR-CB30	STORAGE	45.13	62.45	0	01:08	0.0639	0.0726	-0.002	
PR-CB31	STORAGE	106.44	142.09	0	01:05	0.151	0.236	0.365	
PR-CB32	STORAGE	74.73	74.73	0	01:10	0.106	0.118	-0.793	
PR-CB33	STORAGE	15.75	15.75	0	01:10	0.0217	0.0217	0.003	
PR-CB34	STORAGE	13.60	29.00	0	01:04	0.0158	0.0165	0.057	
PR-CB35	STORAGE	23.38	40.65	0	01:04	0.0277	0.045	0.128	
PR-CB36	STORAGE	13.18	13.18	0	01:10	0.0161	0.0167	0.023	
PR-CBMH104	STORAGE	27.42	61.96	0	01:03	0.0352	0.0964	-0.196	
PR-CBMH105	STORAGE	16.52	68.41	0	01:03	0.0207	0.113	-0.210	
PR-CBMH106	STORAGE	57.30	104.55	0	01:03	0.08	0.154	-0.168	
PR-CBMH107	STORAGE	28.68	55.47	0	01:06	0.0342	0.0785	-0.052	
PR-CBMH108	STORAGE	64.98	116.63	0	01:03	0.0919	0.173	-0.427	

PR-CBMH109	STORAGE	108.62	198.84	0	01:04	0.154	0.397	-0.974
PR-CBMH109a	STORAGE	0.00	31.24	0	01:11	0	0.312	0.000
PR-CBMH110	STORAGE	113.98	168.56	0	01:07	0.142	0.226	-0.076
PR-CBMH111	STORAGE	31.56	104.05	0	01:06	0.0417	0.186	-0.528
PR-CBMH112	STORAGE	82.80	250.98	0	01:06	0.117	0.445	-1.121
PR-CBMH114	STORAGE	106.12	272.31	0	01:05	0.15	0.565	-0.230
PR-CBMH115	STORAGE	76.87	174.58	0	01:05	0.109	0.329	-0.238
PR-CBMH115a	STORAGE	0.00	10.47	0	02:10	0	0.269	0.017
PR-CBMH118	STORAGE	103.78	231.24	0	01:05	0.147	0.374	-1.224
PR-MH100	STORAGE	0.00	105.54	0	01:02	0	0.194	0.295
PR-MH100a	STORAGE	0.00	38.63	0	01:10	0	0.514	-0.020
PR-MH100b	STORAGE	0.00	88.17	0	01:10	0	0.809	-0.002
PR-MH101	STORAGE	0.00	102.97	0	01:49	0	1.18	-0.232
PR-MH102	STORAGE	0.00	248.83	0	01:50	0	1.94	0.159
PR-MH103	STORAGE	0.00	271.86	0	01:49	0	1.98	-0.072
PR-MH113	STORAGE	0.00	35.90	0	02:10	0	1.03	-0.023
PR-MH116	STORAGE	0.00	96.19	0	01:11	0	0.772	0.064
PR-MH117	STORAGE	0.00	39.25	0	01:10	0	0.485	-0.214
PR-MH119	STORAGE	0.00	59.06	0	01:34	0	1.22	0.020
PR-MH120	STORAGE	0.00	21.24	0	02:25	0	0.688	-0.038
PR-STUB01	STORAGE	0.00	39.59	0	01:20	0	0.245	0.052
PR-TD01	STORAGE	42.15	42.15	0	01:10	0.0549	0.0549	0.027

****
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 LPS
EX-BLDG01	0.004	0	0	0	0.162	4	0 01:16	178.60
EX-CB116	0.001	2	0	0	0.008	38	0 01:10	32.83
EX-CB117	0.002	2	0	0	0.038	45	0 01:30	40.97
EX-CB128	0.001	3	0	0	0.012	51	0 01:21	20.91
EX-CB134	0.000	1	0	0	0.007	82	0 01:11	19.61
EX-CB137	0.000	2	0	0	0.015	88	0 01:11	47.11
EX-CB14	0.031	8	0	0	0.372	93	0 01:42	57.69
EX-CB28	0.005	2	0	0	0.085	35	0 01:37	95.32
EX-CB30	0.003	2	0	0	0.064	36	0 01:24	98.89
EX-CB50	0.001	1	0	0	0.035	20	0 01:12	105.14
EX-CB52	0.002	1	0	0	0.066	41	0 01:22	87.77
EX-CB54	0.000	1	0	0	0.011	24	0 01:20	50.39
EX-CB58	0.001	0	0	0	0.023	18	0 01:11	52.89
EX-CB60	0.000	1	0	0	0.018	44	0 01:21	31.96
EX-CB62	0.000	1	0	0	0.010	41	0 01:22	21.83
EX-CB64	0.001	2	0	0	0.017	58	0 01:12	13.56
EX-CB72	0.000	0	0	0	0.004	39	0 01:11	11.58
EX-CB82	0.001	1	0	0	0.056	63	0 01:11	96.48
EX-CB84	0.001	0	0	0	0.029	16	0 01:11	35.70
EX-CB87	0.002	1	0	0	0.048	35	0 01:24	49.90
EX-CB90	0.001	1	0	0	0.023	24	0 01:11	54.49
EX-CB92	0.004	3	0	0	0.071	58	0 01:31	52.21
EX-CB95	0.001	3	0	0	0.013	42	0 01:31	65.34
EX-CB96	0.003	2	0	0	0.075	33	0 01:33	87.86
EX-MH101	0.000	3	0	0	0.000	21	0 01:20	1163.80
EX-MH101A	0.000	2	0	0	0.000	10	0 01:25	1004.70
EX-MH101B	0.000	1	0	0	0.000	8	0 01:25	1004.69
EX-MH102	0.000	2	0	0	0.000	10	0 01:25	947.29
EX-MH102A	0.000	8	0	0	0.000	15	0 01:35	59.06
EX-MH103	0.000	0	0	0	0.000	3	0 01:12	11.57
EX-MH104	0.000	3	0	0	0.001	34	0 01:25	877.45
EX-MH105	0.000	7	0	0	0.002	88	0 01:25	121.64
EX-MH105a	0.000	1	0	0	0.001	19	0 01:25	122.44
EX-MH106	0.000	4	0	0	0.002	56	0 01:26	109.30
EX-MH106a	0.000	7	0	0	0.002	88	0 01:25	132.60
EX-MH107	0.000	4	0	0	0.002	58	0 01:34	96.58
EX-MH107a	0.000	4	0	0	0.002	57	0 01:30	134.77
EX-MH108	0.000	3	0	0	0.002	83	0 01:24	188.75
EX-MH109	0.000	5	0	0	0.002	69	0 01:24	628.17
EX-MH112	0.000	3	0	0	0.002	55	0 01:23	116.69
EX-MH112a	0.000	3	0	0	0.001	61	0 01:25	112.50
EX-MH115	0.000	3	0	0	0.001	48	0 01:29	88.00
EX-MH116	0.000	3	0	0	0.001	50	0 01:27	88.92
EX-STUB02	0.000	3	0	0	0.002	91	0 01:24	178.46
PR-BLDG01	0.018	0	0	0	0.363	9	0 01:23	147.20

PR-BLDG02	0.005	1	0	0	0.087	10	0	01:23	28.00
PR-CB01	0.002	5	0	0	0.021	56	0	01:45	39.79
PR-CB02	0.002	5	0	0	0.021	52	0	01:45	17.20
PR-CB02a	0.000	9	0	0	0.001	57	0	01:45	51.77
PR-CB03	0.001	4	0	0	0.015	48	0	01:43	40.33
PR-CB04	0.012	14	0	0	0.055	63	0	01:43	62.54
PR-CB05	0.002	3	0	0	0.027	43	0	01:40	38.09
PR-CB06	0.001	5	0	0	0.017	61	0	01:42	26.46
PR-CB07	0.002	5	0	0	0.021	60	0	01:42	54.89
PR-CB08	0.003	5	0	0	0.031	45	0	01:50	48.41
PR-CB09	0.003	5	0	0	0.036	47	0	01:49	52.69
PR-CB10	0.004	4	0	0	0.045	47	0	01:39	6.72
PR-CB11	0.009	14	0	0	0.050	75	0	02:30	41.53
PR-CB12	0.013	12	0	0	0.072	64	0	02:30	94.60
PR-CB13	0.001	6	0	0	0.009	100	0	01:07	25.80
PR-CB14	0.001	5	0	0	0.012	99	0	01:20	10.10
PR-CB15	0.003	5	0	0	0.029	50	0	01:53	57.83
PR-CB16/17	0.001	0	0	0	0.053	24	0	01:14	96.58
PR-CB18	0.001	4	0	0	0.012	96	0	01:13	9.27
PR-CB19	0.000	3	0	0	0.007	97	0	01:38	72.82
PR-CB20	0.001	6	0	0	0.013	100	0	01:23	41.66
PR-CB21	0.005	12	0	0	0.038	99	0	01:30	169.68
PR-CB22	0.005	12	0	0	0.039	99	0	01:30	108.43
PR-CB23	0.004	13	0	0	0.033	100	0	01:20	71.96
PR-CB24	0.014	12	0	0	0.071	57	0	02:50	168.16
PR-CB25	0.014	12	0	0	0.070	57	0	02:50	106.28
PR-CB26	0.012	12	0	0	0.057	58	0	02:50	71.93
PR-CB27	0.007	6	0	0	0.050	40	0	02:11	99.80
PR-CB28	0.007	6	0	0	0.047	41	0	02:11	50.60
PR-CB29	0.013	11	0	0	0.099	85	0	01:40	11.53
PR-CB29a	0.000	1	0	0	0.000	5	0	01:10	24.98
PR-CB30	0.005	13	0	0	0.038	92	0	02:10	39.79
PR-CB31	0.011	13	0	0	0.079	92	0	02:10	133.15
PR-CB32	0.009	15	0	0	0.063	99	0	01:31	10.55
PR-CB33	0.000	0	0	0	0.000	0	0	00:00	15.74
PR-CB34	0.000	1	0	0	0.003	19	0	01:35	13.44
PR-CB35	0.000	0	0	0	0.002	9	0	01:35	32.29
PR-CB36	0.001	2	0	0	0.006	21	0	01:08	5.58
PR-CBMH104	0.003	6	0	0	0.026	43	0	01:40	24.07
PR-CBMH105	0.006	13	0	0	0.031	67	0	01:41	14.70
PR-CBMH106	0.011	8	0	0	0.067	48	0	01:50	16.31
PR-CBMH107	0.003	4	0	0	0.034	51	0	01:33	27.86
PR-CBMH108	0.012	10	0	0	0.073	64	0	01:44	20.55
PR-CBMH109	0.059	24	0	0	0.178	71	0	02:30	11.00
PR-CBMH109a	0.000	2	0	0	0.001	29	0	01:26	21.71
PR-CBMH110	0.029	21	0	0	0.131	96	0	01:52	41.36
PR-CBMH111	0.011	15	0	0	0.072	99	0	01:37	49.55
PR-CBMH112	0.053	28	0	0	0.187	99	0	01:31	24.63
PR-CBMH114	0.092	34	0	0	0.218	80	0	02:50	16.61
PR-CBMH115	0.036	18	0	0	0.128	64	0	02:10	11.71
PR-CBMH115a	0.000	1	0	0	0.000	2	0	02:11	10.47
PR-CBMH118	0.033	21	0	0	0.132	83	0	02:06	37.28
PR-MH100	0.000	16	0	0	0.001	94	0	01:43	73.52
PR-MH100a	0.000	3	0	0	0.001	51	0	01:26	45.09
PR-MH100b	0.000	3	0	0	0.001	52	0	01:26	83.00
PR-MH101	0.000	4	0	0	0.001	54	0	01:25	117.29
PR-MH102	0.000	4	0	0	0.002	63	0	01:25	261.18
PR-MH103	0.000	4	0	0	0.002	67	0	01:25	279.82
PR-MH113	0.000	3	0	0	0.000	6	0	02:11	35.90
PR-MH116	0.000	3	0	0	0.000	16	0	01:11	96.07
PR-MH117	0.000	2	0	0	0.000	9	0	01:10	37.44
PR-MH119	0.000	3	0	0	0.000	8	0	01:34	59.07
PR-MH120	0.000	2	0	0	0.000	5	0	02:26	21.24
PR-STUB01	0.000	0	0	0	0.000	1	0	01:20	39.59
PR-TD01	0.000	0	0	0	0.018	4	0	01:20	11.59

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
HP-EX-CB134	0.00	0.00	0.00	0.000
HP-EX-CB14	0.00	0.00	0.00	0.000
HP-PR-CB01	0.00	0.00	0.00	0.000
HP-PR-CB11	0.00	0.00	0.00	0.000
HP-PR-CB29	0.00	0.00	0.00	0.000
HP-PR-CB30	0.00	0.00	0.00	0.000
HP-PR-CB31	0.00	0.00	0.00	0.000
HP-PR-CB32	0.00	0.00	0.00	0.000
HP-PR-CBMH118	0.00	0.00	0.00	0.000
IF-EX-CB116	14.04	0.13	0.14	0.002
IF-EX-CB117	15.45	0.13	0.14	0.002
IF-EX-CB128	16.66	0.12	0.14	0.002
IF-EX-CB137	15.50	0.19	0.21	0.003
IF-EX-CB14	32.63	0.11	0.14	0.003
IF-EX-CB28	17.02	0.13	0.14	0.002
IF-EX-CB30	18.35	0.12	0.14	0.002

IF-EX-CB50	18.54	0.13	0.14	0.002
IF-EX-CB52	17.66	0.12	0.14	0.002
IF-EX-CB54	14.59	0.13	0.14	0.002
IF-EX-CB58	17.12	0.12	0.14	0.002
IF-EX-CB64	14.28	0.13	0.14	0.002
IF-EX-CB82	21.33	0.17	0.21	0.003
IF-EX-CB84	16.53	0.19	0.21	0.003
IF-EX-CB87	17.17	0.12	0.14	0.002
IF-EX-CB90	16.05	0.13	0.14	0.002
IF-EX-CB92	18.98	0.12	0.14	0.002
IF-EX-CB95	17.36	0.12	0.14	0.002
IF-EX-CB96	16.71	0.13	0.14	0.002
IF-PR-CB04	71.80	0.39	0.39	0.024
IF-PR-CB10	30.56	0.27	0.27	0.007
IF-PR-CB13	20.51	0.15	0.15	0.003
IF-PR-CB14	19.95	0.15	0.15	0.003
IF-PR-CB18	20.62	0.15	0.15	0.003
IF-PR-CB29	34.71	1.14	1.17	0.034
IF-PR-CB32	41.08	1.57	1.61	0.056
IF-PR-CB36	33.76	0.15	0.15	0.004
IF-PR-CBMH104	37.22	0.15	0.15	0.005
IF-PR-CBMH105	53.53	0.27	0.27	0.012
IF-PR-CBMH106	40.56	0.52	0.52	0.018
IF-PR-CBMH107	26.62	0.21	0.21	0.005
IF-PR-CBMH108	38.92	0.58	0.58	0.019
IF-PR-CBMH109	66.83	1.55	1.55	0.089
IF-PR-CBMH110	50.91	1.24	1.24	0.054
IF-PR-CBMH111	34.87	0.94	0.94	0.028
IF-PR-CBMH112	56.63	2.17	2.18	0.106
IF-PR-CBMH114	77.45	2.18	2.18	0.146
IF-PR-CBMH115	56.46	1.24	1.24	0.060
IF-PR-CBMH118	46.90	2.24	2.28	0.091
Major-01	0.00	0.00	0.00	0.000
OF1	0.00	0.00	0.00	0.000
SWM_Pond	71.81	134.26	1163.80	8.285
System	24.86	154.04	1162.77	9.091

****
Link Flow Summary
****

	Maximum |Flow|	Time of Max Occurrence	Maximum |Veloc|	Max/ Full	Max/ Full

Link	Type	LPS	days	hr:min	m/sec	Flow	Depth
102_(CB)	CONDUIT	54.89	0	01:03	1.12	1.33	1.00
104_(CB)	CONDUIT	26.46	0	01:03	0.57	0.64	1.00
108_(CB)	CONDUIT	40.33	0	01:03	0.82	1.05	1.00
115_(CB)	CONDUIT	72.82	0	01:06	1.47	0.75	1.00
121_(CB)	CONDUIT	41.66	0	01:10	0.95	0.61	1.00
126_(STM)	CONDUIT	39.79	0	01:05	0.56	0.57	1.00
138_(CB)_1	CONDUIT	39.79	0	01:02	0.56	0.58	1.00
138_(CB)_2	CONDUIT	51.77	0	01:02	0.73	0.76	1.00
14_(STM)	CONDUIT	112.50	0	01:11	1.63	2.62	1.00
142_(STM)	CONDUIT	66.44	0	01:02	1.05	1.05	1.00
145_(CB)	CONDUIT	52.69	0	01:03	1.07	1.27	1.00
150_(STM)_1	CONDUIT	24.98	0	01:10	1.01	0.28	0.39
154_(CB)	CONDUIT	133.15	0	01:05	1.88	1.93	1.00
156_(STM)	CONDUIT	17.20	0	01:02	0.35	0.44	1.00
17_(1)_(STM)_4	CONDUIT	37.44	0	01:10	0.99	0.56	0.53
20_(STM)	CONDUIT	39.59	0	01:20	1.68	0.47	0.52
226_(CB)	CONDUIT	17.16	0	01:04	0.37	0.40	1.00
230_(CB)	CONDUIT	29.76	0	01:06	0.61	0.70	1.00
28_(1)_(STM)	CONDUIT	35.90	0	02:11	1.25	0.37	0.48
28_(STM)	CONDUIT	59.07	0	01:34	1.20	0.61	0.66
30_(STM)	CONDUIT	21.24	0	02:26	1.00	0.25	0.36
32_(STM)	CONDUIT	10.47	0	02:11	0.82	0.11	0.26
34_(1)_(STM)	CONDUIT	50.60	0	01:02	1.03	1.22	1.00
34_(STM)	CONDUIT	99.80	0	01:03	2.03	1.83	1.00
36_(1)_(STM)	CONDUIT	106.28	0	01:02	1.50	1.57	1.00
36_(STM)	CONDUIT	168.16	0	01:04	2.38	2.49	1.00
42_(1)_(STM)	CONDUIT	71.96	0	01:02	1.02	1.04	1.00
42_(2)_(STM)	CONDUIT	108.43	0	01:03	1.53	1.60	1.00
49_(STM)	CONDUIT	71.93	0	01:02	1.02	1.07	1.00
5_(STM)_1	CONDUIT	45.09	0	01:49	0.68	0.29	1.00
5_(STM)_2	CONDUIT	83.00	0	01:50	0.95	0.54	1.00
54_(STM)	CONDUIT	169.68	0	01:04	2.40	2.51	1.00
57_(STM)	CONDUIT	22.35	0	01:11	0.68	0.33	1.00
59_(STM)	CONDUIT	94.60	0	01:02	1.93	2.27	1.00
61_(STM)	CONDUIT	41.53	0	01:01	0.85	0.98	1.00
64_(CB)	CONDUIT	57.83	0	01:07	1.18	0.97	1.00
7_(STM)	CONDUIT	117.29	0	01:50	0.99	0.50	1.00
86_(CB)	CONDUIT	48.41	0	01:03	0.99	1.16	1.00
9_(1)_(STM)	CONDUIT	279.82	0	01:49	0.99	0.83	1.00
9_(STM)_2	CONDUIT	261.18	0	01:49	0.92	0.78	1.00
94_(CB)	CONDUIT	38.09	0	01:03	0.78	0.90	1.00
C1	CONDUIT	32.69	0	01:04	1.07	0.37	1.00
C10	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C100	CONDUIT	0.00	0	00:00	0.00	0.00	0.10

C101	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C102	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C103	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C104	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C105	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C106	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C107	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C108	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C109	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C11	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C110	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C111	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C112	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C113	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C114	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C115	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C116	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C117	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C118	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C119	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C12	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C120	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C121	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C122	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C123	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C124	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C125	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C126	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C127	CONDUIT	0.00	0	00:00	0.00	0.00	0.04
C128	CONDUIT	17.83	0	01:09	0.13	0.00	0.05
C129	CONDUIT	17.83	0	01:10	0.67	0.00	0.05
C13	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C130	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C131	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C132	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C133	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C135	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C136	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C137	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C138	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C139	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C14	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C142	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C143	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C144	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C145	CONDUIT	0.00	0	00:00	0.00	0.00	0.00

C146	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C147	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C148	CONDUIT	0.00	0	00:00	0.00	0.00	0.03
C149	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C15	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C150	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C151	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C152	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C16	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C17	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C18	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C19	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C2	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C20	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C21	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C22	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C23	CONDUIT	17.03	0	01:20	0.82	0.00	0.08
C24	CONDUIT	10.78	0	01:30	0.67	0.00	0.08
C25	CONDUIT	8.19	0	01:30	0.06	0.00	0.08
C26	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C27	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C28	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C29	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C3	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C30	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C31	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C32	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C33	CONDUIT	0.00	0	00:00	0.00	0.00	0.02
C34	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C35	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C36	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C37	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C38	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C39	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C4	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C40	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C41	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C42	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C43	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C44	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C45	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C46	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C47	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C48	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C49	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C5	CONDUIT	0.00	0	00:00	0.00	0.00	0.09

C50	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C51	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C52	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C53	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C53_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C53_2	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C54	CONDUIT	4.01	0	01:20	0.03	0.00	0.05
C54_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C54_2	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C55	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C56	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C57	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C58	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C59	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C6	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C60	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C61	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C62	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C63	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C64	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C65	CONDUIT	4.01	0	01:20	0.02	0.00	0.10
C66	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C67	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C68	CONDUIT	2.52	0	01:31	0.01	0.00	0.10
C69	CONDUIT	2.52	0	01:31	0.06	0.00	0.07
C7	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C70	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C71	CONDUIT	8.41	0	01:40	0.04	0.00	0.08
C72	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C73	CONDUIT	6.93	0	01:38	0.03	0.00	0.08
C74	CONDUIT	2.11	0	01:37	0.01	0.00	0.08
C75	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C76	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C77	CONDUIT	8.41	0	01:40	0.80	0.00	0.00
C78	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C79	CONDUIT	6.93	0	01:38	0.68	0.00	0.00
C8	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C81	CONDUIT	2.11	0	01:37	0.00	0.00	0.00
C82	CONDUIT	16.58	0	01:38	0.01	0.00	0.50
C83	CONDUIT	0.00	0	00:00	0.00	0.00	0.34
C84	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C84_2	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C85	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C87	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C88	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C89	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C9	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C90	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C91	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C92	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C93	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
C94	CONDUIT	3.79	0	01:12	0.02	0.00	0.10
C95	CONDUIT	3.79	0	01:12	0.02	0.00	0.05
C96	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C97	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C98	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C99	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C-CB22	CONDUIT	10.78	0	01:30	0.03	0.00	0.11
C-CB23	CONDUIT	17.04	0	01:20	0.05	0.00	0.11
C-CB24	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C-CB25	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C-CB87	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C-CBMH112	CONDUIT	8.19	0	01:30	0.03	0.00	0.10
C-CBMH114	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
EXMH101-OUT	CONDUIT	1163.80	0	01:20	3.90	0.74	0.64
EXMH115-101	CONDUIT	88.00	0	01:29	1.24	1.29	1.00
EXMH116-115	CONDUIT	88.92	0	01:27	1.26	1.31	1.00
PRMH116-EX-MH116	CONDUIT	96.07	0	01:11	3.02	0.66	0.80
X-CB-129_(X-CB)	CONDUIT	65.20	0	01:03	2.08	2.39	1.00
X-CB-89_(X-CB)	CONDUIT	49.76	0	01:03	1.58	0.78	1.00
X-CB-91_(X-CB)	CONDUIT	54.35	0	01:03	1.73	0.73	1.00
X-CB-94_(X-CB)	CONDUIT	52.07	0	01:02	1.66	1.36	1.00
X-CB-97_(X-CB)	CONDUIT	68.85	0	01:02	0.97	0.85	1.00
X-CB-98_(X-CB)	CONDUIT	75.75	0	01:04	1.07	2.19	1.00
X-STM-13_(1)_(X-STM)	CONDUIT	1004.70	0	01:25	3.28	0.76	0.65
X-STM-13_(X-STM)	CONDUIT	1004.69	0	01:25	3.75	0.60	0.58
X-STM-17_(X-STM)	CONDUIT	947.29	0	01:25	3.39	0.68	0.61
X-STM-19_(X-STM)	CONDUIT	59.06	0	01:35	1.30	0.65	0.61
X-STM-21_(X-STM)	CONDUIT	877.45	0	01:25	3.13	1.25	0.97
X-STM-23_(X-STM)	CONDUIT	122.44	0	01:35	1.20	1.03	1.00
X-STM-25_(X-STM)_1	CONDUIT	109.30	0	02:17	1.30	0.30	1.00
X-STM-25_(X-STM)_2	CONDUIT	132.60	0	01:03	0.83	0.36	1.00
X-STM-27_(X-STM)_1	CONDUIT	96.58	0	01:03	1.37	1.83	1.00
X-STM-27_(X-STM)_2	CONDUIT	134.77	0	01:03	1.91	3.40	1.00
X-STM-29_(X-STM)	CONDUIT	95.18	0	01:02	1.35	3.79	1.00
X-STM-31_(X-STM)	CONDUIT	98.75	0	01:02	1.40	1.50	1.00
X-STM-33_(X-STM)	CONDUIT	628.17	0	01:35	2.22	1.77	1.00
X-STM-51_(X-STM)	CONDUIT	94.21	0	01:03	1.33	3.24	1.00
X-STM-53_(X-STM)	CONDUIT	76.31	0	01:52	1.08	1.85	1.00
X-STM-55_(X-STM)	CONDUIT	83.35	0	01:02	1.70	1.79	1.00
X-STM-59_(X-STM)	CONDUIT	52.75	0	01:03	1.68	1.60	1.00
X-STM-63_(X-STM)	CONDUIT	21.83	0	01:55	0.71	0.89	1.00

X-STM-71_(X-STM)	CONDUIT	11.57	0	01:12	0.94	0.11	0.23	
X-STM-75_(X-STM)	CONDUIT	188.75	0	01:11	1.71	1.02	1.00	
X-STM-77_(X-STM)	CONDUIT	178.46	0	01:24	1.62	1.56	1.00	
102_(5)_(CB)	ORIFICE	7.32	0	01:53			1.00	
114_(CB)	ORIFICE	14.40	0	01:37			1.00	
124_(CB)	ORIFICE	9.12	0	01:13			1.00	
131_(CB)	ORIFICE	11.36	0	02:14			1.00	
147_(CB)	ORIFICE	9.21	0	01:49			1.00	
151_(STM)	ORIFICE	10.36	0	01:42			1.00	
42_(STM)	ORIFICE	14.70	0	01:31			1.00	
46_(STM)	ORIFICE	10.77	0	02:50			1.00	
66_(CB)	ORIFICE	8.36	0	01:57			1.00	
69_(CB)	ORIFICE	14.15	0	01:45			1.00	
78_(CB)	ORIFICE	8.01	0	01:09			1.00	
81_(CB)	ORIFICE	7.50	0	01:09			1.00	
88_(CB)	ORIFICE	7.47	0	01:50			1.00	
91_(CB)	ORIFICE	6.45	0	01:56			1.00	
96_(CB)	ORIFICE	7.33	0	01:53			1.00	
OR1	ORIFICE	8.94	0	01:32			1.00	
OR10	ORIFICE	11.59	0	01:20			1.00	
OR11	ORIFICE	116.69	0	01:03			1.00	
OR12	ORIFICE	5.43	0	01:11			1.00	
OR13	ORIFICE	15.74	0	01:09			0.70	
OR14	ORIFICE	19.61	0	01:11			1.00	
OR2	ORIFICE	10.47	0	02:10			1.00	
OR3	ORIFICE	31.49	0	01:09			1.00	
OR4	ORIFICE	9.45	0	02:30			1.00	
OR5	ORIFICE	11.71	0	01:53			1.00	
OR6	ORIFICE	96.58	0	01:09			1.00	
OR7	ORIFICE	121.64	0	01:37			1.00	
OR8	ORIFICE	10.82	0	01:09			1.00	
OR9	ORIFICE	7.74	0	01:56			1.00	
X-CB-135_(X-CB)	ORIFICE	46.90	0	01:08			1.00	
X-CB-83_(X-CB)	ORIFICE	96.27	0	01:11			1.00	
X-CB-86_(X-CB)	ORIFICE	35.49	0	01:11			1.00	
X-STM-15_(X-STM)	ORIFICE	57.55	0	01:42			1.00	
X-STM-73_(X-STM)	ORIFICE	11.58	0	01:11			1.00	
EX-BLDG01-OUT	DUMMY	178.60	0	01:11				
INFIL-EX-CB116	DUMMY	0.14	0	00:25				
INFIL-EX-CB117	DUMMY	0.14	0	00:25				
INFIL-EX-CB128	DUMMY	0.14	0	00:26				
INFIL-EX-CB137	DUMMY	0.21	0	00:25				
INFIL-EX-CB14	DUMMY	0.14	0	00:24				
INFIL-EX-CB28	DUMMY	0.14	0	00:24				
INFIL-EX-CB30	DUMMY	0.14	0	00:25				
INFIL-EX-CB50	DUMMY	0.14	0	00:24				

INFIL-EX-CB52	DUMMY	0.14	0	00:25
INFIL-EX-CB54	DUMMY	0.14	0	00:25
INFIL-EX-CB58	DUMMY	0.14	0	00:25
INFIL-EX-CB64	DUMMY	0.14	0	00:25
INFIL-EX-CB82	DUMMY	0.21	0	00:25
INFIL-EX-CB84	DUMMY	0.21	0	00:25
INFIL-EX-CB87	DUMMY	0.14	0	00:25
INFIL-EX-CB90	DUMMY	0.14	0	00:25
INFIL-EX-CB92	DUMMY	0.14	0	00:25
INFIL-EX-CB95	DUMMY	0.14	0	00:26
INFIL-EX-CB96	DUMMY	0.14	0	00:24
INFIL-PR-CB04	DUMMY	0.39	0	00:25
INFIL-PR-CB10	DUMMY	0.27	0	00:26
INFIL-PR-CB13	DUMMY	0.15	0	00:25
INFIL-PR-CB14	DUMMY	0.15	0	00:25
INFIL-PR-CB18	DUMMY	0.15	0	00:25
INFIL-PR-CB29	DUMMY	1.17	0	00:27
INFIL-PR-CB32	DUMMY	1.61	0	00:29
INFIL-PR-CB36	DUMMY	0.15	0	00:26
INFIL-PR-CBMH104	DUMMY	0.15	0	00:25
INFIL-PR-CBMH105	DUMMY	0.27	0	00:26
INFIL-PR-CBMH106	DUMMY	0.52	0	00:26
INFIL-PR-CBMH107	DUMMY	0.21	0	00:25
INFIL-PR-CBMH108	DUMMY	0.58	0	00:26
INFIL-PR-CBMH109	DUMMY	1.55	0	00:26
INFIL-PR-CBMH110	DUMMY	1.24	0	00:26
INFIL-PR-CBMH111	DUMMY	0.94	0	00:27
INFIL-PR-CBMH112	DUMMY	2.18	0	00:28
INFIL-PR-CBMH114	DUMMY	2.18	0	00:27
INFIL-PR-CBMH115	DUMMY	1.24	0	00:27
INFIL-PR-CBMH118	DUMMY	2.28	0	00:28
PR-BLDG01-OUT	DUMMY	147.20	0	01:16
PR-BLDG02-OUT	DUMMY	28.00	0	01:11

****
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
102_(CB)	1.00	0.02	0.00	0.00	0.24	0.00	0.00	0.75	0.04	0.00
104_(CB)	1.00	0.02	0.00	0.00	0.22	0.00	0.00	0.77	0.03	0.00

108_(CB)	1.00	0.02	0.00	0.00	0.21	0.00	0.00	0.78	0.00	0.00
115_(CB)	1.00	0.02	0.00	0.00	0.21	0.00	0.00	0.78	0.09	0.00
121_(CB)	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.89	0.00
126_(STM)	1.00	0.02	0.00	0.00	0.35	0.00	0.00	0.64	0.11	0.00
138_(CB)_1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.78	0.00
138_(CB)_2	1.00	0.02	0.00	0.00	0.24	0.00	0.00	0.75	0.03	0.00
14_(STM)	1.00	0.02	0.00	0.00	0.03	0.00	0.00	0.96	0.00	0.00
142_(STM)	1.00	0.76	0.00	0.00	0.19	0.00	0.01	0.03	0.01	0.00
145_(CB)	1.00	0.02	0.00	0.00	0.27	0.00	0.00	0.71	0.05	0.00
150_(STM)_1	1.00	0.56	0.04	0.00	0.29	0.00	0.00	0.10	0.95	0.00
154_(CB)	1.00	0.02	0.00	0.00	0.37	0.00	0.00	0.62	0.04	0.00
156_(STM)	1.00	0.02	0.00	0.00	0.22	0.00	0.00	0.76	0.01	0.00
17_(1)_(STM)_4	1.00	0.53	0.01	0.00	0.02	0.00	0.00	0.44	0.02	0.00
20_(STM)	1.00	0.01	0.00	0.00	0.27	0.08	0.00	0.64	0.35	0.00
226_(CB)	1.00	0.02	0.00	0.00	0.16	0.00	0.00	0.82	0.03	0.00
230_(CB)	1.00	0.02	0.00	0.00	0.17	0.00	0.00	0.81	0.03	0.00
28_(1)_(STM)	1.00	0.03	0.00	0.00	0.00	0.16	0.00	0.81	0.16	0.00
28_(STM)	1.00	0.03	0.21	0.00	0.75	0.00	0.00	0.00	0.78	0.00
30_(STM)	1.00	0.03	0.00	0.00	0.00	0.30	0.00	0.67	0.30	0.00
32_(STM)	1.00	0.33	0.17	0.00	0.48	0.01	0.00	0.01	0.96	0.00
34_(1)_(STM)	1.00	0.02	0.00	0.00	0.32	0.00	0.00	0.67	0.08	0.00
34_(STM)	1.00	0.02	0.00	0.00	0.42	0.00	0.00	0.56	0.13	0.00
36_(1)_(STM)	1.00	0.02	0.00	0.00	0.57	0.00	0.00	0.41	0.14	0.00
36_(STM)	1.00	0.02	0.00	0.00	0.66	0.00	0.00	0.33	0.13	0.00
42_(1)_(STM)	1.00	0.02	0.00	0.00	0.26	0.00	0.00	0.72	0.06	0.00
42_(2)_(STM)	1.00	0.02	0.00	0.00	0.33	0.00	0.00	0.65	0.09	0.00
49_(STM)	1.00	0.02	0.00	0.00	0.44	0.00	0.00	0.54	0.09	0.00
5_(STM)_1	1.00	0.02	0.03	0.00	0.95	0.00	0.00	0.00	0.94	0.00
5_(STM)_2	1.00	0.02	0.00	0.00	0.03	0.00	0.00	0.95	0.00	0.00
54_(STM)	1.00	0.02	0.00	0.00	0.44	0.00	0.00	0.54	0.09	0.00
57_(STM)	1.00	0.38	0.00	0.00	0.03	0.00	0.00	0.59	0.01	0.00
59_(STM)	1.00	0.02	0.00	0.00	0.54	0.00	0.00	0.44	0.28	0.00
61_(STM)	1.00	0.02	0.00	0.00	0.47	0.00	0.00	0.51	0.36	0.00
64_(CB)	1.00	0.02	0.00	0.00	0.38	0.00	0.00	0.60	0.71	0.00
7_(STM)	1.00	0.02	0.00	0.00	0.05	0.00	0.00	0.93	0.01	0.00
86_(CB)	1.00	0.02	0.00	0.00	0.29	0.00	0.00	0.69	0.09	0.00
9_(1)_(STM)	1.00	0.01	0.01	0.00	0.16	0.00	0.00	0.82	0.01	0.00
9_(STM)_2	1.00	0.02	0.00	0.00	0.56	0.00	0.00	0.43	0.19	0.00
94_(CB)	1.00	0.02	0.00	0.00	0.20	0.00	0.00	0.79	0.03	0.00
C1	1.00	0.86	0.00	0.00	0.11	0.01	0.00	0.03	0.04	0.00
C10	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C100	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C101	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C102	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C103	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C104	1.00	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C105	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C106	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C107	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C108	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C109	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C110	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C111	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C112	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C113	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C114	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C115	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C116	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C117	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C118	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C119	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C12	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C120	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C121	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C122	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C123	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C124	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C125	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C126	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C127	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C128	1.00	0.98	0.01	0.00	0.01	0.00	0.00	0.00	0.94	0.00
C129	1.00	0.97	0.02	0.00	0.01	0.00	0.00	0.00	0.95	0.00
C13	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C130	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C131	1.00	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C132	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C133	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C135	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C136	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C137	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C138	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C139	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C14	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C142	1.00	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C143	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C144	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C145	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C146	1.00	0.92	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C147	1.00	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C148	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C149	1.00	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C15	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C150	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C151	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C152	1.00	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16	1.00	0.78	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C17	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C18	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C19	1.00	0.81	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.77	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	0.81	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C21	1.00	0.82	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C22	1.00	0.82	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C23	1.00	0.94	0.00	0.00	0.05	0.00	0.00	0.01	0.94	0.00
C24	1.00	0.95	0.01	0.00	0.05	0.00	0.00	0.00	0.94	0.00
C25	1.00	0.95	0.02	0.00	0.03	0.00	0.00	0.00	0.94	0.00
C26	1.00	0.78	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C27	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C28	1.00	0.78	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C29	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3	1.00	0.77	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C30	1.00	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C31	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C32	1.00	0.78	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C33	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C34	1.00	0.70	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C35	1.00	0.70	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C36	1.00	0.70	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C37	1.00	0.70	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C38	1.00	0.70	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C39	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.77	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C40	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C41	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C42	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C43	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C44	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C45	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C46	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C47	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C48	1.00	0.89	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C49	1.00	0.89	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.78	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C50	1.00	0.89	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C51	1.00	0.89	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C52	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C53	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C53_1	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C53_2	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C54	1.00	0.97	0.02	0.00	0.01	0.00	0.00	0.00	0.94	0.00
C54_1	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C54_2	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C55	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C56	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C57	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C58	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C59	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C6	1.00	0.77	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C60	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C61	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C62	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C63	1.00	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C64	1.00	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C65	1.00	0.84	0.15	0.00	0.01	0.00	0.00	0.00	0.95	0.00
C66	1.00	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C67	1.00	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C68	1.00	0.82	0.17	0.00	0.01	0.00	0.00	0.00	0.93	0.00
C69	1.00	0.97	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.00
C7	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C70	1.00	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C71	1.00	0.95	0.03	0.00	0.02	0.00	0.00	0.00	0.92	0.00
C72	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C73	1.00	0.95	0.04	0.00	0.01	0.00	0.00	0.00	0.92	0.00
C74	1.00	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.93	0.00
C75	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C76	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C77	1.00	0.98	0.00	0.00	0.00	0.02	0.00	0.00	0.92	0.00
C78	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C79	1.00	0.98	0.01	0.00	0.00	0.01	0.00	0.00	0.93	0.00
C8	1.00	0.77	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C81	1.00	0.98	0.01	0.00	0.00	0.00	0.00	0.00	0.93	0.00
C82	1.00	0.86	0.12	0.00	0.02	0.00	0.00	0.00	0.94	0.00
C83	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C84	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C84_2	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C85	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C87	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C88	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C89	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C9	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C90	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C91	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C92	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C93	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C94	1.00	0.84	0.15	0.00	0.01	0.00	0.00	0.00	0.95	0.00
C95	1.00	0.96	0.02	0.00	0.01	0.00	0.00	0.00	0.94	0.00
C96	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C97	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C98	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C99	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-CB22	1.00	0.81	0.14	0.00	0.05	0.00	0.00	0.00	0.90	0.00
C-CB23	1.00	0.81	0.13	0.00	0.06	0.00	0.00	0.00	0.89	0.00
C-CB24	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-CB25	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-CB87	1.00	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-CBMH112	1.00	0.82	0.15	0.00	0.03	0.00	0.00	0.00	0.91	0.00
C-CBMH114	1.00	0.65	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EXMH101-OUT	1.00	0.01	0.00	0.00	0.29	0.70	0.00	0.00	0.69	0.00
EXMH115-101	1.00	0.01	0.00	0.00	0.63	0.00	0.00	0.36	0.51	0.00
EXMH116-115	1.00	0.01	0.00	0.00	0.98	0.01	0.00	0.00	0.84	0.00
PRMH116-EX-MH116	1.00	0.01	0.00	0.00	0.00	0.04	0.00	0.95	0.04	0.00
X-CB-129_(X-CB)	1.00	0.84	0.00	0.00	0.09	0.00	0.00	0.07	0.00	0.00
X-CB-89_(X-CB)	1.00	0.83	0.00	0.00	0.10	0.00	0.00	0.07	0.01	0.00
X-CB-91_(X-CB)	1.00	0.84	0.00	0.00	0.10	0.00	0.00	0.05	0.01	0.00
X-CB-94_(X-CB)	1.00	0.02	0.80	0.00	0.18	0.00	0.00	0.00	0.89	0.00
X-CB-97_(X-CB)	1.00	0.83	0.00	0.00	0.11	0.00	0.00	0.05	0.02	0.00
X-CB-98_(X-CB)	1.00	0.02	0.82	0.00	0.16	0.00	0.00	0.00	0.85	0.00
X-STM-13_(1)_(X-STM)	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
X-STM-13_(X-STM)	1.00	0.01	0.00	0.00	0.00	0.10	0.00	0.89	0.08	0.00
X-STM-17_(X-STM)	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
X-STM-19_(X-STM)	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.97	0.00	0.00
X-STM-21_(X-STM)	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
X-STM-23_(X-STM)	1.00	0.02	0.00	0.00	0.02	0.00	0.00	0.96	0.00	0.00
X-STM-25_(X-STM)_1	1.00	0.02	0.00	0.00	0.95	0.03	0.00	0.00	0.89	0.00
X-STM-25_(X-STM)_2	1.00	0.02	0.00	0.00	0.12	0.01	0.00	0.85	0.02	0.00
X-STM-27_(X-STM)_1	1.00	0.02	0.78	0.00	0.20	0.00	0.00	0.00	0.89	0.00
X-STM-27_(X-STM)_2	1.00	0.02	0.00	0.00	0.09	0.00	0.00	0.89	0.00	0.00
X-STM-29_(X-STM)	1.00	0.83	0.00	0.00	0.09	0.00	0.00	0.07	0.00	0.00
X-STM-31_(X-STM)	1.00	0.82	0.00	0.00	0.10	0.00	0.00	0.08	0.00	0.00
X-STM-33_(X-STM)	1.00	0.01	0.00	0.00	0.03	0.00	0.00	0.96	0.00	0.00
X-STM-51_(X-STM)	1.00	0.82	0.00	0.00	0.06	0.00	0.00	0.13	0.00	0.00
X-STM-53_(X-STM)	1.00	0.79	0.03	0.00	0.17	0.00	0.00	0.00	0.92	0.00
X-STM-55_(X-STM)	1.00	0.82	0.04	0.00	0.14	0.00	0.00	0.00	0.93	0.00
X-STM-59_(X-STM)	1.00	0.83	0.00	0.00	0.06	0.00	0.00	0.11	0.00	0.00
X-STM-63_(X-STM)	1.00	0.02	0.00	0.00	0.04	0.00	0.00	0.94	0.00	0.00
X-STM-71_(X-STM)	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
X-STM-75_(X-STM)	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.94	0.00
X-STM-77_(X-STM)	1.00	0.01	0.00	0.00	0.91	0.09	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
102_(CB)	3.47	3.47	3.87	0.03	0.03
104_(CB)	3.41	3.41	3.44	0.01	0.01
108_(CB)	3.95	3.95	3.97	0.01	0.01
115_(CB)	2.08	2.08	3.17	0.01	0.01
121_(CB)	1.99	1.99	2.08	0.01	0.01
126_(STM)	5.52	5.52	5.60	0.01	0.01
138_(CB)_1	3.92	3.92	3.96	0.01	0.01
138_(CB)_2	3.96	3.96	4.33	0.01	0.01
14_(STM)	0.58	1.05	0.58	1.28	0.58
142_(STM)	3.90	3.90	3.95	0.01	0.01
145_(CB)	4.07	4.07	4.98	0.04	0.04
154_(CB)	5.61	5.63	6.74	0.07	0.04
156_(STM)	3.95	3.95	3.99	0.01	0.01
226_(CB)	2.38	2.38	2.60	0.01	0.01
230_(CB)	2.63	2.63	2.95	0.01	0.01
34_(1)_(STM)	5.66	5.66	5.73	0.02	0.02
34_(STM)	5.73	5.74	7.74	0.08	0.07
36_(1)_(STM)	8.79	8.79	9.12	0.09	0.09
36_(STM)	9.26	9.28	11.82	0.11	0.08
42_(1)_(STM)	4.72	4.72	4.80	0.01	0.01
42_(2)_(STM)	4.80	4.80	4.89	0.12	0.11
49_(STM)	8.68	8.68	8.77	0.01	0.01
5_(STM)_1	0.48	0.48	0.61	0.01	0.01
5_(STM)_2	0.61	0.61	0.67	0.01	0.01
54_(STM)	5.19	5.22	7.24	0.13	0.08
57_(STM)	0.52	0.52	0.64	0.01	0.01
59_(STM)	8.12	8.12	10.15	0.09	0.09
61_(STM)	7.41	7.41	8.00	0.01	0.01
64_(CB)	4.01	4.01	6.52	0.01	0.02
7_(STM)	0.70	0.70	0.84	0.01	0.01
86_(CB)	4.40	4.40	5.36	0.03	0.04
9_(1)_(STM)	0.92	0.92	0.95	0.01	0.28
9_(STM)_2	0.86	0.86	0.91	0.01	0.01
94_(CB)	3.10	3.10	3.56	0.01	0.01
C1	1.68	1.68	2.11	0.01	0.01
C82	0.01	0.01	22.44	0.01	0.01

EXMH115-101	1.07	1.07	1.20	0.91	1.02
EXMH116-115	1.00	1.00	1.07	0.94	0.91
PRMH116-EX-MH116	0.01	0.01	0.86	0.01	0.01
X-CB-129_(X-CB)	1.96	1.96	2.00	0.01	0.01
X-CB-89_(X-CB)	1.93	1.93	2.30	0.01	0.01
X-CB-91_(X-CB)	1.92	1.92	2.30	0.01	0.01
X-CB-94_(X-CB)	2.00	2.00	2.27	0.02	0.03
X-CB-97_(X-CB)	1.93	1.93	2.10	0.01	0.01
X-CB-98_(X-CB)	2.15	2.16	2.16	0.34	1.07
X-STM-21_(X-STM)	0.01	0.72	0.01	0.76	0.01
X-STM-23_(X-STM)	0.24	0.25	0.24	0.84	0.24
X-STM-25_(X-STM)_1	1.99	1.99	2.26	0.01	0.01
X-STM-25_(X-STM)_2	2.26	2.26	2.41	0.01	0.01
X-STM-27_(X-STM)_1	2.04	2.04	2.16	0.24	0.24
X-STM-27_(X-STM)_2	2.12	2.16	2.12	2.29	2.12
X-STM-29_(X-STM)	1.97	1.97	1.98	0.48	0.87
X-STM-31_(X-STM)	1.91	1.91	1.99	0.01	0.01
X-STM-33_(X-STM)	0.67	0.96	0.67	1.05	0.67
X-STM-51_(X-STM)	1.08	1.16	1.08	1.31	1.08
X-STM-53_(X-STM)	1.06	1.06	1.16	0.23	0.24
X-STM-55_(X-STM)	1.03	1.03	1.11	0.01	0.01
X-STM-59_(X-STM)	1.08	1.08	1.25	0.17	0.45
X-STM-63_(X-STM)	0.94	0.94	0.94	0.01	0.01
X-STM-75_(X-STM)	0.94	0.94	1.39	0.08	0.46
X-STM-77_(X-STM)	0.92	0.92	0.94	0.62	0.68

Analysis begun on: Sat Apr 25 16:48:43 2020
Analysis ended on: Sat Apr 25 16:48:50 2020
Total elapsed time: 00:00:07

Appendix E

Development Servicing Checklist

Hard Rock Hotel Casino
4837 Albion Road, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content	Addressed (Y/N/NA)	Comments
Executive Summary (for larger reports only).	N/A	
Date and revision number of the report.	Y	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Refer to Report Figures
Plan showing the site and location of all existing services.	Y	Refer to Grading and Servicing Plans
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.	Y	Refer to Site Plan
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	
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.	N/A	
Statement of objectives and servicing criteria.	Y	Report Sections: 2.0 Water Servicing , 3.0 Sanitary Servicing, 4.0 Storm Servicing and Stormwater Management
Identification of existing and proposed infrastructure available in the immediate area.	Y	
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 neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	Refer to Grading Plan and Stormwater Management Plan

Hard Rock Hotel Casino
4837 Albion Road, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content	**Addressed (Y/N/NA)**	**Comments**
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.	Y	Report Section 4.0 Site Constraints
All preliminary and formal site plan submissions should have the following information:		
Metric scale	Y	
North arrow (including construction North)	Y	
Key plan	Y	
Name and contact information of applicant and property owner	Y	
Property limits including bearings and dimensions	Y	
Existing and proposed structures and parking areas	Y	
Easements, road widening and rights-of-way	Y	
Adjacent street names	Y	

Hard Rock Hotel Casino
4837 Albion Road, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.2 Water	Addressed (Y/N/NA)	Comments
Confirm consistency with Master Servicing Study, if available.	N/A	
Availability of public infrastructure to service proposed development.	Y	Report Sections: 2.0 Water Servicing , 3.0 Sanitary Servicing,4.0 Storm Servicing and Stormwater Management
Identification of system constraints.	N/A	
Identify boundary conditions.	Y	Provided by City of Ottawa
Confirmation of adequate domestic supply and pressure.	Y	Refer to Appendix A
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.	Y	Refer to Appendix A
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.	Y	Refer to Appendix A
Definition of phasing constraints. Hydraulic modeling 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 shut-off valves.	Y	Refer to Appendix A
Check on the necessity of a pressure zone boundary modification.	N/A	
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y	Report Section 2.0 Water Servicing
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.	Y	Report Section 2.0 Water Servicing
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.	Y	Report Section 2.0 Water Servicing
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A	

4.3 Wastewater	Addressed (Y/N/NA)	**Comments**
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).	Y	Report Section 3.0 Sanitary Servicing
Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A	
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	Report Section 3.0 Sanitary Servicing
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)	Y	Refer to Appendix B
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A	
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	Report Section 3.0 Sanitary Servicing
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.	Y	Report Section 3.3 Existing Sanitary Sewer and Pump Station
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	

Hard Rock Hotel Casino
4837 Albion Road, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.4 Stormwater	Addressed (Y/N/NA)	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	Report Section 4.0 Storm Servicing and Stormwater Management
Analysis of the available capacity in existing public infrastructure.	N/A	Storm outlet is to an existing private pond, which ultimatly outlets an open ditch system
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y	Refer to Stormwater Management Plan
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.	Y	Report Section 4.0 Storm Servicing and Stormwater Management
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	4.0 Storm Servicing and Stormwater Management
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	4.0 Storm Servicing and Stormwater Management
Set-back 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.	N/A	
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	Refer to Appendix D
Identification of watercourse 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.	Y	Refer to Appendix D
Any proposed diversion of drainage catchment areas from one outlet to another.	N/A	
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	N/A	
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A	

Hard Rock Hotel Casino
4837 Albion Road, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.4 Stormwater	Addressed (Y/N/NA)	Comments
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.	Y	4.0 Storm Servicing and Stormwater Management
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	Refer to Stormwater Management Plan
Inclusion of hydraulic analysis including HGL elevations.	N/A	
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	Report Section 5.0 Erosion and Sediment Control Measures
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 constrains related to floodplain and geotechnical investigation.	N/A	

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Comments
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 Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A	
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	Addressed (Y/N/NA)	Comments
Clearly stated conclusions and recommendations.	Y	Report Section 6.0 Conclusions and Recommendations
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.	N/A	T.B.D.
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	

Appendix F

Drawings