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# Hard Rock Ottawa
# 4837 Albion Road

## Servicing and Stormwater Management Report

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# 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
April 24, 2020
Revised: November 7, 2022


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

November 7, 2022

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**

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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



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- 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:

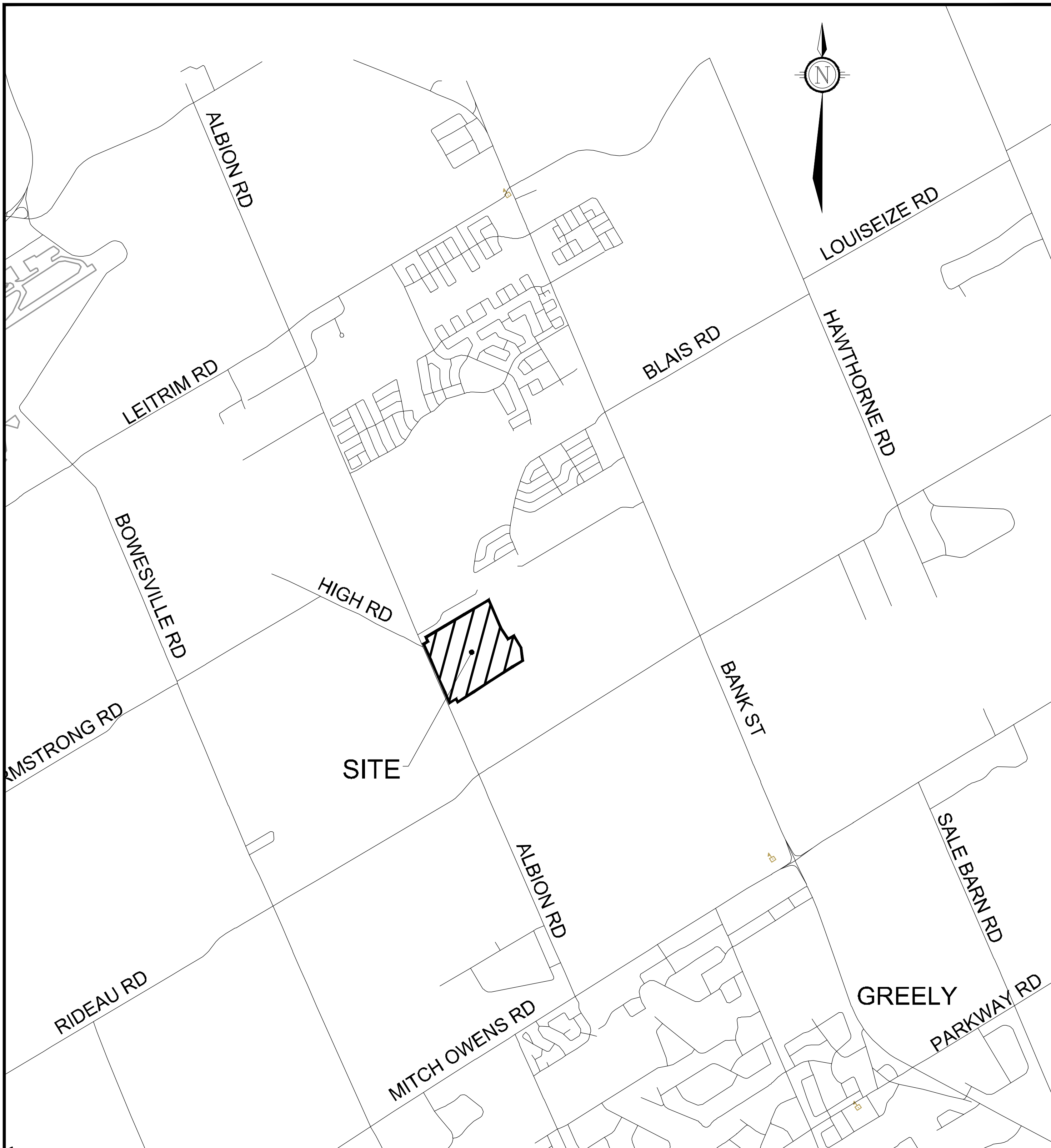
- Expansion of the existing watermain system and addition of the fire suppression system.
- Watermain installed across the property to the east connecting to the existing watermain along Bank Street.
- Storm drainage and stormwater management infrastructure.

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 a 6-storey hotel with 150 rooms, multiple different restaurants with a total seat count of 350, a live auditorium with 1800 seats, and an additional 580 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.

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KEY PLAN

CITY OF OTTAWA

4837 ALBION ROAD
HARD ROCK OTTAWA

| DATE | JOB | FIGURE |
|---|---|---|
| NOV 2019 | 116111 | FIG 1 |

SHT8X11.DWG - 216mmx279mm

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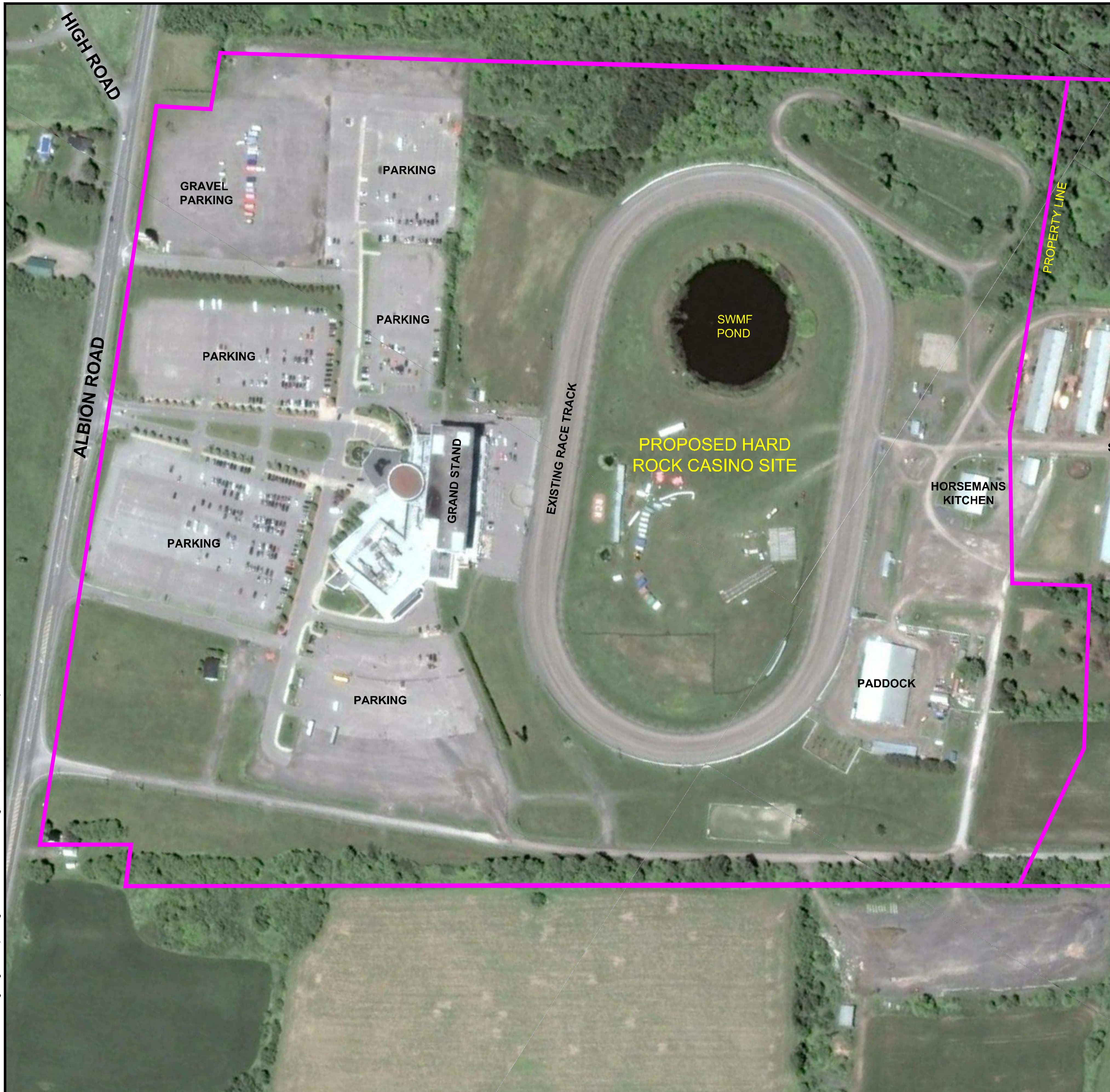


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4837 ALBION ROAD
HARD ROCK OTTAWA

EXISTING CONDITIONS

SCALE 1 : 3000

DATE APR 2020 | JOB 116111 | FIGURE FIG 2

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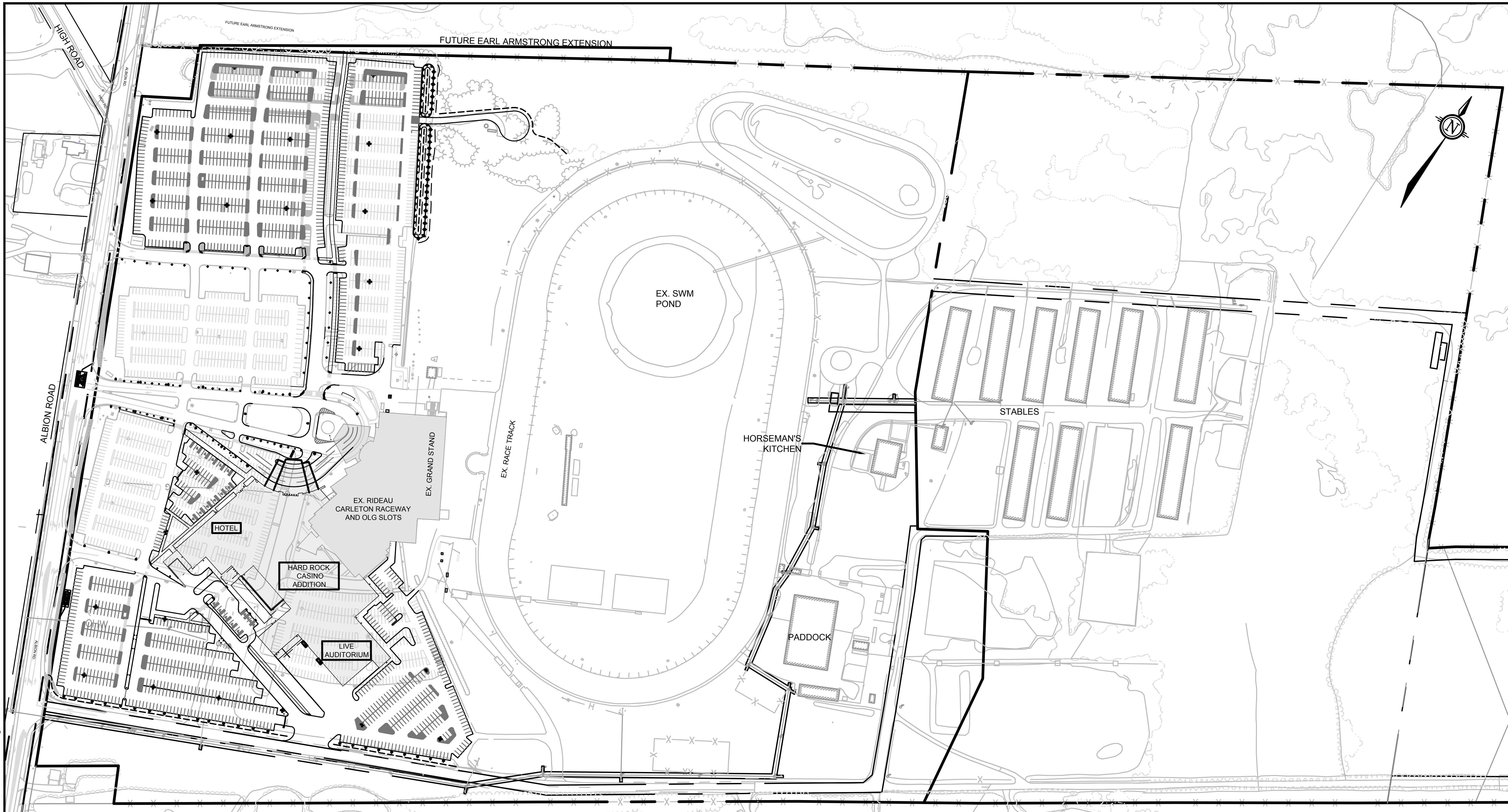


M:\2016\116111\CAD\Design\Figures\Report Figures\116111- PS-FIG 3.dwg, FIG3, Oct 26, 2022 - 11:18am, dmaratha

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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 | 1.34 | 2.01 | 3.62 |
| Proposed Hard Rock Hotel | 0.70 | 1.75 | 3.85 |
| **Existing + Proposed Expansion** | **3.05** | **5.28** | **10.21** |

**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 (344,100 Litre) and 30,000 gallon (113,560 Litre) 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 (31.5 LPS) fire pump will be replaced by a new 1250 USGPM (78.9 LPS) pump to meet the fire suppression requirements for all areas of the existing and proposed building. A 70,000-gallon (265,000 Litre) 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 | 3.05 | 80psi (Max) | 72.1 |
| Peak Hour | Bank Street | 10.21 | 40psi (Min) | 50.9 |

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

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 | 2.01 | **N/A | 2.01 |
| Proposed Hard Rock Hotel | 2.24 | **N/A | 2.24 |
| **Existing + Expansion** | **5.77** | **4.13** | **9.90** |

**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 9.90 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**. It should be noted that most of the sewers in the design sheet are overcapacity. This is due to an existing condition where the existing infrastructure was never adequality sized to convey the uncontrolled 2-year flows. Most of this existing infrastructure including the outlet pipe to the pond is to remain in service under proposed conditions. The undersized existing and proposed infrastructure will be mitigated using inlet controls and underground storage / infiltration, which will be discussed in subsequent sections of the report.

*Inlet Control Devices*

Inlet control devices (ICDs) will be installed in the existing and proposed catchbasins to restrict inflows to the minor system. The ICDs have been sized appropriately to mitigate the undersized overcapacity sewers on site by maximizing the use of underground storage and promoting infiltration. The inlet control design is based on the following criteria:

Existing Areas: Maximize underground and above-ground storage while preventing surface ponding during the 2-year event.

Proposed Areas: Maximize flow restrictions to prevent the storm sewer from 'spilling' out of the structure lids 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 for the existing and proposed drainage areas:

- 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. For further information refer to **Section 4.4.1** of the report.

### 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 / ditches and rooftops and use of underground storage chambers.

#### *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 502 proposed Stormtech SC-740 arch-type chambers will provide approximately 1,193 $m^3$ 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 designed to treat the "first flush". The Isolator Row accomplishes this in two ways. The first is by way of settlement. The Isolator Row length is provided to allow for larger particles to settle out as the flows travel down the Isolator Row. In addition to settling, the Isolator Row is surrounded by filter fabric (geotextile) and is not connected directly to the outlet and as such the water must pass through the filter fabric to make its way to the other chambers and ultimately to the outlet.

The "first flush" Stormwater runoff is directed to the Isolator Row via a weir or elevated bypass. This is done to ensure on frequent (small) storm events are directed to the Isolator and not large events with high velocities that can cause resuspension of the sediment. 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 Infiltration / Storage Ditch*

The existing ditch at the northeast portion of the site will be expanded to store and infiltrate drainage from the northeast parking lot. The proposed infiltration / storage ditch will provide 395 $m^3$ of storage and include a 300mm subdrain surrounded by clearstone to promote infiltration. An ICD will be installed within the existing catchbasin to restrict peak flows to the existing storm sewer system. Refer to Section A-A on the Notes and Detail (drawing 116111-ND).

## 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. An oil and grit separator unit (OGS) is proposed in the loading dock/ garbage compactor area to treat any potential spills and contaminants. Refer to **Appendix C** for additional details on the OGS unit.

### *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 (224 $m^3$). 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 require 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 | 2022 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. However, as part of the development it is proposed to perform regular maintenance on the pond by draining and removing any sediment buildup.

## 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**.

*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 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.

### *4.5.2 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-R8, R10) | 45.3 L/s | 77.6 L/s | 449.5 $m^3$ |
| East Outlet | (R9, R11-R14) | 22.1 L/s | 37.9 L/s | 150.7 $m^3$ |
| TOTAL | | 67.4 L/s | 115.5 L/s | 600.2 $m^3$ |

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**.

## 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.

<u>*Major System Design and Analysis*</u>

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 existing and 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 existing and proposed areas.

<u>*Historical Storms*</u>

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 | 728 | 0 | 728 | 3,147 |
| 5-year | 923 | 0 | 923 | 4,463 |
| 100-year | 1,140 | 0 | 1,140 | 8,188 |
| 100-year (+20%) | 1,197 | 656 | 1,853 | 10,576 |

**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 (265,000-Litre) 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 with exception of removing the sediment from the bottom of the pond.
- 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 during a 2-year storm event and 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:

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# 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 |

# HARD ROCK OTTAWA
# RIDEAU CARLETON RACEWAY
# WATER DEMANDS



**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 |

**HARD ROCK OTTAWA**
**RIDEAU CARLETON RACEWAY**
**WATER DEMANDS**

JOB NO. 116111
DATE PREPARED: NOVEMBER 2019
REVISED DATE: NOVEMBER 2022

**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 | 580 | 350 | 1800 | 230 | 1.34 | 2.01 | 3.62 |

*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 | 150 | 270 | 0.70 | 1.75 | 3.85 |

**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 | 3.05 | 5.28 | 10.21 |

**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

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Project No. **2019-667797**

April 23, 2020

Fax: 613-580-2495

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**

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

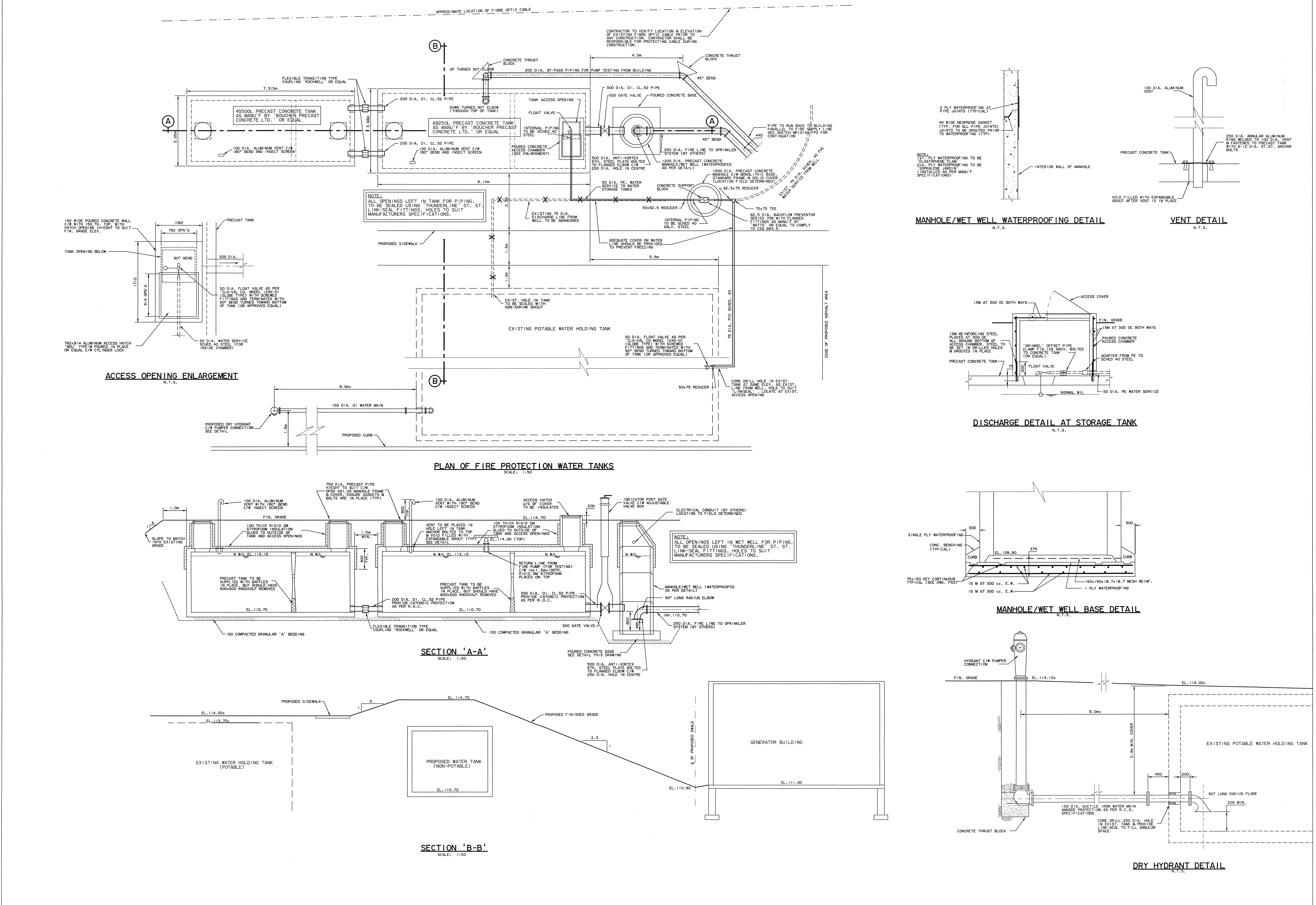
If you have any further questions or require additional clarifications please feel free to contact me.

**SNC-LAVALIN INC.**
**Buildings Ontario**

per: ______________________

Jeff Hunter, P. Eng.
Mechanical Director

Appendix A




| 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

D.F. McGOVERN — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

D.W. SMITH — REGISTERED PROFESSIONAL ENGINEER — 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) 225-9940
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

Appendix A

EXISTING ASPHALT
EXISTING GRANDSTAND
FUTURE PUMPING STATION
FUTURE FORCE MAIN
PROPOSED GENERATOR
NEW TRANSFORMER
EXISTING HEDGE TO REMAIN
LINE OF EXISTING FENCE
GRASSED SWALE 1.0% SLOPE
BOLLARD WITH CHAIN BETWEEN STAFF AND VALET PARKING
GRAVEL PARKING(FUTURE ASPHALT)
PARKING P1
PARKING P2
PARKING P3
PARKING P4
PARKING P5
FUTURE WATER FEATURE
PROPOSED ONE STOREY ADDITION
BUS PARKING GRAVEL PARKING
BUS SHELTER ON CONCRETE CURB
ASPHALT PAVING
CONC. SIDEWALK
CONC. CURB
EXTENT OF CONC. CURB
SODDED AREA
FIRE ROUTE
BUSES AND TAXIS ONLY
LIMIT OF GRAVEL PARKING
LIMIT OF PAVED PARKING
EXISTING STORM SEWER TO BE ABANDONED
EXISTING CATCH BASIN TO BE REMOVED
LIMIT OF CONTRACT
CULVERT 600mm CSP (BY OTHERS)
PROPERTY LINE
PYLON SIGN
POSSIBLE FUTURE PARKING
GRASS FIELD
PROP. ACCESS ROAD
GRASS SWALE 1.2% SLOPE
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
8 ADDED EXISTING UTILITIES 29/09/99
7 REVISED SITEPLAN 22/09/99
6 ADD MH 102A 05/09/99
5 ISSUED FOR SITE PLAN AGREEMENT AND TENDER 27/08/99
4 ISSUED FOR SITE PLAN AGREEMENT AND TENDER 28/07/99
3 REMOVE STORM SEWERS SOUTH PARKING 16/07/99
2 AS PER CITY OF GLOUCTER 6/08/99
1 ROTATED HATCHING 21/06/99
C.B. WARNOCK
G.W. SMITH
OMM A TROW COMPANY
Trow
CONSULTING ENGINEERS, HYDROGEOLOGISTS & PLANNERS
154 COLONNADE RD. S NEPEAN ONTARIO
PHONE (613) 225-9940
FAX (613) 225-7337
P.B.K. ARCHITECTS
RIDEAU CARLETON RACEWAY
SITE SERVICING PLAN
C.B.W.
A.M.C.
C.B.W.
JUNE 1999
1 : 500
SS1

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

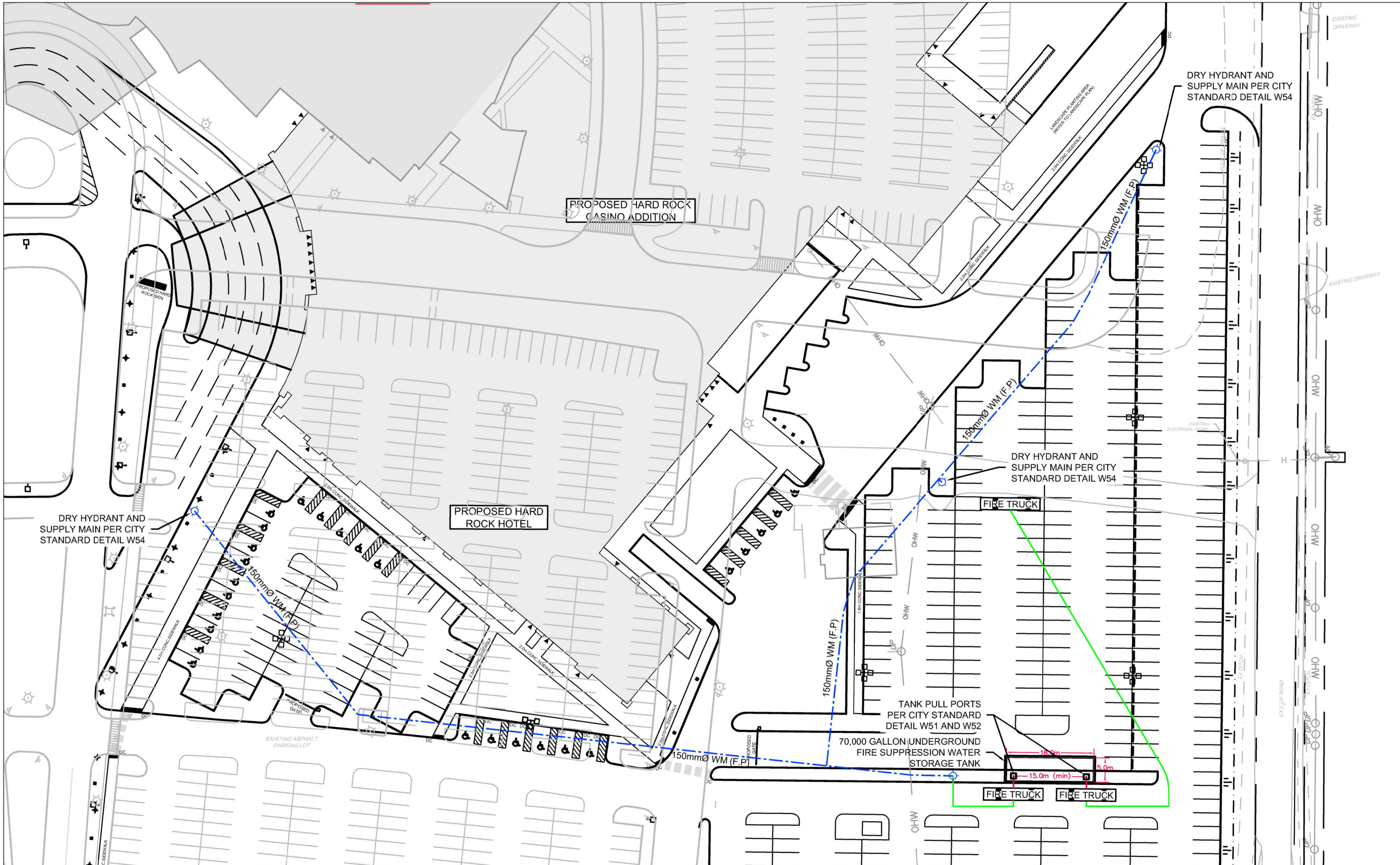
RE: Underground water storage tank

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.




DRY HYDRANT FIRE SUPPRESSION SYSTEM
SCALE: 1:750
DATE: APRIL 22, 2020

# Boundary Conditions 4837 Albion Road

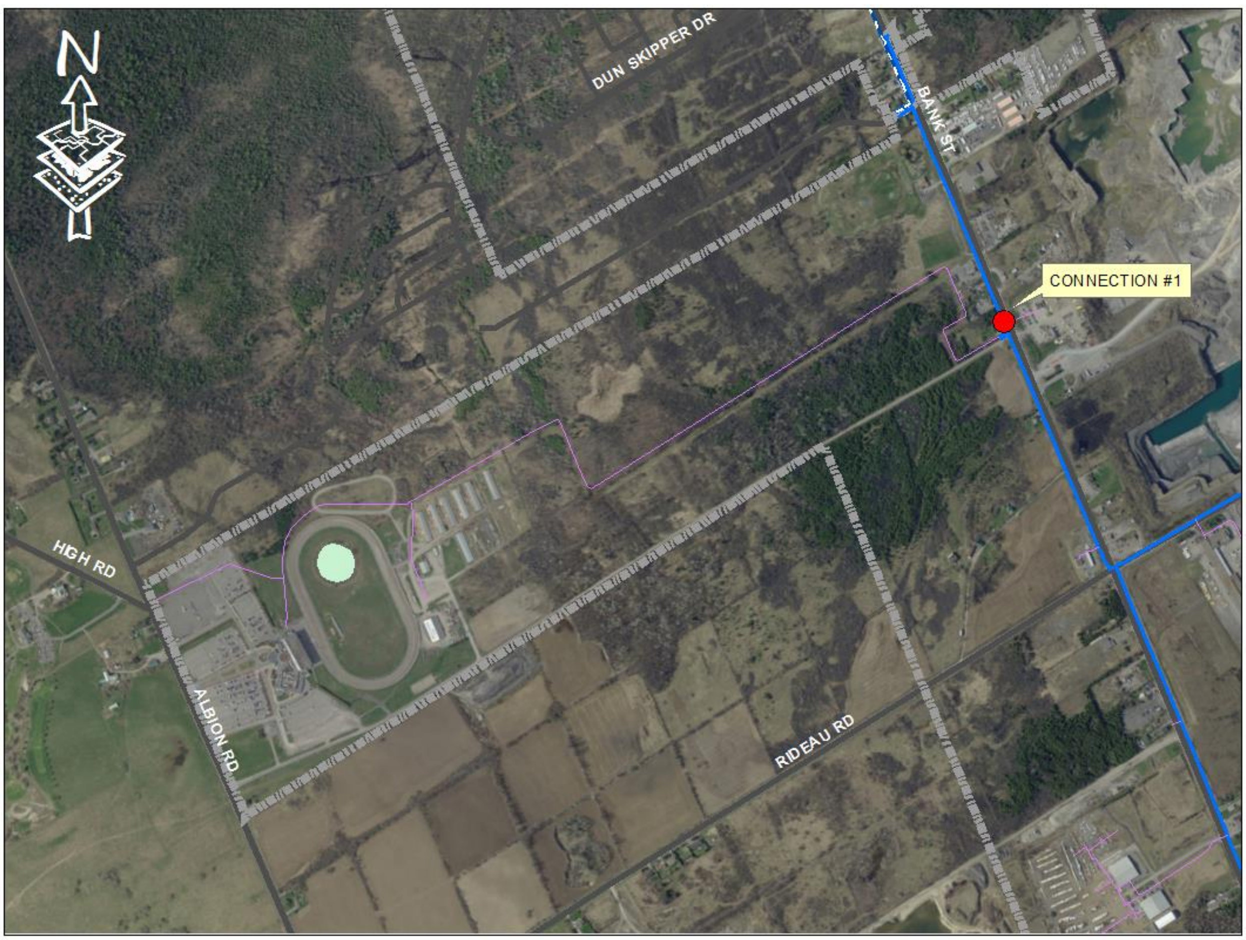
## Information Provided

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.*

```
**********************************************************************
*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                          Version 2.2                               *
**********************************************************************
```

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 |

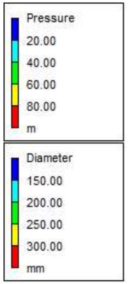
Node Results:

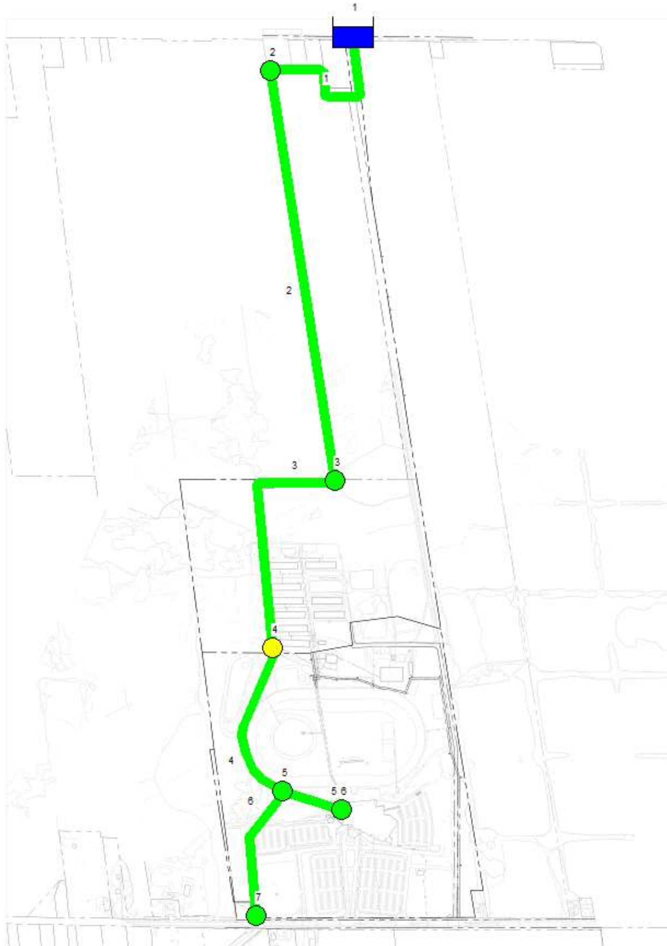
| Node ID | Demand LPS | Head m | Pressure m | Quality | |
|---|---|---|---|---|---|
| 2 | 0.00 | 164.86 | 52.86 | 0.00 | |
| 3 | 0.00 | 164.78 | 57.48 | 0.00 | |
| 4 | 0.00 | 164.72 | 60.72 | 0.00 | |
| 5 | 0.00 | 164.69 | 56.19 | 0.00 | |
| 6 | 3.05 | 164.67 | 50.67 | 0.00 | |
| 7 | 0.00 | 164.69 | 48.19 | 0.00 | |
| 1 | -3.05 | 164.90 | 0.00 | 0.00 | Reservoir |

Link Results:

| Link ID | Flow LPS | VelocityUnit m/s | Headloss m/km | Status |
|---|---|---|---|---|
| 1 | 3.05 | 0.10 | 0.08 | Open |
| 2 | 3.05 | 0.10 | 0.08 | Open |
| 3 | 3.05 | 0.10 | 0.08 | Open |
| 4 | 3.05 | 0.10 | 0.08 | Open |
| 5 | 3.05 | 0.10 | 0.08 | Open |
| 6 | 0.00 | 0.00 | 0.00 | Open |

# HIGH PRESSURE



```
**********************************************************************
*                            E P A N E T                             *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                          Version 2.2                               *
**********************************************************************
```

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 |

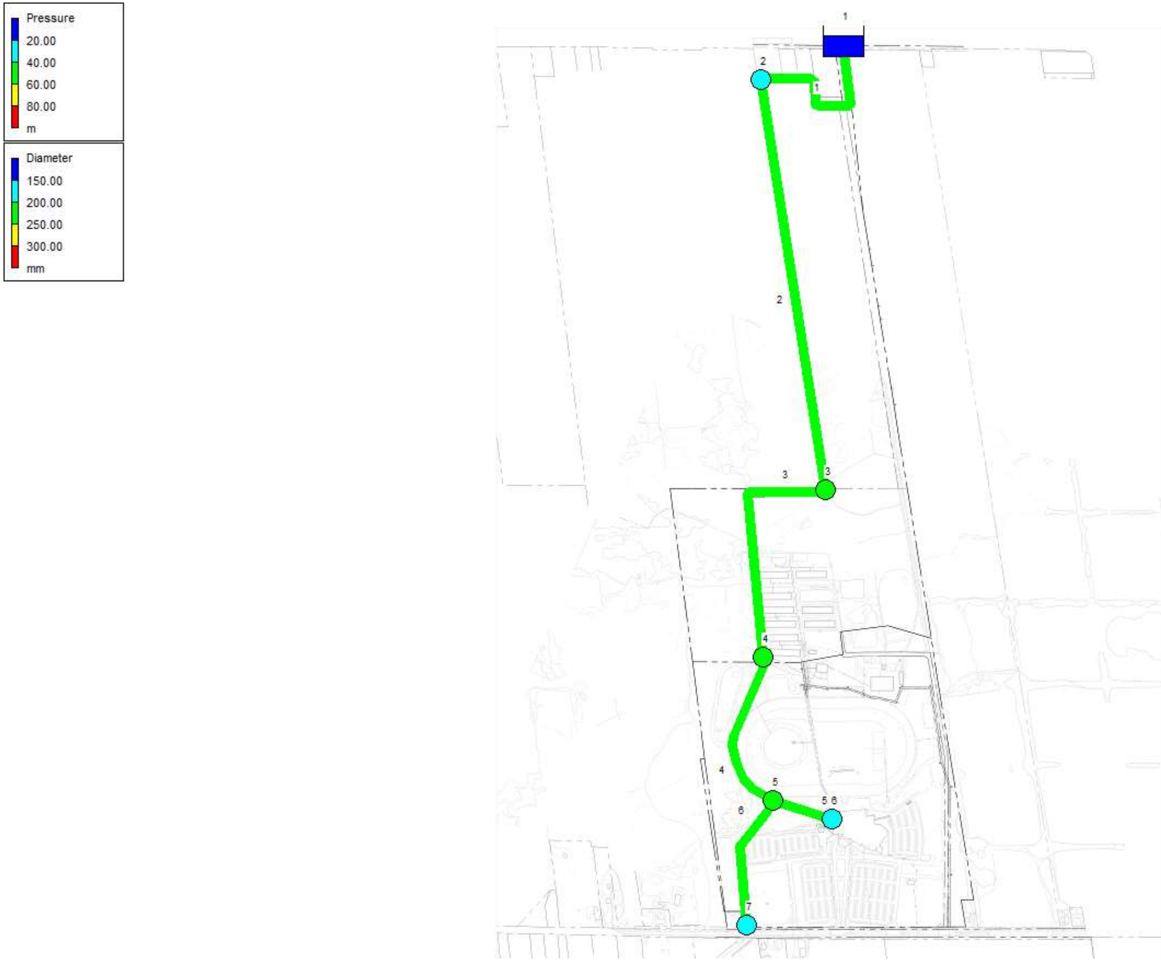
Node Results:

| Node ID | Demand LPS | Head m | Pressure m | Quality | |
|---|---|---|---|---|---|
| 2 | 0.00 | 151.57 | 39.57 | 0.00 | |
| 3 | 0.00 | 150.77 | 43.47 | 0.00 | |
| 4 | 0.00 | 150.22 | 46.22 | 0.00 | |
| 5 | 0.00 | 149.90 | 41.40 | 0.00 | |
| 6 | 10.21 | 149.78 | 35.78 | 0.00 | |
| 7 | 0.00 | 149.90 | 33.40 | 0.00 | |
| 1 | -10.21 | 151.90 | 0.00 | 0.00 | Reservoir |

Link Results:

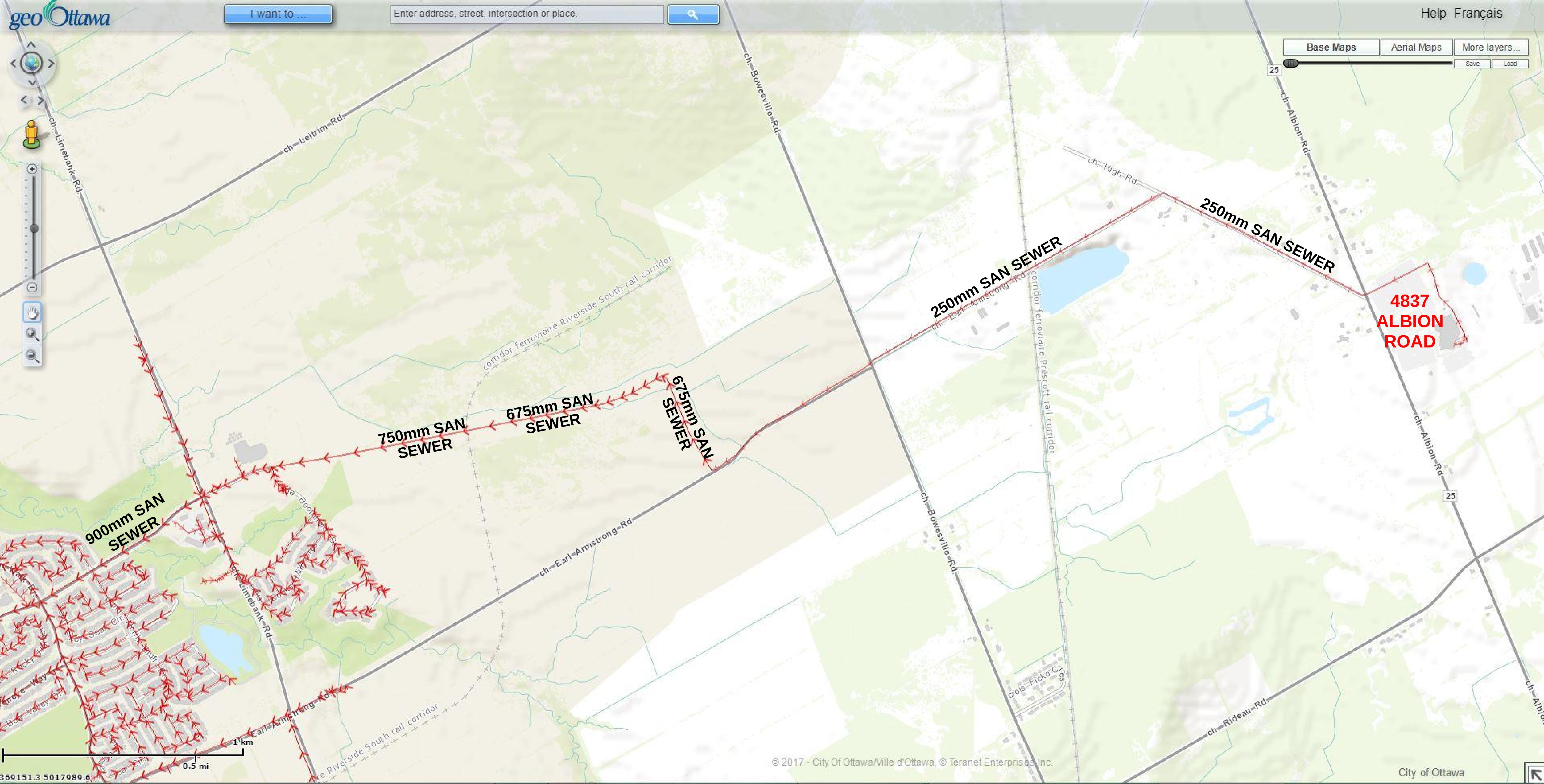
| Link ID | Flow LPS | VelocityUnit m/s | Headloss m/km | Status |
|---|---|---|---|---|
| 1 | 10.21 | 0.32 | 0.78 | Open |
| 2 | 10.21 | 0.32 | 0.78 | Open |
| 3 | 10.21 | 0.32 | 0.78 | Open |
| 4 | 10.21 | 0.32 | 0.78 | Open |
| 5 | 10.21 | 0.32 | 0.78 | Open |
| 6 | 0.00 | 0.00 | 0.00 | Open |

# PEAK HOUR



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
6
5 6
7

# Appendix B
Sanitary Servicing Information


geoOttawa
I want to ...
Enter address, street, intersection or place.
Help Français
Base Maps
Aerial Maps
More layers...
900mm SAN SEWER
750mm SAN SEWER
675mm SAN SEWER
675mm SAN SEWER
250mm SAN SEWER
250mm SAN SEWER
4837 ALBION ROAD
ch. Limebank Rd.
ch. Leitrim Rd.
ch. Bowesville Rd.
ch. Albion Rd.
ch. High Rd.
ch. Earl Armstrong Rd.
ch. Rideau Rd.
corridor ferroviaire Riverside South rail corridor
corridor ferroviaire Prescott rail corridor
crois. Ficko Cres.
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

NOVATECH
Engineers, Planners & Landscape Architects

**JOB NO. 116111**
**DATE PREPARED: NOVEMBER 2019**
**REVISED DATE: NOVEMBER 2022**

**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. Employees | 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 | | 1800 | 350 | 580 | 230 | 150 | 270 | 1.34 | 0.70 | 1.5 | 3.2 | 4.25 | 5.77 | 14.74 | 4.13 | 9.90 | 250 | 0.28 | N/A | 31.4 | 0.64 | 31.5% |

*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

<u>Section 4.0 Ottawa Sewer Design Guidelines</u>

| | | |
|---|---|---|
| - 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 |
| <u>Novatech Daily Usage Calculation</u> | | |
| - OLG Slots (calculated based on existing usage) | 32 | L/slot/day |
| - Gaming Tables (based on existing slots calculation) | 32 | L/seat/Day |
| <u>Commercial Peaking Factor</u> (Section 4.0 Ottawa Sewer Design Guidelines) | 1.5 | |
| <u>Residential Peaking Factor</u> (Section 4.0 Ottawa Sewer Design Guidelines) | Harmon Formula | |
| <u>Section 4.0 Ottawa Sewer Design Guidelines</u> | | |
| - 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:

LICENSED PROFESSIONAL ENGINEER
C. J. SCIUK
Nov 1, 2019
PROVINCE OF ONTARIO

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:**

David McManus Engineering Ltd.

**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

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.

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

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 M$^{c}$Manus, 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

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

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

Run Time = 128.4 seconds
Run Time = 2.14 minutes

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

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

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

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

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

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

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

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

Run Time = 152.58 seconds
Run Time = 2.54 minutes

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

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

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

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

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

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

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

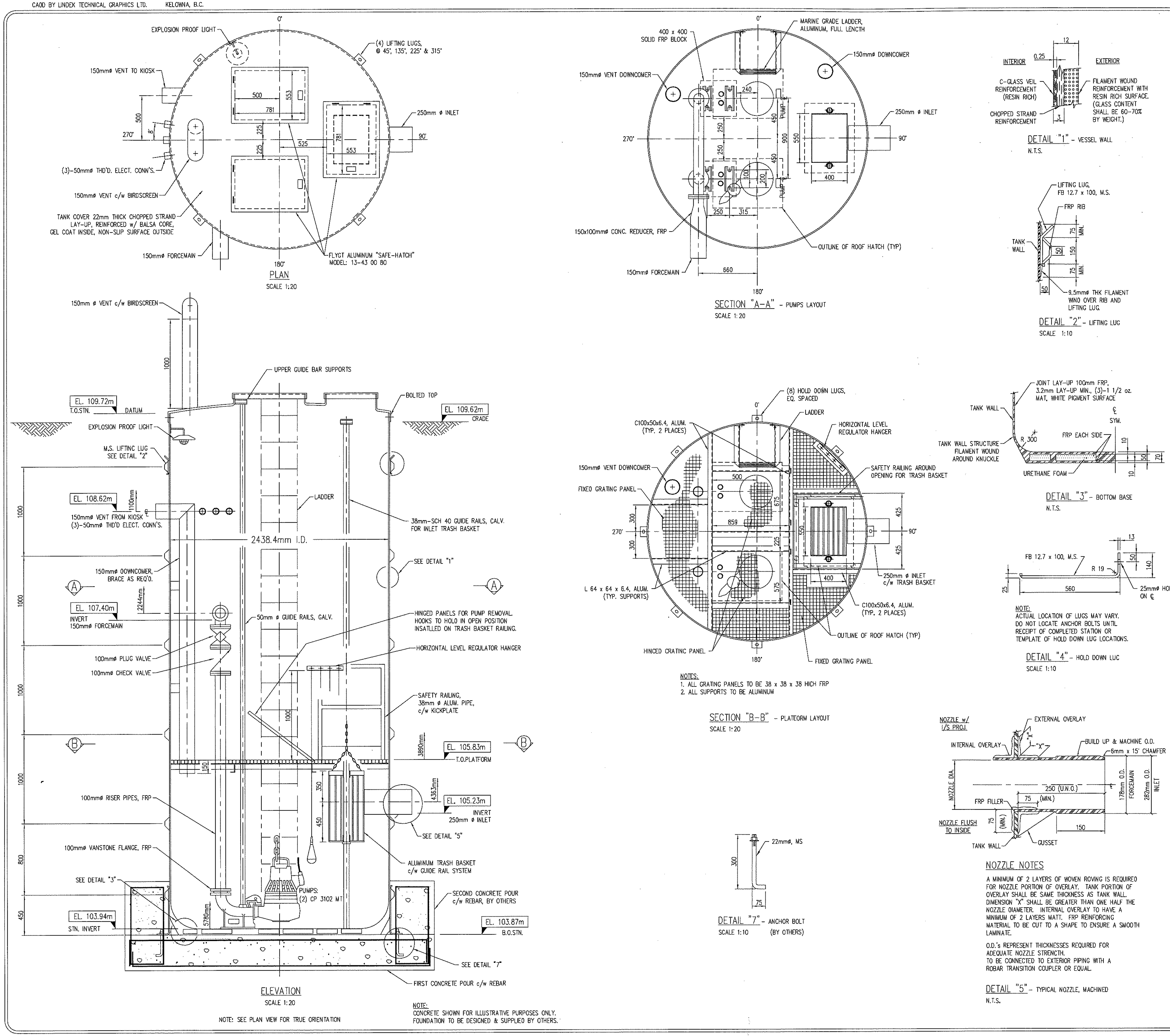
$$\text{Minimum Cycle Time} = \frac{4.52 \times (105.4-104.72)}{17.2/1000 - 0}$$

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

# APPENDIX C:

# ELECTRICAL AND STRUCTURAL INFORMATION

CADD BY LINDEX TECHNICAL GRAPHICS LTD. KELOWNA, B.C.




## BILL OF MATERIALS

| ITEM | QTY | DESCRIPTION |
|---|---|---|
| 1 | 8 | HOLD DOWN LUCS, MS |
| 2 | 4 | LIFTINC LUCS, 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-10.01 MANUFACTURE AND INSTALLATION FOR FRP STRUCTURES
3. AMEC 4S-10.02 FRP PRESSURE PIPE, FITTINGS AND FLANGES
4. CANADIAN GOVERNMENT STANDARD 41-CP-22

## GENERAL NOTES

1. WINDINC 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 EXISTINC 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 BACKFILLINC OPERATIONS COMMENCE.
8. USE A COOD 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 BEINC 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 CHANCES | 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

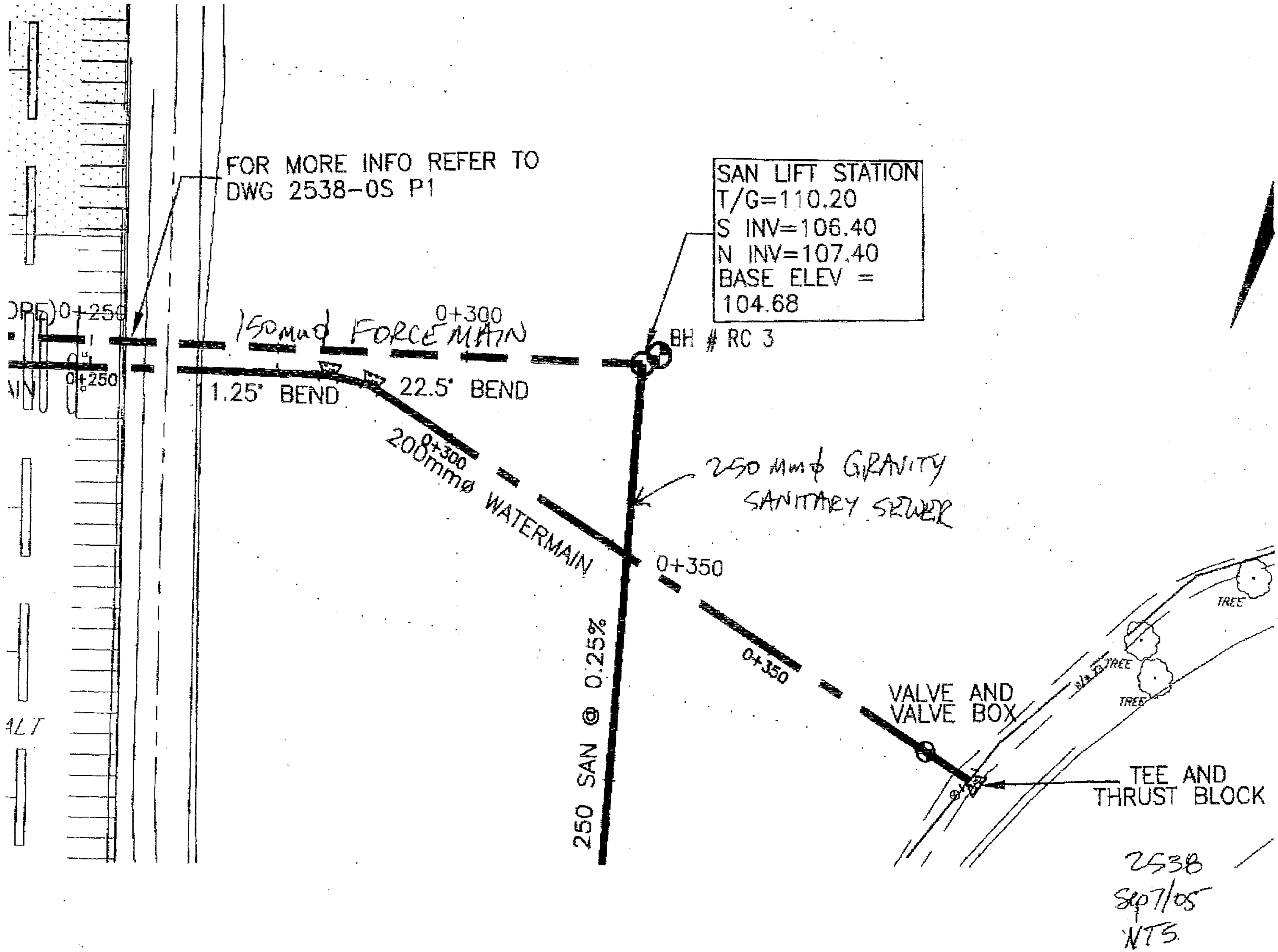


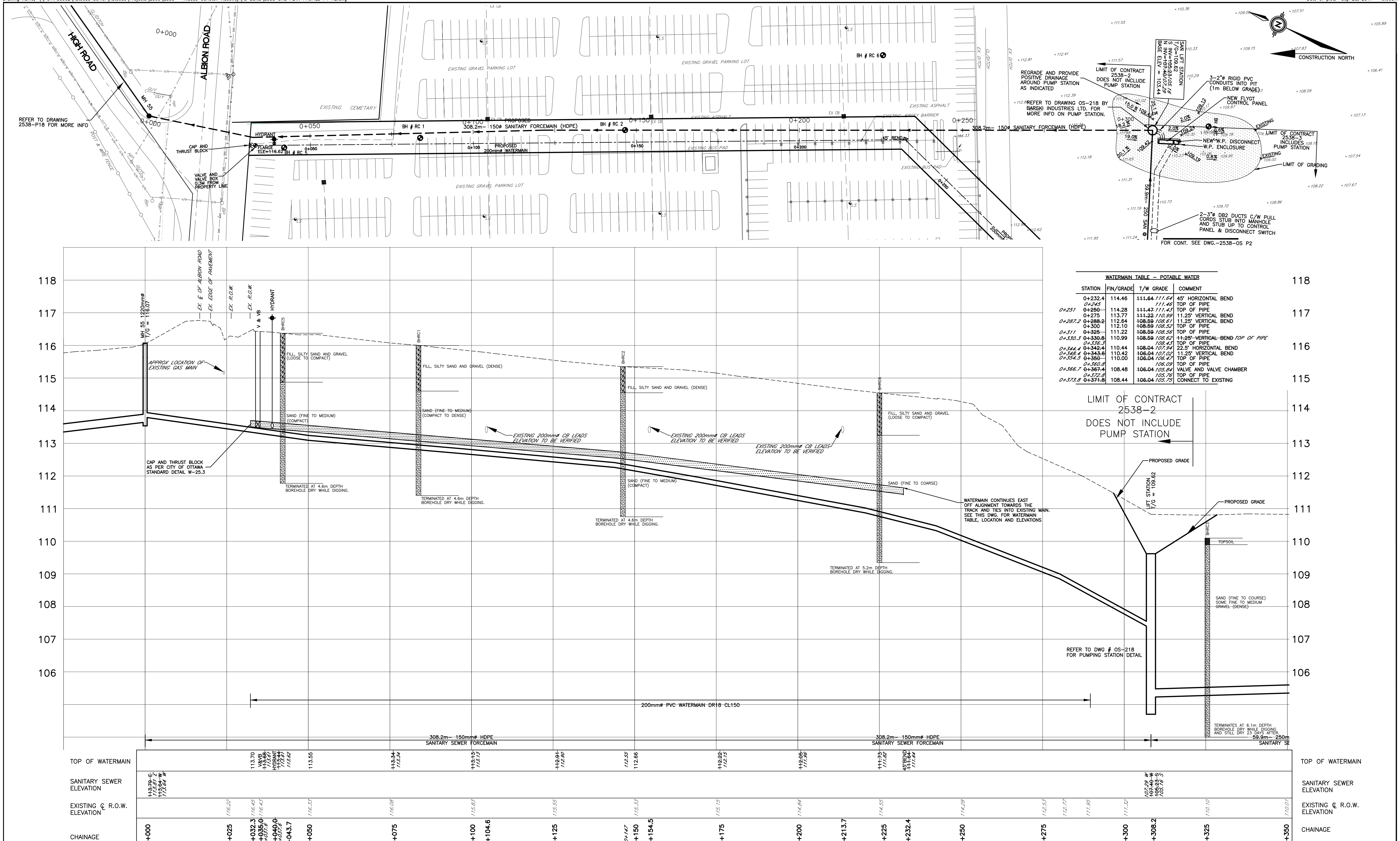
CLIENT: ITT FLYGT CANADA
ENGINEER: DAVID McMANUS ENCINEERINC LTD. NEPEAN, ONTARIO
PROJECT: RIDEAU CARLETON RACEWAY SEWAGE PUMP STATION

TITLE:

# 2438.4mm I.D. RIDEAU CARLETON RACEWAY LIFT STATION

| | | | |
|---|---|---|---|
| ENG BY: | DATE: | CAD FILE: RideauCarleton | PROJECT: |
| CAD BY: LMc | DATE: 2005/09/30 | SCALE: AS SHOWN | |
| APP BY: | DATE: | DRAWING NUMBER: 05-218 | REV: 3 |
| ISSUED BY: | DATE: | | |


FOR MORE INFO REFER TO
DWG 2538-0S P1
SAN LIFT STATION
T/G=110.20
S INV=106.40
N INV=107.40
BASE ELEV =
104.68
0+250
0+300
150mmø FORCEMAIN
BH # RC 3
0+250
1.25° BEND
22.5° BEND
0+300
200mmø WATERMAIN
250 mmø GRAVITY
SANITARY SEWER
0+350
0+350
250 SAN @ 0.25%
VALVE AND
VALVE BOX
TREE
TREE
TREE
TEE AND
THRUST BLOCK
2538
Sep 7/05
NTS




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+336.3 | | 108.43 | TOP OF PIPE |
| 0+344.4 | ~~0+342.4~~ | 110.44 | ~~108.04~~ 107.94 | 22.5° HORIZONTAL BEND |
| 0+348.4 | ~~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+360.8 | | 106.09 | TOP OF PIPE |
| 0+366.7 | ~~0+367.4~~ | 108.48 | ~~106.04~~ 105.84 | VALVE AND VALVE CHAMBER |
| | 0+372.8 | | 105.76 | 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 |

| No. | REVISION | DATE | BY |
|---|---|---|---|
| 7. | REVISED SANITARY AND WATERMAN 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 |

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Ph. 225-1929 Fax 225-7330

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

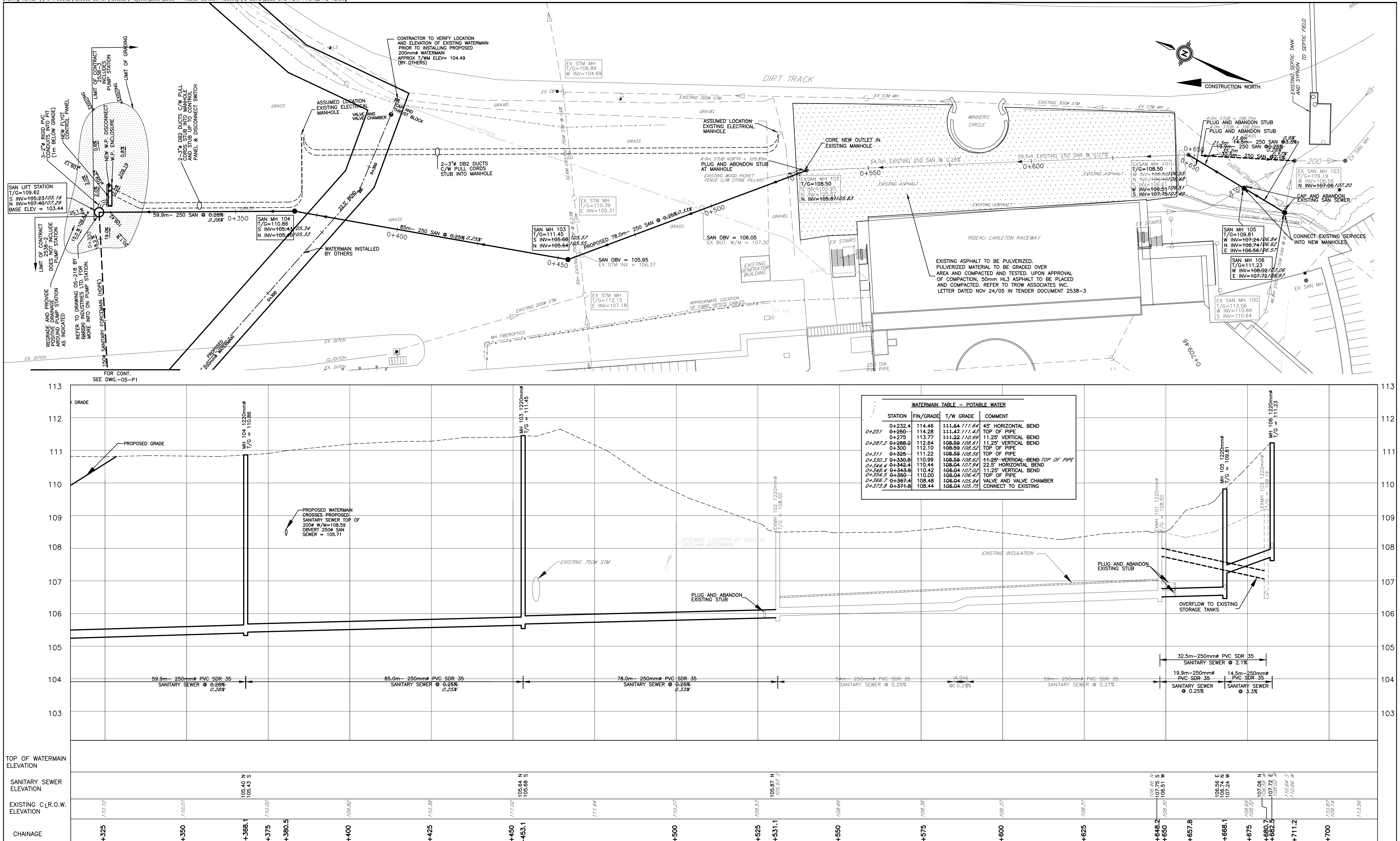
SCALE
HORZ 1:500
0 5 10 15 20

# 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

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+251 ~~0+250~~ | 114.28 | ~~111.47~~ 111.43 | TOP OF PIPE |
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| 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+344.4 ~~0+342.4~~ | 110.44 | ~~108.04~~ 107.94 | 22.5° HORIZONTAL BEND |
| 0+348.4 ~~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+366.7 ~~0+367.4~~ | 108.48 | ~~106.04~~ 105.84 | VALVE AND VALVE CHAMBER |
| 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 |
|---|---|---|---|
| 9. | AS BUILT INVERTS ADDED | OCT 9/07 | CJR |
| 8. | ISSUED FOR CONSTRUCTION (CONTRACT 2538–3) | MAY 25/06 | CJR |

| No. | REVISION | DATE | BY |
|---|---|---|---|
| 7. | ISSUED FOR TENDER (CONTRACT 2538–3) | APR 12/06 | CJR |
| 6. | REVISED SANITARY AND WATERMAIN 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 |


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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


PUMP 2
MAIN DISCONNECT
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)
0.29
MILLTRONICS
MultiRanger 100
MILLTRONICS
PUMP 1
PUMP 2
TRIP
SPS
FEED FROM OLD ELECTRICAL ROOM
HIGH LEVEL
MAN OFF AUTO
LOW LEVEL
TEMPERATURE RESET

# CCTV Sewer Inspection Review Form

2019-11-14

NOVATECH Engineers, Planners & Landscape Architects

**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) Acceptable | Monitor | Repair | Inspection Length (m) | Problem/Observation | Comment/Action |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | |

# CCTV Sewer Inspection Review Form

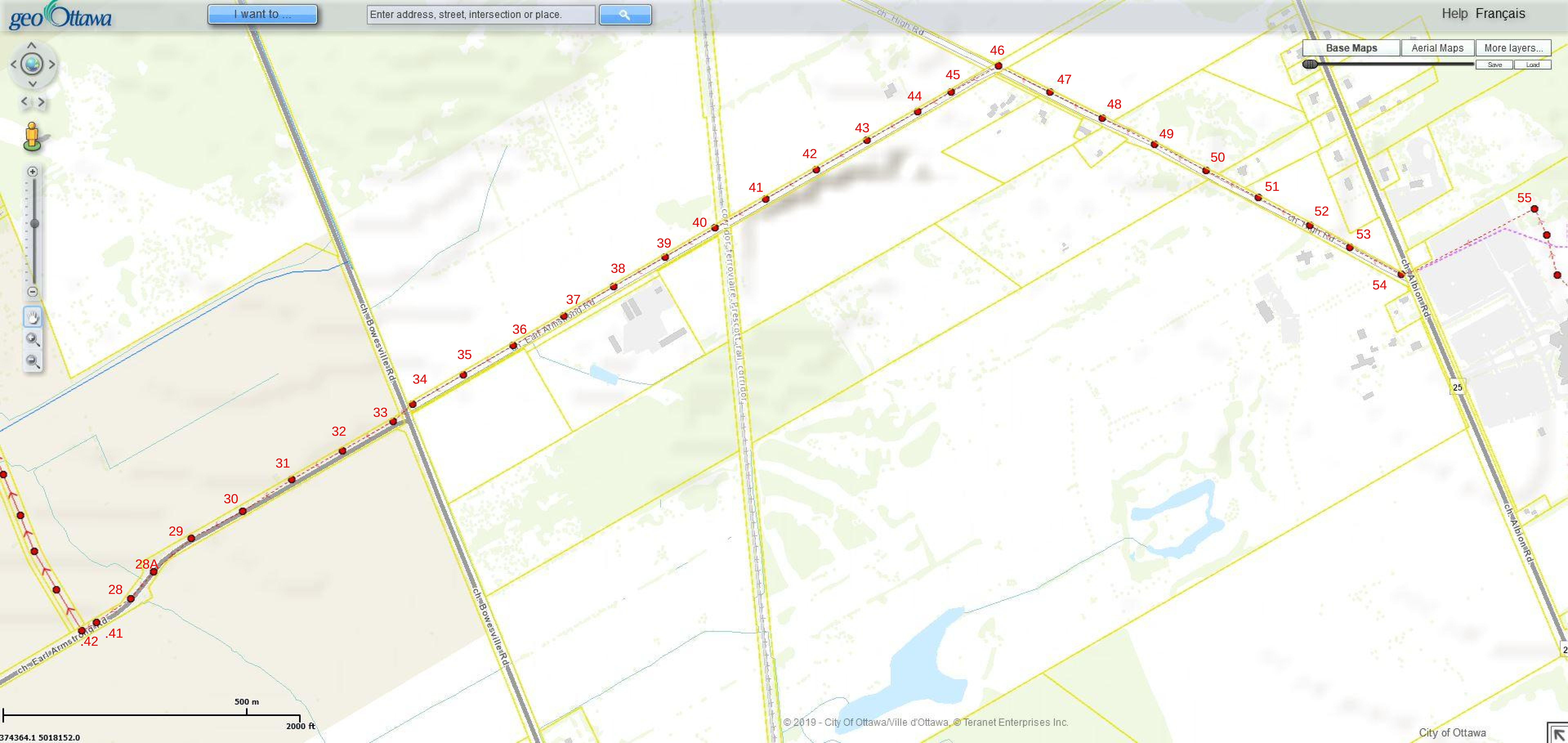


| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MHSA-36 MHSA-35 | EARL ARMSTRONG | 36 | 35 | ☒ | ☐ | ☐ | 118.50 | | |
| MHSA-37 MHSA-36 | EARL ARMSTRONG | 37 | 36 | ☒ | ☐ | ☐ | 119.00 | | |
| MHSA-38 MHSA-37 | EARL ARMSTRONG | 38 | 37 | ☒ | ☐ | ☐ | 118.00 | | |
| MHSA-39 MHSA-38 | EARL 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<br>MHSA-52 | EARL<br>ARMSTRONG | 53 | 52 | ☒ | ☐ | ☐ | 118.00 | Mild Grease | Requires Cleaning |
| MHSA-54<br>MHSA-53 | EARL<br>ARMSTRONG | 54 | 43 | ☒ | ☐ | ☐ | 95.00 | Mild Grease | Requires Cleaning |
| MHSA-55<br>MHSA-54 | EARL<br>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. Bowesville Rd
ch. Earl Armstrong Rd
ch. Earl Armstrong Rd
corridor ferroviaire Prescott rail corridor
ch. Albion Rd
ch. Albion Rd
ch. High Rd
25
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500 m
2000 ft
374364.1 5018152.0
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City of Ottawa

CCTV inspection report

Hard Rock Ottawa L.P

Sanitary Sewer

EARL ARMSTRONG, HIGH RD

Page

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 |

VEOLIA

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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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

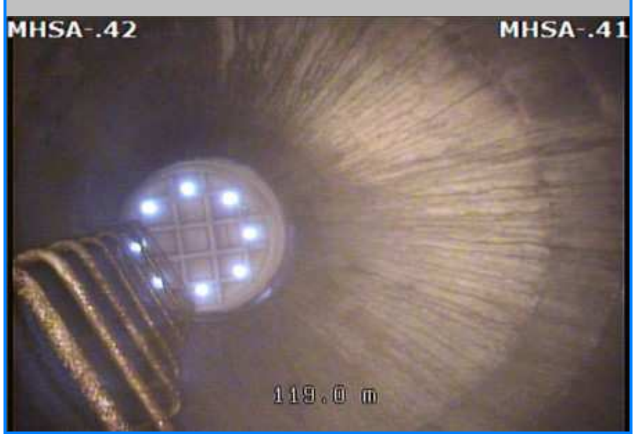
**#3 0.00**
WL - Water level, 5%

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

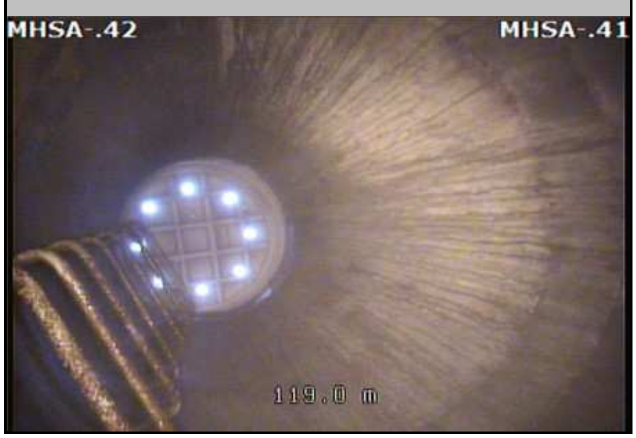

**#5 35.70**
DES - Debris silt, 10%


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

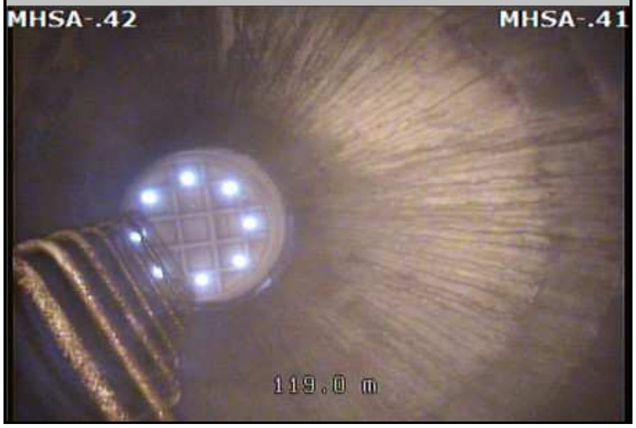

**#7 119.00**
(F1) DES - Debris silt, 0%




**#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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **Analyst:** | | | |

## Internal Condition

**Grade:** 1
**Total:** 0
**Peak:** 0

## Operational Performance

**Grade:** 3
**Total:** 4
**Peak:** 2

## Comments

## Other information

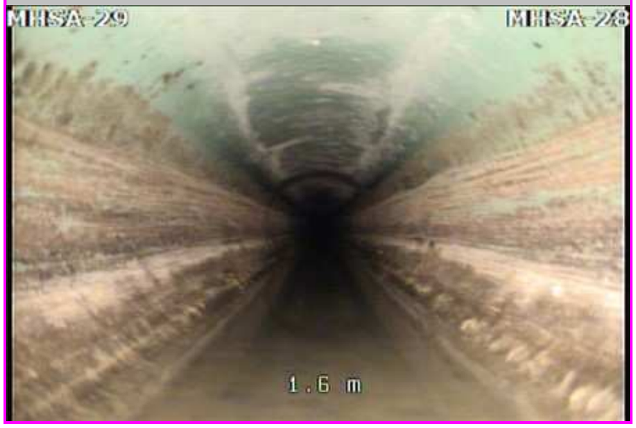
| | | | |
|---|---|---|---|
| **Other 1:** | 455019 | **Other 7:** | |
| **Other 2:** | | **Other 8:** | |
| **Other 3:** | | **Other 9:** | |
| **Other 4:** | | **Other 10:** | |
| **Other 5:** | | **PI5 (MAMR):** | |
| **Other 6:** | | **PI6 (MAMR):** | |

**#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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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 |

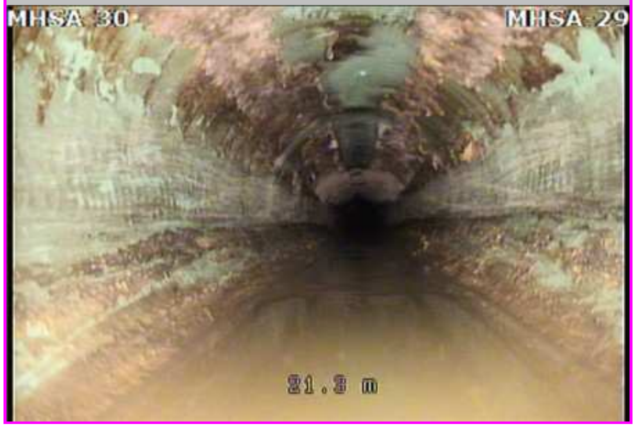
## Comments

## 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**<br>ST - Start of Survey | **#2 0.00**<br>MH - Manhole / node, MHSA-30 |
| **#3 0.00**<br>WL - Water level, 10% | **#4 1.20**<br>DEG - Debris grease, from 7 o'clock to 5 o'clock, 5% |

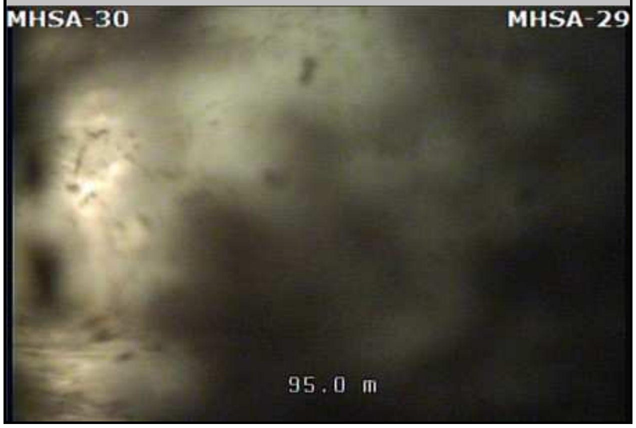

**#5 21.30**
DEG - Debris grease, from 7 o'clock to 5 o'clock, 5%




**#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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **Analyst:** | | | |

## Internal Condition

**Grade:** 1
**Total:** 0
**Peak:** 0

## Operational Performance

**Grade:** 1
**Total:** 0
**Peak:** 0

## Comments

## Other information

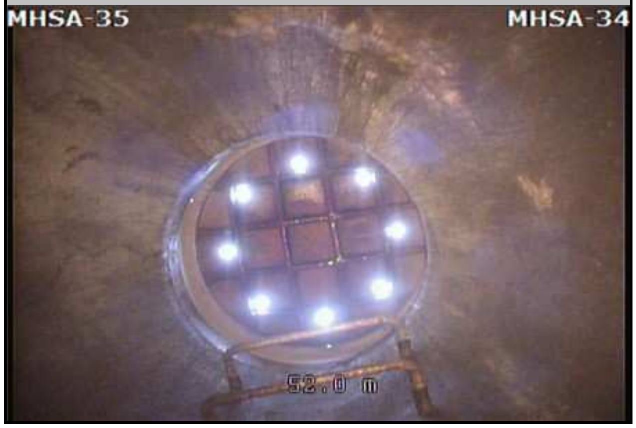
| | | | |
|---|---|---|---|
| **Other 1:** | 455019 | **Other 7:** | |
| **Other 2:** | | **Other 8:** | |
| **Other 3:** | | **Other 9:** | |
| **Other 4:** | | **Other 10:** | |
| **Other 5:** | | **PI5 (MAMR):** | |
| **Other 6:** | | **PI6 (MAMR):** | |

**#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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **Analyst:** | | | |

## Internal Condition

**Grade:** 1
**Total:** 0
**Peak:** 0

## Operational Performance

**Grade:** 1
**Total:** 0
**Peak:** 0

## Comments

## Other information

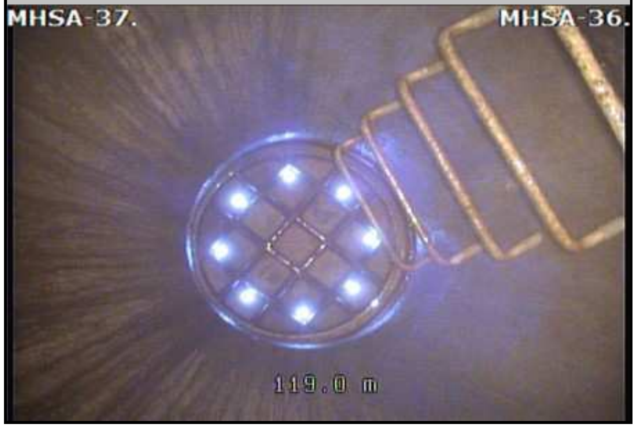
| | | | |
|---|---|---|---|
| **Other 1:** | 455019 | **Other 7:** | |
| **Other 2:** | | **Other 8:** | |
| **Other 3:** | | **Other 9:** | |
| **Other 4:** | | **Other 10:** | |
| **Other 5:** | | **PI5 (MAMR):** | |
| **Other 6:** | | **PI6 (MAMR):** | |

**#1 0.00**
ST - Start of Survey

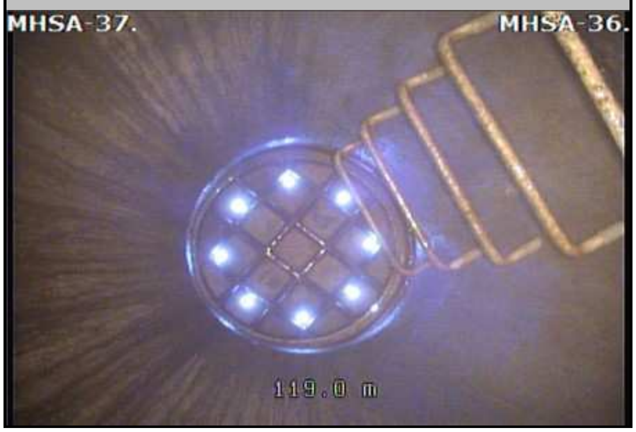
**#2 0.00**
MH - Manhole / node, MHSA-37.

**#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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **Analyst:** | | | |

## Internal Condition

| | |
|---|---|
| **Grade:** | 1 |
| **Total:** | 0 |
| **Peak:** | 0 |

## Operational Performance

| | |
|---|---|
| **Grade:** | 1 |
| **Total:** | 0 |
| **Peak:** | 0 |

## Comments

## Other information

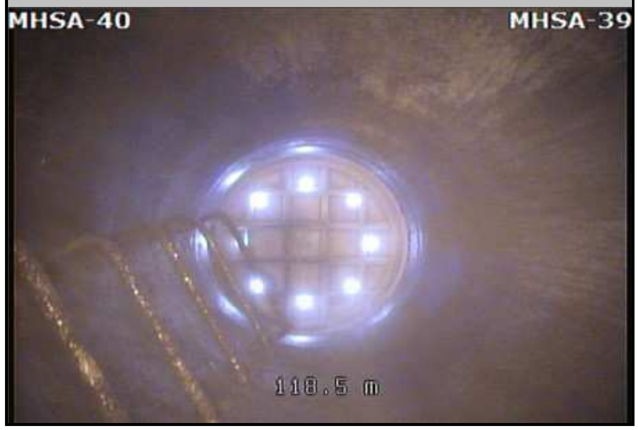
| | | | |
|---|---|---|---|
| **Other 1:** | 455019 | **Other 7:** | |
| **Other 2:** | | **Other 8:** | |
| **Other 3:** | | **Other 9:** | |
| **Other 4:** | | **Other 10:** | |
| **Other 5:** | | **PI5 (MAMR):** | |
| **Other 6:** | | **PI6 (MAMR):** | |

**#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 | #2 0.00 |
|---|---|
| ST - Start of Survey | MH - Manhole / node, MHSA-41 |

| #3 0.00 | #4 118.50 |
|---|---|
| WL - Water level, 5% | 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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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):** | |

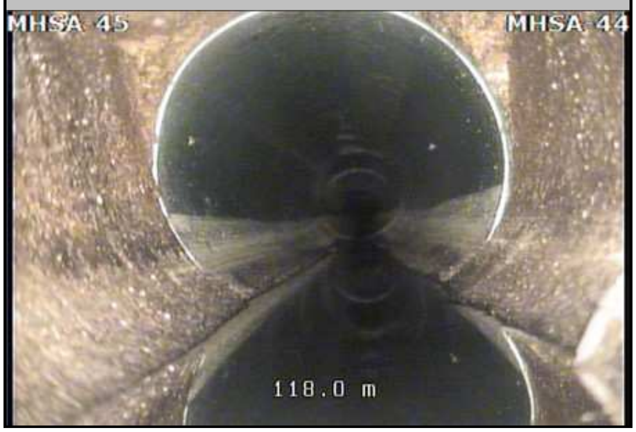
#1 0.00
ST - Start of Survey

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

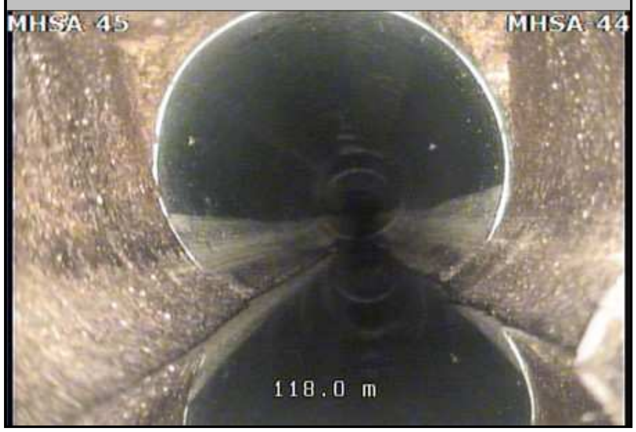
#3 0.00
WL - Water level, 10%

#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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Snow | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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 | #2 0.00 |
|---|---|
| ST - Start of Survey | 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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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 | #2 0.00 |
|---|---|
| ST - Start of Survey | 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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | DT | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Dry | **Start position:** | |
| **Operator:** | DT | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Rain | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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:** | ☑ |
| **Project type:** | Video Inspection | **Blocked flow:** | ☐ |
| **Project supplier:** | | **Regular CCTV:** | ☐ |
| **Client:** | Hard Rock Ottawa L.P | **Reinspect with ZOOM:** | ☐ |
| **Purpose:** | Assessment of complete remedial or renovation works | **Medium #:** | |
| **Weather:** | Light Rain | **Start position:** | |
| **Operator:** | RS | **End position:** | |
| **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
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Project No.  MP13140A
Date: September 3, 1999

# Table of Contents

# 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 $m^3$/ha x 12.88 ha
= 2,705 $m^3$

Extended Detention:

V = 40 $m^3$/ha x 12.88 ha
= 515 $m^3$

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 $m^2$x6504 $m^2$)$^{1/2}$ $m^2$ )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 $(2 \times 9.81\ m/s^2)^{0.5}]$
= 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.

**<u>Quantity Control</u>**

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(☎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(☎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 = $0.60 \times .0886 \text{ m} \times 137400 \text{ m}^2$

Runoff volume = $7304 \text{ m}^3$

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 0.06 | | | | | | | | | | | | | | | 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 | | | | | | | | | | | | | | | | |

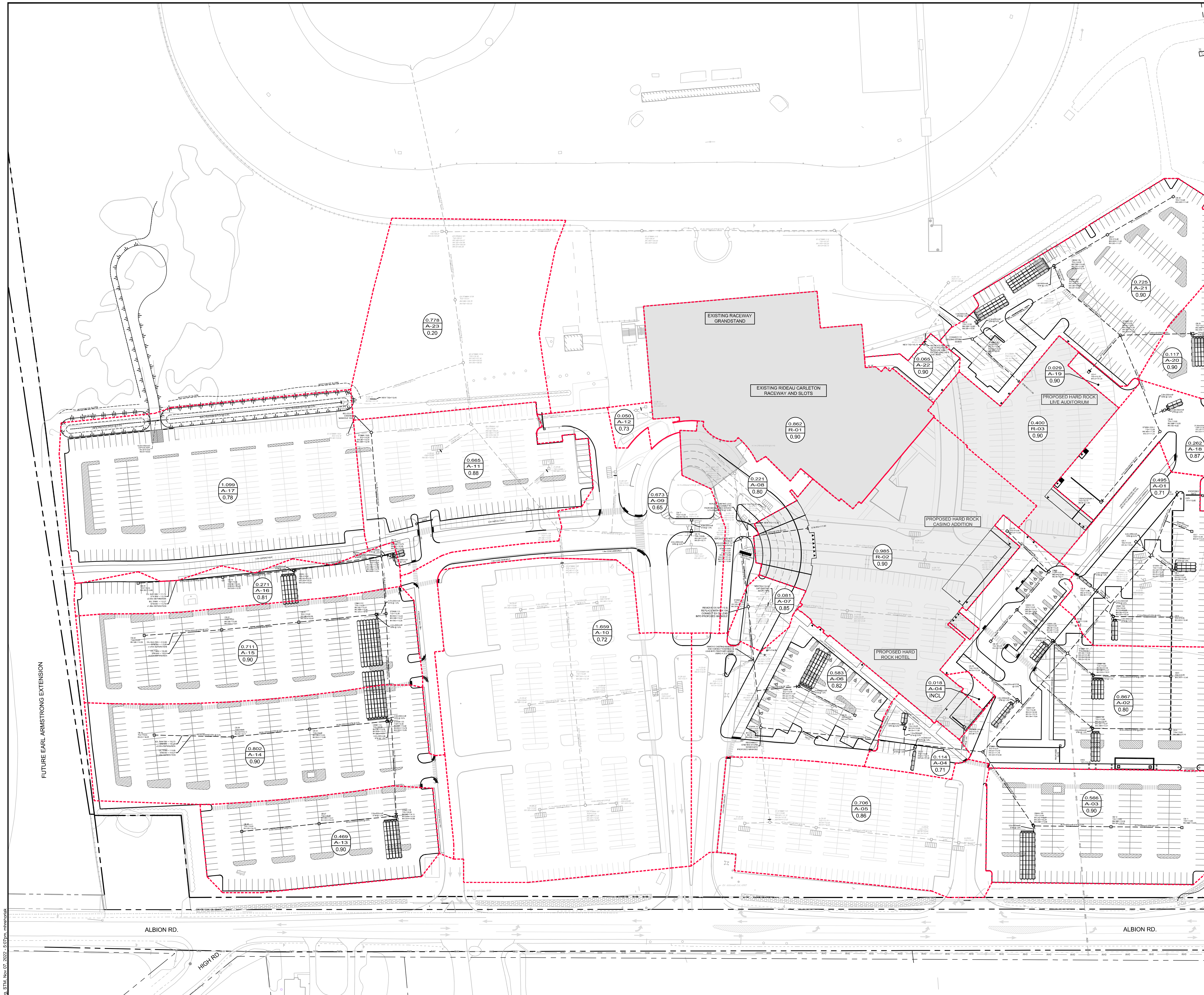
Shaded area show pipe segments that will surcharge during storms less than 1:5 years.

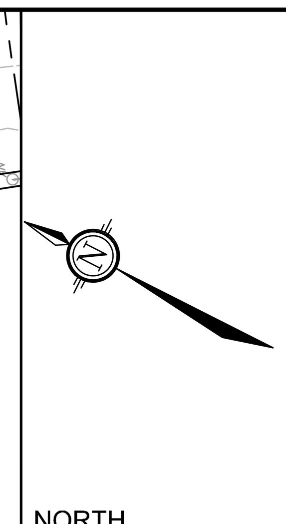
Should have been
351.0 + 60 = 411.0

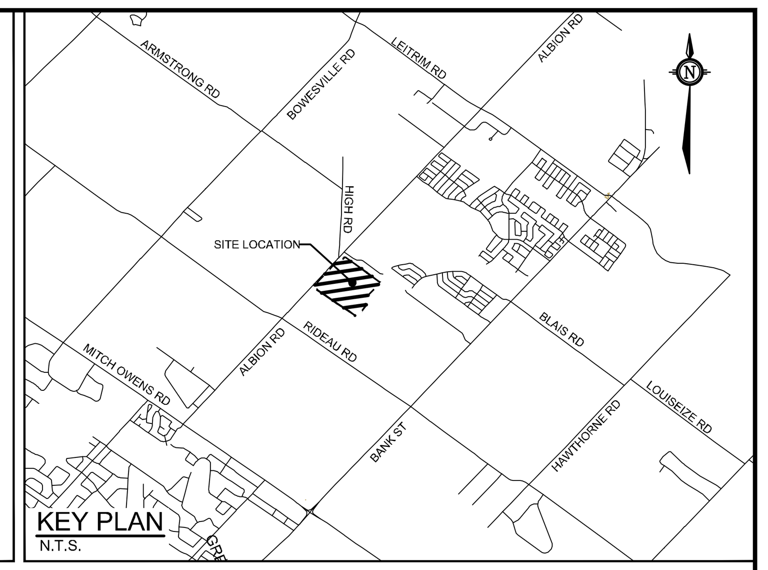
This number is incorrect, added
178.6+20+40 = 238.6

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 | | | |





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
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha) / DRAINAGE AREA ID / RUNOFF COEFFICIENT

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 |
|---|---|---|---|
| 3 | REVISED PER CITY COMMENTS | NOV 07/22 | MJH |
| 2 | REVISED PER CITY COMMENTS | APR 24/20 | CJR |
| 1 | ISSUED FOR SITE PLAN APPROVAL | NOV 20/19 | CJR |

SCALE 1:750

DESIGN MJH
CHECKED CJR
DRAWN MJH
CHECKED CJR
APPROVED JLS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER M. J. HREHORIAK 100211256 NOV 7/22 PROVINCE OF ONTARIO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LOCATION
4837 ALBION ROAD, CITY OF OTTAWA
HARD ROCK OTTAWA

DRAWING NAME
STORM SEWER DRAINAGE AREA PLAN

PROJECT No. 116111
REV REV # 3
DRAWING No. 116111-STM

PLANB1.DWG - 1000mmx707mm

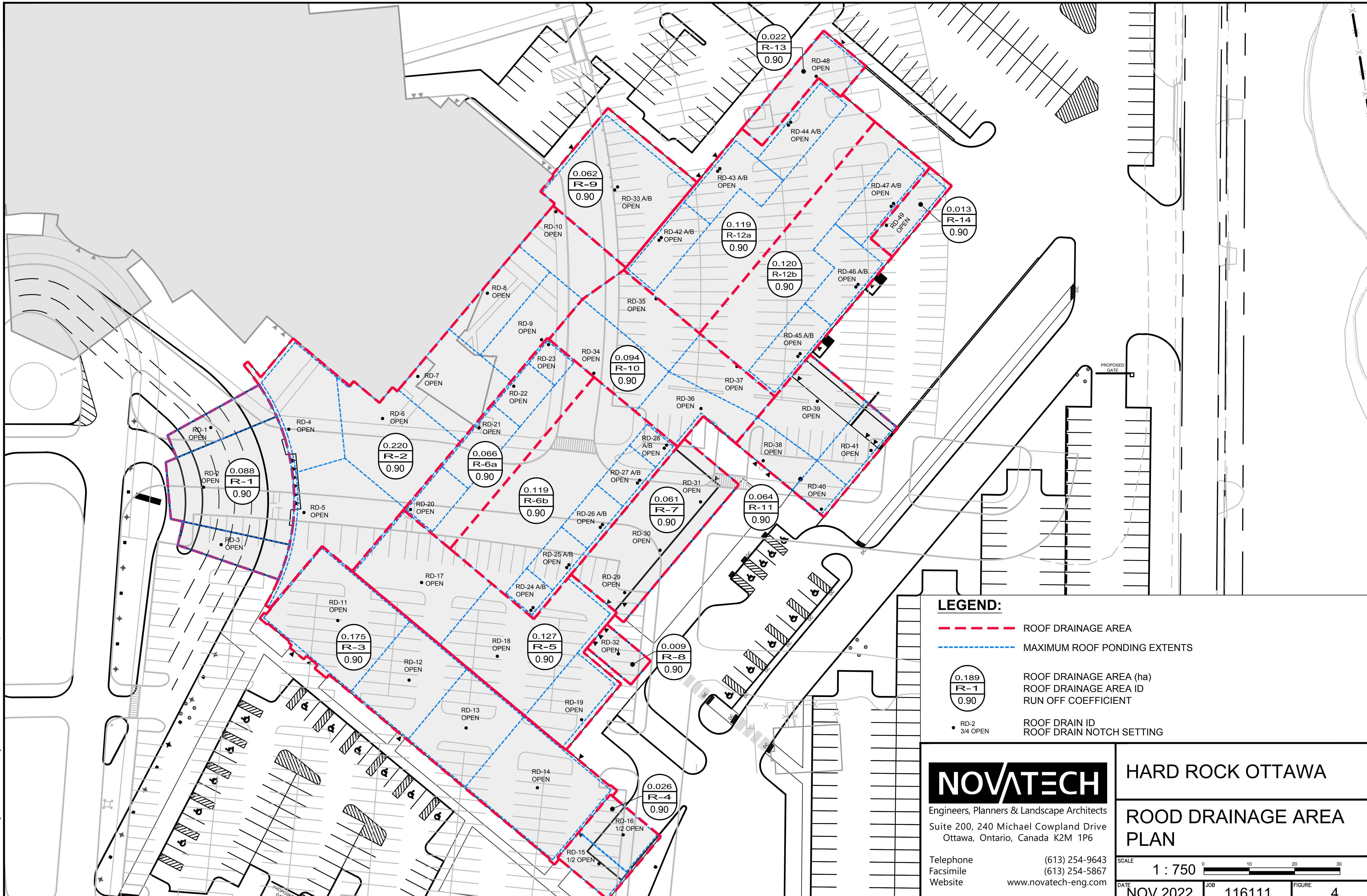
## 2 Year Storm Sewer Design Sheet

| 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) | CONTROLLED FLOW (2-YEAR) $Q_{controlled}$ (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 | $Q_{controlled}/Q_{full}$ |
| A-01 | STMMH 100 | STMMH 101 | 0.495 | 0.132 | 0.363 | 0.71 | 0.98 | 0.98 | 10.00 | 76.81 | 75.39 | 14.0 | 457.2 | 0.30 | 61.3 | 163.08 | 0.99 | 1.03 | 87.68 | 0.46 | 0.09 |
| A-02 | STMMH 101 | STMMH 102 | 0.867 | 0.119 | 0.748 | 0.80 | 1.94 | 2.92 | 11.03 | 73.07 | 213.30 | 36.5 | 457.2 | 0.30 | 61.6 | 163.08 | 0.99 | 1.03 | -50.22 | 1.31 | 0.22 |
| A-03 | CBMH 109 | STMMH 102 | 0.566 | 0.000 | 0.566 | 0.90 | 1.42 | 1.42 | 10.00 | 76.81 | 108.77 | 8.8 | 304.8 | 0.50 | 42.5 | 71.41 | 0.98 | 0.72 | -37.36 | 1.52 | 0.12 |
| A-04 | STMMH 102 | STMMH 103 | 0.132 | 0.035 | 0.096 | 0.71 | 0.26 | 4.60 | 12.06 | 69.69 | 320.32 | 49.0 | 533.0 | 0.30 | 106.0 | 245.50 | 1.10 | 1.61 | -74.82 | 1.30 | 0.20 |
| A-05 | EX STMMH 112 | STMMH 103 | 0.706 | 0.044 | 0.662 | 0.86 | 1.68 | 1.68 | 10.00 | 76.81 | 129.09 | 91.8 | 304.8 | 0.10 | 45.1 | 31.93 | 0.44 | 1.72 | -97.16 | 4.04 | 2.87 |
| A-06 | STMMH 103 | STMMH 104 | 0.583 | 0.067 | 0.516 | 0.82 | 1.33 | 7.60 | 13.67 | 65.09 | 495.02 | 157.7 | 610.0 | 0.30 | 57.6 | 351.82 | 1.20 | 0.80 | -143.20 | 1.41 | 0.45 |
| A-07 | STMMH 104 | STMMH X109 | 0.081 | 0.006 | 0.075 | 0.85 | 0.19 | 7.80 | 14.47 | 63.05 | 491.50 | 162.3 | 610.0 | 0.30 | 32.8 | 351.82 | 1.20 | 0.45 | -139.69 | 1.40 | 0.46 |
| R-01 | EXSTMMH 108 | STMMH X109 | 0.862 | 0.000 | 0.862 | 0.90 | 2.16 | 2.16 | 10.00 | 76.81 | 165.65 | 100.1 | 381.0 | 1.10 | 32.9 | 192.03 | 1.68 | 0.33 | 26.39 | 0.86 | 0.52 |
| R-02 | Building Service | STMMH X109 | 0.985 | 0.000 | 0.985 | 0.90 | Controlled 100-year flow from roof drains = 77.6 L/s | | | | 77.60 | 52.2 | | | | | | | | | |
| A-08 | Building Service | STMMH X109 | 0.221 | 0.030 | 0.191 | 0.80 | 0.49 | 0.49 | 10.00 | 76.81 | 115.58 | 64.7 | 304.8 | 1.00 | 32.2 | 100.98 | 1.38 | 0.39 | -14.60 | 1.14 | 0.64 |
| A-09 | STMMH X109 | EX STMMH 104 | 0.673 | 0.242 | 0.431 | 0.65 | 1.21 | 11.66 | 14.92 | 61.95 | 799.89 | 374.3 | 610.0 | 0.30 | 86.3 | 351.82 | 1.20 | 1.20 | -448.08 | 2.27 | 1.06 |
| 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 | 108.2 | 457.2 | 0.20 | 17.4 | 133.15 | 0.81 | 0.36 | -121.09 | 1.91 | 0.81 |
| A-11 | EX STMMH 104 | EX STMMH 102 | 0.665 | 0.019 | 0.646 | 0.88 | 1.63 | 16.60 | 16.12 | 59.24 | 1060.87 | 577.9 | 610.0 | 1.30 | 65.3 | 732.37 | 2.50 | 0.43 | -328.50 | 1.45 | 0.79 |
| 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 | 7.8 | 304.8 | 1.10 | 78.6 | 105.91 | 1.45 | 0.90 | 98.10 | 0.07 | 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 | 8.3 | 304.8 | 1.00 | 45.1 | 100.98 | 1.38 | 0.54 | 10.86 | 0.89 | 0.08 |
| A-14 | STMMH 120 | STMMH 113 | 0.802 | 0.000 | 0.802 | 0.90 | 2.01 | 3.18 | 10.54 | 74.78 | 237.80 | 17.9 | 304.8 | 0.80 | 51.0 | 90.32 | 1.24 | 0.69 | -147.48 | 2.63 | 0.20 |
| A-15 | STMMH 113 | STMMH 119 | 0.711 | 0.000 | 0.711 | 0.90 | 1.78 | 4.96 | 11.23 | 72.38 | 358.93 | 25.0 | 304.8 | 1.00 | 51.0 | 100.98 | 1.38 | 0.61 | -257.95 | 3.55 | 0.25 |
| A-16 | STMMH119 | EX STMH 102A | 0.271 | 0.035 | 0.236 | 0.81 | 0.61 | 5.57 | 11.85 | 70.38 | 391.92 | 32.2 | 304.8 | 1.00 | 86.3 | 100.98 | 1.38 | 1.04 | -290.94 | 3.88 | 0.32 |
| | EX STMH 102A | EX STMMH 102 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 5.57 | 12.89 | 67.25 | 374.53 | 32.2 | 304.8 | 0.90 | 59.0 | 95.80 | 1.31 | 0.75 | -278.72 | 3.91 | 0.34 |
| | EX STMMH 102 | EX STMMH 101A | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 22.27 | 16.56 | 58.33 | 1376.37 | 607.1 | 762.0 | 1.60 | 29.4 | 1470.57 | 3.22 | 0.15 | 94.20 | 0.94 | 0.41 |
| A-17 | EX STMMH 101A | EX STMMH 101B | 1.099 | 0.191 | 0.908 | 0.78 | 2.38 | 24.65 | 16.71 | 58.01 | 1507.33 | 661.0 | 762.0 | 1.40 | 30.1 | 1375.59 | 3.01 | 0.17 | -131.74 | 1.10 | 0.48 |
| | EX STMMH 101B | EX STMMH 101 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 24.65 | 16.87 | 57.67 | 1498.97 | 661.0 | 762.0 | 2.30 | 32.6 | 1763.15 | 3.86 | 0.14 | 264.18 | 0.85 | 0.37 |
| A-18 | OGS 1 | STMMH 123 | 0.262 | 0.011 | 0.251 | 0.87 | 0.63 | 0.63 | 10.00 | 76.81 | 48.70 | 32.1 | 304.8 | 0.50 | 49.4 | 71.41 | 0.98 | 0.84 | 22.70 | 0.68 | 0.45 |
| A-19 | CB 41 | STMMH 123 | 0.029 | 0.000 | 0.029 | 0.90 | 0.07 | 0.07 | 10.00 | 76.81 | 5.57 | 5.6 | 254.0 | 0.50 | 23.0 | 43.91 | 0.87 | 0.44 | 38.34 | 0.13 | 0.13 |
| A-20 | CB 29 | STMMH 123 | 0.117 | 0.000 | 0.117 | 0.90 | 0.29 | 0.29 | 10.00 | 76.81 | 22.48 | 2.4 | 254.0 | 0.50 | 34.4 | 43.91 | 0.87 | 0.66 | 21.43 | 0.51 | 0.05 |
| | STMMH 123 | STMMH 117 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 1.00 | 10.84 | 73.72 | 73.67 | 39.6 | 304.8 | 0.50 | 36.2 | 71.41 | 0.98 | 0.62 | -2.27 | 1.03 | 0.55 |
| A-21 | STMMH 117 | STMMH 116 | 0.725 | 0.000 | 0.725 | 0.90 | 1.81 | 2.81 | 11.46 | 71.62 | 201.50 | 59.8 | 304.8 | 0.50 | 49.7 | 71.41 | 0.98 | 0.85 | -130.09 | 2.82 | 0.84 |
| R-03 | Building Service | STMMH 116 | 0.400 | 0.000 | 0.400 | 0.90 | Controlled 100-year flow from roof / trench drains = 37.9 L/s | | | | 37.90 | 24.9 | 254.0 | 2.00 | 30.0 | 87.82 | 1.73 | 0.29 | 49.92 | 0.43 | 0.28 |
| A-22 | STMMH 116 | EX STMMH 116 | 0.065 | 0.000 | 0.065 | 0.90 | 0.16 | 2.98 | 12.31 | 68.95 | 243.11 | 94.7 | 254.0 | 5.90 | 93.9 | 150.84 | 2.97 | 0.53 | -92.26 | 1.61 | 0.63 |
| | EX STMMH 116 | EX STMMH 115 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 2.98 | 12.83 | 67.41 | 238.50 | 81.5 | 304.8 | 0.50 | 91.3 | 71.41 | 0.98 | 1.56 | -167.09 | 3.34 | 1.14 |
| | EX STMMH 115 | EX STMMH 101 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 2.98 | 14.39 | 63.25 | 226.12 | 80.5 | 304.8 | 0.50 | 92.7 | 71.41 | 0.98 | 1.58 | -154.72 | 3.17 | 1.13 |
| A-23 | EX STMMH 101 | POND | 0.778 | 0.778 | 0.000 | 0.20 | 0.43 | 28.05 | 17.01 | 57.39 | 1725.50 | 729.6 | 762.0 | 2.00 | 80.9 | 1644.14 | 3.60 | 0.37 | -81.36 | 1.05 | 0.44 |

***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 = $732.951 / (\text{time} + 6.199)^{0.810}$




## LEGEND:

- ROOF DRAINAGE AREA
- MAXIMUM ROOF PONDING EXTENTS
- 0.189 / R-1 / 0.90 — ROOF DRAINAGE AREA (ha), ROOF DRAINAGE AREA ID, RUN OFF COEFFICIENT
- RD-2 3/4 OPEN — ROOF DRAIN ID, ROOF DRAIN NOTCH SETTING

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# HARD ROCK OTTAWA

# ROOD DRAINAGE AREA PLAN

| SCALE | DATE | JOB | FIGURE |
|---|---|---|---|
| 1 : 750 (0 10 20 30) | NOV 2022 | 116111 | 4 |

M:\2016\116111\CAD\Design\116111-ROOF.dwg, Roof Drains, Nov 03, 2022 - 2:41pm, dmaratha

SHT11X17.DWG - 279mmX432mm

## PORT COCHERE 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 |
| 0.088 | Roof | 0.088 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area**

0.088 =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 | 13.41 | 3.3 | 10.10 | 15.14 |
| | 30 | 53.93 | 11.87 | 3.3 | 8.56 | 15.41 |
| | **35** | **48.52** | **10.68** | **3.3** | **7.37** | **15.48** |
| | 40 | 44.18 | 9.73 | 3.3 | 6.42 | 15.40 |
| | 45 | 40.63 | 8.95 | 3.3 | 5.63 | 15.21 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area**

0.088 =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 | 25 | 103.85 | 25.41 | 5.7 | 19.73 | 29.59 |
| | 30 | 91.87 | 22.47 | 5.7 | 16.80 | 30.23 |
| | **35** | **82.58** | **20.20** | **5.7** | **14.52** | **30.50** |
| | 40 | 75.15 | 18.38 | 5.7 | 12.71 | 30.49 |
| | 45 | 69.05 | 16.89 | 5.7 | 11.21 | 30.28 |

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 1D: Roof Drain Flows**

| Roof Drains | | |
|---|---|---|
| Roof Area | 880 | m² |
| Qty | 3 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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 | 155 | 0.089 | 4.61 | - |
| | RD-2 | 566 | 0.089 | 16.77 | - |
| | RD-3 | 159 | 0.089 | 4.71 | - |
| | | | **Total** | **26.08** | **15.48** |
| 100 Year | RD-1 | 155 | 0.152 | 7.89 | - |
| | RD-2 | 566 | 0.152 | 28.74 | - |
| | RD-3 | 159 | 0.152 | 8.07 | - |
| | | | **Total** | **44.70** | **30.50** |

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{3}$

**LOWER CASINO ROOF**

**TABLE 1A: 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 |
| 0.220 | Roof | 0.220 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R2 Controlled Roof Area**

0.22 =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 | 33.52 | 7.7 | 25.79 | 38.69 |
| | 30 | 53.93 | 29.68 | 7.7 | 21.96 | 39.52 |
| | **35** | **48.52** | **26.71** | **7.7** | **18.98** | **39.85** |
| | 40 | 44.18 | 24.32 | 7.7 | 16.59 | 39.82 |
| | 45 | 40.63 | 22.36 | 7.7 | 14.63 | 39.51 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R2 Controlled Roof Area**

0.22 =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 | 56.19 | 13.2 | 42.94 | 77.29 |
| | 35 | 82.58 | 50.51 | 13.2 | 37.26 | 78.24 |
| | **40** | **75.15** | **45.96** | **13.2** | **32.71** | **78.50** |
| | 45 | 69.05 | 42.23 | 13.2 | 28.98 | 78.25 |
| | 50 | 63.95 | 39.11 | 13.2 | 25.87 | 77.60 |

Equations:
Flow Equation
Q = 2.78 x C x I x 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 | 2200 | m² |
| Qty | 7 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-4 | 319.1 | 0.089 | 9.46 | - |
| | RD-5 | 415.7 | 0.089 | 12.32 | - |
| | RD-6 | 434.0 | 0.089 | 12.86 | - |
| | RD-7 | 311.6 | 0.089 | 9.23 | - |
| | RD-8 | 213.6 | 0.089 | 6.33 | - |
| | RD-9 | 218.8 | 0.089 | 6.48 | - |
| | RD-10 | 229.0 | 0.089 | 6.79 | - |
| | | | **Total** | **63.47** | **39.85** |
| 100 Year | RD-4 | 319.1 | 0.152 | 16.21 | - |
| | RD-5 | 415.7 | 0.152 | 21.12 | - |
| | RD-6 | 434.0 | 0.152 | 22.05 | - |
| | RD-7 | 311.6 | 0.152 | 15.83 | - |
| | RD-8 | 213.6 | 0.152 | 10.85 | - |
| | RD-9 | 218.8 | 0.152 | 11.12 | - |
| | RD-10 | 229.0 | 0.152 | 11.63 | - |
| | | | **Total** | **108.80** | **78.50** |

**HOTEL ROOF**

**TABLE 1A: 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 |
| 0.175 | Roof | 0.175 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R3 Controlled Roof Area**

0.175 =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 | 40 | 44.18 | 19.35 | 4.4 | 14.93 | 35.83 |
| | 45 | 40.63 | 17.79 | 4.4 | 13.37 | 36.11 |
| | **50** | **37.65** | **16.49** | **4.4** | **12.07** | **36.21** |
| | 55 | 35.12 | 15.38 | 4.4 | 10.96 | 36.18 |
| | 60 | 32.94 | 14.42 | 4.4 | 10.01 | 36.03 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R3 Controlled Roof Area**

0.175 =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 | 33.59 | 7.6 | 26.02 | 70.26 |
| | 50 | 63.95 | 31.11 | 7.6 | 23.54 | 70.63 |
| | **55** | **59.62** | **29.01** | **7.6** | **21.44** | **70.74** |
| | 60 | 55.89 | 27.19 | 7.6 | 19.62 | 70.64 |
| | 65 | 52.65 | 25.61 | 7.6 | 18.04 | 70.36 |

Equations:
Flow Equation
Q = 2.78 x C x I x 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 | 1750 | $m^2$ |
| Qty | 4 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | L/s (ea) |

**Table 1E: 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-11 | 503.8 | 0.089 | 14.93 | - |
| | RD-12 | 327.9 | 0.089 | 9.72 | - |
| | RD-13 | 327.9 | 0.089 | 9.72 | - |
| | RD-14 | 501.0 | 0.089 | 14.85 | - |
| | | | **Total** | **49.21** | **36.21** |
| 100 Year | RD-11 | 503.8 | 0.152 | 25.59 | - |
| | RD-12 | 327.9 | 0.152 | 16.66 | - |
| | RD-13 | 327.9 | 0.152 | 16.66 | - |
| | RD-14 | 501.0 | 0.152 | 25.45 | - |
| | | | **Total** | **84.36** | **70.74** |

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area\ X\ Depth}{3}$$

**HOTEL DOCK SOUTH**

**TABLE 1A: 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 |
| 0.026 | Roof | 0.026 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R4 Controlled Roof Area**

0.026 =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 | 5 | 141.18 | 9.18 | 2.2 | 6.98 | 2.09 |
| | 10 | 104.19 | 6.78 | 2.2 | 4.57 | 2.74 |
| | **15** | **83.56** | **5.44** | **2.2** | **3.23** | **2.90** |
| | 20 | 70.25 | 4.57 | 2.2 | 2.36 | 2.83 |
| | 25 | 60.90 | 3.96 | 2.2 | 1.75 | 2.63 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R4 Controlled Roof Area**

0.026 =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 | 17.54 | 3.8 | 13.76 | 4.13 |
| | 10 | 178.56 | 12.91 | 3.8 | 9.12 | 5.47 |
| | **15** | **142.89** | **10.33** | **3.8** | **6.54** | **5.89** |
| | 20 | 119.95 | 8.67 | 3.8 | 4.88 | 5.86 |
| | 25 | 103.85 | 7.51 | 3.8 | 3.72 | 5.58 |

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 | 260 | m² |
| Qty | 2 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-15 | 101.9 | 0.089 | 3.02 | - |
| | RD-16 | 143.9 | 0.089 | 4.26 | - |
| | | | **Total** | **7.28** | **2.90** |
| 100 Year | RD-15 | 101.9 | 0.152 | 5.18 | - |
| | RD-16 | 143.9 | 0.152 | 7.31 | - |
| | | | **Total** | **12.49** | **5.89** |

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{3}$

## CASINO ROOF

**TABLE 1A: Post-Development Runoff Coefficient "C" - R5 Controlled Roof Area**

| Area | Surface | Ha | 5 Year Event "C" | 5 Year Event $C_{avg}$ | 100 Year Event "C" + 25% | 100 Year Event *$C_{avg}$ |
|---|---|---|---|---|---|---|
| Total | Hard | 0.000 | 0.90 | 0.90 | 1.00 | 1.00 |
| 0.127 | Roof | 0.127 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R5 Controlled Roof Area**

0.127 =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 | 40 | 44.18 | 14.04 | 3.3 | 10.73 | 25.75 |
| | 45 | 40.63 | 12.91 | 3.3 | 9.60 | 25.91 |
| | **50** | **37.65** | **11.96** | **3.3** | **8.65** | **25.96** |
| | 55 | 35.12 | 11.16 | 3.3 | 7.85 | 25.90 |
| | 60 | 32.94 | 10.47 | 3.3 | 7.16 | 25.76 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R5 Controlled Roof Area**

0.127 =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 | 24.38 | 5.7 | 18.70 | 50.49 |
| | 50 | 63.95 | 22.58 | 5.7 | 16.90 | 50.70 |
| | **55** | **59.62** | **21.05** | **5.7** | **15.37** | **50.73** |
| | 60 | 55.89 | 19.73 | 5.7 | 14.06 | 50.60 |
| | 65 | 52.65 | 18.59 | 5.7 | 12.91 | 50.35 |

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 | 1270 | $m^2$ |
| Qty | 3 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | L/s (ea) |

**Table 1E: 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 | 439 | 0.089 | 13.01 | - |
| | RD-18 | 574 | 0.089 | 17.01 | - |
| | RD-19 | 195 | 0.089 | 5.78 | - |
| | | | **Total** | **35.80** | **25.96** |
| 100 Year | RD-17 | 439 | 0.152 | 22.30 | - |
| | RD-18 | 574 | 0.152 | 29.16 | - |
| | RD-19 | 195 | 0.152 | 9.92 | - |
| | | | **Total** | **61.37** | **50.73** |

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{3}$

**HIGH CASINO ROOF**

**TABLE 1A: Post-Development Runoff Coefficient "C" - R6a 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 |
| 0.066 | Roof | 0.066 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R6a Controlled Roof Area**

0.066 =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 | 17.21 | 4.4 | 12.79 | 7.67 |
| | 15 | 83.56 | 13.80 | 4.4 | 9.38 | 8.44 |
| | **20** | **70.25** | **11.60** | **4.4** | **7.18** | **8.62** |
| | 25 | 60.90 | 10.06 | 4.4 | 5.64 | 8.46 |
| | 30 | 53.93 | 8.91 | 4.4 | 4.49 | 8.08 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R6a Controlled Roof Area**

0.066 =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 | 10 | 178.56 | 32.76 | 7.6 | 25.19 | 15.11 |
| | 15 | 142.89 | 26.22 | 7.6 | 18.65 | 16.78 |
| | **20** | **119.95** | **22.01** | **7.6** | **14.44** | **17.33** |
| | 25 | 103.85 | 19.05 | 7.6 | 11.48 | 17.22 |
| | 30 | 91.87 | 16.86 | 7.6 | 9.29 | 16.71 |

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 | 660 | m² |
| Qty | 4 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-20 | 92.6 | 0.089 | 4.12 | - |
| | RD-21 | 133.1 | 0.089 | 5.92 | - |
| | RD-22 | 89.7 | 0.089 | 3.99 | - |
| | RD-23 | 48.9 | 0.089 | 2.17 | - |
| | | | **Total** | **16.19** | **8.62** |
| 100 Year | RD-20 | 92.6 | 0.152 | 7.06 | - |
| | RD-21 | 133.1 | 0.152 | 10.14 | - |
| | RD-22 | 89.7 | 0.152 | 6.84 | - |
| | RD-23 | 48.9 | 0.152 | 3.73 | - |
| | | | **Total** | **27.76** | **17.33** |

*Note: Ponding volumes calculated using end area equation: $V = \frac{Area\ X\ Depth}{2}$

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## HIGH CASINO ROOF

**TABLE 1A: Post-Development Runoff Coefficient "C" - R6b 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 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R6b 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 | 5 | 141.18 | 42.03 | 11.0 | 30.99 | 9.30 |
| | 10 | 104.19 | 31.02 | 11.0 | 19.98 | 11.99 |
| | **15** | **83.56** | **24.88** | **11.0** | **13.84** | **12.45** |
| | 20 | 70.25 | 20.92 | 11.0 | 9.88 | 11.85 |
| | 25 | 60.90 | 18.13 | 11.0 | 7.09 | 10.64 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R6b 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 | 5 | 242.70 | 80.29 | 18.9 | 61.36 | 18.41 |
| | 10 | 178.56 | 59.07 | 18.9 | 40.14 | 24.09 |
| | **15** | **142.89** | **47.27** | **18.9** | **28.35** | **25.51** |
| | 20 | 119.95 | 39.68 | 18.9 | 20.76 | 24.91 |
| | 25 | 103.85 | 34.35 | 18.9 | 15.43 | 23.14 |

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 | 1190 | m² |
| Qty | 10 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-24a & 24b | 53.4 | 0.089 | 2.37 | - |
| | RD-25a & 25b | 89.5 | 0.089 | 3.98 | - |
| | RD-26a & 26b | 91.1 | 0.089 | 4.05 | - |
| | RD-27a & 27b | 84.5 | 0.089 | 3.76 | - |
| | RD-28a & 28b | 45.5 | 0.089 | 2.02 | - |
| | | | **Total** | **16.18** | **12.45** |
| 100 Year | RD-24a & 24b | 53.4 | 0.152 | 4.07 | - |
| | RD-25a & 25b | 89.5 | 0.152 | 6.82 | - |
| | RD-26a & 26b | 91.1 | 0.152 | 6.94 | - |
| | RD-27a & 27b | 84.5 | 0.152 | 6.44 | - |
| | RD-28a & 28b | 45.5 | 0.152 | 3.47 | - |
| | | | **Total** | **27.74** | **25.51** |

*Note: Ponding volumes calculated using end area equation: $V = \frac{Area \ X \ Depth}{2}$

## GAMING PATIO ROOF

**TABLE 1A: Post-Development Runoff Coefficient "C" - R7 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 |
| 0.061 | Roof | 0.061 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R7 Controlled Roof Area**

0.0612 =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 | 15 | 83.56 | 12.79 | 3.3 | 9.48 | 8.53 |
| | 20 | 70.25 | 10.76 | 3.3 | 7.44 | 8.93 |
| | **25** | **60.90** | **9.32** | **3.3** | **6.01** | **9.02** |
| | 30 | 53.93 | 8.26 | 3.3 | 4.95 | 8.90 |
| | 35 | 48.52 | 7.43 | 3.3 | 4.12 | 8.65 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R7 Controlled Roof Area**

0.0612 =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 | 24.31 | 5.7 | 18.63 | 16.77 |
| | 20 | 119.95 | 20.41 | 5.7 | 14.73 | 17.68 |
| | **25** | **103.85** | **17.67** | **5.7** | **11.99** | **17.99** |
| | 30 | 91.87 | 15.63 | 5.7 | 9.95 | 17.91 |
| | 35 | 82.58 | 14.05 | 5.7 | 8.37 | 17.58 |

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 | 612 | m² |
| Qty | 3 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-29 | 204.0 | 0.089 | 6.05 | - |
| | RD-30 | 204.0 | 0.089 | 6.05 | - |
| | RD-31 | 204.0 | 0.089 | 6.05 | - |
| | | | **Total** | **18.14** | **9.02** |
| 100 Year | RD-29 | 204.0 | 0.152 | 10.36 | - |
| | RD-30 | 204.0 | 0.152 | 10.36 | - |
| | RD-31 | 204.0 | 0.152 | 10.36 | - |
| | | | **Total** | **31.09** | **17.99** |

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area\ X\ Depth}{3}$$

**EAST ENTRANCE ROOF**

**TABLE 1A: Post-Development Runoff Coefficient "C" - R8 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 |
| 0.009 | Roof | 0.009 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R8 Controlled Roof Area**

0.009 =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 | 5.19 | 1.1 | 4.09 | 0.00 |
| | 5 | 141.18 | 3.18 | 1.1 | 2.07 | 0.62 |
| | **10** | **104.19** | **2.35** | **1.1** | **1.24** | **0.75** |
| | 15 | 83.56 | 1.88 | 1.1 | 0.78 | 0.70 |
| | 20 | 70.25 | 1.58 | 1.1 | 0.48 | 0.57 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R8 Controlled Roof Area**

0.009 =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 | 0 | 398.62 | 9.97 | 1.9 | 8.08 | 0.00 |
| | 5 | 242.70 | 6.07 | 1.9 | 4.18 | 1.25 |
| | **10** | **178.56** | **4.47** | **1.9** | **2.57** | **1.54** |
| | 15 | 142.89 | 3.58 | 1.9 | 1.68 | 1.51 |
| | 20 | 119.95 | 3.00 | 1.9 | 1.11 | 1.33 |

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 | 90 | m² |
| Qty | 1 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-32 | 85.5 | 0.089 | 2.53 | 0.75 |
| | | | **Total** | **2.53** | **0.75** |
| 100 Year | RD-32 | 85.5 | 0.152 | 4.34 | 1.54 |
| | | | **Total** | **4.34** | **1.54** |

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{3}$

## LOWER CASINO ROOF

**TABLE 1A: Post-Development Runoff Coefficient "C" - R9 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 |
| 0.062 | Roof | 0.062 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R9 Controlled Roof Area**

0.0619 =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 | 9.43 | 2.2 | 7.22 | 10.83 |
| | 30 | 53.93 | 8.35 | 2.2 | 6.14 | 11.06 |
| | **35** | **48.52** | **7.51** | **2.2** | **5.31** | **11.14** |
| | 40 | 44.18 | 6.84 | 2.2 | 4.63 | 11.12 |
| | 45 | 40.63 | 6.29 | 2.2 | 4.08 | 11.03 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R9 Controlled Roof Area**

0.0619 =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 | 15.81 | 3.8 | 12.02 | 21.64 |
| | 35 | 82.58 | 14.21 | 3.8 | 10.42 | 21.89 |
| | **40** | **75.15** | **12.93** | **3.8** | **9.15** | **21.95** |
| | 45 | 69.05 | 11.88 | 3.8 | 8.10 | 21.86 |
| | 50 | 63.95 | 11.01 | 3.8 | 7.22 | 21.66 |

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 | 619 | $m^2$ |
| Qty | 2 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | L/s (ea) |

**Table 1E: 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-33a & 33b | 566.1 | 0.089 | 16.78 | 11.14 |
| | | | **Total** | **16.78** | **11.14** |
| 100 Year | RD-33a & 33b | 566.1 | 0.152 | 28.76 | 21.95 |
| | | | **Total** | **28.76** | **21.95** |

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area \times Depth}{3}$$

**LOWER CASINO ROOF**

**TABLE 1A: Post-Development Runoff Coefficient "C" - R10 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 |
| 0.094 | Roof | 0.094 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R10 Controlled Roof Area**

0.0935 =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 | 20 | 70.25 | 16.43 | 4.4 | 12.02 | 14.42 |
| | 25 | 60.90 | 14.25 | 4.4 | 9.83 | 14.74 |
| | **30** | **53.93** | **12.62** | **4.4** | **8.20** | **14.76** |
| | 35 | 48.52 | 11.35 | 4.4 | 6.93 | 14.56 |
| | 40 | 44.18 | 10.34 | 4.4 | 5.92 | 14.21 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R10 Controlled Roof Area**

0.0935 =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 | 20 | 119.95 | 31.18 | 7.6 | 23.61 | 28.33 |
| | 25 | 103.85 | 26.99 | 7.6 | 19.42 | 29.13 |
| | **30** | **91.87** | **23.88** | **7.6** | **16.31** | **29.36** |
| | 35 | 82.58 | 21.46 | 7.6 | 13.89 | 29.18 |
| | 40 | 75.15 | 19.53 | 7.6 | 11.96 | 28.71 |

Equations:
Flow Equation
Q = 2.78 x C x I x 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 | 935 | m² |
| Qty | 4 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-34 | 285.0 | 0.089 | 8.45 | - |
| | RD-35 | 253.0 | 0.089 | 7.50 | - |
| | RD-36 | 204.6 | 0.089 | 6.06 | - |
| | RD-37 | 178.6 | 0.089 | 5.29 | - |
| | | | **Total** | **27.30** | **14.76** |
| 100 Year | RD-34 | 285.0 | 0.152 | 14.48 | - |
| | RD-35 | 253.0 | 0.152 | 12.85 | - |
| | RD-36 | 204.6 | 0.152 | 10.39 | - |
| | RD-37 | 178.6 | 0.152 | 9.07 | - |
| | | | **Total** | **46.80** | **29.36** |

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area\ X\ Depth}{3}$$

**LIVE LOADING DOCK ROOF**

**TABLE 1A: Post-Development Runoff Coefficient "C" - R11 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 |
| 0.064 | Roof | 0.064 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R11 Controlled Roof Area**

0.064 =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 | 16.68 | 4.4 | 12.27 | 7.36 |
| | 15 | 83.56 | 13.38 | 4.4 | 8.96 | 8.07 |
| | **20** | **70.25** | **11.25** | **4.4** | **6.83** | **8.20** |
| | 25 | 60.90 | 9.75 | 4.4 | 5.33 | 8.00 |
| | 30 | 53.93 | 8.64 | 4.4 | 4.22 | 7.59 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R11 Controlled Roof Area**

0.064 =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 | 10 | 178.56 | 31.77 | 7.6 | 24.20 | 14.52 |
| | 15 | 142.89 | 25.42 | 7.6 | 17.85 | 16.07 |
| | **20** | **119.95** | **21.34** | **7.6** | **13.77** | **16.52** |
| | 25 | 103.85 | 18.48 | 7.6 | 10.91 | 16.36 |
| | 30 | 91.87 | 16.35 | 7.6 | 8.77 | 15.79 |

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 | 640 | $m^2$ |
| Qty | 4 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | L/s (ea) |

**Table 1E: 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-38 | 129.4 | 0.089 | 3.83 | - |
| | RD-39 | 282.3 | 0.089 | 8.37 | - |
| | RD-40 | 69.9 | 0.089 | 2.07 | - |
| | RD-41 | 141.0 | 0.089 | 4.18 | - |
| | | | **Total** | **18.45** | **8.20** |
| 100 Year | RD-38 | 129.4 | 0.152 | 6.57 | - |
| | RD-39 | 282.3 | 0.152 | 14.34 | - |
| | RD-40 | 69.9 | 0.152 | 3.55 | - |
| | RD-41 | 141.0 | 0.152 | 7.16 | - |
| | | | **Total** | **31.63** | **16.52** |

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area\ X\ Depth}{3}$$

**LIVE AUDITORIUM ROOF**

**TABLE 1A: Post-Development Runoff Coefficient "C" - R12a Controlled Roof Area**

| Area | Surface | Ha | 5 Year Event "C" | 5 Year Event $C_{avg}$ | 100 Year Event "C" + 25% | 100 Year Event *$C_{avg}$ |
|---|---|---|---|---|---|---|
| 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 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R12a 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 | 15 | 83.56 | 24.88 | 6.6 | 18.25 | 16.43 |
| | 20 | 70.25 | 20.92 | 6.6 | 14.29 | 17.15 |
| | **25** | **60.90** | **18.13** | **6.6** | **11.51** | **17.26** |
| | 30 | 53.93 | 16.06 | 6.6 | 9.43 | 16.98 |
| | 35 | 48.52 | 14.45 | 6.6 | 7.82 | 16.42 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R12a 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 | 15 | 142.89 | 47.27 | 11.4 | 35.92 | 32.32 |
| | 20 | 119.95 | 39.68 | 11.4 | 28.33 | 33.99 |
| | **25** | **103.85** | **34.35** | **11.4** | **23.00** | **34.50** |
| | 30 | 91.87 | 30.39 | 11.4 | 19.04 | 34.26 |
| | 35 | 82.58 | 27.32 | 11.4 | 15.96 | 33.52 |

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 | 1190 | $m^2$ |
| Qty | 6 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | L/s (ea) |

**Table 1E: 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-42a & 42b | 144.6 | 0.089 | 6.43 | - |
| | RD-43a & 43b | 179.4 | 0.089 | 7.97 | - |
| | RD-44a & 44b | 162.9 | 0.089 | 7.24 | - |
| | | | **Total** | **21.64** | **17.26** |
| 100 Year | RD-42a & 42b | 144.6 | 0.152 | 11.02 | - |
| | RD-43a & 43b | 179.4 | 0.152 | 13.67 | - |
| | RD-44a & 44b | 162.9 | 0.152 | 12.41 | - |
| | | | **Total** | **37.10** | **34.50** |

*Note: Ponding volumes calculated using end area equation:

$$V = \frac{Area \ X \ Depth}{2}$$

**LIVE AUDITORIUM ROOF**

**TABLE 1A: Post-Development Runoff Coefficient "C" - R12b 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 |
| 0.120 | Roof | 0.120 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R12b Controlled Roof Area**

0.12 =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 | 15 | 83.56 | 25.09 | 6.6 | 18.46 | 16.62 |
| | 20 | 70.25 | 21.09 | 6.6 | 14.47 | 17.36 |
| | **25** | **60.90** | **18.28** | **6.6** | **11.66** | **17.49** |
| | 30 | 53.93 | 16.19 | 6.6 | 9.57 | 17.22 |
| | 35 | 48.52 | 14.57 | 6.6 | 7.94 | 16.68 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R12b Controlled Roof Area**

0.12 =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 | 47.67 | 11.4 | 36.31 | 32.68 |
| | 20 | 119.95 | 40.02 | 11.4 | 28.66 | 34.39 |
| | **25** | **103.85** | **34.64** | **11.4** | **23.29** | **34.93** |
| | 30 | 91.87 | 30.65 | 11.4 | 19.29 | 34.72 |
| | 35 | 82.58 | 27.55 | 11.4 | 16.19 | 34.00 |

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 | 1200 | m² |
| Qty | 6 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-45a & 445b | 144.7 | 0.089 | 6.43 | - |
| | RD-46a & 46b | 179.3 | 0.089 | 7.97 | - |
| | RD-47a & 47b | 162.9 | 0.089 | 7.24 | - |
| | | | **Total** | **21.64** | **17.49** |
| 100 Year | RD-45a & 445b | 144.7 | 0.152 | 11.03 | - |
| | RD-46a & 46b | 179.3 | 0.152 | 13.66 | - |
| | RD-47a & 47b | 162.9 | 0.152 | 12.41 | - |
| | | | **Total** | **37.10** | **34.93** |

*Note: Ponding volumes calculated using end area equation:

$$V = \frac{Area \ X \ Depth}{2}$$

## LIVE AUDITORIUM LOADING ROOF

**TABLE 1A: Post-Development Runoff Coefficient "C" - R13 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 |
| 0.022 | Roof | 0.022 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R13 Controlled Roof Area**

0.022 =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 | 15 | 83.56 | 4.60 | 1.1 | 3.50 | 3.15 |
| | 20 | 70.25 | 3.87 | 1.1 | 2.76 | 3.32 |
| | **25** | **60.90** | **3.35** | **1.1** | **2.25** | **3.37** |
| | 30 | 53.93 | 2.97 | 1.1 | 1.86 | 3.36 |
| | 35 | 48.52 | 2.67 | 1.1 | 1.57 | 3.29 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R13 Controlled Roof Area**

0.022 =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 | 20 | 119.95 | 7.34 | 1.9 | 5.44 | 6.53 |
| | 25 | 103.85 | 6.35 | 1.9 | 4.46 | 6.69 |
| | **30** | **91.87** | **5.62** | **1.9** | **3.73** | **6.71** |
| | 35 | 82.58 | 5.05 | 1.9 | 3.16 | 6.63 |
| | 40 | 75.15 | 4.60 | 1.9 | 2.70 | 6.49 |

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 | 220 | m² |
| Qty | 1 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-48 | 210.5 | 0.089 | 6.24 | 3.37 |
| | | | **Total** | **6.24** | **3.37** |
| 100 Year | RD-48 | 210.5 | 0.152 | 10.69 | 6.71 |
| | | | **Total** | **10.69** | **6.71** |

*Note: Ponding volumes calculated using cone equation:

$$V = \frac{Area\ X\ Depth}{3}$$

**LOWER LIVE AUDITORIUM ROOF**

**TABLE 1A: Post-Development Runoff Coefficient "C" - R14 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 |
| 0.013 | Roof | 0.013 | 0.90 | | 1.00 | |
| | Soft | 0.000 | 0.20 | | 0.25 | |

**TABLE 1B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R14 Controlled Roof Area**

0.0127 =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 | 5 | 141.18 | 4.49 | 1.1 | 3.38 | 1.01 |
| | 10 | 104.19 | 3.31 | 1.1 | 2.21 | 1.32 |
| | **15** | **83.56** | **2.66** | **1.1** | **1.55** | **1.40** |
| | 20 | 70.25 | 2.23 | 1.1 | 1.13 | 1.35 |
| | 25 | 60.90 | 1.93 | 1.1 | 0.83 | 1.25 |

**TABLE 1C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R14 Controlled Roof Area**

0.0127 =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 | 8.57 | 1.9 | 6.68 | 2.00 |
| | 10 | 178.56 | 6.30 | 1.9 | 4.41 | 2.65 |
| | **15** | **142.89** | **5.05** | **1.9** | **3.15** | **2.84** |
| | 20 | 119.95 | 4.23 | 1.9 | 2.34 | 2.81 |
| | 25 | 103.85 | 3.67 | 1.9 | 1.77 | 2.66 |

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 | 127 | m² |
| Qty | 1 | |
| Type | Accutrol RD-100-A-ADJ | |
| Setting | Fully 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 | 0.95 | L/s (ea) |
| Design Flow 4" of head | 1.26 | L/s (ea) |
| Design Flow 5" of head | 1.58 | L/s (ea) |
| Design Flow 6" of head | 1.89 | 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-49 | 107.0 | 0.089 | 3.17 | 1.40 |
| | | | **Total** | **3.17** | **1.40** |
| 100 Year | RD-49 | 107.0 | 0.152 | 5.44 | 2.84 |
| | | | **Total** | **5.44** | **2.84** |

*Note: Ponding volumes calculated using cone equation:

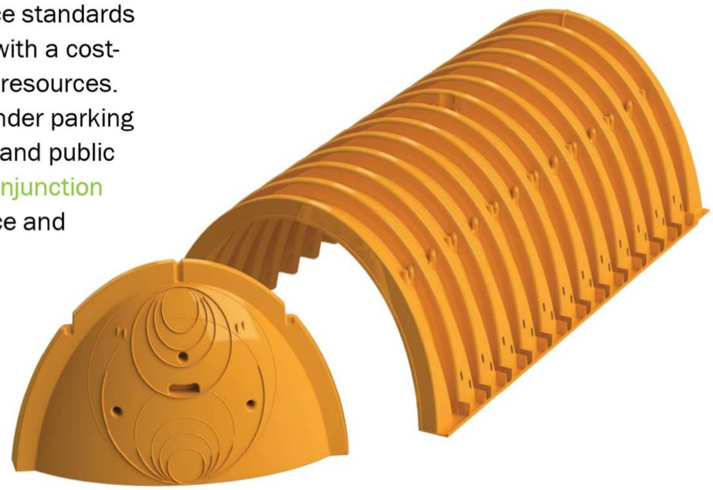
$$V = \frac{Area\ X\ Depth}{3}$$

**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 | 0.088 | 0.90 | 1.00 | BLDG Service | 3.3 | 0.089 | 15.5 | 26.1 | 5.7 | 0.152 | 30.5 | 44.7 |
| R2 | 0.220 | 0.90 | 1.00 | BLDG Service | 7.7 | 0.089 | 39.9 | 63.5 | 13.2 | 0.152 | 78.5 | 108.8 |
| R3 | 0.175 | 0.90 | 1.00 | BLDG Service | 4.4 | 0.089 | 36.2 | 49.2 | 7.6 | 0.152 | 70.7 | 84.4 |
| R4 | 0.026 | 0.90 | 1.00 | BLDG Service | 2.2 | 0.089 | 2.9 | 7.3 | 3.8 | 0.152 | 5.9 | 12.5 |
| R5 | 0.127 | 0.90 | 1.00 | BLDG Service | 3.3 | 0.089 | 26.0 | 35.8 | 5.7 | 0.152 | 50.7 | 61.4 |
| R6a | 0.066 | 0.90 | 1.00 | BLDG Service | 4.4 | 0.089 | 8.6 | 16.2 | 7.6 | 0.152 | 17.3 | 27.8 |
| R6b | 0.119 | 0.90 | 1.00 | BLDG Service | 11.0 | 0.089 | 12.5 | 16.2 | 18.9 | 0.152 | 25.5 | 27.7 |
| R7 | 0.061 | 0.90 | 1.00 | BLDG Service | 3.3 | 0.089 | 9.0 | 18.1 | 5.7 | 0.152 | 18.0 | 31.1 |
| R8 | 0.009 | 0.90 | 1.00 | BLDG Service | 1.1 | 0.089 | 0.7 | 2.5 | 1.9 | 0.152 | 1.5 | 4.3 |
| R10 | 0.094 | 0.90 | 1.00 | BLDG Service | 4.4 | 0.089 | 14.8 | 27.3 | 7.6 | 0.152 | 29.4 | 46.8 |
| **North Storm Service** | | | | | **45.3** | | **166.0** | **262.2** | **77.6** | | **328.1** | **449.5** |
| | 0.985 | | | | | | | | | | | |
| R9 | 0.062 | 0.90 | 1.00 | Front Service | 2.2 | 0.089 | 11.1 | 16.8 | 3.8 | 0.152 | 21.9 | 28.8 |
| R11 | 0.064 | 0.90 | 1.00 | Front Service | 4.4 | 0.089 | 8.2 | 18.4 | 7.6 | 0.152 | 16.5 | 31.6 |
| R12a | 0.119 | 0.90 | 1.00 | Front Service | 6.6 | 0.089 | 17.3 | 21.6 | 11.4 | 0.152 | 34.5 | 37.1 |
| R12b | 0.120 | 0.90 | 1.00 | Front Service | 6.6 | 0.089 | 17.5 | 21.6 | 11.4 | 0.152 | 34.9 | 37.1 |
| R13 | 0.022 | 0.90 | 1.00 | Front Service | 1.1 | 0.089 | 3.4 | 6.2 | 1.9 | 0.152 | 6.7 | 10.7 |
| R14 | 0.013 | 0.90 | 1.00 | Front Service | 1.1 | 0.089 | 1.4 | 3.2 | 1.9 | 0.152 | 2.8 | 5.4 |
| **South Storm Service** | | | | | **22.1** | | **58.9** | **87.9** | **37.9** | | **117.4** | **150.7** |
| **Total** | | | | | **67.4** | | **224.9** | **350.1** | **115.5** | | **445.5** | **600.2** |

# 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)

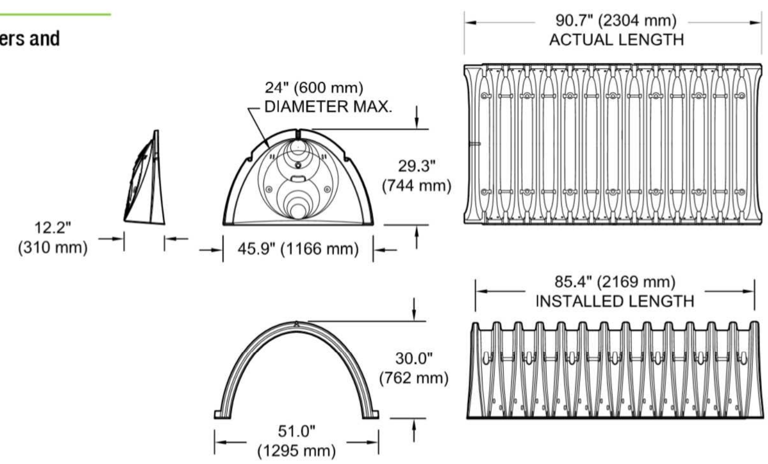
**Nominal Chamber Specifications**

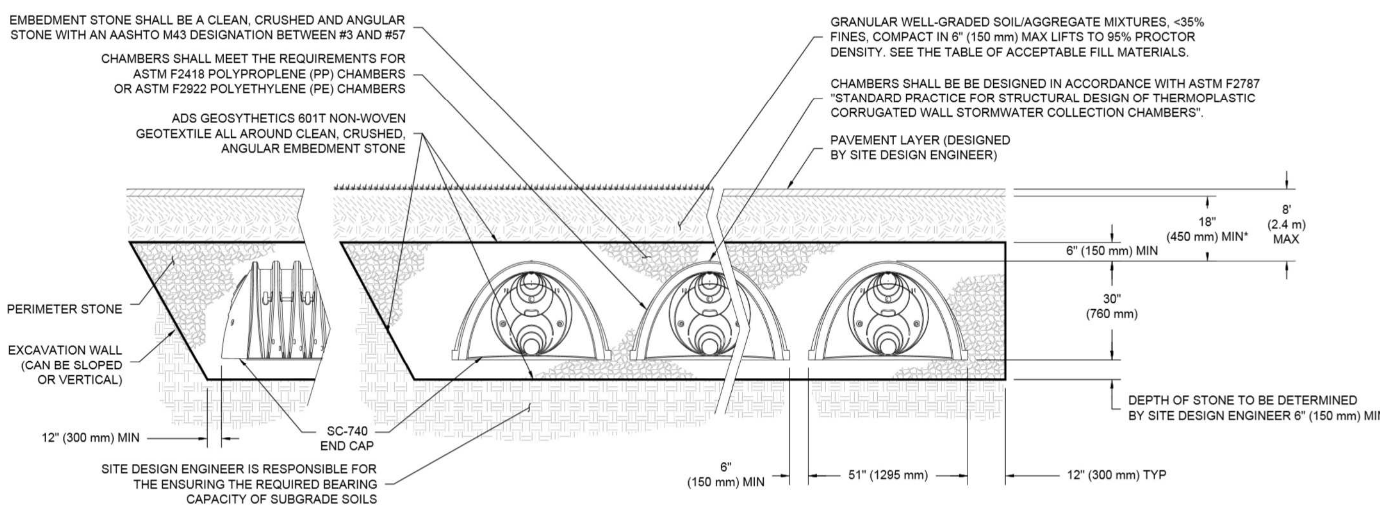
| | |
|---|---|
| Size (L x W x H) | 85.4" x 51.0" x 30.0" (2,170 x 1,295 x 762 mm) |
| Chamber Storage | 45.9 ft$^3$ (1.30 m$^3$) |
| Min. Installed Storage* | 74.9 ft$^3$ (2.12 m$^3$) |
| Weight | 74.0 lbs (33.6 kg) |

*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


SC-740


MC-3500


MC-4500

THE MOST *ADVANCED* NAME IN WATER MANAGEMENT SOLUTIONS™

# 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.

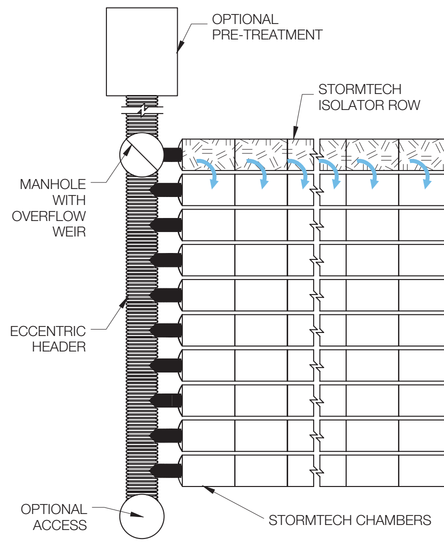
The Isolator Row is typically designed to capture the “first flush” and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed 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.

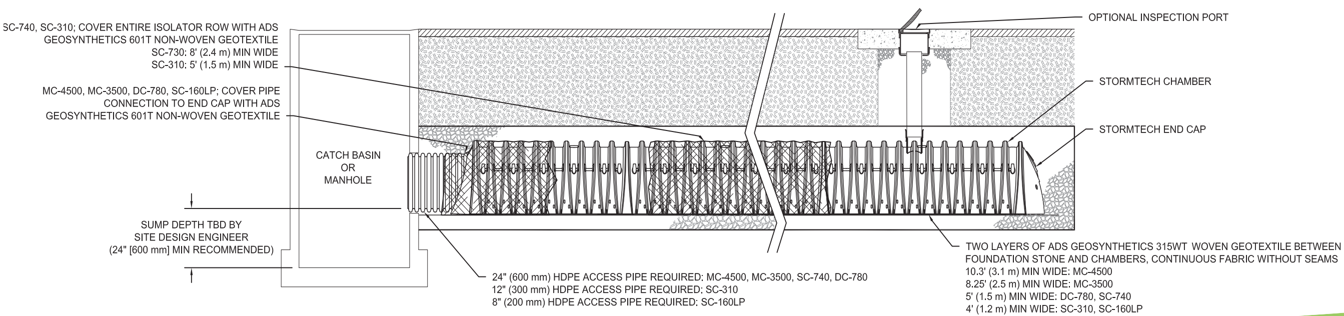
## MAINTENANCE

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.

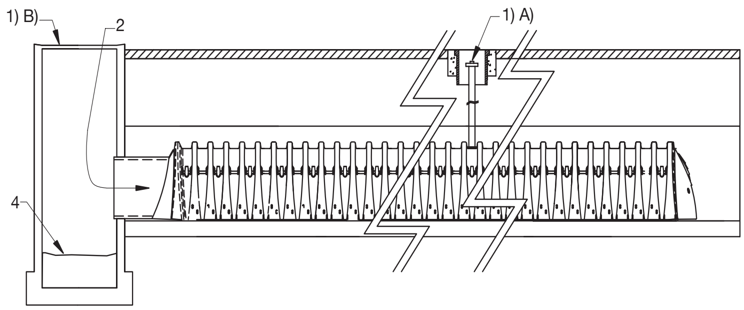
B) All Isolator Rows
  i. Remove cover from manhole at upstream end of Isolator Row
  ii. Using a flashlight, inspect down Isolator Row through outlet pipe
    1. Mirrors on poles or cameras may be used to avoid a confined space entry
    2. Follow OSHA regulations for confined space entry if entering 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: Fixed point to chamber bottom (1) | Stadia Rod Readings: Fixed point to top of sediment (2) | Sediment Depth (1)–(2) | Observations/Actions | Inspector |
|---|---|---|---|---|---|
| 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 |



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Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

| PROJECT INFORMATION | |
|---|---|
| ENGINEERED PRODUCT MANAGER: | HAIDER NASRULLAH<br>647-850-9417<br>HAIDER.NASRULLAH@ADS-PIPE.COM |
| ADS SALES REP: | MICHAEL REID<br>613-882-4186<br>MICHAEL.REID@ADS-PIPE.COM |
| PROJECT NO: | S188516 |
| ADS SITE COORDINATOR: | MATTHEW BEGHIN<br>519-710-3687<br>MATTHEW.BEGHIN@ADS-PIPE.COM |

ADVANCED DRAINAGE SYSTEMS, INC.

SiteASSIST™ by StormTech

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# HARD ROCK OTTAWA

## OTTAWA, ON.

## SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

## IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

## NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

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

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

## PROPOSED LAYOUT - SYSTEM 1

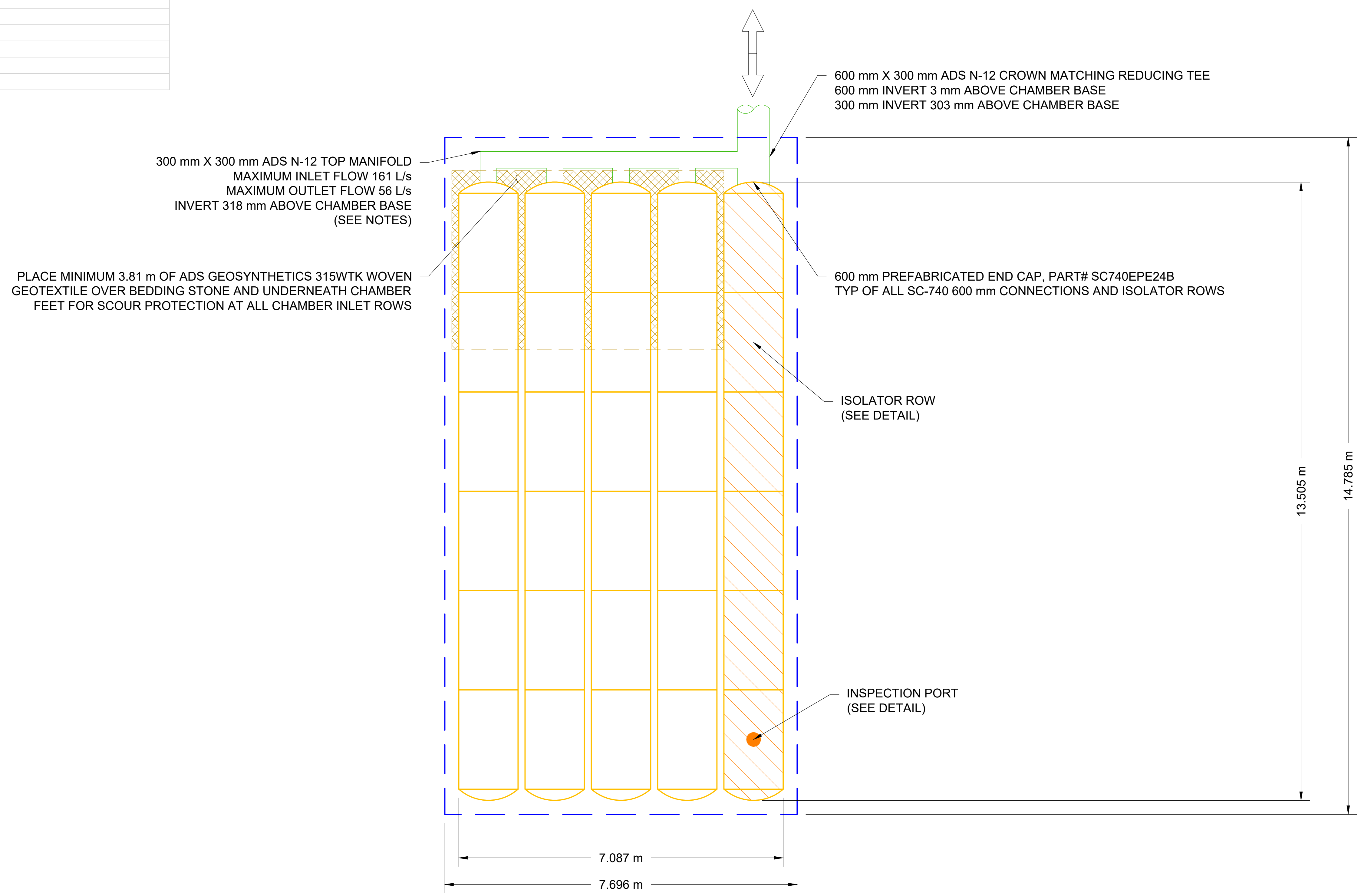
| | |
|---|---|
| 30 | STORMTECH SC-740 CHAMBERS |
| 10 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **65.0** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 113.00 (PERIMETER STONE INCLUDED)** |
| **13.8** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 113.00 (PERIMETER STONE INCLUDED)** |
| 113.7 | SYSTEM AREA (m²) |
| 44.9 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 1

| | |
|---|---|
| 116.197 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 114.369 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 114.216 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 114.216 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 114.216 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 113.911 | TOP OF STONE: |
| 113.759 | TOP OF SC-740 CHAMBER: |
| 113.314 | 300 mm TOP MANIFOLD INVERT: |
| 113.000 | 600 mm ISOLATOR ROW INVERT: |
| 112.997 | BOTTOM OF SC-740 CHAMBER: |
| 112.697 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..




HARD ROCK OTTAWA
OTTAWA, ON.

DATE: 06/12/20 DRAWN: RCT
PROJECT #: S188516 CHECKED: JMQ

| DATE | DRWN | CHKD | DESCRIPTION |
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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 100

## PROPOSED LAYOUT - SYSTEM 2

| | |
|---|---|
| 4 | STORMTECH SC-740 CHAMBERS |
| 4 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **10.0** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 113.490 (PERIMETER STONE INCLUDED)** |
| **3.0** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 113.490 (PERIMETER STONE INCLUDED)** |
| 20.4 | SYSTEM AREA (m²) |
| 18.9 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 2

| | |
|---|---|
| 116.649 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 114.821 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 114.668 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 114.668 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 114.668 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 114.363 | TOP OF STONE: |
| 114.211 | TOP OF SC-740 CHAMBER: |
| 113.640 | 300 mm CUSTOM MANIFOLD INVERT: |
| 113.490 | 450 mm ISOLATOR ROW INVERT: |
| 113.449 | BOTTOM OF SC-740 CHAMBER: |
| 113.149 | BOTTOM OF STONE: |

## NOTES

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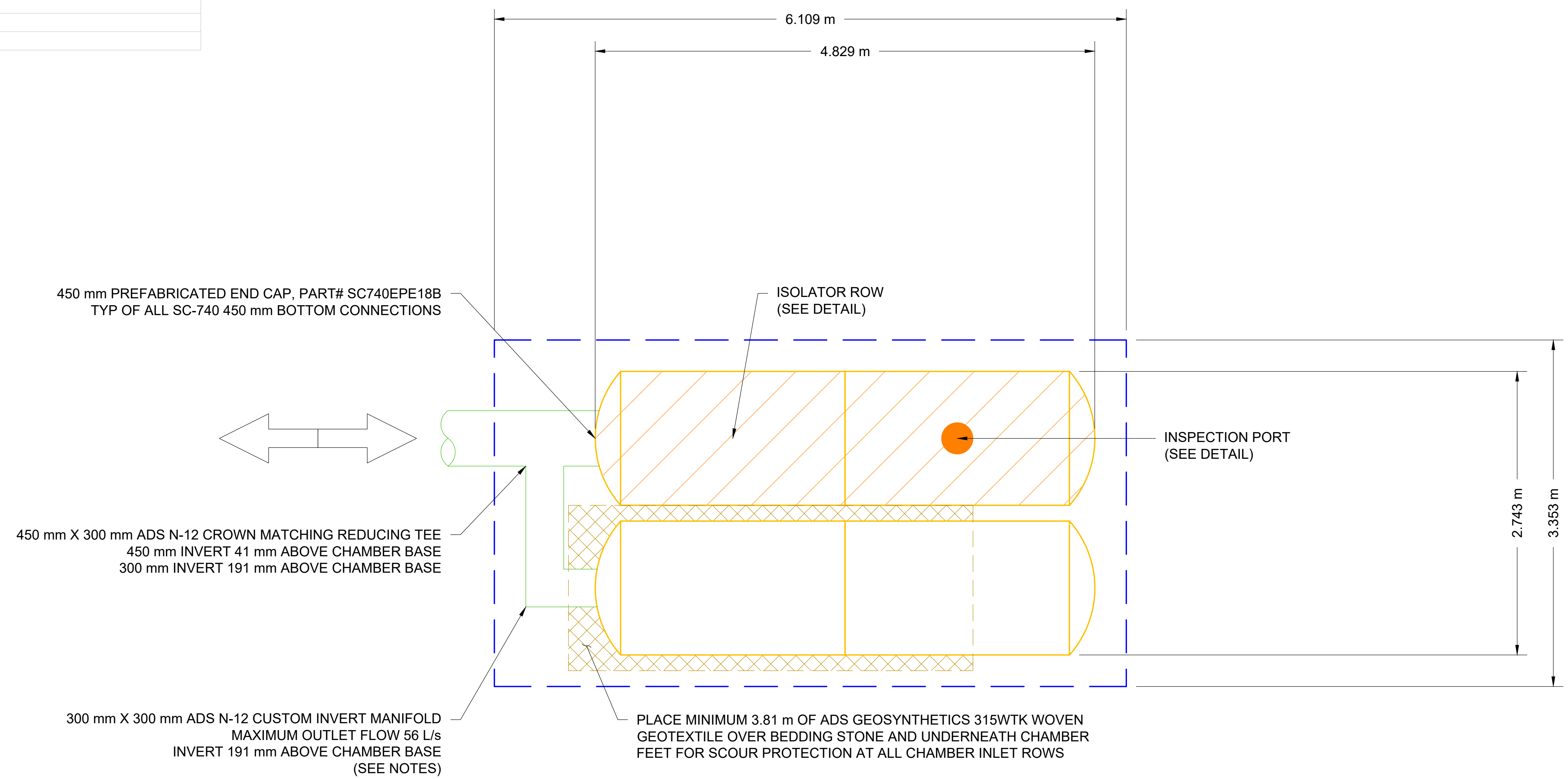
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..




HARD ROCK OTTAWA
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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 50

## PROPOSED LAYOUT - SYSTEM 3

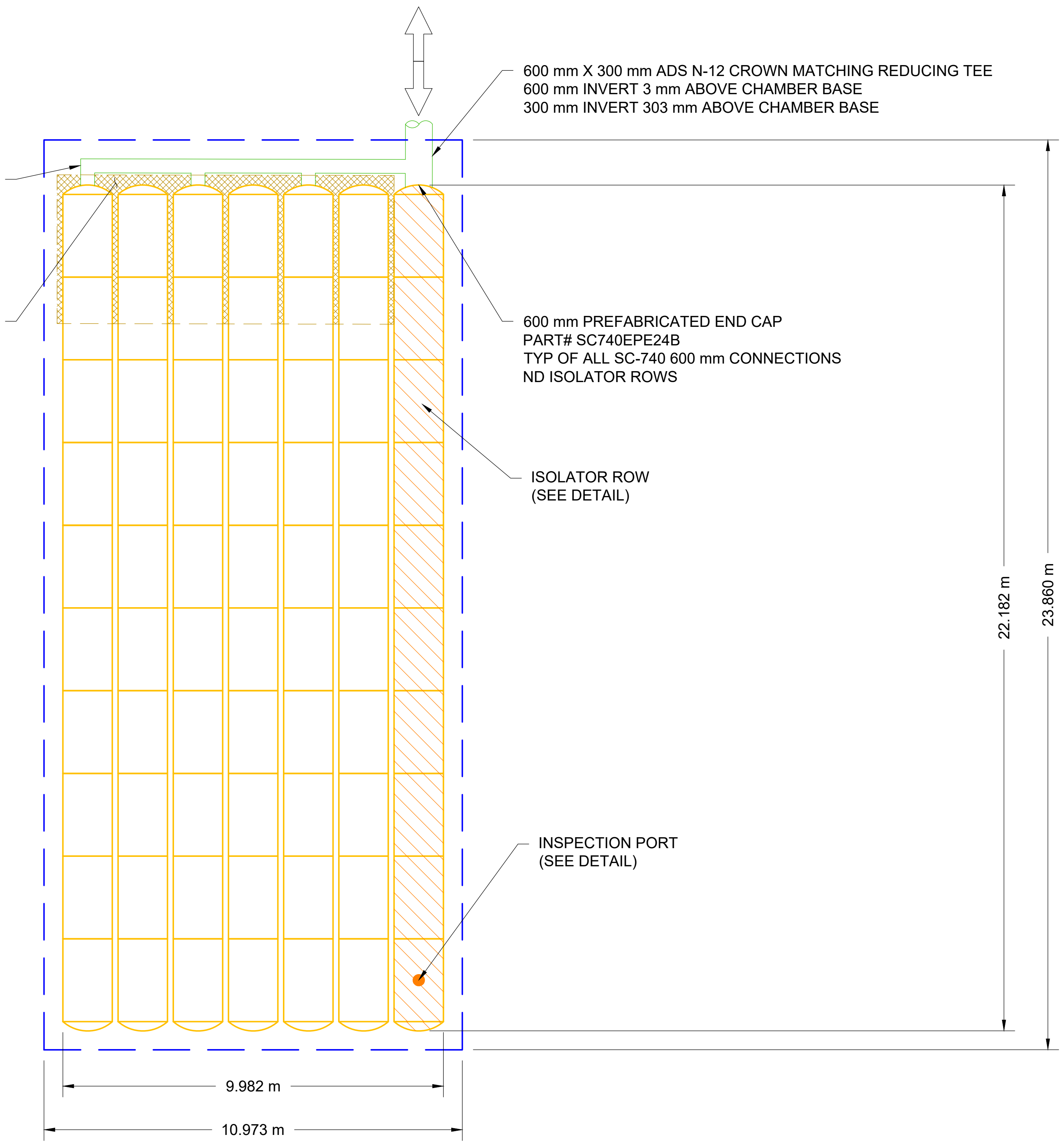
| | |
|---|---|
| 70 | STORMTECH SC-740 CHAMBERS |
| 14 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **150.4** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 113.120 (PERIMETER STONE INCLUDED)** |
| **31.9** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 113.120 (PERIMETER STONE INCLUDED)** |
| 261.8 | SYSTEM AREA (m²) |
| 69.6 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 3

| | |
|---|---|
| 116.317 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 114.489 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 114.336 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 114.336 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 114.336 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 114.031 | TOP OF STONE: |
| 113.879 | TOP OF SC-740 CHAMBER: |
| 113.435 | 300 mm TOP MANIFOLD INVERT: |
| 113.120 | 600 mm ISOLATOR ROW INVERT: |
| 113.117 | BOTTOM OF SC-740 CHAMBER: |
| 112.817 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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OTTAWA, ON.

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PROJECT #: S188516 | CHECKED: JMQ

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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 150

## PROPOSED LAYOUT - SYSTEM 4

| | |
|---|---|
| 70 | STORMTECH SC-740 CHAMBERS |
| 14 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **150.5** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 113.510 (PERIMETER STONE INCLUDED)** |
| **31.9** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 113.510 (PERIMETER STONE INCLUDED)** |
| 261.8 | SYSTEM AREA (m²) |
| 69.6 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 4

| | |
|---|---|
| 116.707 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 114.879 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 114.726 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 114.726 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 114.726 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 114.421 | TOP OF STONE: |
| 114.269 | TOP OF SC-740 CHAMBER: |
| 113.825 | 300 mm TOP MANIFOLD INVERT: |
| 113.510 | 600 mm ISOLATOR ROW INVERT: |
| 113.507 | BOTTOM OF SC-740 CHAMBER: |
| 113.207 | BOTTOM OF STONE: |

## NOTES

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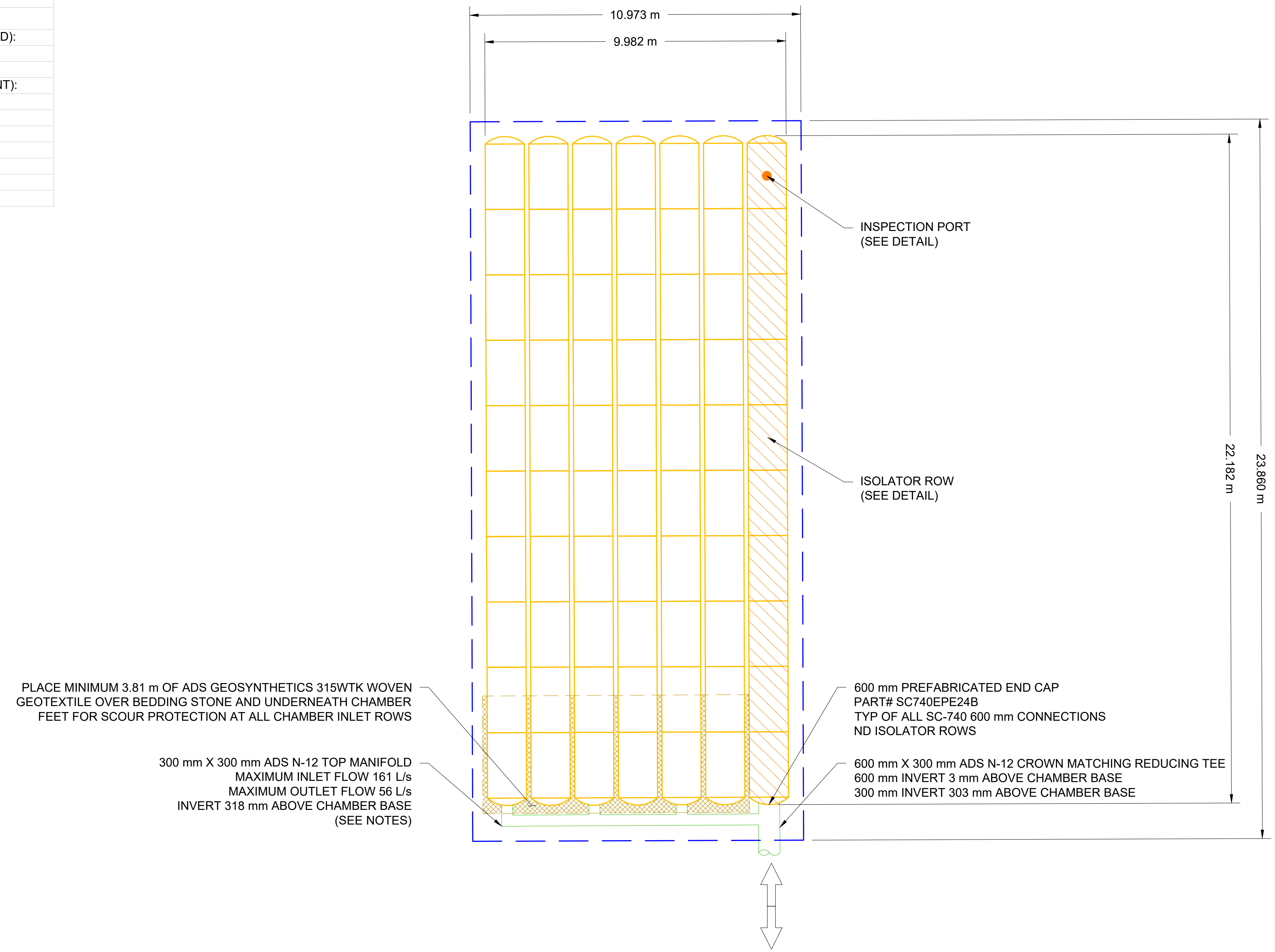
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 150

## PROPOSED LAYOUT - SYSTEM 5

| | |
|---|---|
| 40 | STORMTECH SC-740 CHAMBERS |
| 10 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **85.8** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 113.89 (PERIMETER STONE INCLUDED)** |
| **18.1** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 113.89 (PERIMETER STONE INCLUDED)** |
| 149.1 | SYSTEM AREA (m²) |
| 53.9 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 5

| | |
|---|---|
| 117.087 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 115.259 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 115.106 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 115.106 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 115.106 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 114.801 | TOP OF STONE: |
| 114.649 | TOP OF SC-740 CHAMBER: |
| 114.205 | 300 mm TOP MANIFOLD INVERT: |
| 113.890 | 600 mm ISOLATOR ROW INVERT: |
| 113.887 | BOTTOM OF SC-740 CHAMBER: |
| 113.587 | BOTTOM OF STONE: |

## NOTES

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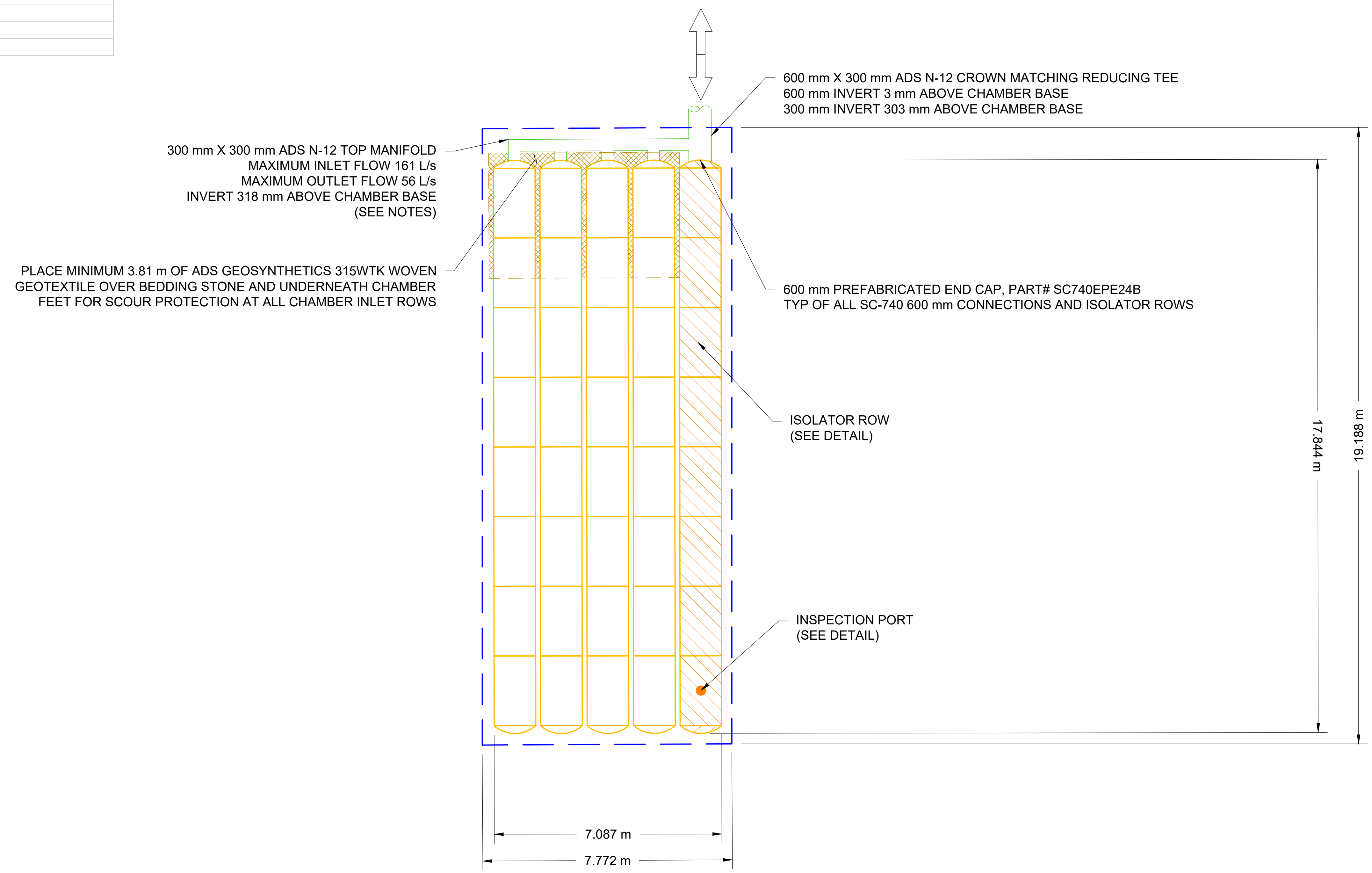
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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HILLIARD, OH 43026

SCALE = 1 : 150

## PROPOSED LAYOUT - SYSTEM 6

| | |
|---|---|
| 40 | STORMTECH SC-740 CHAMBERS |
| 10 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **85.8** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.620 (PERIMETER STONE INCLUDED)** |
| **18.1** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.620 (PERIMETER STONE INCLUDED)** |
| 149.1 | SYSTEM AREA (m²) |
| 53.6 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 6

| | |
|---|---|
| 114.817 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 112.989 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 112.836 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 112.836 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 112.836 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.531 | TOP OF STONE: |
| 112.379 | TOP OF SC-740 CHAMBER: |
| 111.935 | 300 mm TOP MANIFOLD INVERT: |
| 111.620 | 600 mm ISOLATOR ROW INVERT: |
| 111.617 | BOTTOM OF SC-740 CHAMBER: |
| 111.317 | BOTTOM OF STONE: |

## NOTES

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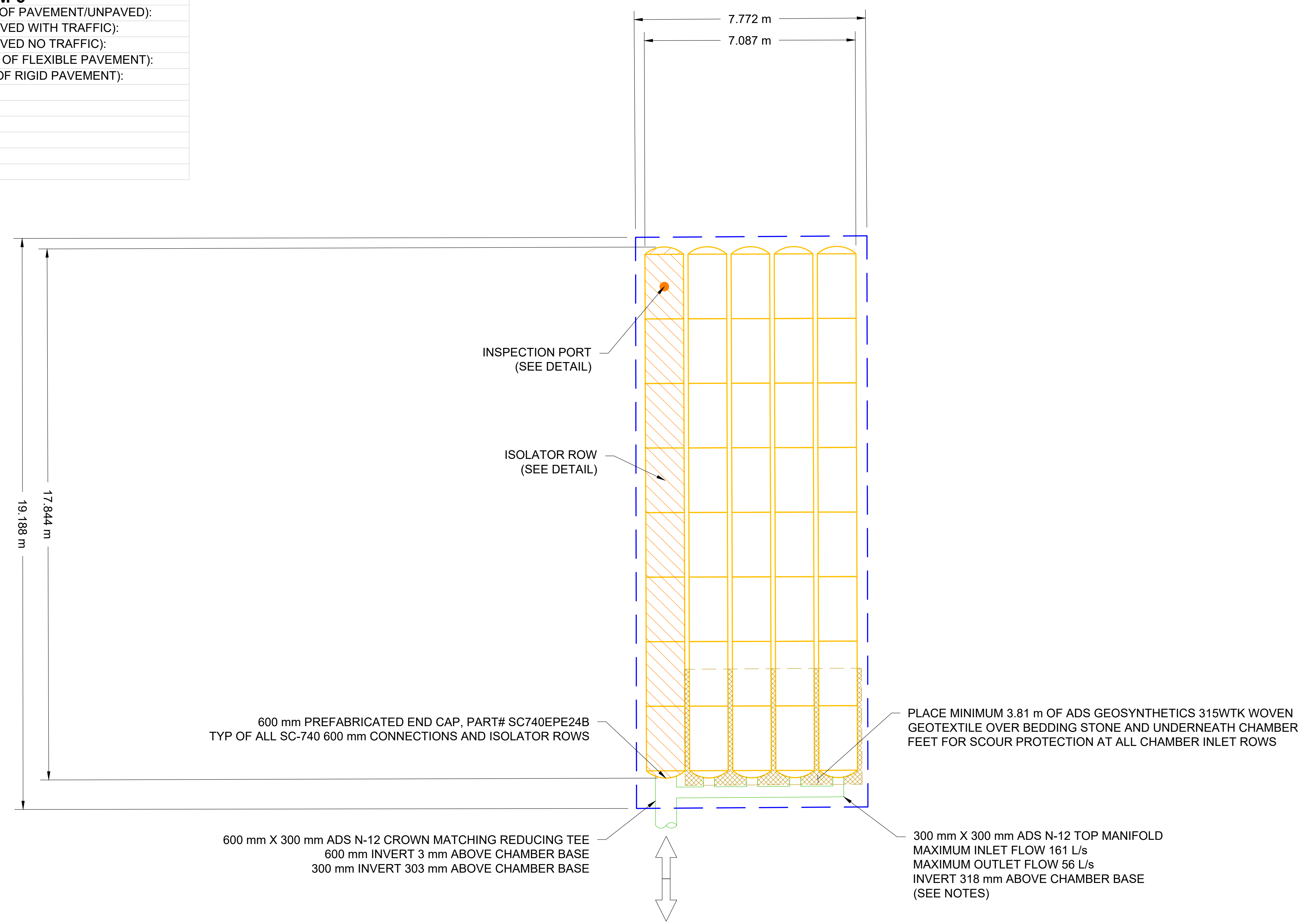


HARD ROCK OTTAWA
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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 150

## PROPOSED LAYOUT - SYSTEM 7

| | |
|---|---|
| 4 | STORMTECH SC-740 CHAMBERS |
| 4 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **10.0** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.800 (PERIMETER STONE INCLUDED)** |
| **3.0** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.800 (PERIMETER STONE INCLUDED)** |
| 20.4 | SYSTEM AREA (m²) |
| 18.9 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 7

| | |
|---|---|
| 114.959 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.131 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 112.978 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 112.978 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 112.978 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.673 | TOP OF STONE: |
| 112.521 | TOP OF SC-740 CHAMBER: |
| 111.950 | 300 mm CUSTOM MANIFOLD INVERT: |
| 111.800 | 450 mm ISOLATOR ROW INVERT: |
| 111.759 | BOTTOM OF SC-740 CHAMBER: |
| 111.459 | BOTTOM OF STONE: |

## NOTES

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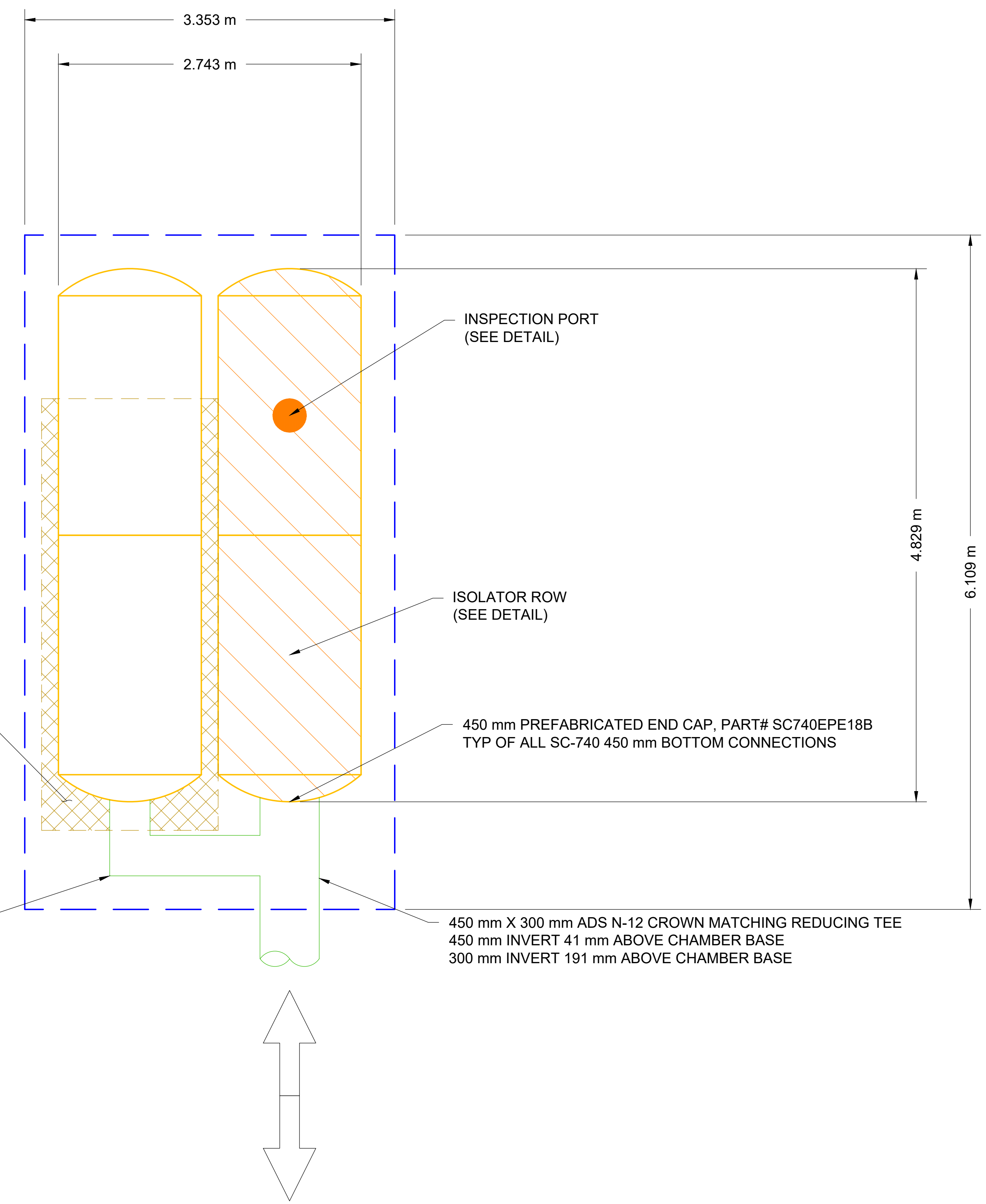


HARD ROCK OTTAWA
OTTAWA, ON.

DATE: 06/12/20 | DRAWN: RCT
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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 50

SHEET 8 OF 24

## PROPOSED LAYOUT - SYSTEM 8

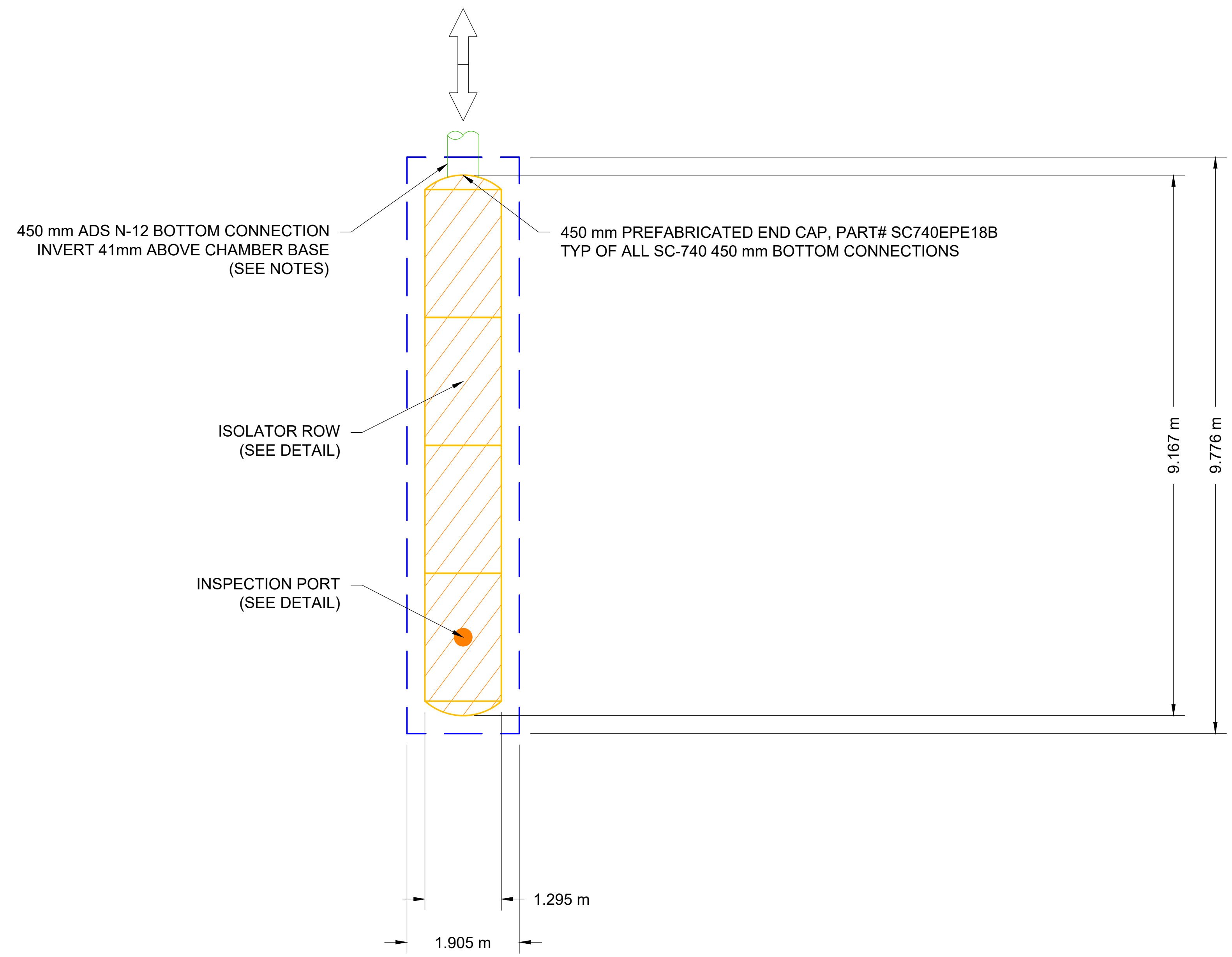
| | |
|---|---|
| 4 | STORMTECH SC-740 CHAMBERS |
| 2 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **9.4** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.900 (PERIMETER STONE INCLUDED)** |
| **2.7** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.900 (PERIMETER STONE INCLUDED)** |
| 18.6 | SYSTEM AREA (m²) |
| 23.3 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 8

| | |
|---|---|
| 115.059 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.231 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.078 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.078 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.078 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.773 | TOP OF STONE: |
| 112.621 | TOP OF SC-740 CHAMBER: |
| 111.900 | 450 mm ISOLATOR ROW INVERT: |
| 111.859 | BOTTOM OF SC-740 CHAMBER: |
| 111.559 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..




HARD ROCK OTTAWA
OTTAWA, ON.

DATE: 06/12/20 DRAWN: RCT
PROJECT #: S188516 CHECKED: JMQ

| DATE | DRWN | CHKD | DESCRIPTION |
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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 100

## PROPOSED LAYOUT - SYSTEM 9

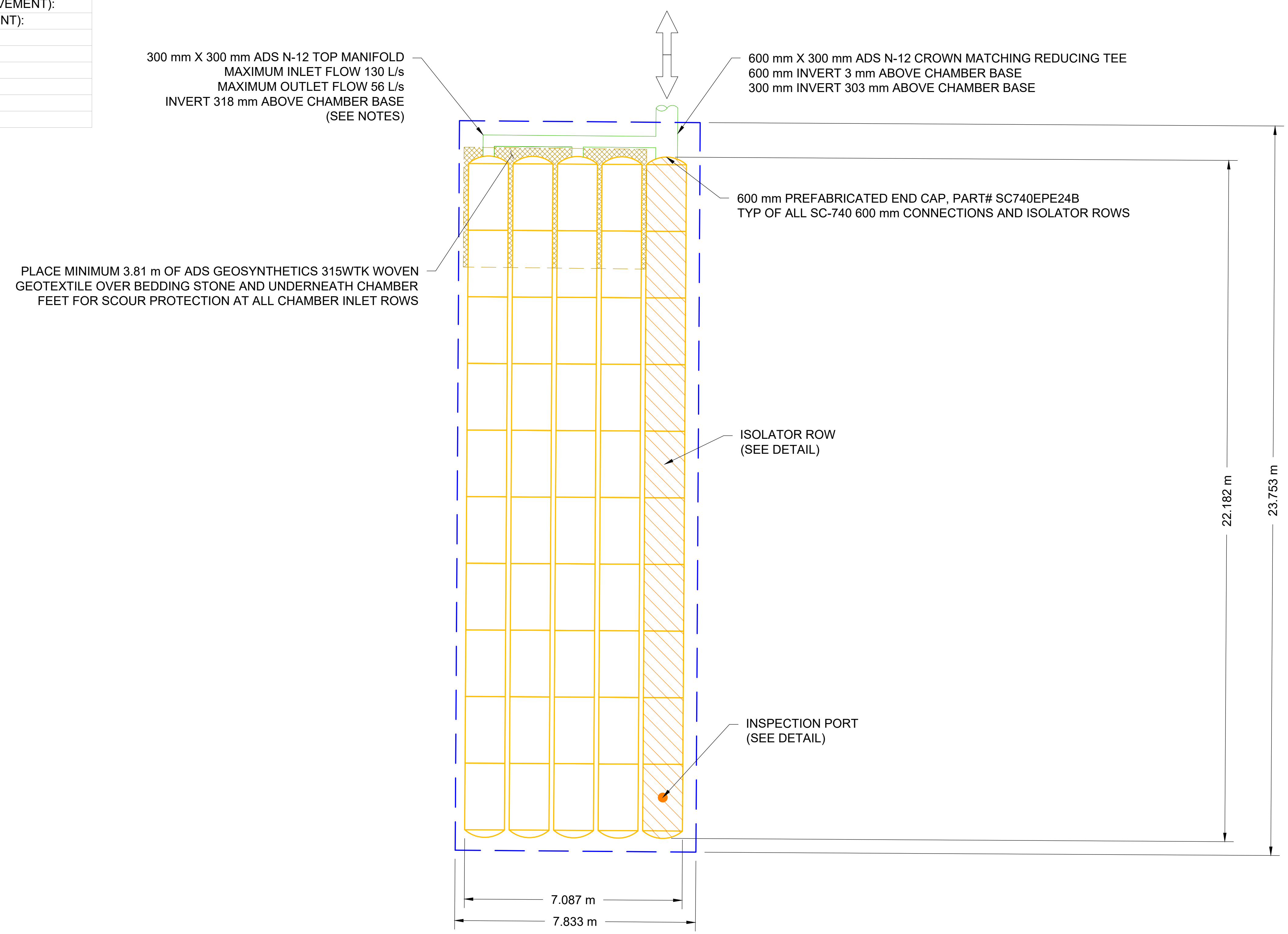
| | |
|---|---|
| 50 | STORMTECH SC-740 CHAMBERS |
| 10 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **107.1** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.960 (PERIMETER STONE INCLUDED)** |
| **22.6** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.960 (PERIMETER STONE INCLUDED)** |
| 186.0 | SYSTEM AREA (m²) |
| 63.1 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 9

| | |
|---|---|
| 115.157 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.329 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.176 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.176 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.176 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.871 | TOP OF STONE: |
| 112.719 | TOP OF SC-740 CHAMBER: |
| 112.275 | 300 mm TOP MANIFOLD INVERT: |
| 111.960 | 600 mm ISOLATOR ROW INVERT: |
| 111.957 | BOTTOM OF SC-740 CHAMBER: |
| 111.657 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..




HARD ROCK OTTAWA
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DATE: 06/12/20 DRAWN: RCT
PROJECT #: S188516 CHECKED: JMQ

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SCALE = 1 : 150

## PROPOSED LAYOUT - SYSTEM 10

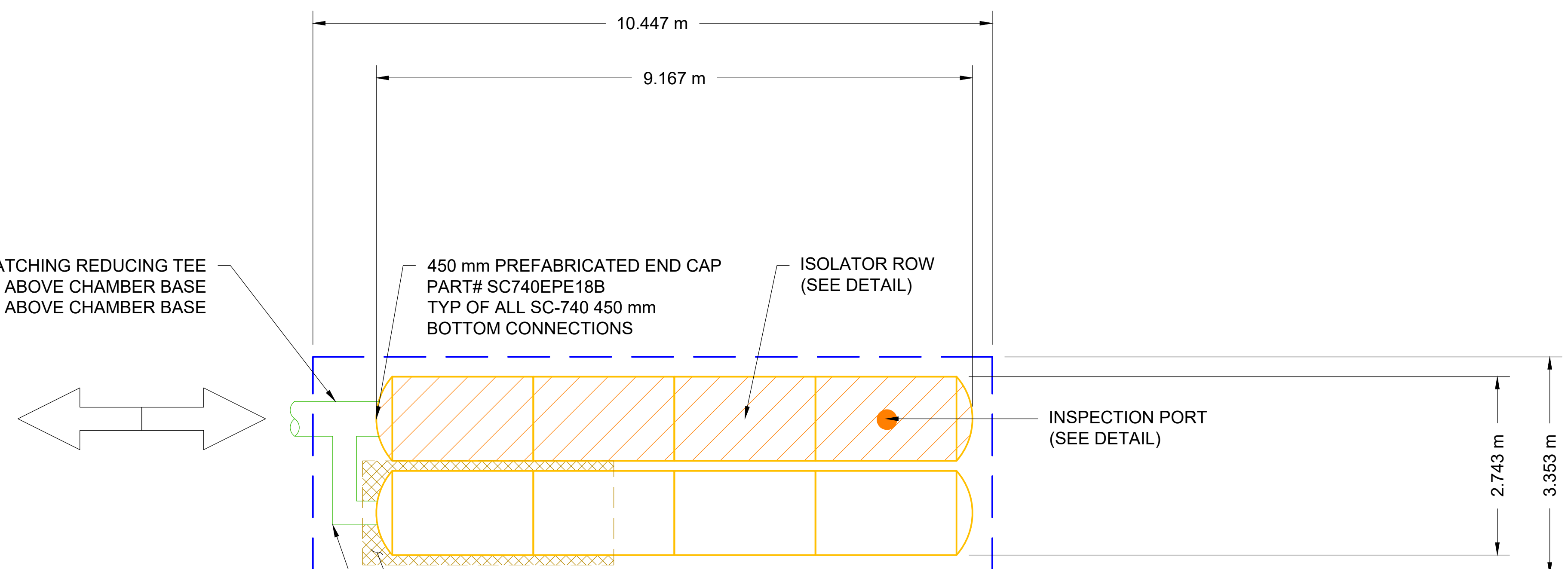
| | |
|---|---|
| 8 | STORMTECH SC-740 CHAMBERS |
| 4 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **18.1** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.850 (PERIMETER STONE INCLUDED)** |
| **5.2** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.850 (PERIMETER STONE INCLUDED)** |
| 35.0 | SYSTEM AREA (m²) |
| 27.5 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 10

| | |
|---|---|
| 115.009 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.181 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.028 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.028 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.028 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.723 | TOP OF STONE: |
| 112.571 | TOP OF SC-740 CHAMBER: |
| 112.000 | 300 mm CUSTOM MANIFOLD INVERT: |
| 111.850 | 450 mm ISOLATOR ROW INVERT: |
| 111.809 | BOTTOM OF SC-740 CHAMBER: |
| 111.509 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..




450 mm X 300 mm ADS N-12 CROWN MATCHING REDUCING TEE
450 mm INVERT 41 mm ABOVE CHAMBER BASE
300 mm INVERT 191 mm ABOVE CHAMBER BASE

450 mm PREFABRICATED END CAP
PART# SC740EPE18B
TYP OF ALL SC-740 450 mm
BOTTOM CONNECTIONS

ISOLATOR ROW
(SEE DETAIL)

INSPECTION PORT
(SEE DETAIL)

PLACE MINIMUM 3.81 m OF ADS GEOSYNTHETICS 315WTK WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

300 mm X 300 mm ADS N-12 CUSTOM INVERT MANIFOLD
MAXIMUM INLET FLOW 65 L/s
MAXIMUM OUTLET FLOW 56 L/s
INVERT 191 mm ABOVE CHAMBER BASE
(SEE NOTES)

HARD ROCK OTTAWA
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SCALE = 1 : 100

## PROPOSED LAYOUT - SYSTEM 11

| | |
|---|---|
| 18 | STORMTECH SC-740 CHAMBERS |
| 6 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **40.2** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 112.04 (PERIMETER STONE INCLUDED)** |
| **8.7** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 112.04 (PERIMETER STONE INCLUDED)** |
| 71.5 | SYSTEM AREA (m²) |
| 39.2 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 11

| | |
|---|---|
| 115.237 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.409 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.256 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.256 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.256 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.951 | TOP OF STONE: |
| 112.799 | TOP OF SC-740 CHAMBER: |
| 112.355 | 300 mm TOP MANIFOLD INVERT: |
| 112.040 | 600 mm ISOLATOR ROW INVERT: |
| 112.037 | BOTTOM OF SC-740 CHAMBER: |
| 111.737 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
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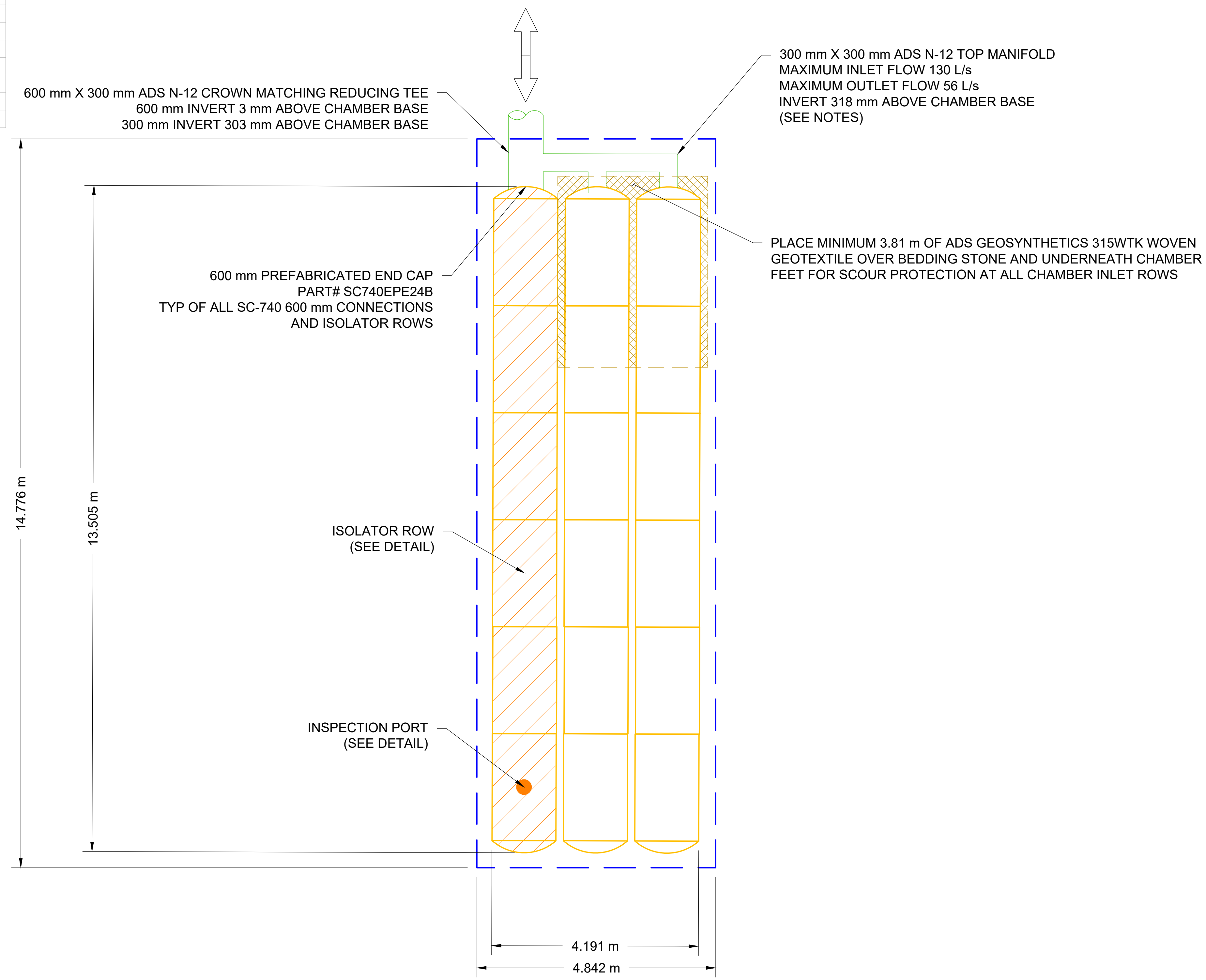
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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SCALE = 1 : 100

SHEET 12 OF 24

## PROPOSED LAYOUT - SYSTEM 12

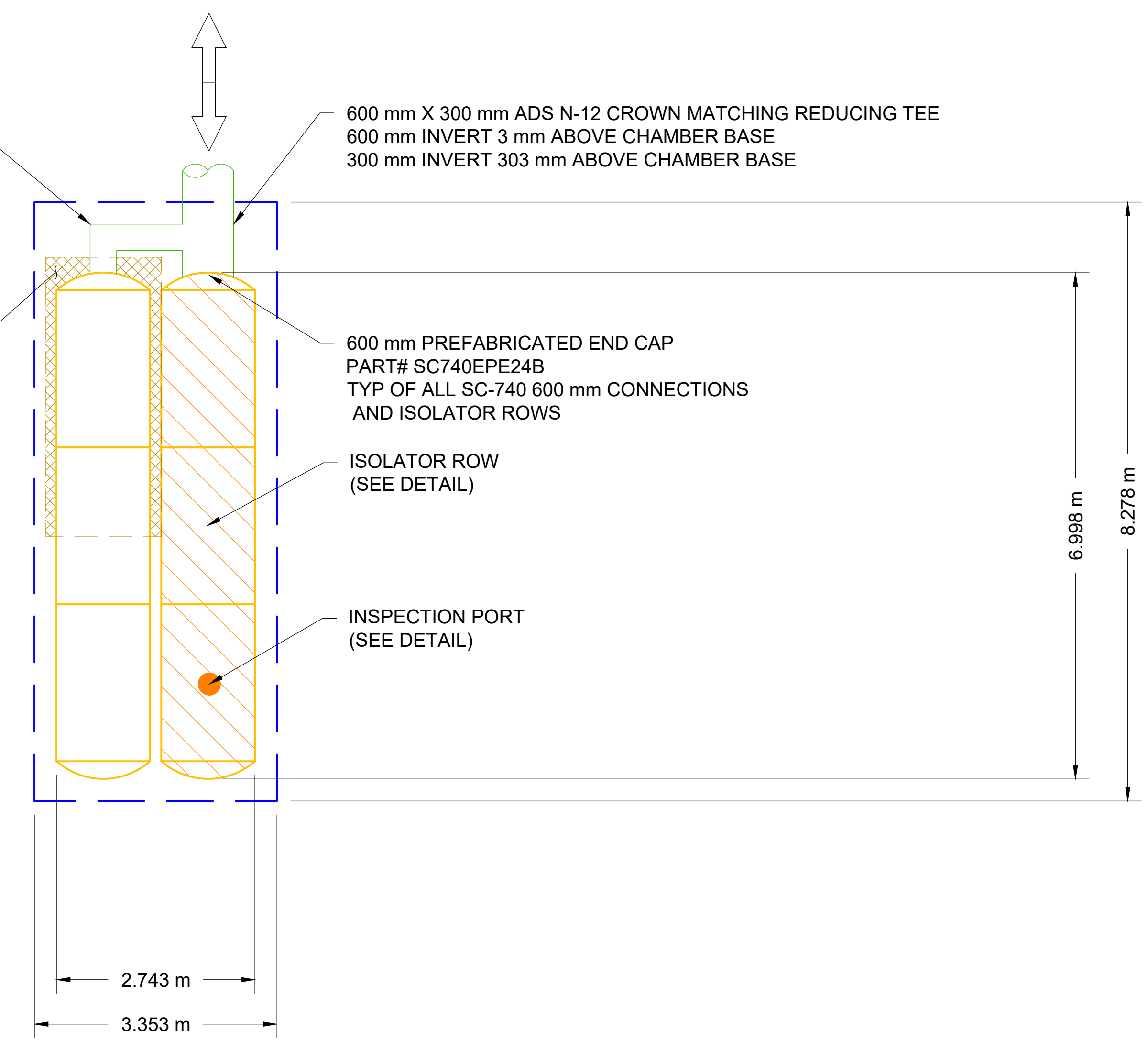
| | |
|---|---|
| 6 | STORMTECH SC-740 CHAMBERS |
| 4 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **14.8** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.830 (PERIMETER STONE INCLUDED)** |
| **3.3** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.830 (PERIMETER STONE INCLUDED)** |
| 27.7 | SYSTEM AREA (m²) |
| 23.2 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 12

| | |
|---|---|
| 115.027 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.199 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.046 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.046 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.046 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.741 | TOP OF STONE: |
| 112.589 | TOP OF SC-740 CHAMBER: |
| 112.145 | 300 mm TOP MANIFOLD INVERT: |
| 111.830 | 600 mm ISOLATOR ROW INVERT: |
| 111.827 | BOTTOM OF SC-740 CHAMBER: |
| 111.527 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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OTTAWA, ON.

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HILLIARD, OH 43026

SCALE = 1 : 100

## PROPOSED LAYOUT - SYSTEM 13

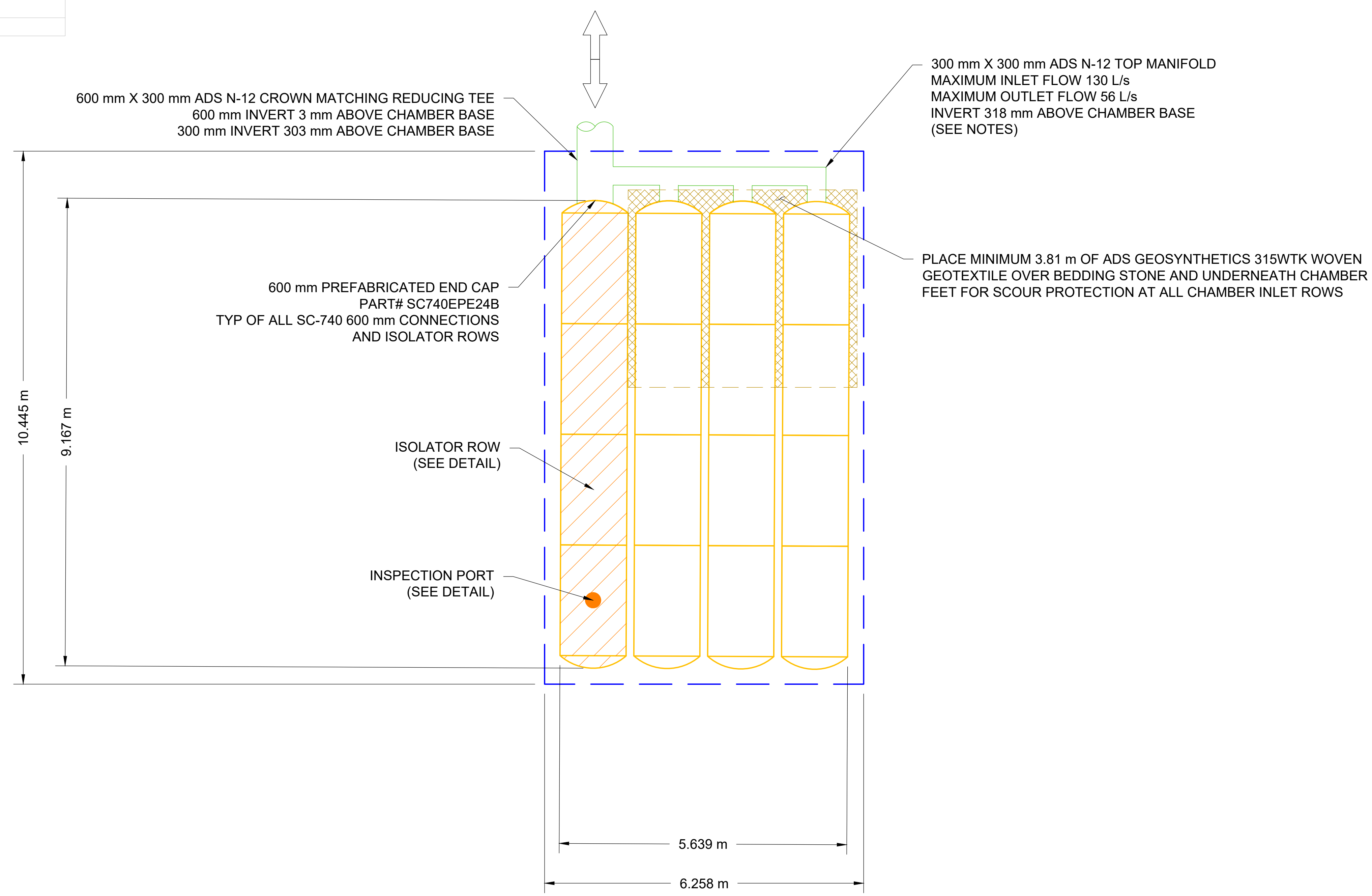
| | |
|---|---|
| 16 | STORMTECH SC-740 CHAMBERS |
| 8 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **36.3** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 112.04 (PERIMETER STONE INCLUDED)** |
| **7.9** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 112.04 (PERIMETER STONE INCLUDED)** |
| 65.3 | SYSTEM AREA (m²) |
| 33.4 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 13

| | |
|---|---|
| 115.237 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.409 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.256 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.256 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.256 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.951 | TOP OF STONE: |
| 112.799 | TOP OF SC-740 CHAMBER: |
| 112.355 | 300 mm TOP MANIFOLD INVERT: |
| 112.040 | 600 mm ISOLATOR ROW INVERT: |
| 112.037 | BOTTOM OF SC-740 CHAMBER: |
| 111.737 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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SCALE = 1 : 100

## PROPOSED LAYOUT - SYSTEM 14

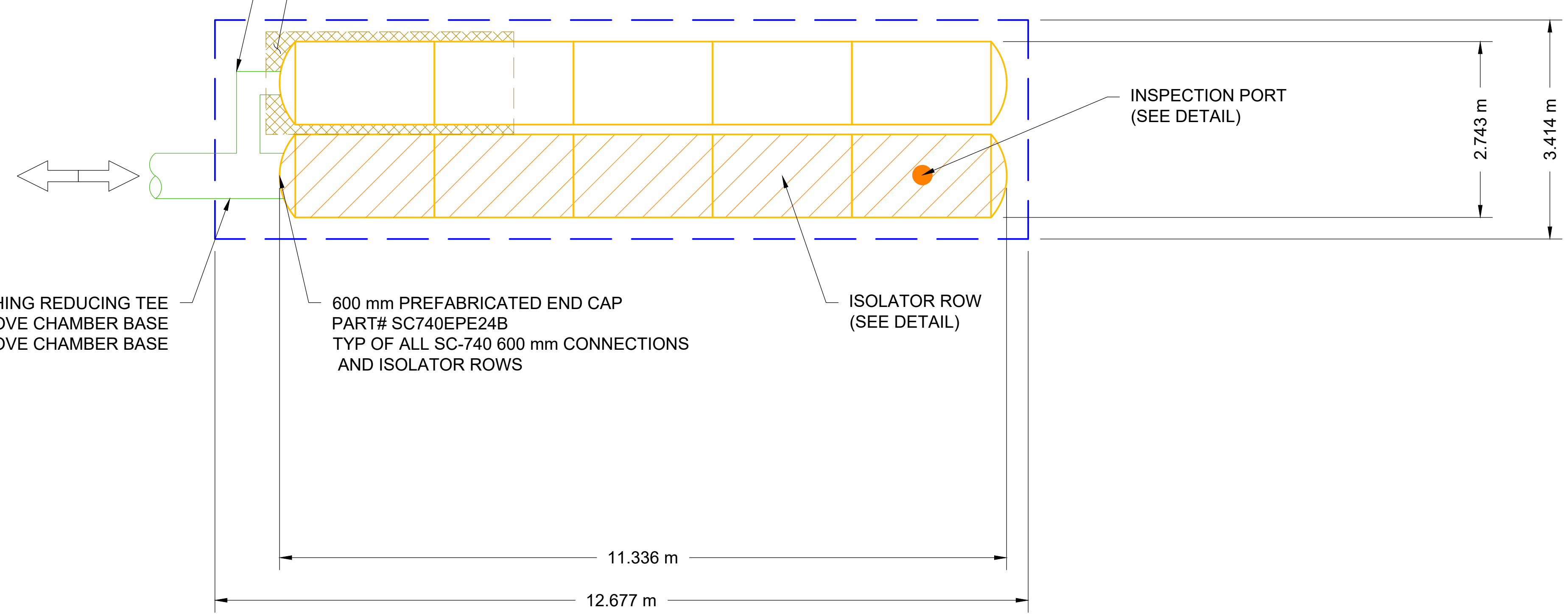
| | |
|---|---|
| 10 | STORMTECH SC-740 CHAMBERS |
| 4 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **24.0** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.850 (PERIMETER STONE INCLUDED)** |
| **4.8** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.850 (PERIMETER STONE INCLUDED)** |
| 43.2 | SYSTEM AREA (m²) |
| 32.1 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 14

| | |
|---|---|
| 115.047 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.219 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.066 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.066 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.066 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.761 | TOP OF STONE: |
| 112.609 | TOP OF SC-740 CHAMBER: |
| 112.165 | 300 mm TOP MANIFOLD INVERT: |
| 111.850 | 600 mm ISOLATOR ROW INVERT: |
| 111.847 | BOTTOM OF SC-740 CHAMBER: |
| 111.547 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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SCALE = 1 : 100

## PROPOSED LAYOUT - SYSTEM 15

| | |
|---|---|
| 8 | STORMTECH SC-740 CHAMBERS |
| 4 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **19.2** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 112.030 (PERIMETER STONE INCLUDED)** |
| **4.2** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 112.030 (PERIMETER STONE INCLUDED)** |
| 35.2 | SYSTEM AREA (m²) |
| 27.6 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 15

| | |
|---|---|
| 115.227 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.399 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.246 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.246 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.246 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.941 | TOP OF STONE: |
| 112.789 | TOP OF SC-740 CHAMBER: |
| 112.345 | 300 mm TOP MANIFOLD INVERT: |
| 112.030 | 600 mm ISOLATOR ROW INVERT: |
| 112.027 | BOTTOM OF SC-740 CHAMBER: |
| 111.727 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
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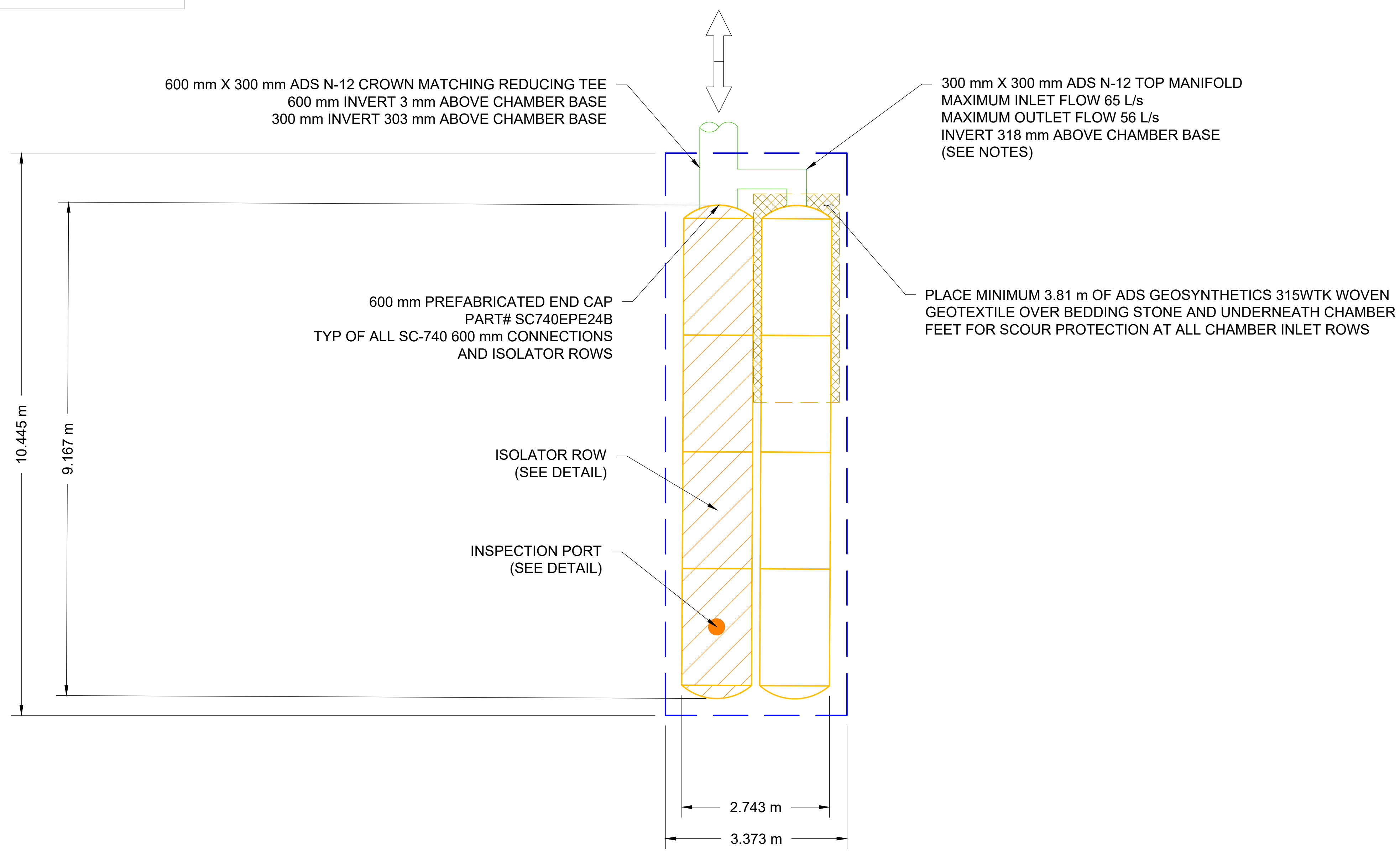
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 100

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## PROPOSED LAYOUT - SYSTEM 16

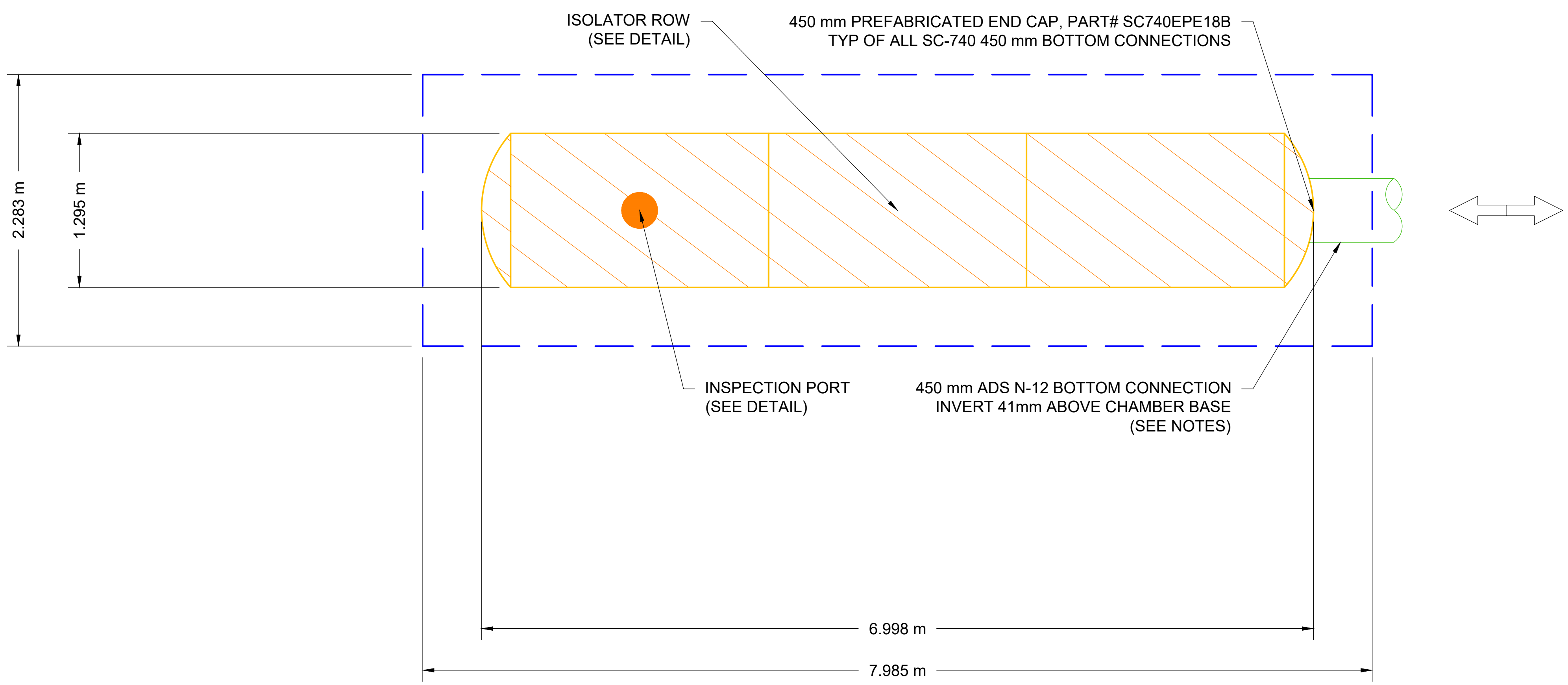
| | |
|---|---|
| 3 | STORMTECH SC-740 CHAMBERS |
| 2 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **8.6** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.850 (PERIMETER STONE INCLUDED)** |
| **2.6** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.850 (PERIMETER STONE INCLUDED)** |
| 18.2 | SYSTEM AREA (m²) |
| 20.5 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 16

| | |
|---|---|
| 115.009 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.181 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 113.028 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 113.028 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 113.028 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.723 | TOP OF STONE: |
| 112.571 | TOP OF SC-740 CHAMBER: |
| 111.850 | 450 mm ISOLATOR ROW INVERT: |
| 111.809 | BOTTOM OF SC-740 CHAMBER: |
| 111.509 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..




HARD ROCK OTTAWA
OTTAWA, ON.

DATE: 06/12/20 DRAWN: RCT
PROJECT #: S188516 CHECKED: JMQ

| DATE | DRWN | CHKD | DESCRIPTION |
|---|---|---|---|

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4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 50

## PROPOSED LAYOUT - SYSTEM 17

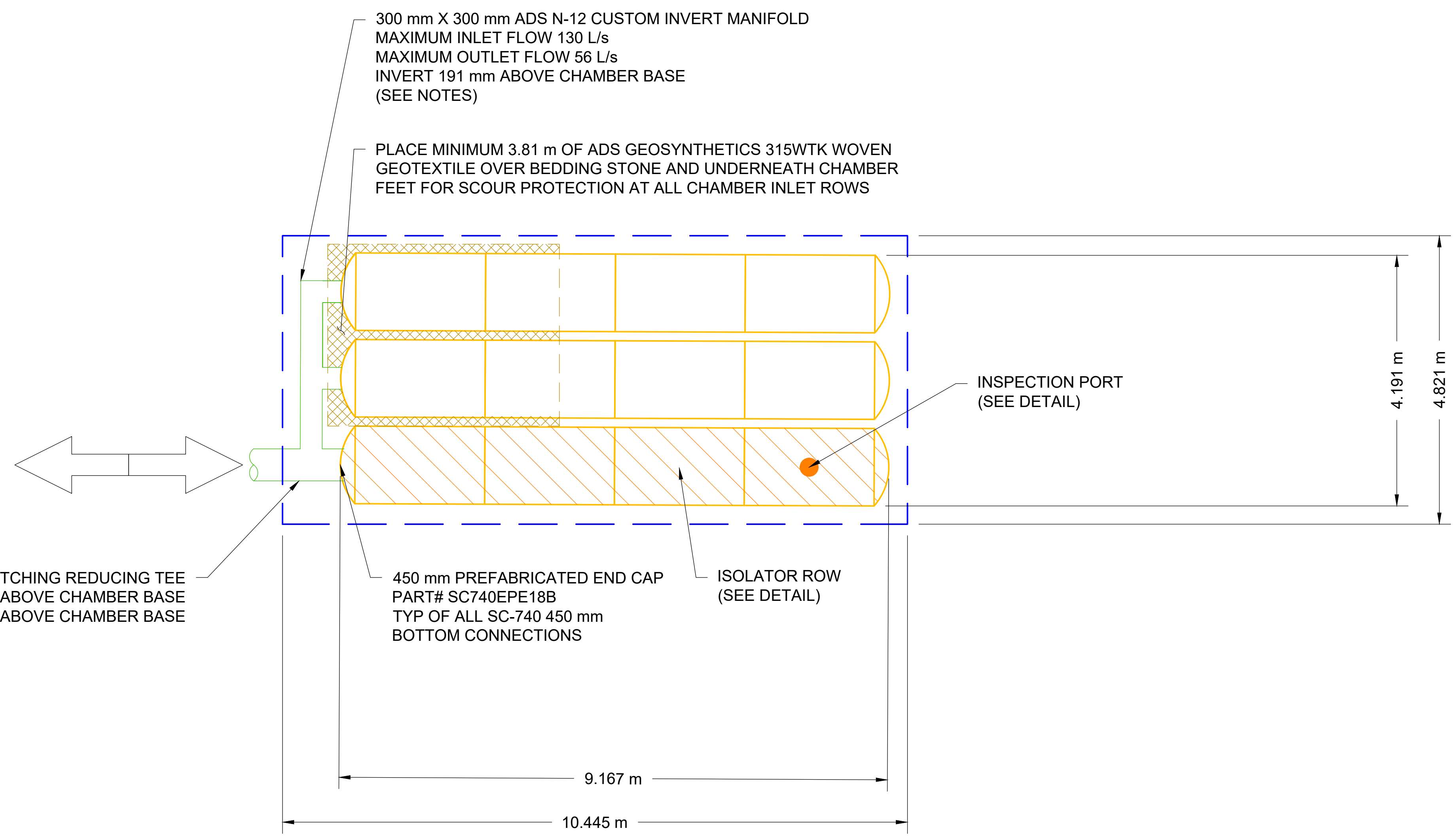
| | |
|---|---|
| 12 | STORMTECH SC-740 CHAMBERS |
| 6 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **26.3** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.800 (PERIMETER STONE INCLUDED)** |
| **7.5** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.800 (PERIMETER STONE INCLUDED)** |
| 50.3 | SYSTEM AREA (m²) |
| 30.5 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 17

| | |
|---|---|
| 114.959 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 113.131 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 112.978 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 112.978 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 112.978 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.673 | TOP OF STONE: |
| 112.521 | TOP OF SC-740 CHAMBER: |
| 111.950 | 300 mm CUSTOM MANIFOLD INVERT: |
| 111.800 | 450 mm ISOLATOR ROW INVERT: |
| 111.759 | BOTTOM OF SC-740 CHAMBER: |
| 111.459 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..




HARD ROCK OTTAWA
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HILLIARD, OH 43026

SCALE = 1 : 100

## PROPOSED LAYOUT - SYSTEM 18

| | |
|---|---|
| 28 | STORMTECH SC-740 CHAMBERS |
| 6 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **59.3** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.650 (PERIMETER STONE INCLUDED)** |
| **16.7** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.650 (PERIMETER STONE INCLUDED)** |
| 111.2 | SYSTEM AREA (m²) |
| 47.2 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 18

| | |
|---|---|
| 113.809 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 111.981 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 111.828 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 111.828 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 111.828 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 111.523 | TOP OF STONE: |
| 111.371 | TOP OF SC-740 CHAMBER: |
| 110.800 | 300 mm CUSTOM MANIFOLD INVERT: |
| 110.650 | 450 mm ISOLATOR ROW INVERT: |
| 110.609 | BOTTOM OF SC-740 CHAMBER: |
| 110.309 | BOTTOM OF STONE: |

## NOTES

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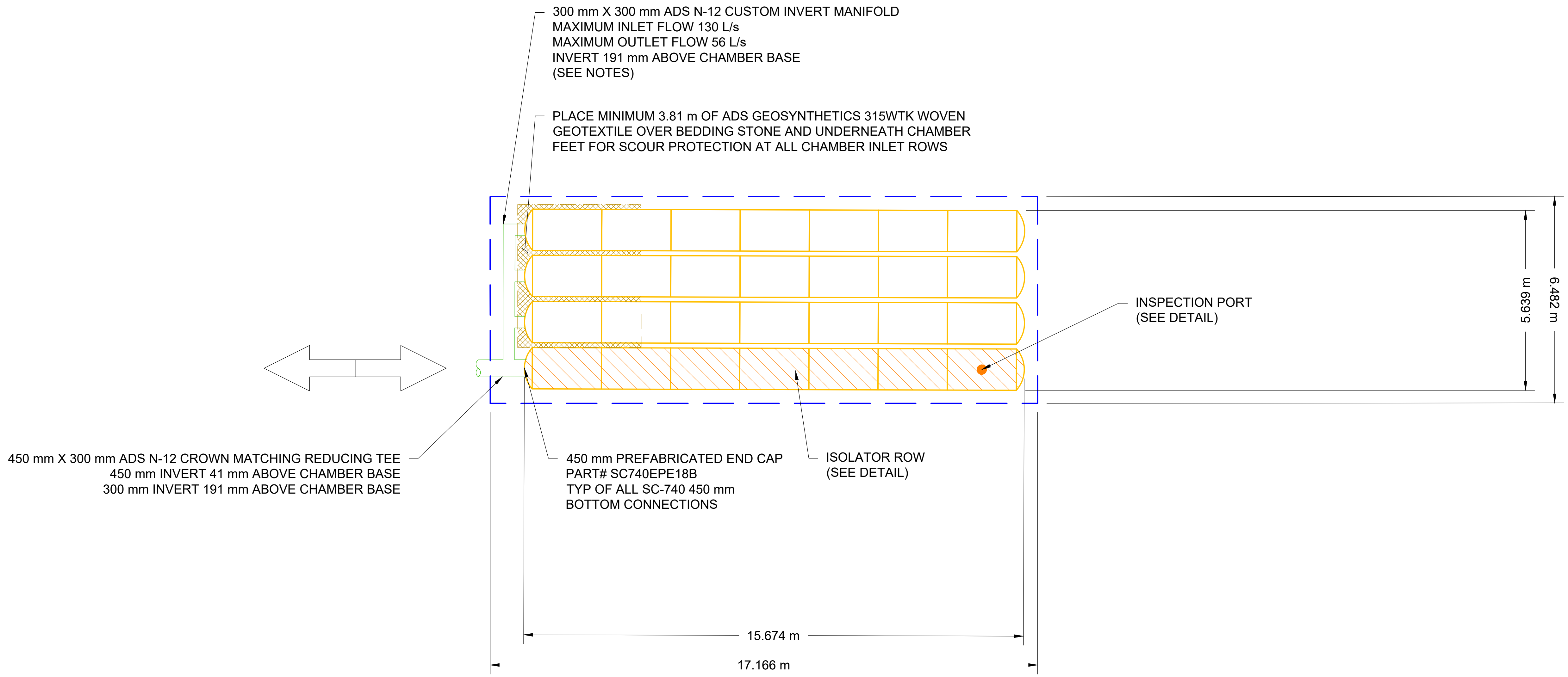
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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SCALE = 1 : 150

## PROPOSED LAYOUT - SYSTEM 19

| | |
|---|---|
| 40 | STORMTECH SC-740 CHAMBERS |
| 10 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **85.8** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 110.740 (PERIMETER STONE INCLUDED)** |
| **18.1** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 110.740 (PERIMETER STONE INCLUDED)** |
| 149.1 | SYSTEM AREA (m²) |
| 53.9 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 19

| | |
|---|---|
| 113.937 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 112.109 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 111.956 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 111.956 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 111.956 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 111.651 | TOP OF STONE: |
| 111.499 | TOP OF SC-740 CHAMBER: |
| 111.055 | 300 mm TOP MANIFOLD INVERT: |
| 110.740 | 600 mm ISOLATOR ROW INVERT: |
| 110.737 | BOTTOM OF SC-740 CHAMBER: |
| 110.437 | BOTTOM OF STONE: |

## NOTES

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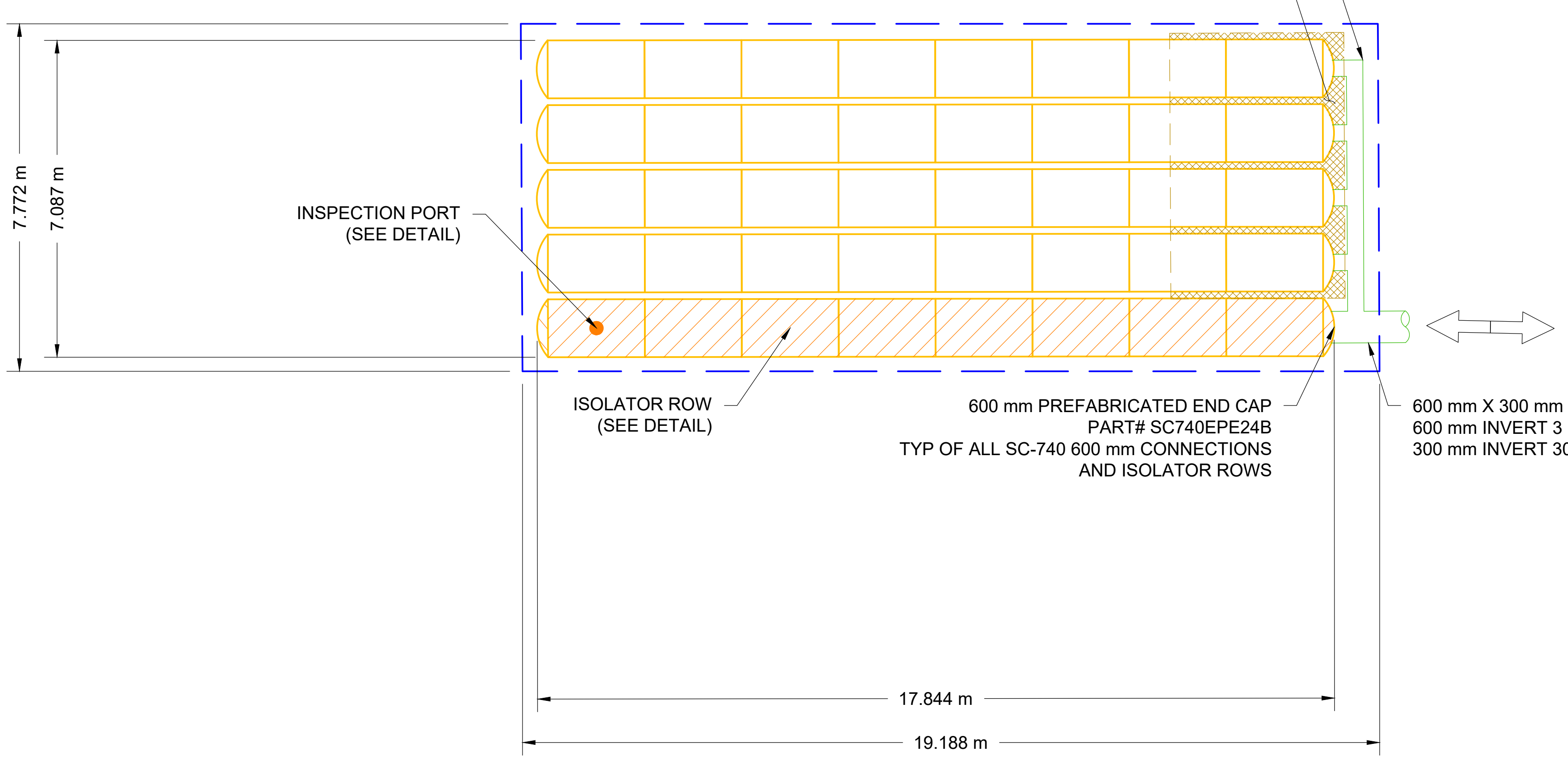


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## PROPOSED LAYOUT - SYSTEM 20

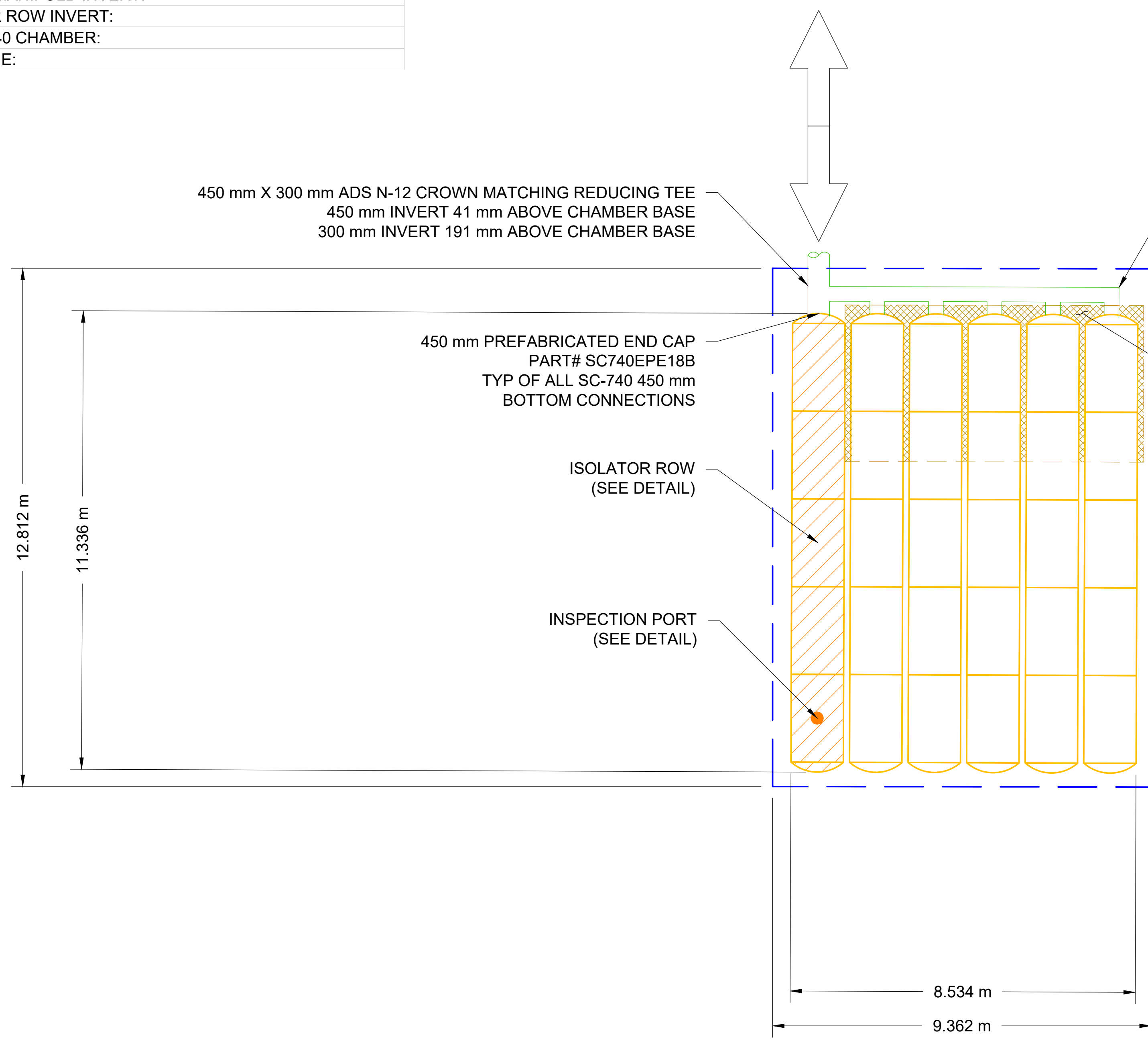
| | |
|---|---|
| 30 | STORMTECH SC-740 CHAMBERS |
| 12 | STORMTECH SC-740 END CAPS |
| 152 | STONE ABOVE (mm) |
| 300 | STONE BELOW (mm) |
| 40 | % STONE VOID |
| **63.8** | **INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 111.250 (PERIMETER STONE INCLUDED)** |
| **18.1** | **INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 111.250 (PERIMETER STONE INCLUDED)** |
| 119.9 | SYSTEM AREA (m²) |
| 44.3 | SYSTEM PERIMETER (m) |

## PROPOSED ELEVATIONS - SYSTEM 20

| | |
|---|---|
| 114.409 | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): |
| 112.581 | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): |
| 112.428 | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): |
| 112.428 | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): |
| 112.428 | MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT): |
| 112.123 | TOP OF STONE: |
| 111.971 | TOP OF SC-740 CHAMBER: |
| 111.400 | 300 mm CUSTOM MANIFOLD INVERT: |
| 111.250 | 450 mm ISOLATOR ROW INVERT: |
| 111.209 | BOTTOM OF SC-740 CHAMBER: |
| 110.909 | BOTTOM OF STONE: |

## NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED..

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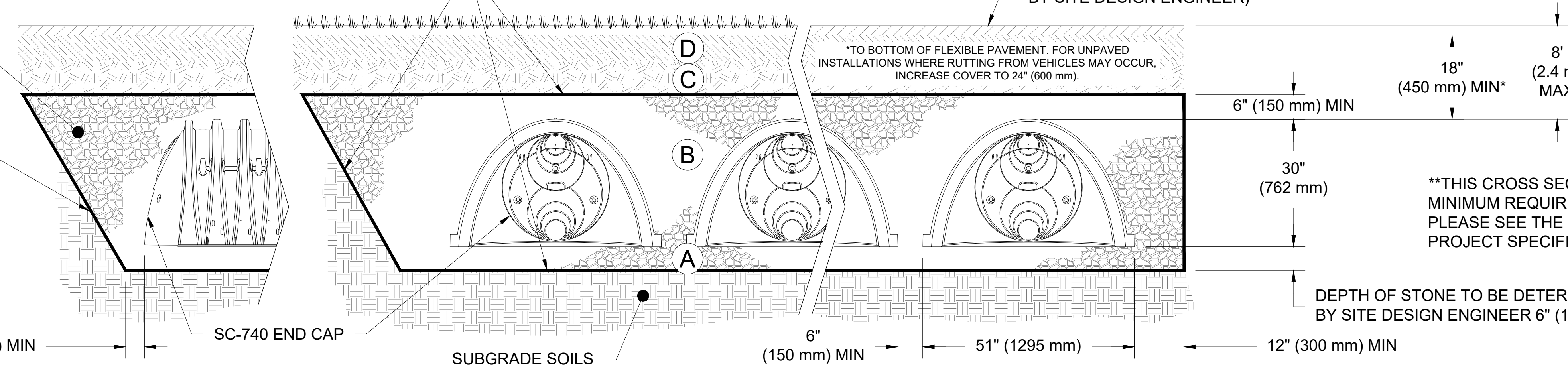
SHEET 21 OF 24

# ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

| MATERIAL LOCATION | | DESCRIPTION | AASHTO MATERIAL CLASSIFICATIONS | COMPACTION / DENSITY REQUIREMENT |
|---|---|---|---|---|
| D | **FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER. | ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS. | N/A | PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS. |
| C | **INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER. | GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER. | AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10 | BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN). |
| B | **EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE. | CLEAN, CRUSHED, ANGULAR STONE | AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57 | NO COMPACTION REQUIRED. |
| A | **FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER. | CLEAN, CRUSHED, ANGULAR STONE | AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57 | PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3] |

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.




## NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

HARD ROCK OTTAWA
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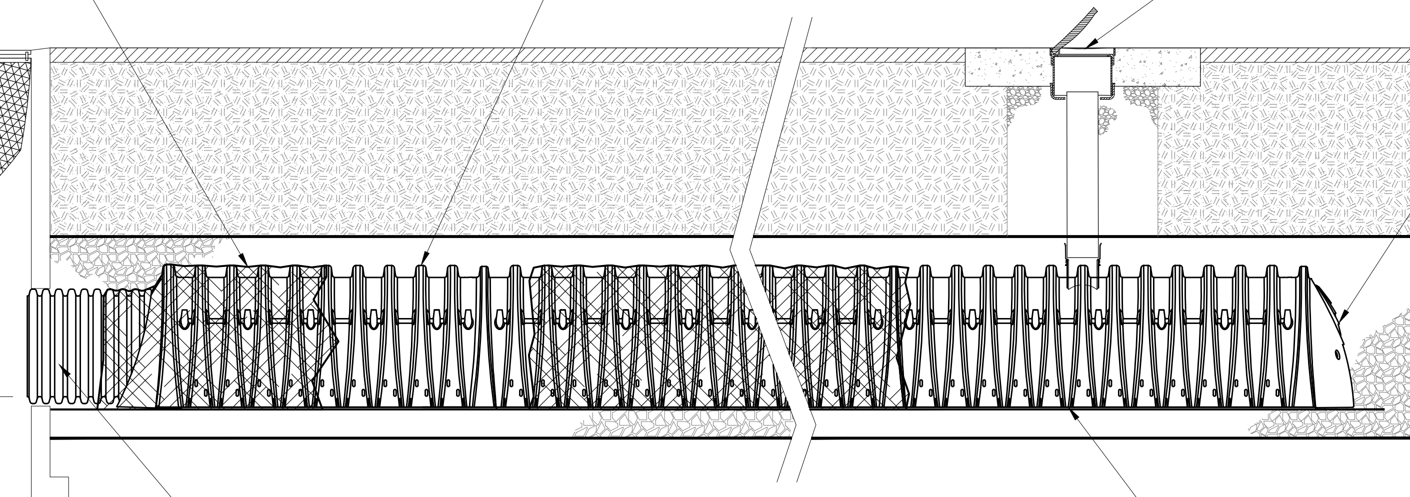



**SC-740 ISOLATOR ROW DETAIL**

NTS

## INSPECTION & MAINTENANCE

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

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

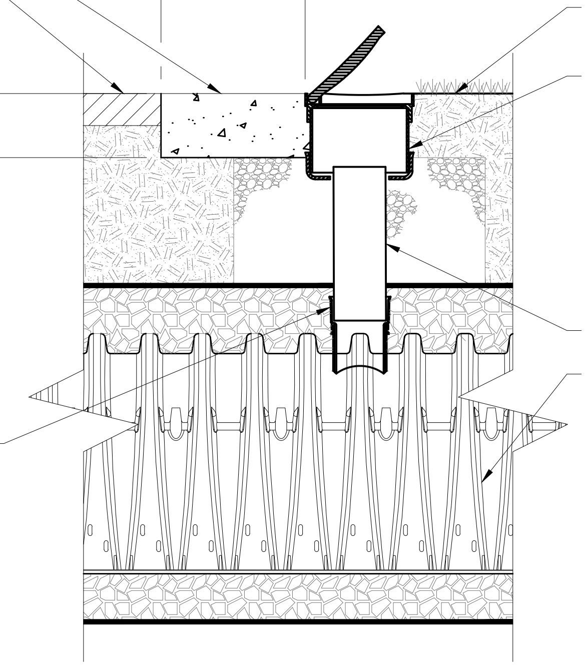
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

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

## NOTES

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

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




* THE PART# **2712AG6IPKIT** CAN BE USED TO ORDER ALL NECESSARY COMPONENTS FOR A SOLID LID INSPECTION PORT INSTALLATION

**SC-740 6" (150 mm) INSPECTION PORT DETAIL**

NTS

HARD ROCK OTTAWA
OTTAWA, ON.

DATE: 06/12/20 | DRAWN: RCT
PROJECT #: S188516 | CHECKED: JMQ

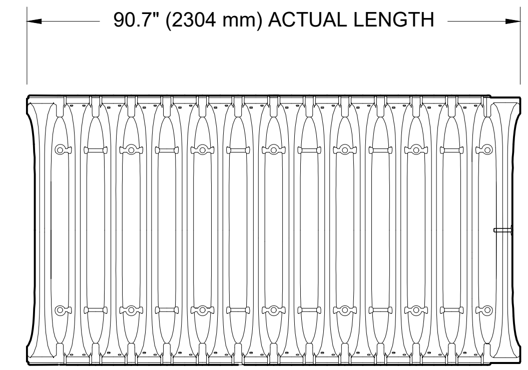
| DATE | DRWN | CHKD | DESCRIPTION |
|---|---|---|---|

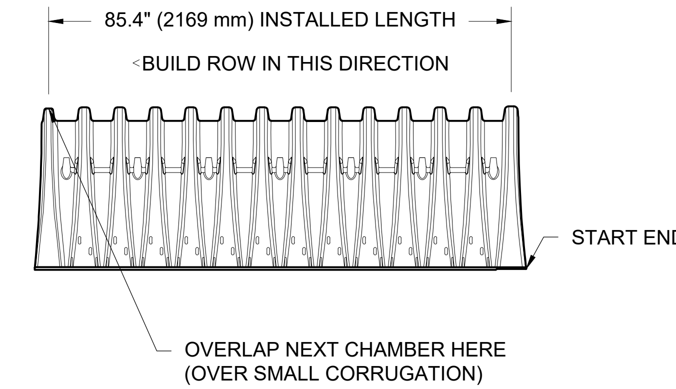
StormTech® Detention•Retention•Water Quality
520 CROMWELL AVENUE | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

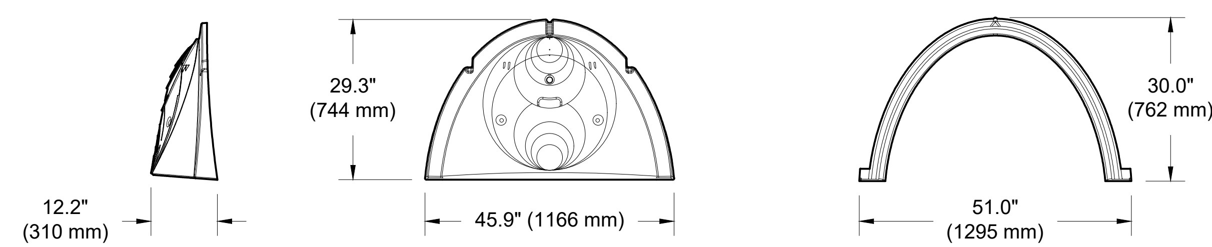
ADS® ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

# SC-740 TECHNICAL SPECIFICATION

NTS



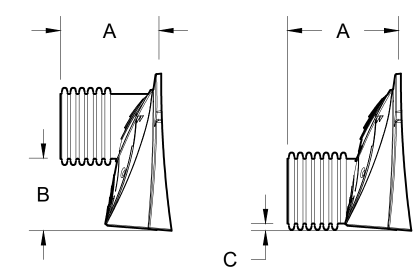




**NOMINAL CHAMBER SPECIFICATIONS**

| | | |
|---|---|---|
| SIZE (W X H X INSTALLED LENGTH) | 51.0" X 30.0" X 85.4" | (1295 mm X 762 mm X 2169 mm) |
| CHAMBER STORAGE | 45.9 CUBIC FEET | (1.30 m³) |
| MINIMUM INSTALLED STORAGE* | 74.9 CUBIC FEET | (2.12 m³) |
| WEIGHT | 75.0 lbs. | (33.6 kg) |

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS




PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

| PART # | STUB | A | B | C |
|---|---|---|---|---|
| SC740EPE06T / SC740EPE06TPC | 6" (150 mm) | 10.9" (277 mm) | 18.5" (470 mm) | --- |
| SC740EPE06B / SC740EPE06BPC | | | --- | 0.5" (13 mm) |
| SC740EPE08T /SC740EPE08TPC | 8" (200 mm) | 12.2" (310 mm) | 16.5" (419 mm) | --- |
| SC740EPE08B / SC740EPE08BPC | | | --- | 0.6" (15 mm) |
| SC740EPE10T / SC740EPE10TPC | 10" (250 mm) | 13.4" (340 mm) | 14.5" (368 mm) | --- |
| SC740EPE10B / SC740EPE10BPC | | | --- | 0.7" (18 mm) |
| SC740EPE12T / SC740EPE12TPC | 12" (300 mm) | 14.7" (373 mm) | 12.5" (318 mm) | --- |
| SC740EPE12B / SC740EPE12BPC | | | --- | 1.2" (30 mm) |
| SC740EPE15T / SC740EPE15TPC | 15" (375 mm) | 18.4" (467 mm) | 9.0" (229 mm) | --- |
| SC740EPE15B / SC740EPE15BPC | | | --- | 1.3" (33 mm) |
| SC740EPE18T / SC740EPE18TPC | 18" (450 mm) | 19.7" (500 mm) | 5.0" (127 mm) | --- |
| SC740EPE18B / SC740EPE18BPC | | | --- | 1.6" (41 mm) |
| SC740EPE24B* | 24" (600 mm) | 18.5" (470 mm) | --- | 0.1" (3 mm) |

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

HARD ROCK OTTAWA
OTTAWA, ON.

DATE: 06/12/20 DRAWN: RCT
PROJECT #: S188516 CHECKED: JMQ

| DATE | DRWN | CHKD | DESCRIPTION |
|---|---|---|---|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ADVANCED DRAINAGE SYSTEMS, INC.
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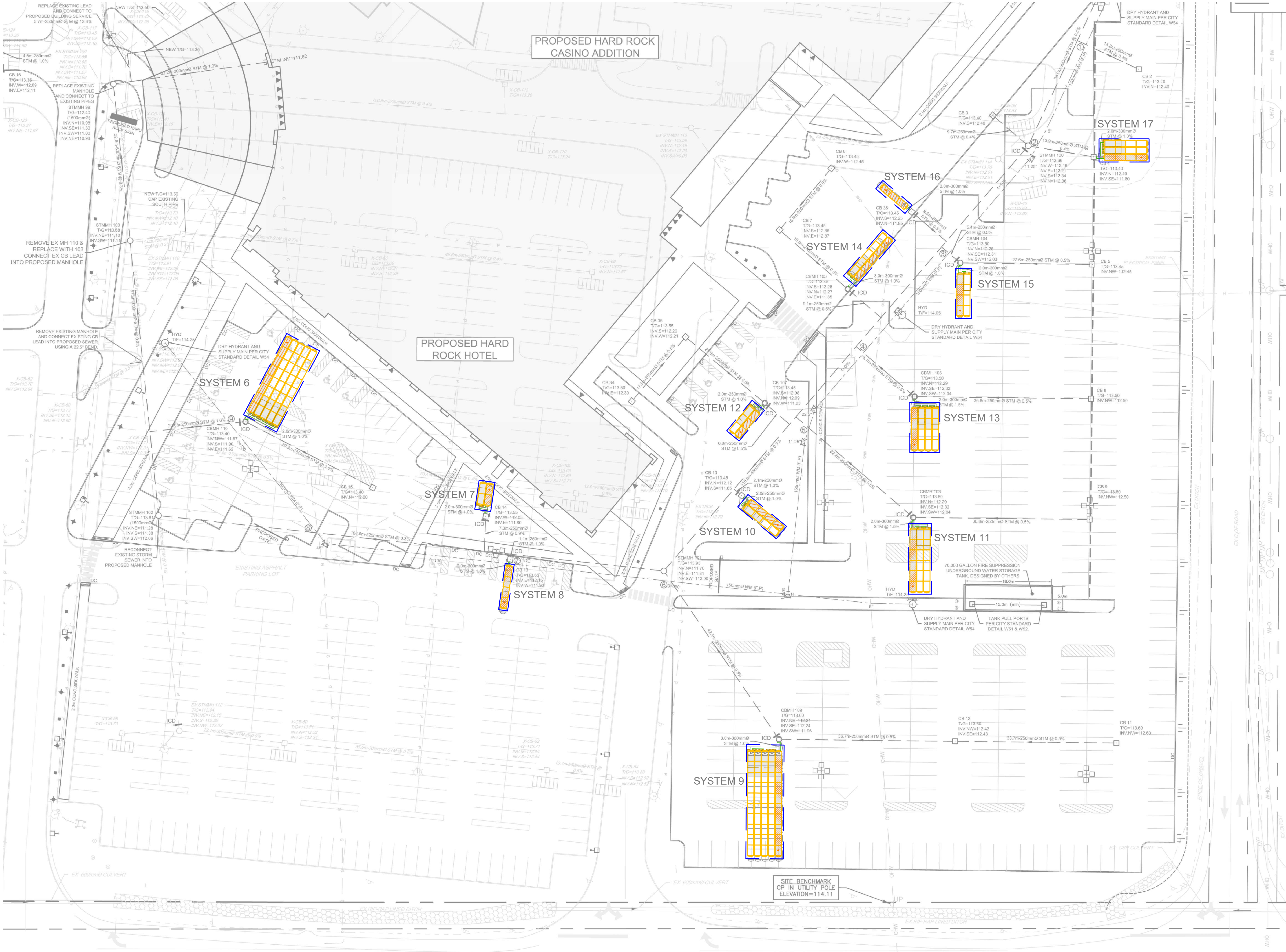
HILLIARD, OH 43026

FUTURE EARL ARMSTRONG EXTENSION
SYSTEM 1
SYSTEM 2
SYSTEM 3
SYSTEM 4
SYSTEM 5
TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS




N.T.S.

TO BE READ IN CONJUNCTION WITH ALL C

## LEGEND

- PROPERTY LINE
- PROPOSED CURB
- DC — PROPOSED DEPRE
- PROPOSED RETAI
- PROPOSED PRECA (O.P.S.D 603.020)
- TACTILE WALKING (TWSI) PER CITY DE
- PROPOSED CAP
- PROPOSED CROSS
- PROPOSED PARKI
- PROPOSED SANITA
- PROPOSED STORM
- PROPOSED FIRE S
- PROPOSED FRY HY
- PROPOSED BUILDI
- DIRECTION OF FLO
- PROPOSED CATCH
- ICD — PROPOSED INLET
- PROPOSED CATCH
- PROPOSED UNDER GEOTEXTILE (REFE
- PROPOSED UNDER GEOTEXTILE (REFE
- PROPOSED LIGHT (REFER TO ELECT
- DECORATIVE LAMP (REFER TO ELECT
- LIGHTING BOLLARD (REFER TO ELECT
- B — CONCRETE BOLLA
- T — HYDRO TRANSFOR (REFER TO ELECT
- G — GENERATOR (REFER TO ELECT
- ELECTRICAL MANH (REFER TO ELECT
- EXISTING UTILITY
- V&VC — EXISTING WATERM CHAMBER
- EXISTING HYDRA
- SAN MH — EXISTING SANITA
- EXISTING SANITA
- STM MH — EXISTING STORM
- CB — EXISTING CATCH
- EXISTING INFILTR
- G B — EXISTING GAS MA / EXISTING BELL LI
- OHW — EXISTING OVERH
- H — EXISTING HYDRO
- P — EXISTING STREET
- LS — EXISTING STREET
- EXISTING PARKIN

## PIPE CROSSING TABLE

| CROSSING | LOWER PIPE | HIGHER PIPE |
|---|---|---|
| 1 | 150mmØ WM OBV = 111.35 | 250mmØ STM INV = 112.3 |
| 2 | 150mmØ WM OBV = 111.25 | 250mmØ STM INV = 112.3 |
| 3 | 150mmØ WM OBV = 111.15 | 250mmØ STM INV = 112.2 |
| 4 | 150mmØ WM OBV = 111.30 | 250mmØ STM INV = 112.2 |
| 5 | 150mmØ WM OBV = 111.30 | 250mmØ STM INV = 112.1 |
| 6 | 150mmØ WM OBV = 111.60 | 300mmØ STM INV = 112.0 |
| 7 | 150mmØ WM OBV = 111.25 | 300mmØ STM INV = 111.9 |
| 8 | 150mmØ WM OBV = 111.20 | 525mmØ STM INV = 111.5 |
| 9 | 150mmØ WM OBV = 111.00 | 250mmØ STM INV = 111.8 |

## 150mmØ FIRE SUPPRESSION WATERMAI

| STATION | ELEVATION | TOP OF WATERMAIN | DESCRIPTION |
|---|---|---|---|
| 0+000 | 114.15 | 111.75 | DRY HYDRA |
| 0+008.7 | 114.30 | 111.90 | 5° HORIZONTAL DE |
| 0+026.1 | 114.30 | 111.90 | TEE CONNECTION WITH 150mm FIRE S |
| 0+050.7 | 114.00 | 111.60 | CROSSING STORM SEWER ( |
| 0+084.5 | 113.65 | 111.25 | CROSSING STORM SEWER ( |
| 0+123.0 | 113.90 | 111.50 | 45° HORIZONTAL |
| 0+125.9 | 113.75 | 111.20 | CROSSING STORM SEWER ( |
| 0+155.3 | 113.40 | 111.00 | CROSSING STORM SEWER ( |
| 0+176.7 | 114.15 | 111.75 | DRY HYDRA |

## 150mmØ FIRE SUPPRESSION WATERMAI

| STATION | ELEVATION | TOP OF WATERMAIN | DESCRIPTION |
|---|---|---|---|
| 1+000 | 114.30 | 111.90 | TEE CONNECTION WITH 150mm FIRE S |
| 1+031.9 | 113.70 | 111.30 | 11.25° HORIZONTA |
| 1+034.9 | 113.70 | 111.30 | CROSSING STORM SEWER (0 |
| 1+039.0 | 113.70 | 111.30 | 22.5° HORIZONTA |
| 1+054.6 | 113.70 | 111.30 | CROSSING STORM SEWER (0 |
| 1+065.9 | 113.95 | 111.55 | DRY HYDRANT TEE CO |
| 1+082.0 | 113.55 | 111.15 | CROSSING STORM SEWER (0 |
| 1+108.1 | 113.65 | 111.25 | 11.25° HORIZONTA |
| 1+110.6 | 113.65 | 111.25 | CROSSING STORM SEWER (0 |
| 1+134.5 | 113.75 | 111.35 | CROSSING STORM SEWER (0 |
| 1+147.7 | 113.55 | 111.15 | DRY HYDRA |


| | | | | |
|---|---|---|---|---|
| SCALE | DESIGN MJH | FOR REVIEW ONLY | | LOCATION 4837 ALBION R |

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

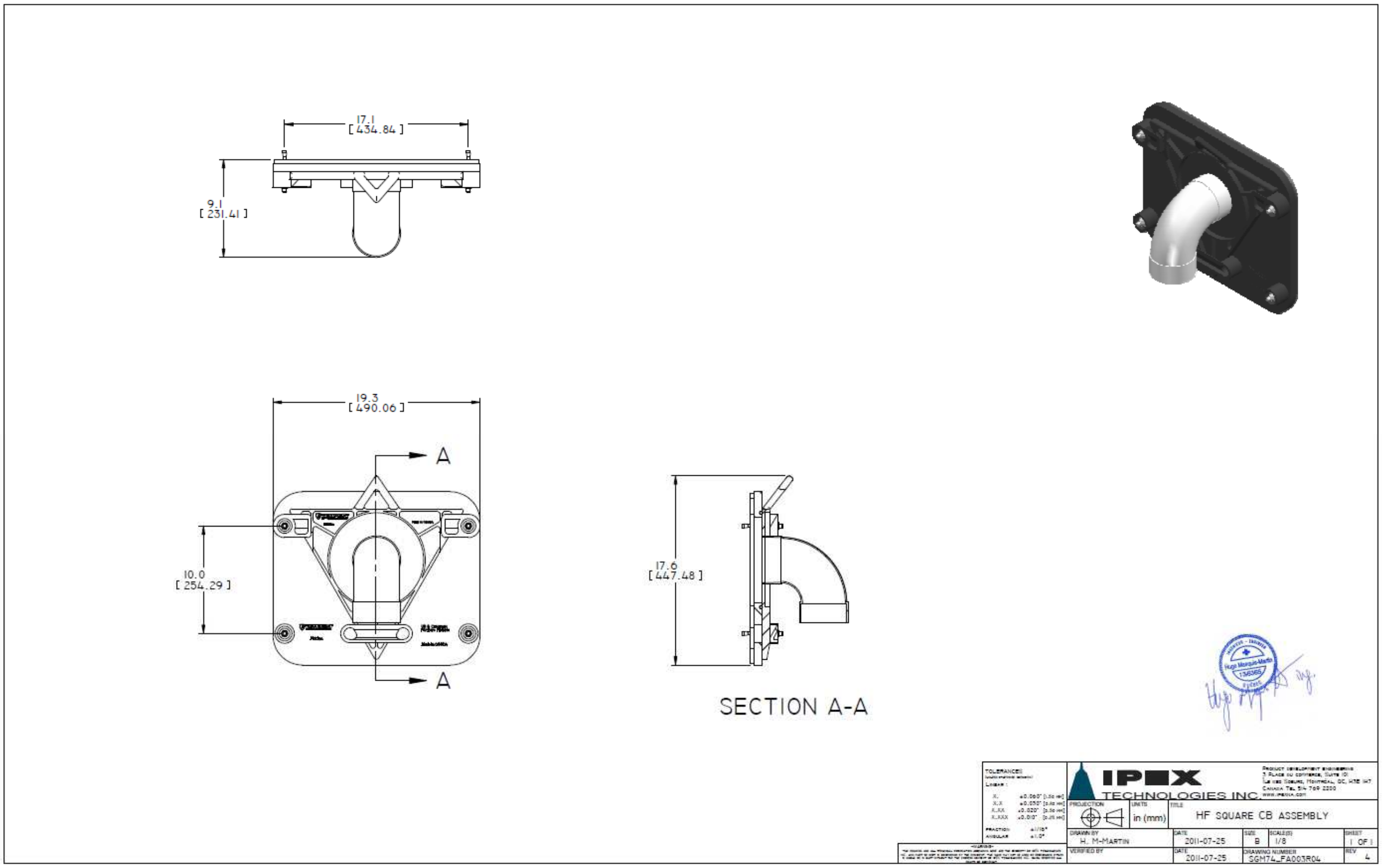
**Contact**: Conrad Stang

**Location**: Ottawa

**Project Name**: Hard Rock

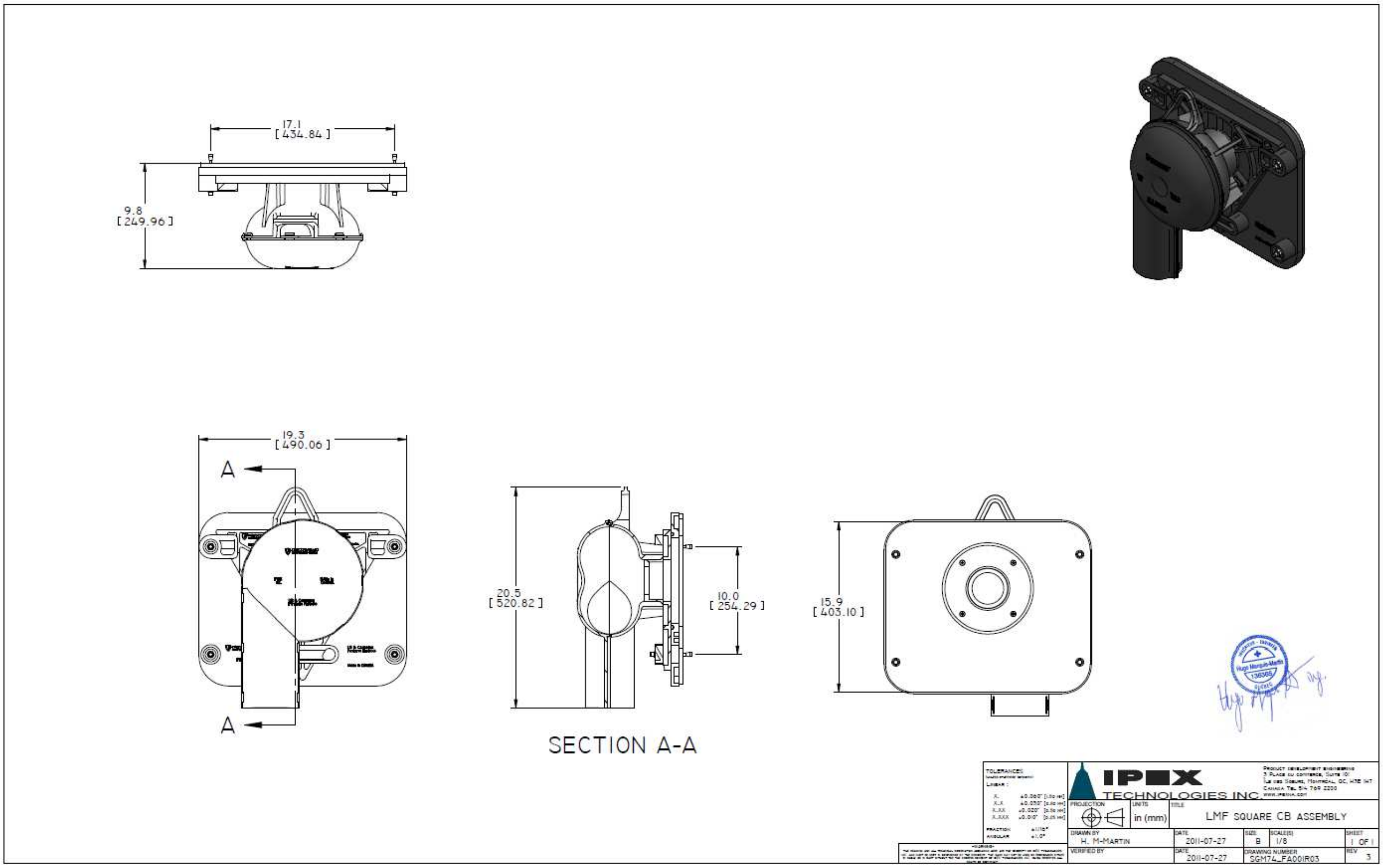
IPEX

# Tempest HF ICD Sq Shop Drawing

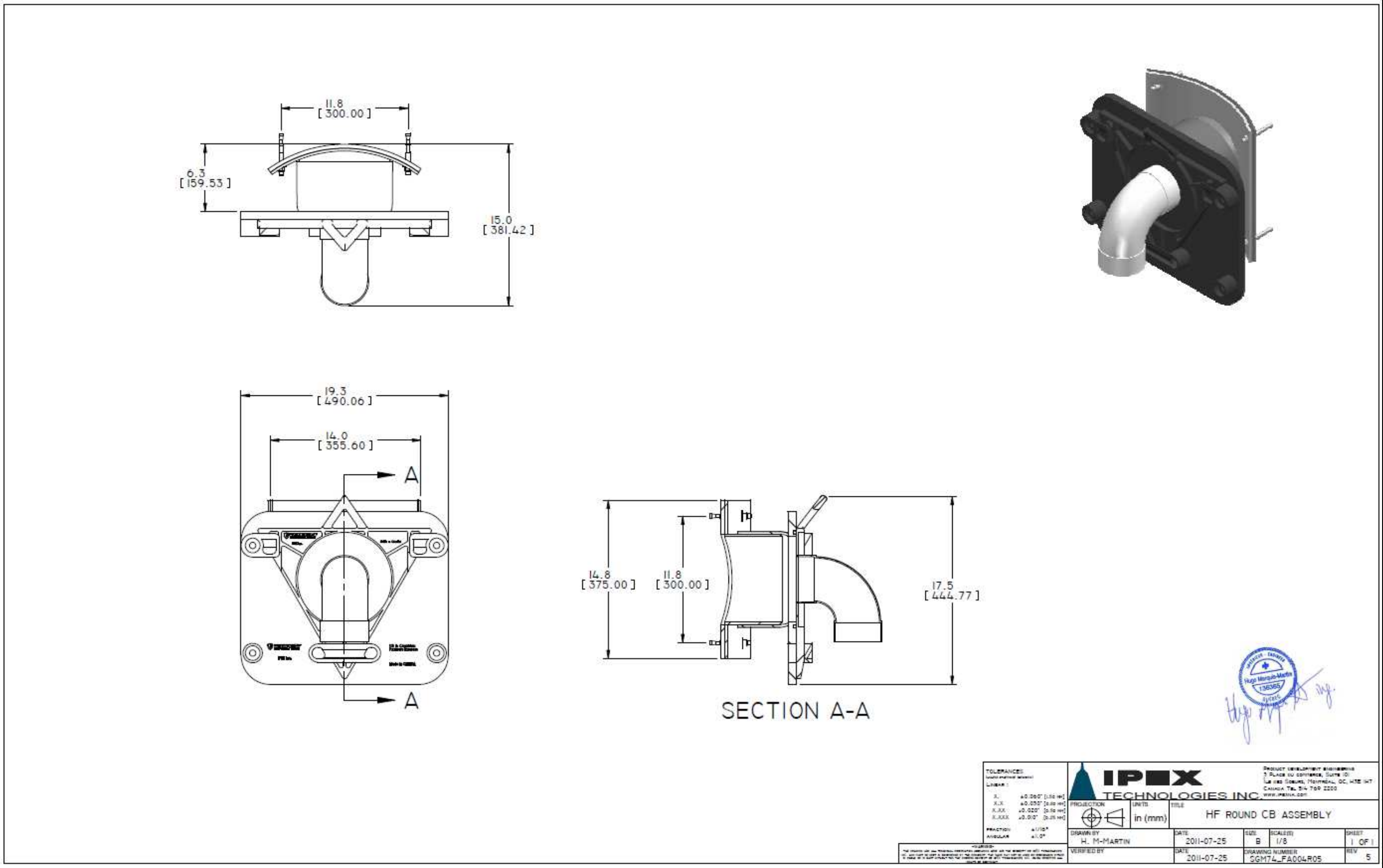



IPEX

# <u>Tempest LMF ICD Sq</u> Shop Drawing

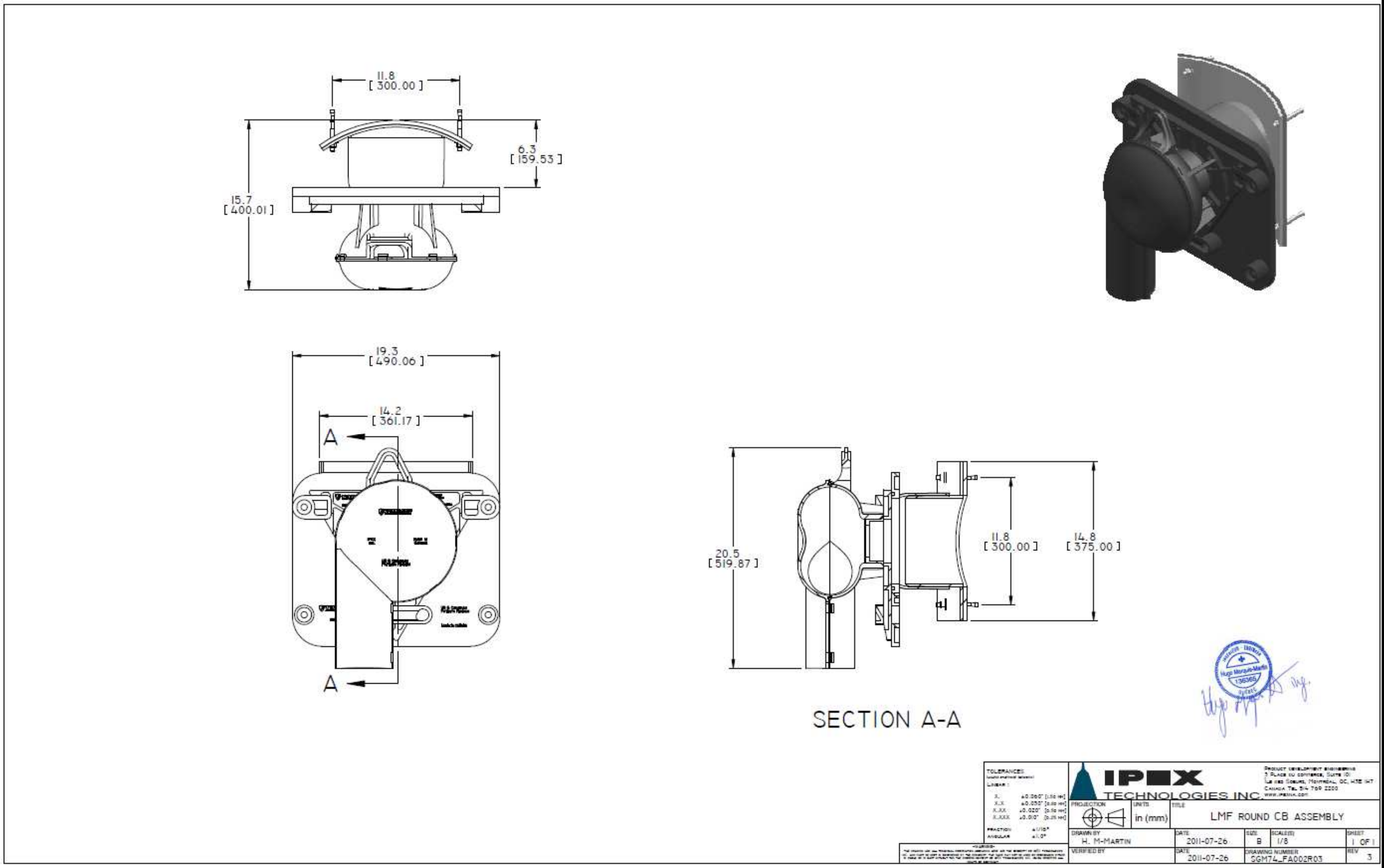


# Tempest HF ICD Rd Shop Drawing

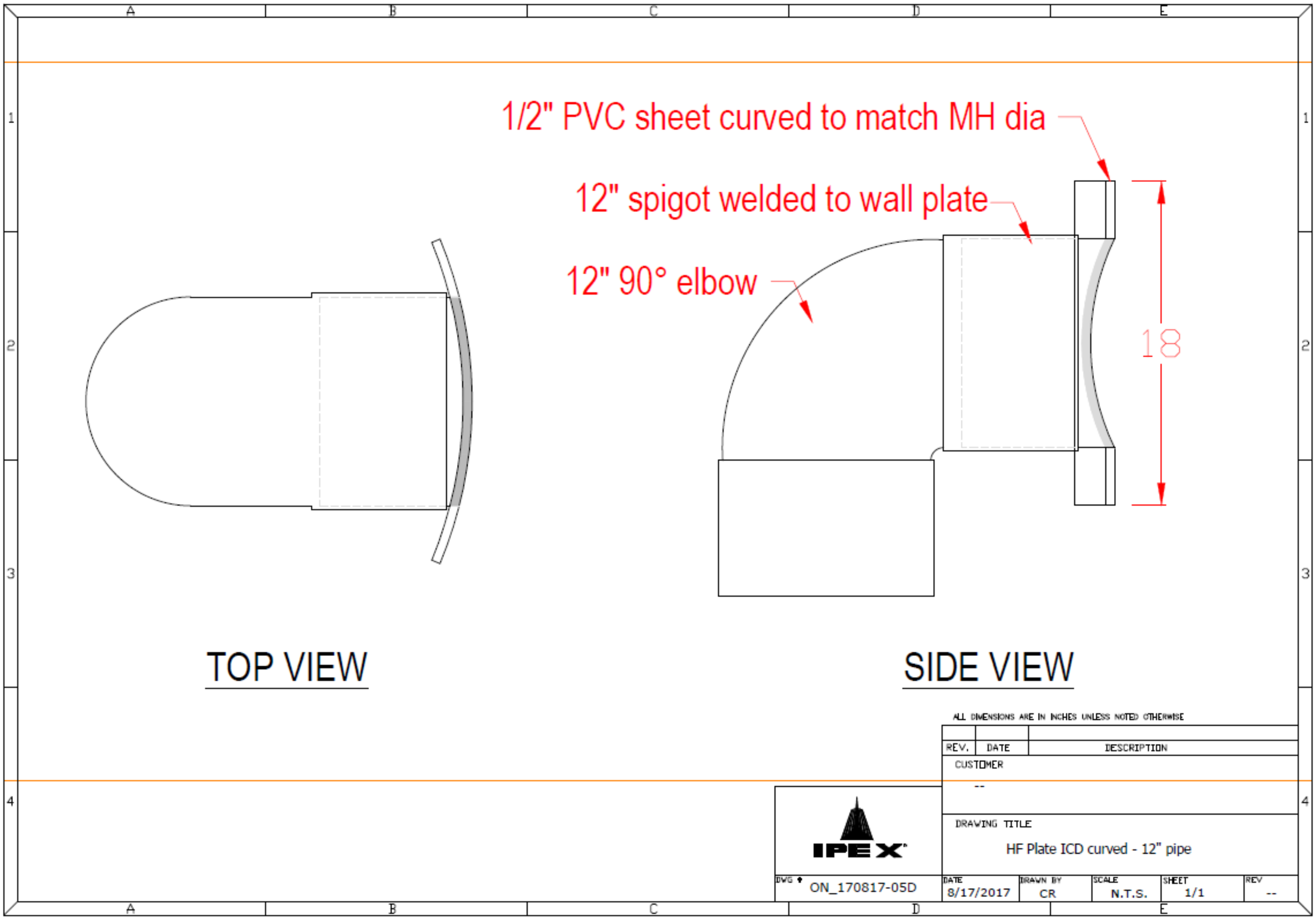



IPEX

# <u>Tempest LMF ICD Rd</u> Shop Drawing



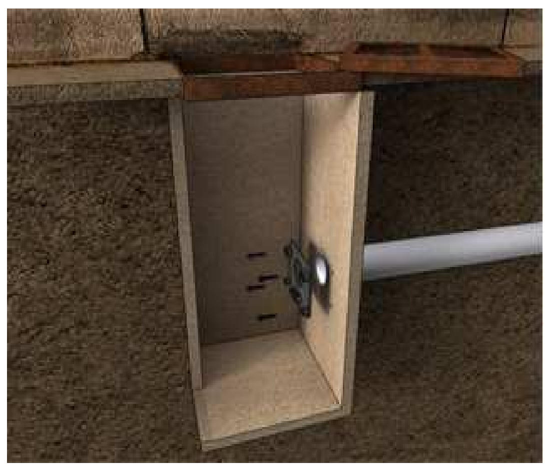
**Tempest Plate ICD Rd Shop Drawing**

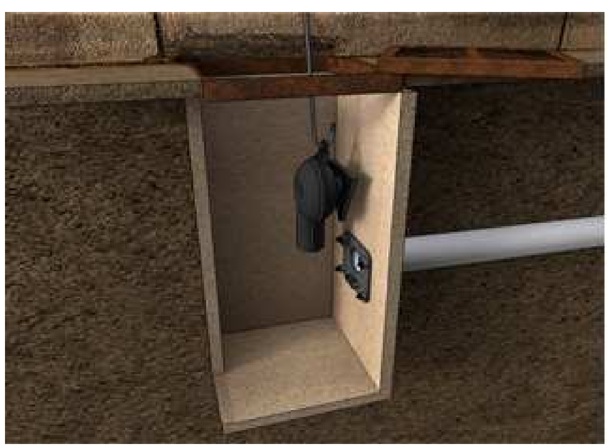



IPEX

# 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.

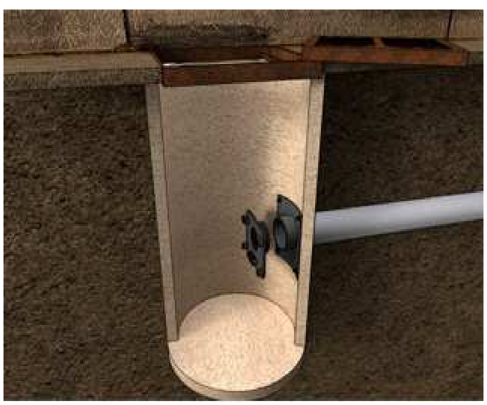




IPEX

## 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.

WATTS® DRAINAGE

**Adjustable Accutrol Weir**

**Tag:** RD-100-A-ADJ

# Adjustable Flow Control for Roof Drains

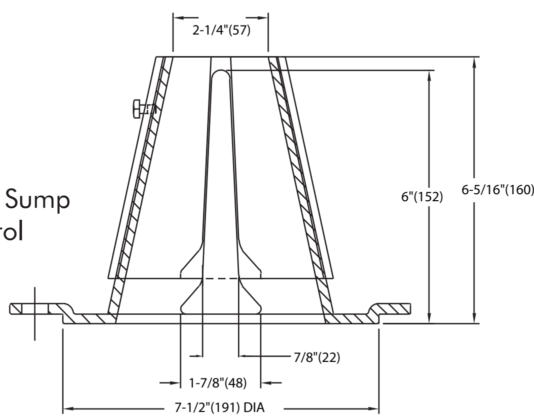
**ADJUSTABLE ACCUTROL(for Large Sump Roof Drains only)**

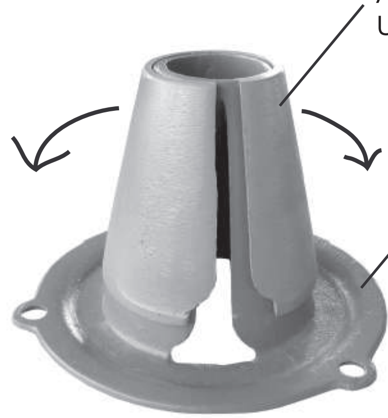
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the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

**EXAMPLE:**

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

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




1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

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

Job Name ______________________ Contractor ______________________

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

Engineer ______________________ Representative ______________________



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

# CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
# BASED ON THE RATIONAL RAINFALL METHOD
# BASED ON A FINE PARTICLE SIZE DISTRIBUTION

**Project Name:** Hard Rock Ottawa
**Location:** Ottawa, ON
**OGS #:** OGS

**Engineer:** NOVATECH
**Contact:** Matthew Hrehoriak
**Report Date:** 27-Oct-22

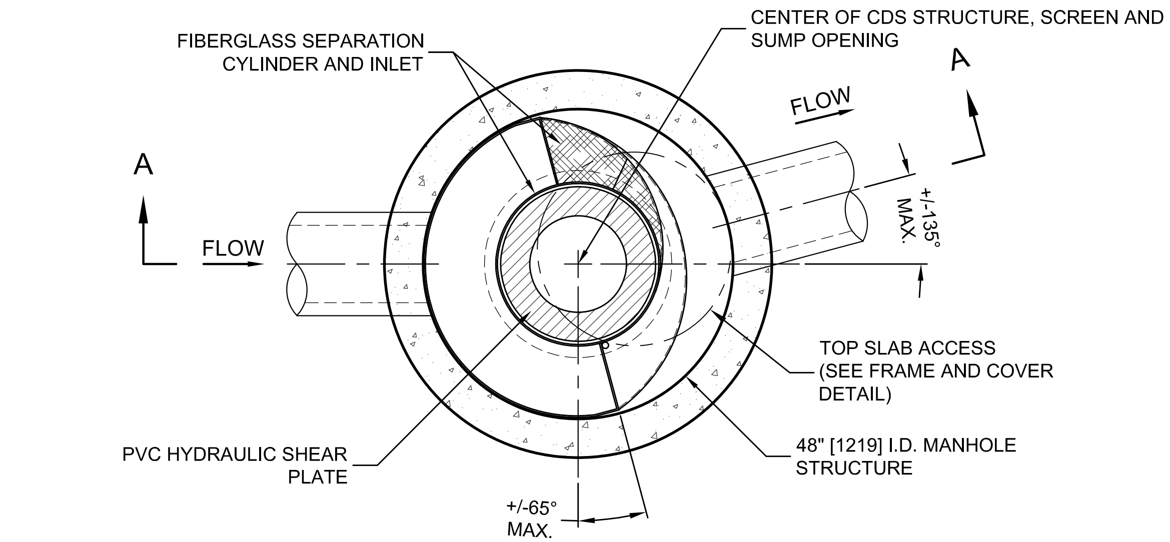
**Area** 0.14 ha
**Weighted C** 0.90
**CDS Model** 2015-4

**Rainfall Station #** 215
**Particle Size Distribution** FINE
**CDS Treatment Capacity** 20 l/s

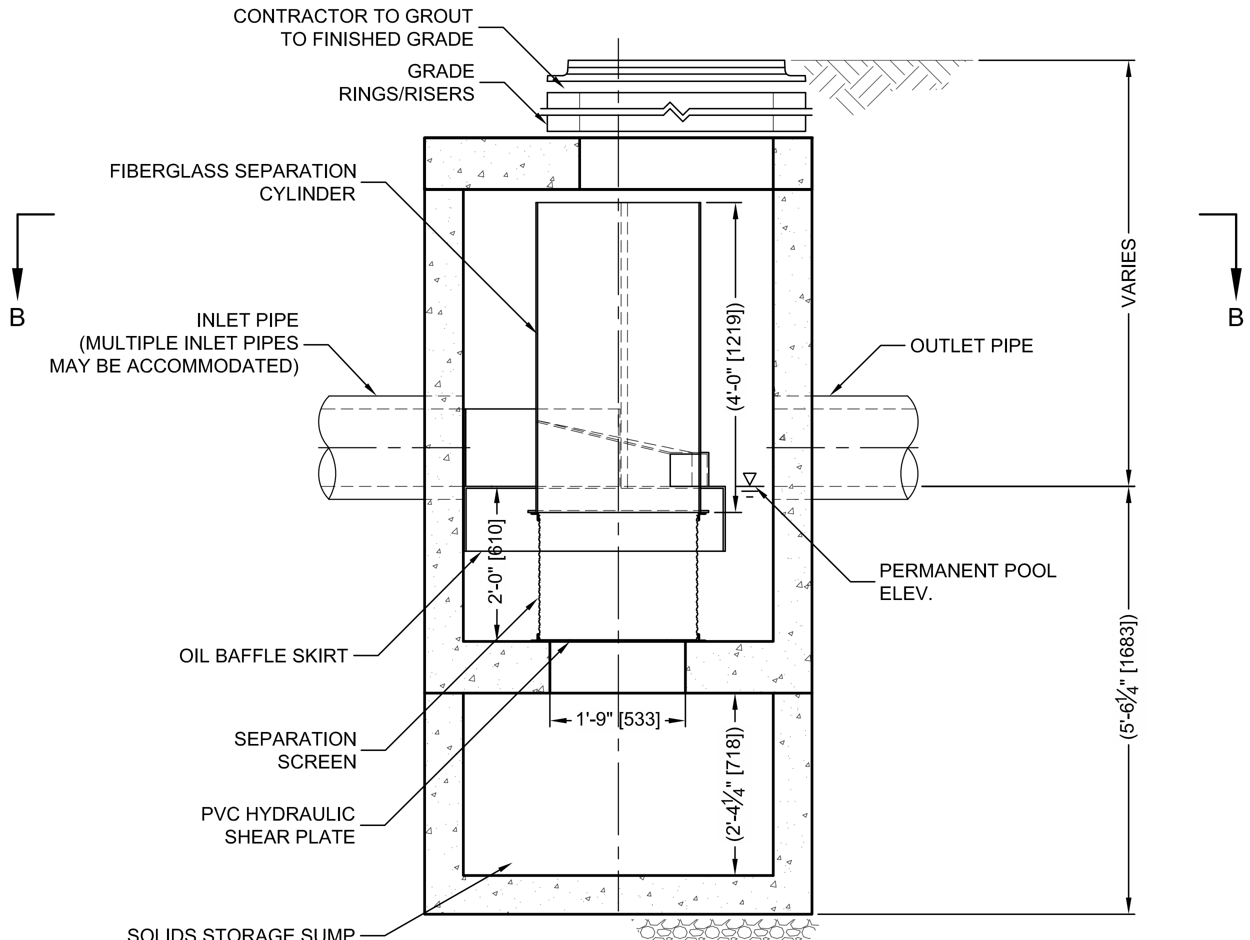
| Rainfall Intensity[1] (mm/hr) | Percent Rainfall Volume[1] | Cumulative Rainfall Volume | Total Flowrate (l/s) | Treated Flowrate (l/s) | Operating Rate (%) | Removal Efficiency (%) | Incremental Removal (%) |
|---|---|---|---|---|---|---|---|
| 0.5 | 9.2% | 9.2% | 0.2 | 0.2 | 0.9 | 98.6 | 9.0 |
| 1.0 | 10.6% | 19.8% | 0.3 | 0.3 | 1.7 | 98.4 | 10.4 |
| 1.5 | 9.9% | 29.7% | 0.5 | 0.5 | 2.6 | 98.1 | 9.7 |
| 2.0 | 8.4% | 38.1% | 0.7 | 0.7 | 3.5 | 97.9 | 8.2 |
| 2.5 | 7.7% | 45.8% | 0.9 | 0.9 | 4.4 | 97.6 | 7.5 |
| 3.0 | 5.9% | 51.7% | 1.0 | 1.0 | 5.2 | 97.4 | 5.8 |
| 3.5 | 4.4% | 56.1% | 1.2 | 1.2 | 6.1 | 97.1 | 4.2 |
| 4.0 | 4.7% | 60.7% | 1.4 | 1.4 | 7.0 | 96.9 | 4.5 |
| 4.5 | 3.3% | 64.0% | 1.6 | 1.6 | 7.8 | 96.6 | 3.2 |
| 5.0 | 3.0% | 67.1% | 1.7 | 1.7 | 8.7 | 96.4 | 2.9 |
| 6.0 | 5.4% | 72.4% | 2.1 | 2.1 | 10.5 | 95.9 | 5.2 |
| 7.0 | 4.4% | 76.8% | 2.4 | 2.4 | 12.2 | 95.4 | 4.1 |
| 8.0 | 3.5% | 80.3% | 2.8 | 2.8 | 13.9 | 94.9 | 3.4 |
| 9.0 | 2.8% | 83.2% | 3.1 | 3.1 | 15.7 | 94.4 | 2.7 |
| 10.0 | 2.2% | 85.3% | 3.5 | 3.5 | 17.4 | 93.9 | 2.0 |
| 15.0 | 7.0% | 92.3% | 5.2 | 5.2 | 26.1 | 91.4 | 6.4 |
| 20.0 | 4.5% | 96.9% | 6.9 | 6.9 | 34.8 | 88.9 | 4.0 |
| 25.0 | 1.4% | 98.3% | 8.6 | 8.6 | 43.5 | 86.4 | 1.2 |
| 30.0 | 0.7% | 99.0% | 10.4 | 10.4 | 52.3 | 83.9 | 0.6 |
| 35.0 | 0.5% | 99.5% | 12.1 | 12.1 | 61.0 | 81.4 | 0.4 |
| 40.0 | 0.5% | 100.0% | 13.8 | 13.8 | 69.7 | 78.9 | 0.4 |
| 45.0 | 0.0% | 100.0% | 15.5 | 15.5 | 78.4 | 76.4 | 0.0 |
| 50.0 | 0.0% | 100.0% | 17.3 | 17.3 | 87.1 | 73.9 | 0.0 |
| | | | | | | | 96.0 |

Removal Efficiency Adjustment[2] = 6.5%
**Predicted Net Annual Load Removal Efficiency = 89.5%**
**Predicted Annual Rainfall Treated = 100.0%**

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS efficiency based on testing conducted at the University of Central Florida.
4 - CDS design and scaling based on original manufacturer model and product specifications.




**PLAN VIEW B-B**
N.T.S.



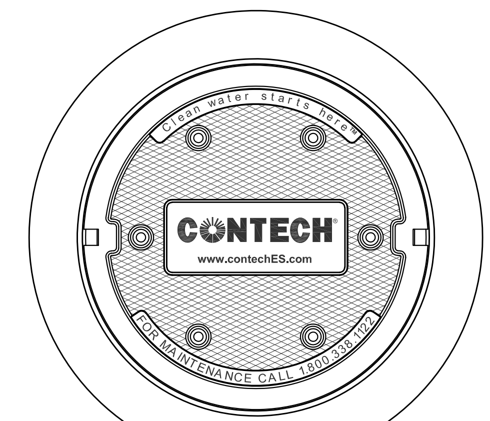

**ELEVATION A-A**
N.T.S.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

## CDS PMSU2015-4-C DESIGN NOTES

THE STANDARD CDS PMSU2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

| CONFIGURATION DESCRIPTION |
|---|
| GRATED INLET ONLY (NO INLET PIPE) |
| GRATED INLET WITH INLET PIPE OR PIPES |
| CURB INLET ONLY (NO INLET PIPE) |
| CURB INLET WITH INLET PIPE OR PIPES |
| CUSTOMIZABLE SUMP DEPTH AVAILABLE |
| ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST |




**FRAME AND COVER**
(DIAMETER VARIES)
N.T.S.

## SITE SPECIFIC DATA REQUIREMENTS

| | | | |
|---|---|---|---|
| STRUCTURE ID | | | |
| WATER QUALITY FLOW RATE (CFS OR L/s) | | | * |
| PEAK FLOW RATE (CFS OR L/s) | | | * |
| RETURN PERIOD OF PEAK FLOW (YRS) | | | * |
| SCREEN APERTURE (2400 OR 4700) | | | * |
| PIPE DATA: | I.E. | MATERIAL | DIAMETER |
| INLET PIPE 1 | * | * | * |
| INLET PIPE 2 | * | * | * |
| OUTLET PIPE | * | * | * |
| RIM ELEVATION | | | * |
| ANTI-FLOTATION BALLAST | | WIDTH | HEIGHT |
| | | * | * |
| NOTES/SPECIAL REQUIREMENTS: | | | |
| * PER ENGINEER OF RECORD | | | |

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH®
ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS PMSU2015-4-C
INLINE CDS
STANDARD DETAIL

C:\USERS\HUDA.ECHELONENV\DOCUMENTS\START ITEMS\PMSU SAMPLE DRAWINGS\4\CDS2015-4-C-DTL.DWG 5/30/2022 12:30 AM

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.**

PROFESSIONAL GEOSCIENTIST
Nov.26/19
NICHOLAS ZULINSKI
PRACTISING MEMBER
2359
ONTARIO

Nicholas Zulinski, P.Geo.

Michael S. Killam, P.Eng.

**Attachments**

- ❏ Drawing PG4315-2 - Estimated Infiltration Rate Plan

**Paterson Group Inc.**

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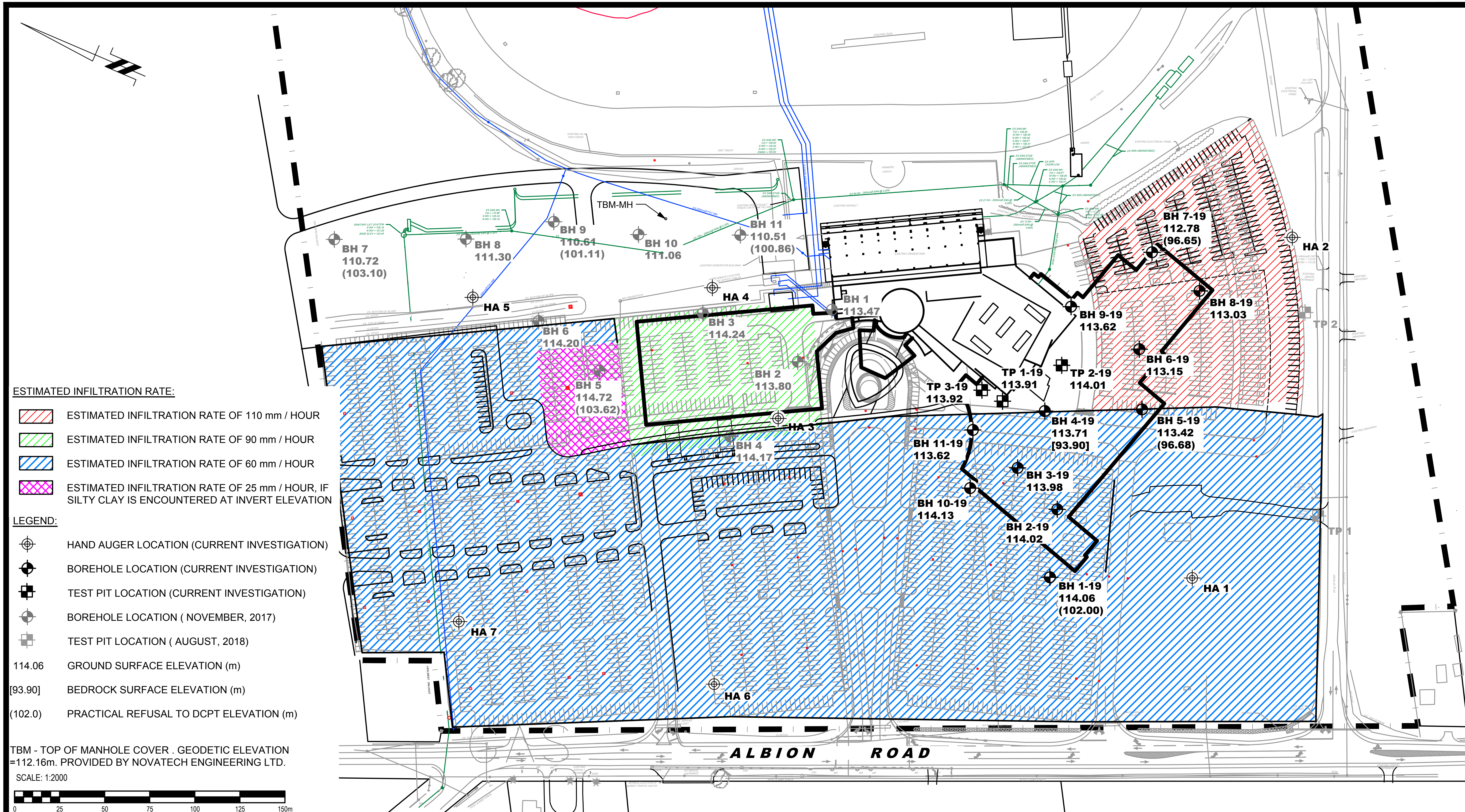


ESTIMATED INFILTRATION RATE:

- 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 |

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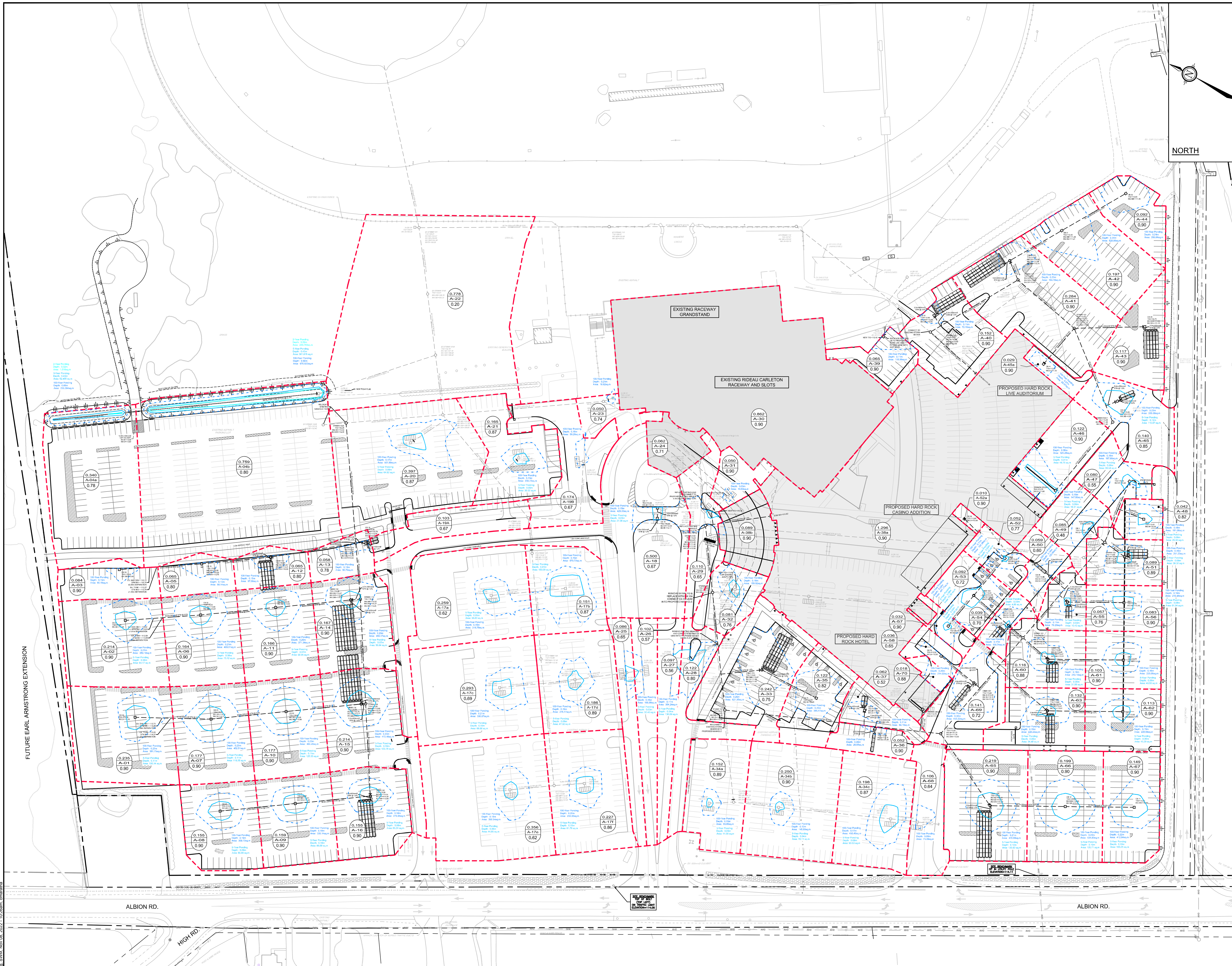
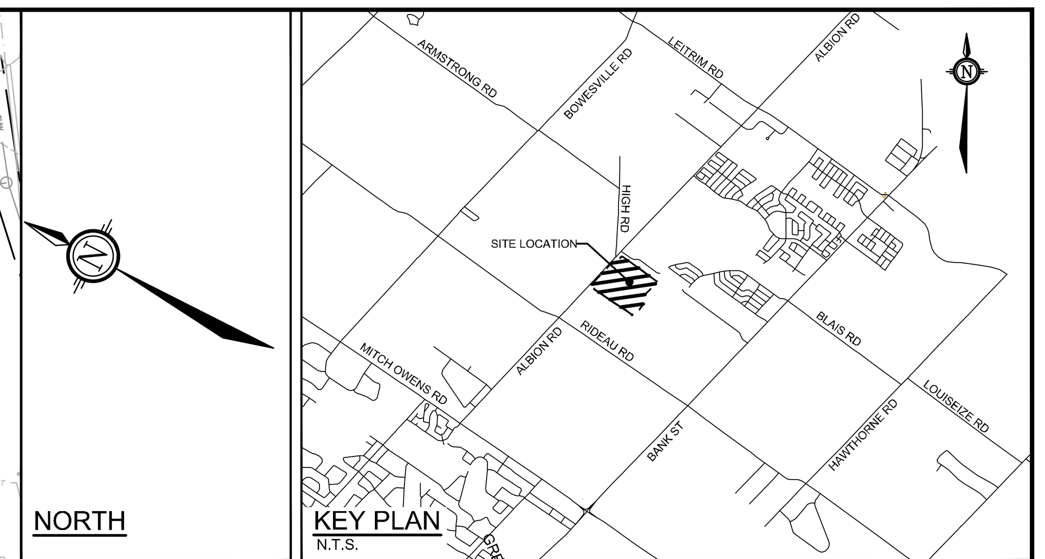
# Appendix D

Stormwater Management Modeling




## 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
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha), DRAINAGE AREA ID, RUNOFF COEFFICIENT
- 100-YEAR PONDING LIMIT
- 5-YEAR PONDING LIMIT
- 2-YEAR PONDING LIMIT

## ROOF DRAIN TABLE:

| WATTS ACCUTROL RD-100-A-ADJ ROOF DRAIN TABLE | | |
|---|---|---|
| ROOF AREA | ROOD DRAIN ID | WEIR SETTING |
| R-1 | RD-1 - RD-3 | OPEN |
| R-2 | RD-4 - RD-10 | OPEN |
| R-3 | RD-11 - RD-14 | OPEN |
| R-4 | RD-15 - RD-16 | OPEN |
| R-5 | RD-17 - RD-19 | OPEN |
| R-6a | RD-20 - RD-23 | OPEN |
| R-6b | RD-24 - RD-28 | OPEN |
| R-7 | RD-29 - RD-31 | OPEN |
| R-8 | RD-32 | OPEN |
| R-9 | RD-33A/B | OPEN |
| R-10 | RD-34 - RD-37 | OPEN |
| R-11 | RD-38 - RD-41 | OPEN |
| R-12a | RD-42 - RD-44 | OPEN |
| R-12b | RD-45 - RD-47 | OPEN |
| R-13 | RD-48 | OPEN |
| R-14 | RD-49 | OPEN |

## INLET CONTROL DEVICE TABLE:

| CB / CBMH ID | IPEX ICD Type (model) | 100-year Model Results | |
|---|---|---|---|
| | | Release Rate (L/s) | Head (m) |
| EX-CB117 | HF-77 | 14.08 | 1.44 |
| EX-CB134 | HF-85 | 19.43 | 1.81 |
| EX-CB137 | HF-137 | 47.28 | 1.58 |
| EX-CB14 | HF-130 | 57.55 | 2.89 |
| EX-CB60 | HF-110 | 31.55 | 1.69 |
| EX-CB64 | LMF-100 | 11.04 | 1.56 |
| EX-CB72 | LMF-100 | 11.58 | 1.7 |
| EX-CB82 | HF-202 | 96.31 | 1.39 |
| EX-CB84 | HF-118 | 35.5 | 1.66 |
| EX-MH105 | HF-199 | 122.26 | 2.39 |
| EX-MH112 | HF-218 | 116.78 | 1.5 |
| PR-CB13 | LMF-85 | 8.01 | 1.58 |
| PR-CB14 | LMF-85 | 7.88 | 1.61 |
| PR-CB16/17 | HF-202 | 97 | 1.41 |
| PR-CB18 | LMF-95 | 9.12 | 1.45 |
| PR-CB29 | LMF-85 | 4.36 | 0.49 |
| PR-CB32 | LMF-80 | 8.17 | 2.06 |
| PR-CB36 | LMF-80 | 6.05 | 1.34 |
| PR-CB40 | LMF-95 | 9.94 | 1.73 |
| PR-CB41 | LMF-85 | 7.6 | 1.47 |
| PR-CBMH104 | LMF-85 | 7.3 | 1.32 |
| PR-CBMH105 | LMF-85 | 7.51 | 1.4 |
| PR-CBMH106 | LMF-85 | 7.52 | 1.4 |
| PR-CBMH107 | LMF-85 | 7.88 | 1.62 |
| PR-CBMH108 | LMF-85 | 7.76 | 1.49 |
| PR-CBMH109 | LMF-90 | 9.44 | 1.6 |
| PR-CBMH110 | LMF-85 | 8.47 | 1.79 |
| PR-CBMH111 | LMF-105 | 14.4 | 1.95 |
| PR-CBMH112 | LMF-105 | 14.7 | 2.03 |
| PR-CBMH114 | LMF-95 | 10.77 | 2.02 |
| PR-CBMH115 | LMF-95 | 10.47 | 1.94 |
| PR-CBMH118 | HF-130 | 54.22 | 1.64 |
| PR-MH100 | LMF-95 | 8.74 | 1.42 |
| PR-TD02 | HF-130 | 35.43 | 1.13 |

*3-hour Chicago Storm.
*IPEX ICD's sized based on 100-year model results.

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 |
|---|---|---|---|
| 3 | REVISED PER CITY COMMENTS | NOV 07/22 | MJH |
| 2 | REVISED PER CITY COMMENTS | APRIL 24/20 | CJR |
| 1 | ISSUED FOR SITE PLAN APPROVAL | NOV 20/19 | CJR |

SCALE 1:750

DESIGN MJH
CHECKED CJR
DRAWN MJH
CHECKED CJR
APPROVED JLS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER M. J. HREHORIAK 100211256 NOV 7/22 PROVINCE OF ONTARIO

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

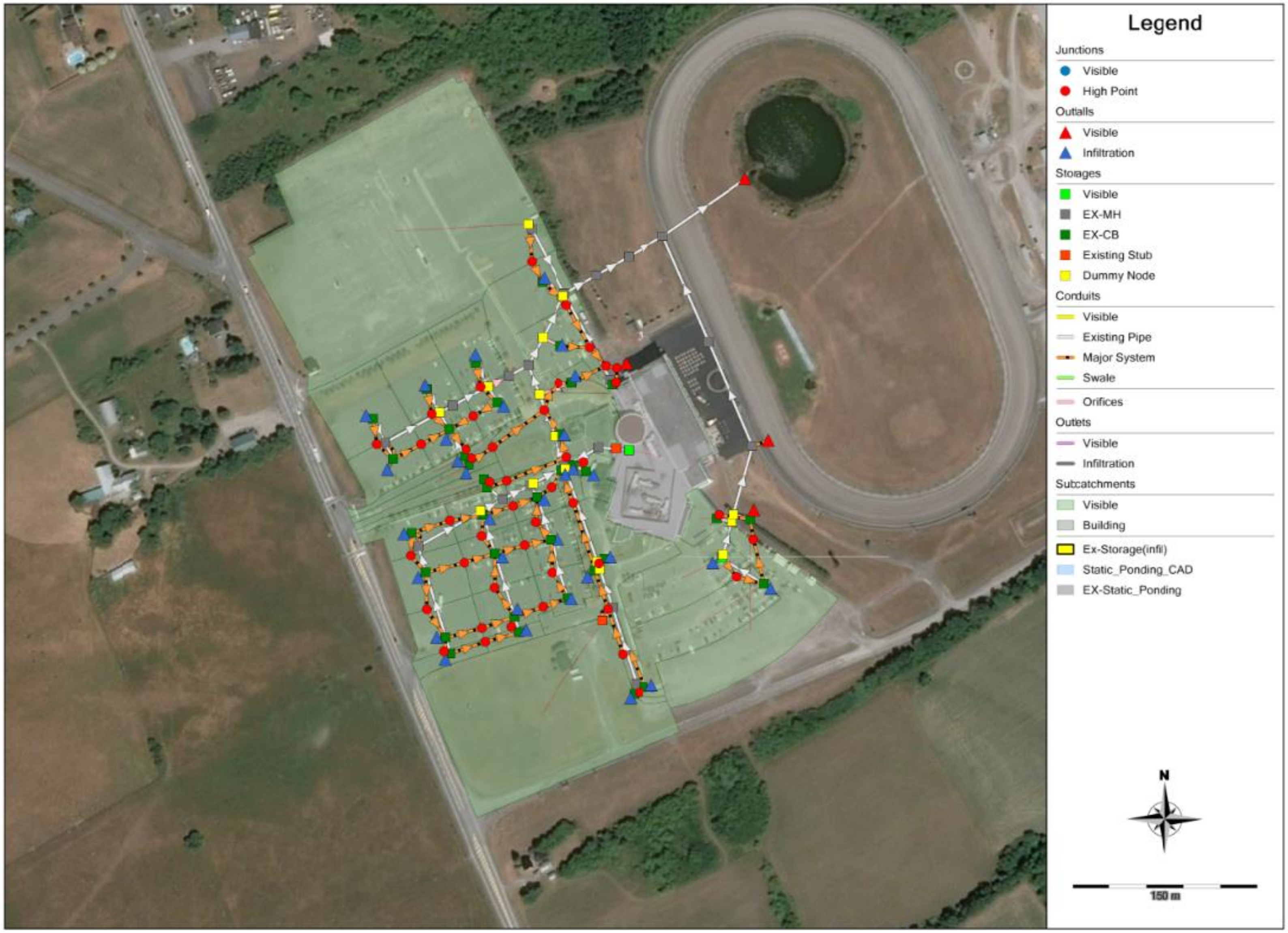
DRAWING NAME
STORMWATER MANAGEMENT
DRAINAGE AREA PLAN

PROJECT No. 116111
REV REV # 3
DRAWING No. 116111-SWM

PLANB1.DWG - 1000mmx707mm

**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Schematics - Existing**

## Overall Model Schematic




Date: 2020-04-23
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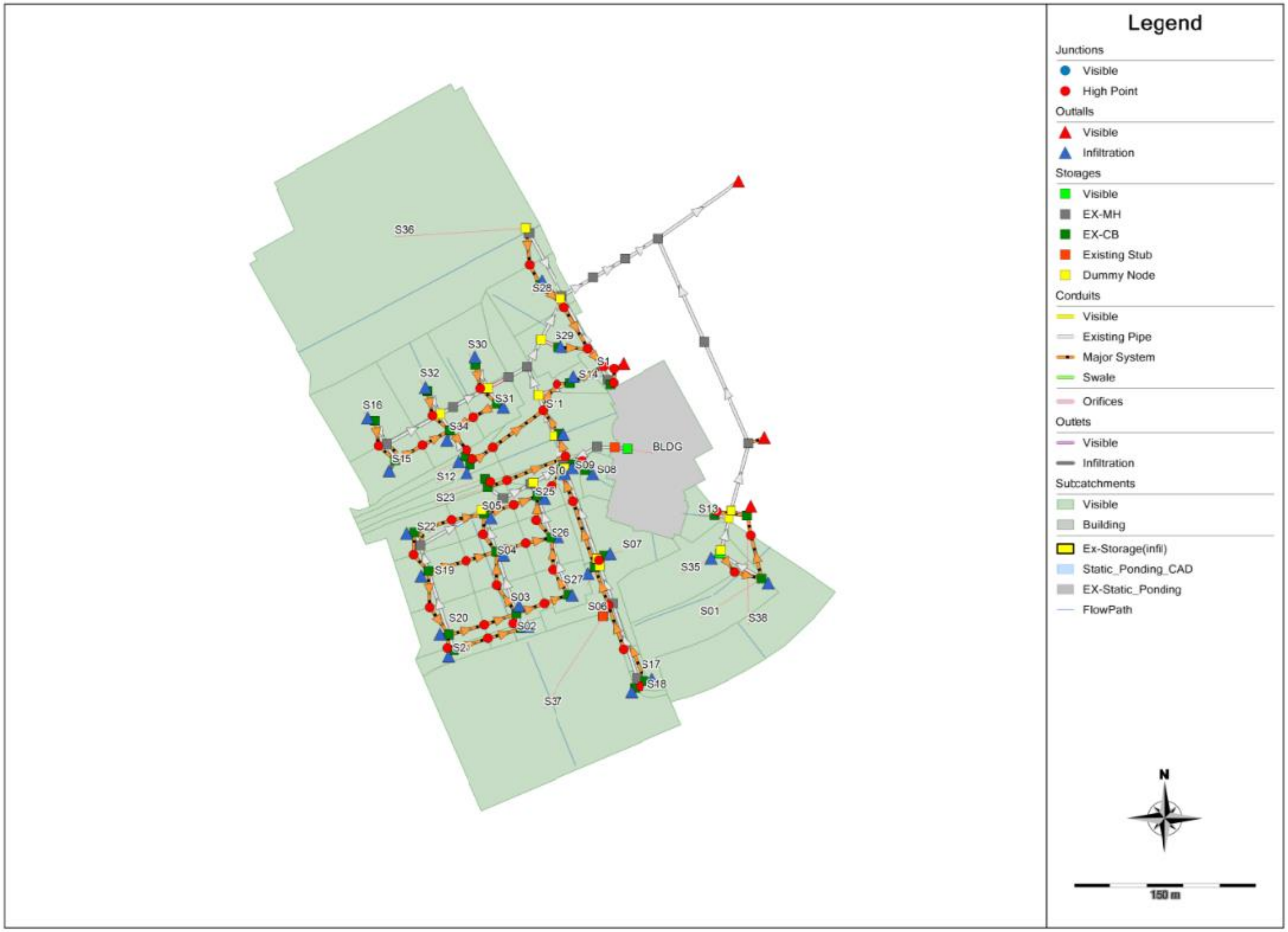
**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Schematics - Existing**

## Subcatchments and Flow Paths




Date: 2020-04-23
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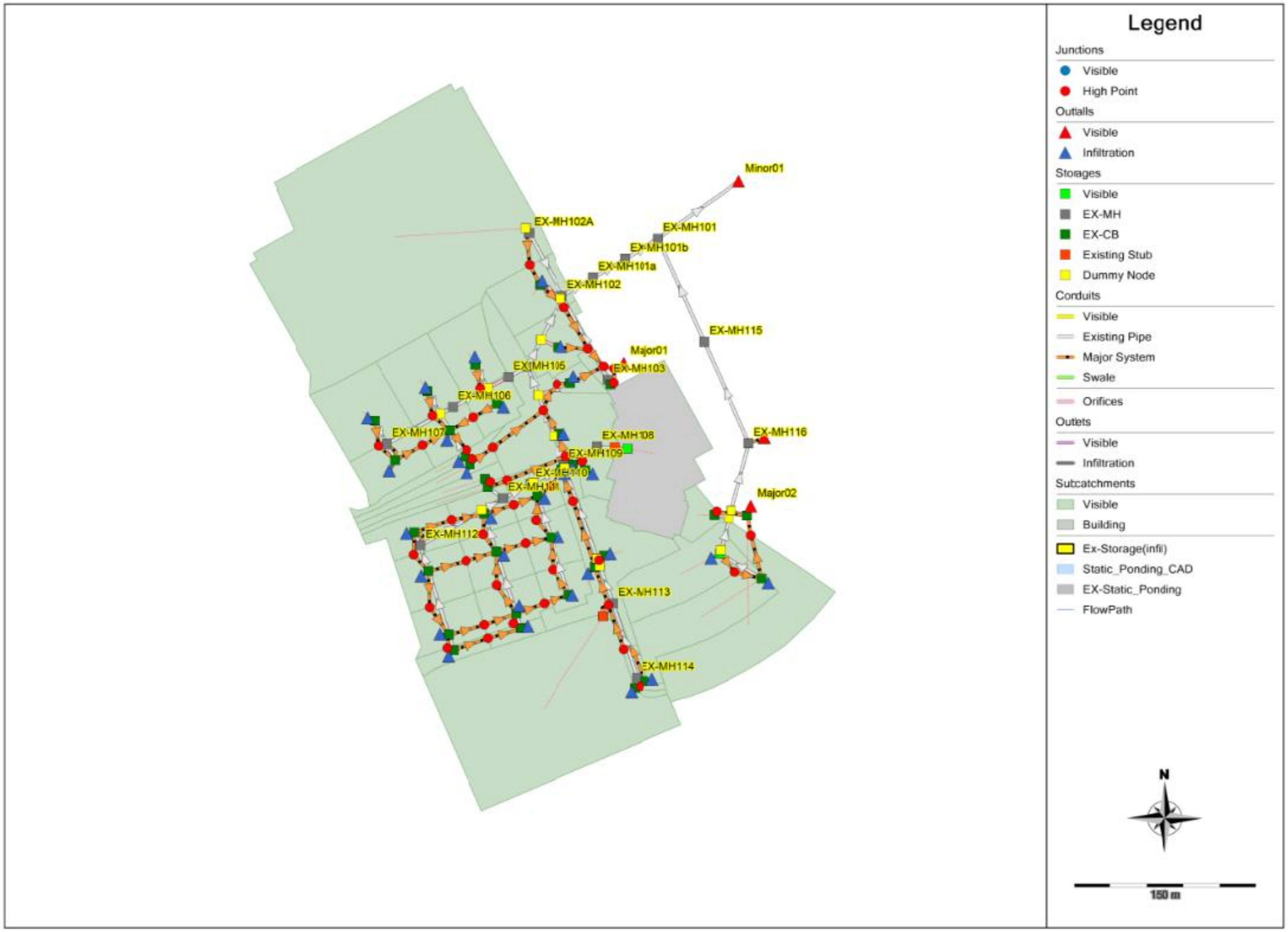
**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Schematics - Existing**

## Manholes and Outfalls




Date: 2020-04-23
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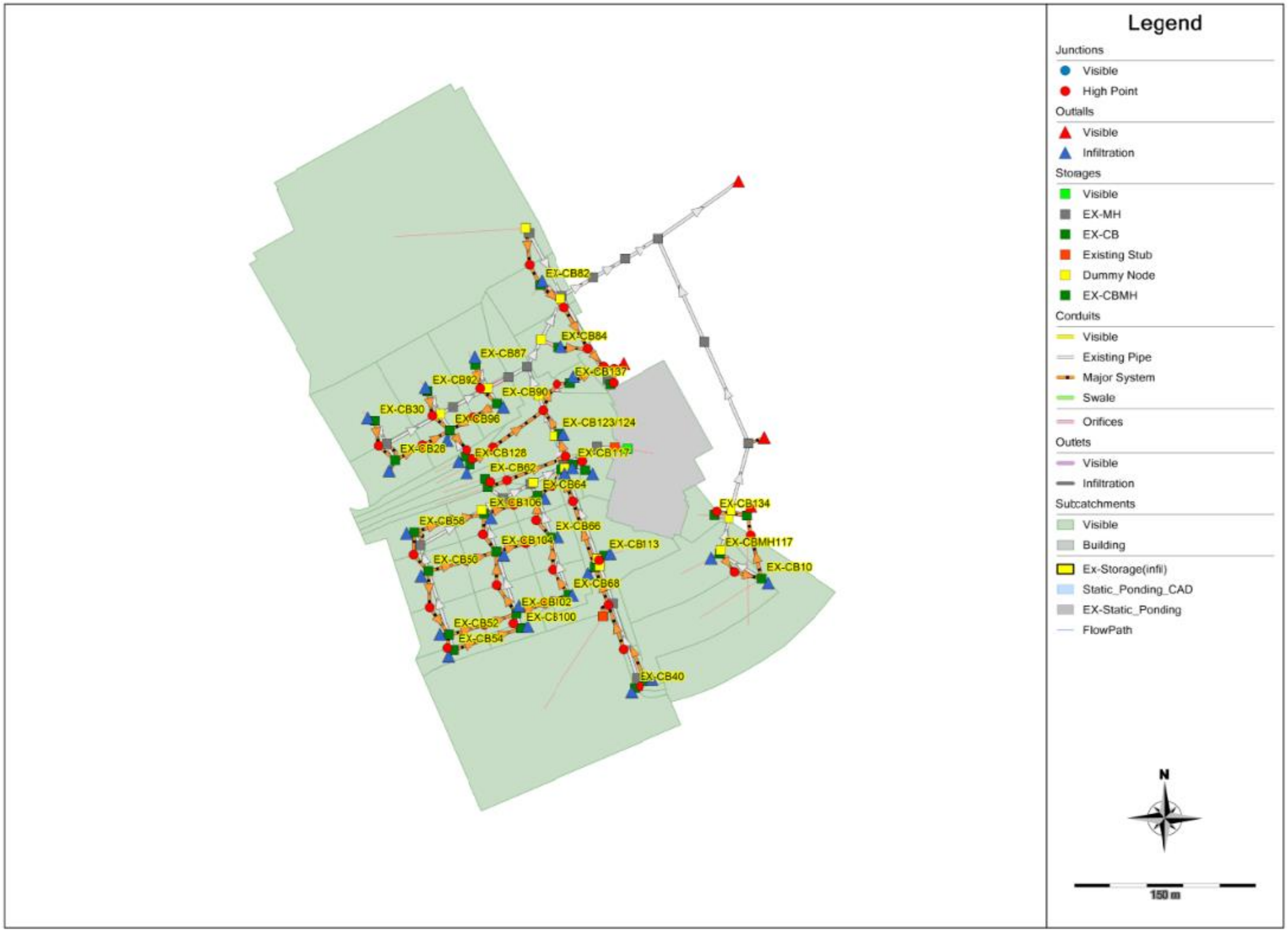
**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Schematics - Existing**

## Catchbasins




Date: 2020-04-23
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## 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** | - | - | - | - |

Date: 4/24/2020
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## 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 $m^3$.*

Date: 4/24/2020
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# 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*

Date: 4/24/2020
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# 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

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| 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

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| 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**

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| 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

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| 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

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| 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**

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| 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**

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| 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

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| 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

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| 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)**

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| 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.*

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**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 |

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**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.*

Date: 4/24/2020
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**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.*

Date: 4/24/2020
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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 |

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Link Summary
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| 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 |

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|---|---|---|---|---|---|---|
| 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 |

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|---|---|---|---|---|---|---|
| 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 |

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|---|---|---|---|---|---|---|
| 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 |

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Node Depth Summary
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| Node | Type | Average Depth Meters | Maximum Depth Meters | Maximum HGL Meters | Time of Max Occurrence days | hr:min | Reported Max Depth Meters |
|---|---|---|---|---|---|---|---|
| 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 |

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Node Inflow Summary
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| Node | Type | Maximum Lateral Inflow LPS | Maximum Total Inflow LPS | Time of Max Occurrence days | Time of Max Occurrence 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 |

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Node Surcharge Summary
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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
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| 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 |

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Link Flow Summary
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| Link | Type | Maximum \|Flow\| LPS | Time of Max Occurrence days hr:min | Maximum \|Veloc\| m/sec | Max/ Full Flow | Max/ Full Depth |
|---|---|---|---|---|---|---|
| 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 | | | |

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Flow Classification Summary
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| Conduit | Adjusted /Actual Length | Dry | Up Dry | Down Dry | Sub Crit | Sup Crit | Up Crit | Down Crit | Norm Ltd | Inlet Ctrl |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Fraction of Time in Flow Class | | | | | | | | |
| 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 |

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Conduit Surcharge Summary
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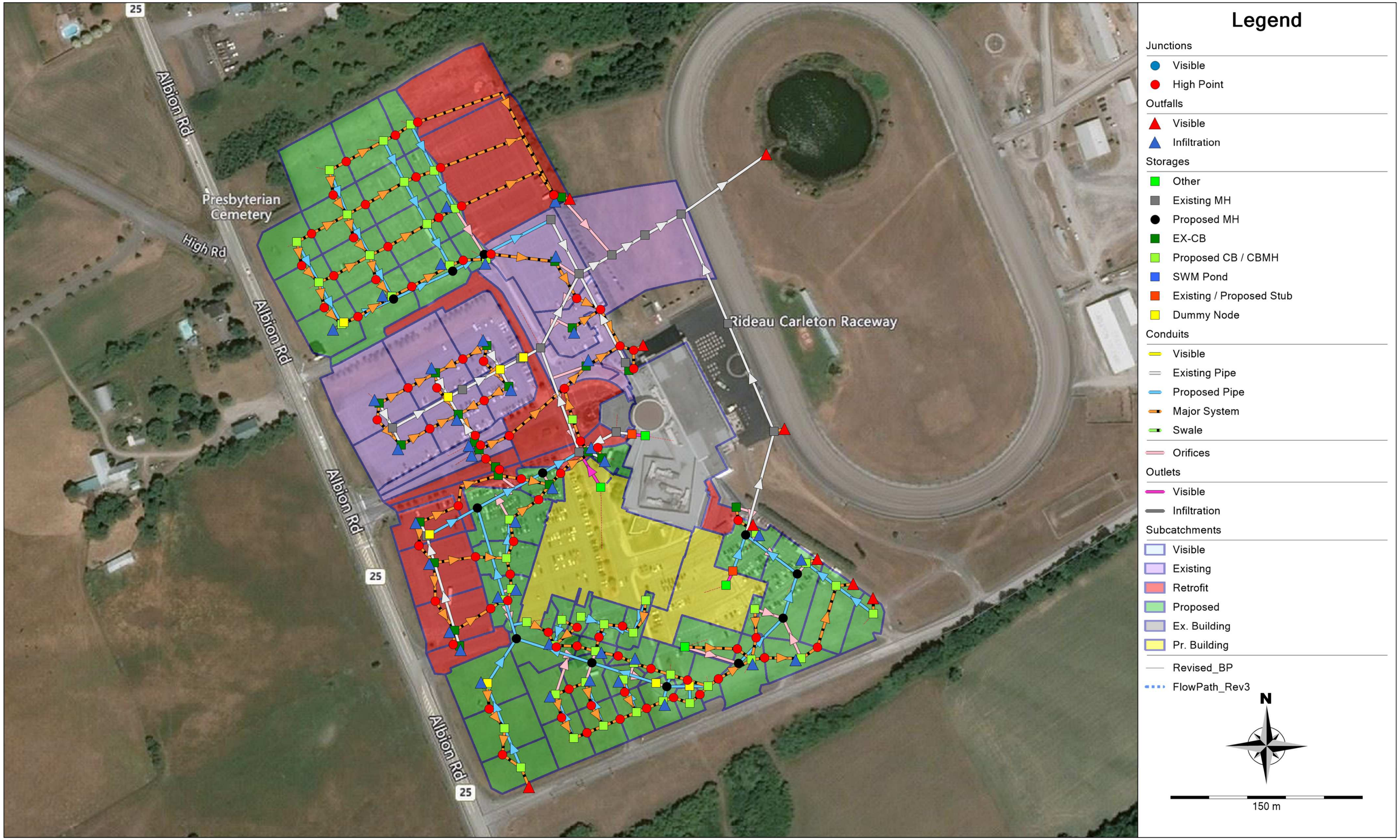
| Conduit | Hours Full Both Ends | Hours Full Upstream | Hours Full Dnstream | Hours Above Full Normal Flow | Hours Capacity Limited |
|---|---|---|---|---|---|
| C9 | 0.01 | 0.01 | 0.12 | 0.01 | 0.01 |
| EX-Ditch | 0.01 | 0.01 | 0.12 | 0.01 | 0.01 |
| EXMH102a-102 | 0.01 | 1.79 | 0.01 | 1.98 | 0.01 |
| 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
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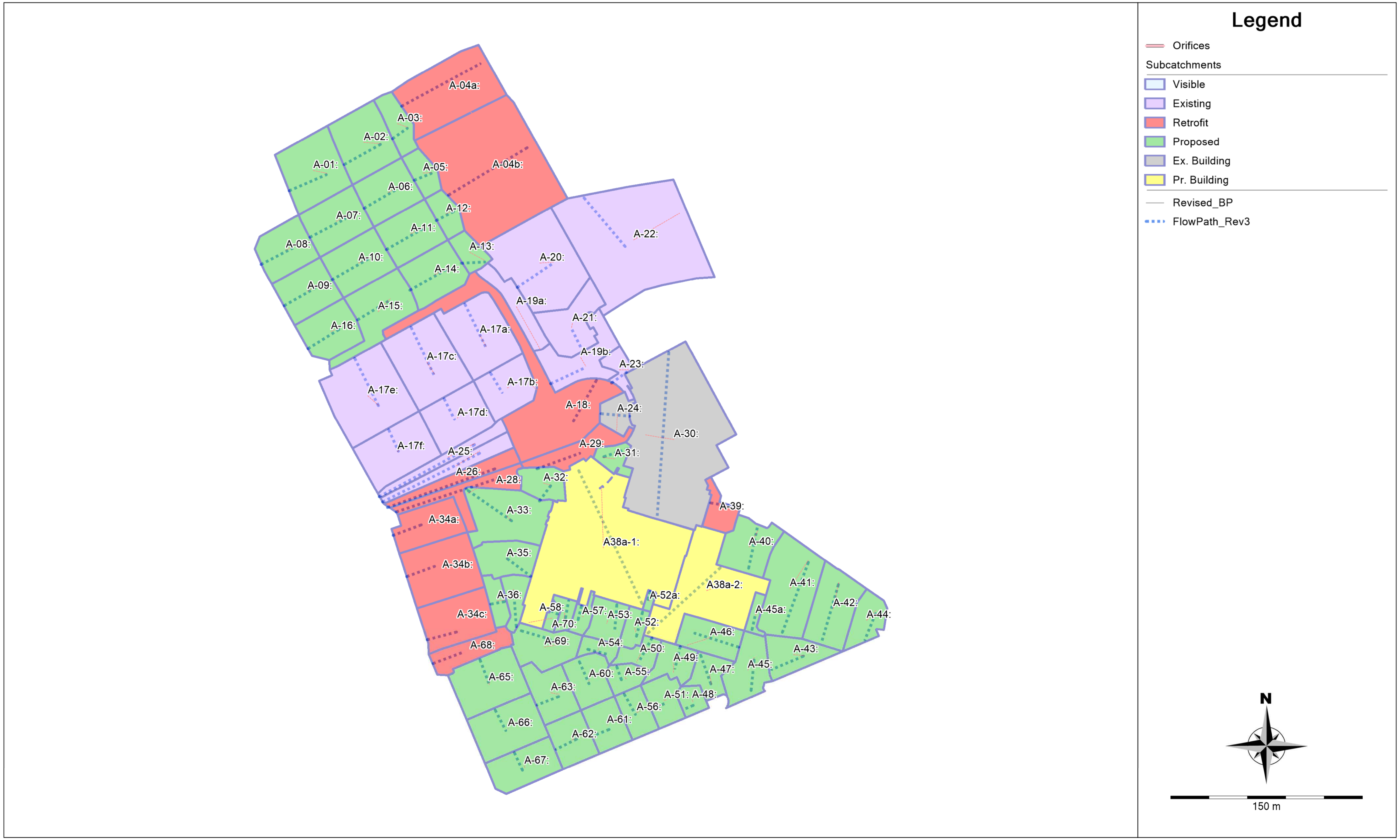
**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Schematics – Proposed Conditions**

**Subcatchments and Flow Paths**




Date: 2020-04-25
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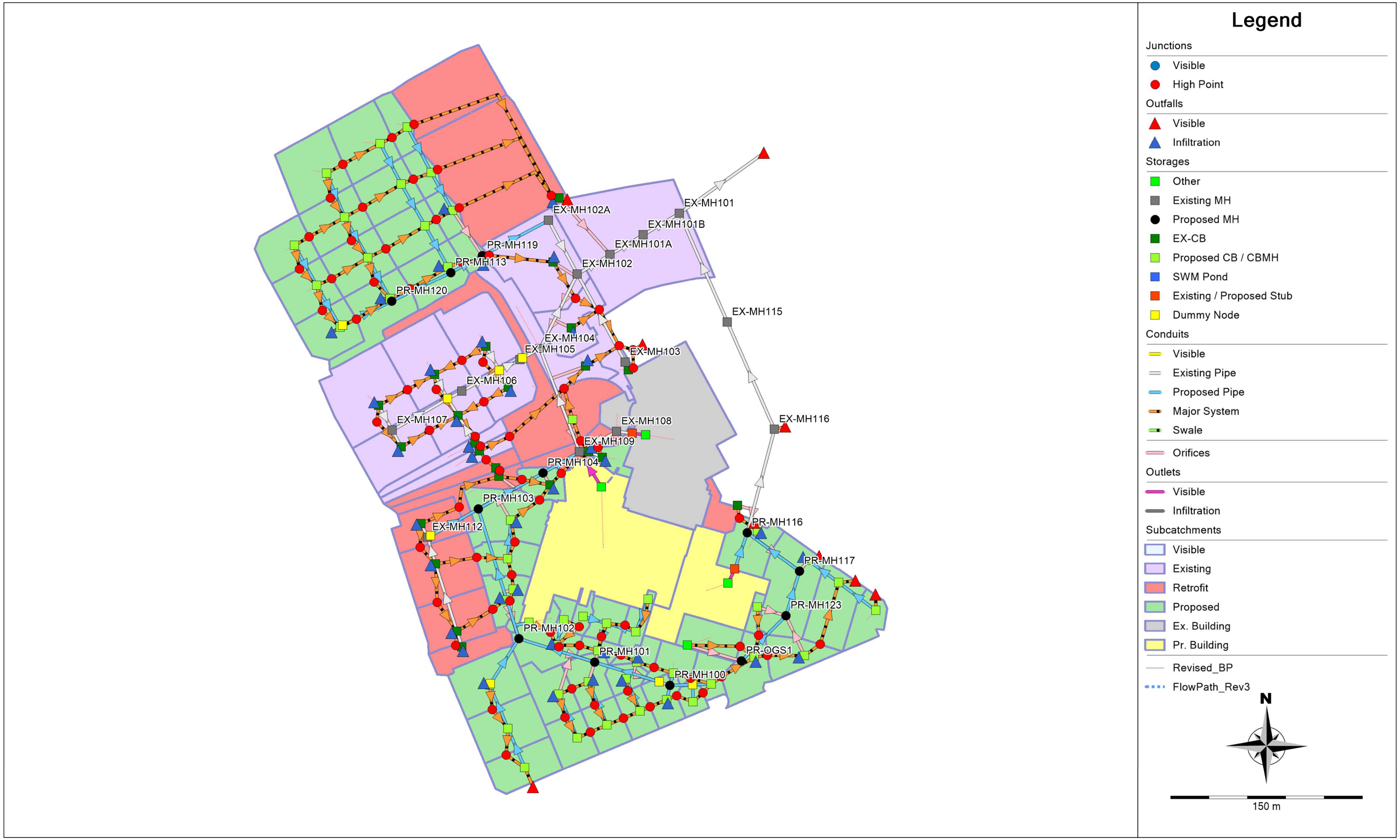
**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Schematics – Proposed Conditions**

**Maintenance Holes**




Date: 2020-04-25
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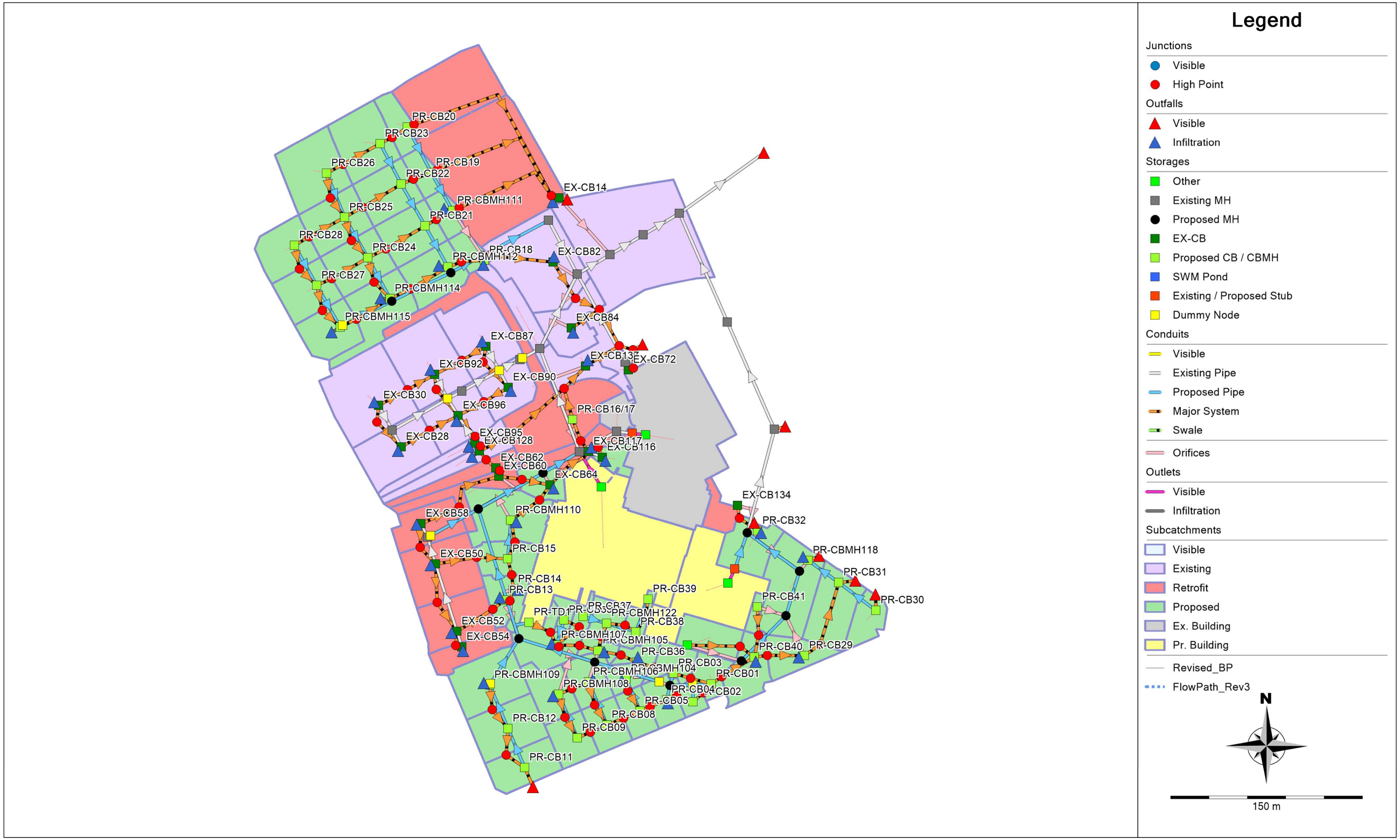
**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Schematics – Proposed Conditions**

**Catchbasins**

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# 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 | 0.103 | 0.67 | 67 | 0 | 51.5 | 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 | 0.862 | 0.90 | 100 | 100 | 66.5 | 129.6 | 1.5 |
| A-31 | 0.050 | 0.90 | 100 | 0 | 24.7 | 20.3 | 1.5 |
| A-32 | 0.081 | 0.76 | 80 | 0 | 55.2 | 14.7 | 1.5 |
| A-33 | 0.242 | 0.74 | 77 | 0 | 58.6 | 41.3 | 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 | 0.122 | 0.82 | 89 | 0 | 53.7 | 22.7 | 1.5 |
| A-36 | 0.052 | 0.90 | 100 | 0 | 49.1 | 10.6 | 1.5 |
| A-37 | 0.062 | 0.51 | 44 | 0 | 22.6 | 27.4 | 1.5 |
| A38a-1 | 0.985 | 0.90 | 100 | 100 | 85.1 | 115.7 | 1.5 |
| A38a-2 | 0.400 | 0.90 | 100 | 100 | 53.0 | 75.4 | 1.5 |
| A-39 | 0.065 | 0.90 | 100 | 0 | 43.5 | 14.9 | 1.5 |
| A-40 | 0.152 | 0.90 | 100 | 0 | 45.2 | 33.6 | 1.5 |
| A-41 | 0.284 | 0.90 | 100 | 0 | 48.6 | 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 | 0.197 | 0.90 | 100 | 0 | 41.4 | 47.5 | 1.5 |
| A-43 | 0.117 | 0.90 | 100 | 0 | 44.1 | 26.5 | 1.5 |
| A-44 | 0.092 | 0.90 | 100 | 0 | 41.7 | 22.1 | 1.5 |
| A-45 | 0.140 | 0.85 | 93 | 0 | 57.4 | 24.4 | 1.5 |
| A-45a | 0.029 | 0.90 | 100 | 0 | 19.8 | 14.6 | 1.5 |
| A-46 | 0.122 | 0.90 | 100 | 0 | 34.1 | 35.8 | 1.5 |
| A-47 | 0.080 | 0.55 | 50 | 0 | 33.9 | 23.6 | 1.5 |
| A-48 | 0.042 | 0.81 | 87 | 0 | 48.8 | 8.6 | 1.5 |
| A-49 | 0.085 | 0.48 | 40 | 0 | 49.0 | 17.3 | 1.5 |
| A-50 | 0.059 | 0.60 | 57 | 0 | 28.3 | 20.9 | 1.5 |
| A-51 | 0.089 | 0.89 | 99 | 0 | 69.8 | 12.7 | 1.5 |
| A-52 | 0.052 | 0.77 | 81 | 0 | 25.8 | 20.1 | 1.5 |
| A-52a | 0.010 | 0.90 | 100 | 0 | 15.6 | 6.4 | 1.5 |
| A-53 | 0.092 | 0.71 | 73 | 0 | 44.4 | 20.7 | 1.5 |
| A-54 | 0.039 | 0.70 | 71 | 0 | 23.4 | 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 | 0.032 | 0.88 | 97 | 25 | 28.5 | 11.2 | 1.5 |
| A-58 | 0.036 | 0.68 | 69 | 25 | 26.8 | 13.4 | 2 |
| A-60 | 0.116 | 0.88 | 97 | 0 | 62.7 | 18.5 | 1.5 |
| A-61 | 0.103 | 0.90 | 100 | 0 | 79.0 | 13.0 | 1.5 |
| A-62 | 0.113 | 0.90 | 100 | 0 | 64.0 | 17.6 | 1.5 |
| A-63 | 0.132 | 0.90 | 100 | 0 | 72.4 | 18.2 | 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 | 0.106 | 0.64 | 63 | 0 | 42.0 | 25.2 | 1.5 |
| **Total** | **14.12** | **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 | 0.050 | 112.99 | 113.50 | 113.60 | 0.51 | 0.10 | 0.61 | 6.8 | 9.5 | 16.3 | EX-10 | 6.8 | 2.04 | 17.0 | 60 | 30 | 0.14 |
| EX-CB117 | A-29 | 0.110 | 112.09 | 113.35 | 113.56 | 1.26 | 0.21 | 1.47 | 6.8 | 52.1 | 58.9 | 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 | 0.065 | 111.60 | 113.30 | 113.40 | 1.70 | 0.10 | 1.80 | 0.0 | 2.8 | 2.8 | - | 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 | 387.7 | 394.5 | 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 | 1980.3 | 1987.1 | 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 | 0.106 | 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 | 10.2 | 17.0 | 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 | 0.080 | 112.40 | 113.40 | 113.60 | 1.00 | 0.20 | 1.20 | 0.0 | 26.3 | 26.3 | - | 0.0 | - | - | 110 | 55 | - |
| PR-CB02 | A-48 | 0.042 | 112.45 | 113.40 | 113.64 | 0.95 | 0.24 | 1.19 | 0.0 | 38.5 | 38.5 | - | 0.0 | - | - | 60 | 30 | - |
| PR-CB03 | A-49 | 0.085 | 112.40 | 113.40 | 113.64 | 1.00 | 0.24 | 1.24 | 0.0 | 26.4 | 26.4 | - | 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-CB08 | A-61 | 0.103 | 112.45 | 113.50 | 113.75 | 1.05 | 0.25 | 1.30 | 0.0 | 65.3 | 65.3 | - | 0.0 | - | - | 60 | 30 | - |
| PR-CB09 | A-62 | 0.113 | 112.45 | 113.60 | 113.85 | 1.15 | 0.25 | 1.40 | 0.0 | 72.9 | 72.9 | - | 0.0 | - | - | 60 | 30 | - |
| 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 | 0.062 | 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 | 0.122 | 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-43 | 0.117 | 111.10 | 112.70 | 112.95 | 1.60 | 0.25 | 1.85 | 63.6 | 49.8 | 113.4 | 30 | 63.6 | 13.53 | 112.7 | 110 | 55 | 1.72 |
| PR-CB30 | A-44 | 0.092 | 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-42 | 0.197 | 111.20 | 112.40 | 112.65 | 1.20 | 0.25 | 1.45 | 0.0 | 70.5 | 70.5 | - | 0.0 | - | - | 110 | 55 | - |
| PR-CB32 | A-40 | 0.152 | 110.65 | 112.90 | 113.00 | 2.25 | 0.10 | 2.35 | 59.3 | 3.0 | 62.3 | 28 | 59.3 | 12.65 | 105.5 | 110 | 55 | 1.61 |
| PR-CB35 | A-58 | 0.036 | 112.20 | 113.50 | 113.75 | 1.30 | 0.25 | 1.55 | 0.0 | 6.8 | 6.8 | - | 0.0 | - | - | 60 | 30 | - |
| PR-CB36 | A-50 | 0.059 | 111.85 | 113.45 | 113.66 | 1.60 | 0.21 | 1.81 | 6.3 | 24.3 | 30.6 | 3 | 6.3 | 2.19 | 18.2 | 60 | 30 | 0.15 |
| PR-CB40 | A-45 | 0.140 | 111.50 | 113.00 | 113.25 | 1.50 | 0.25 | 1.75 | 12.7 | 52.0 | 64.7 | 6 | 12.7 | 3.06 | 25.5 | 60 | 30 | 0.21 |
| PR-CBMH104 | A-55 | 0.057 | 112.04 | 113.50 | 113.75 | 1.46 | 0.25 | 1.71 | 16.9 | 41.0 | 57.9 | 8 | 16.9 | 3.93 | 32.8 | 60 | 30 | 0.27 |
| PR-CBMH105 | A-54 | 0.039 | 111.85 | 113.45 | 113.70 | 1.60 | 0.25 | 1.85 | 25.4 | 22.3 | 47.7 | 12 | 25.4 | 5.68 | 47.3 | 60 | 30 | 0.39 |
| PR-CBMH106 | A-60 | 0.116 | 112.01 | 113.50 | 113.80 | 1.49 | 0.30 | 1.79 | 33.9 | 119.8 | 153.7 | 16 | 33.9 | 7.42 | 61.8 | 60 | 30 | 0.52 |
| PR-CBMH107 | A-69 | 0.141 | 111.84 | 113.40 | 113.70 | 1.56 | 0.30 | 1.86 | 25.4 | 50.3 | 75.7 | 12 | 25.4 | 5.68 | 47.3 | 60 | 30 | 0.39 |
| PR-CBMH108 | A-63 | 0.132 | 112.01 | 113.60 | 113.85 | 1.59 | 0.25 | 1.84 | 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 | 0.242 | 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 | 0.284 | 110.74 | 112.40 | 112.65 | 1.66 | 0.25 | 1.91 | 95.4 | 27.8 | 123.2 | 45 | 95.4 | 20.08 | 167.3 | 110 | 55 | 2.56 |
| PR-TD1 | A-70 | 0.018 | 111.90 | 112.70 | 113.75 | 0.80 | 1.05 | 1.85 | 0.0 | 121.4 | 121.4 | - | 0.0 | - | - | - | - | - |
| **TOTAL** | | **9.991** | | **-** | | | **-** | | **1192.8** | **6613.3** | **7806.1** | **502** | **1192.8** | **229** | **1909.4** | **-** | **-** | **268** |

[1] *Based on Grading Design / Autodesk Civil 3D (refer to drawings 116111-GR & 116111-SWM)*
[2] *Based on StormTech Site Calculator for STC-740*

Date: 11/7/2022
M:\2016\116111\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\November 2022 Excel\PCSWMM Storage Curves.xlsx

**4837 Albion Road - Hard Rock Ottawa (116111)**
**Summary of Underground and Surface Storage - Proposed Conditions**

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| 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 |
| 32 | 67.8 | 70.54 | 35.82 |
| 34 | 72.0 | 74.88 | 37.99 |
| 36 | 76.3 | 79.22 | 40.16 |
| 38 | 80.5 | 83.56 | 42.33 |
| 40 | 84.8 | 87.90 | 44.50 |
| 45 | 95.4 | 98.55 | 49.95 |
| 50 | 106.0 | 109.60 | 55.35 |
| 60 | 127.2 | 132.40 | 67.30 |
| 70 | 148.4 | 154.10 | 78.15 |
| 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 - Proposed Conditions**

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| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **EX-CB116** | **A-31** | **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 |
| 0.51 | 0.00 | 0.0 | 7.0 |
| 0.61 | 190.00 | 9.5 | 16.5 |
| 0.62 | 0.00 | 1.0 | 17.4 |
| 1.51 | 0.00 | 0.0 | 17.4 |

*EX-10x Infiltration Storage Chambers (6.8 m3)*
*0.1m Static Ponding Depth (9.5 m3)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **EX-CB117** | **A-29** | **6.8** | **52.1** |
| 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 |
| 1.26 | 0.00 | 0.0 | 7.0 |
| 1.47 | 496.19 | 52.1 | 59.1 |
| 1.48 | 0.00 | 2.5 | 61.6 |
| 2.26 | 0.00 | 0.0 | 61.6 |

*EX-10x Infiltration Storage Chambers (6.8 m3)*
*0.21m Static Ponding Depth (52.1 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** | **2.8** |
| 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 |
| 1.70 | 0.00 | 0.0 | 0.0 |
| 1.80 | 56.00 | 2.8 | 2.8 |
| 1.81 | 0.00 | 0.3 | 3.1 |
| 2.70 | 0.00 | 0.0 | 3.1 |

*-x Infiltration Storage Chambers (0 m3)*
*0.1m Static Ponding Depth (2.8 m3)*

## 4837 Albion Road - Hard Rock Ottawa (116111)
## PCSWMM Storage Curves - Proposed Conditions

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| 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** | **387.7** |
| **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 |
| 2.21 | 0.00 | 0.0 | 7.0 |
| 2.91 | 1107.71 | 387.7 | 394.7 |
| 2.92 | 0.00 | 5.5 | 400.2 |
| 3.21 | 0.00 | 0.0 | 400.2 |

*EX-10x Infiltration Storage Chambers (6.8 m3)*
*0.7m Static Ponding Depth (387.7 m3)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **EX-CB28** | **A-17f** | **6.8** | **1980.3** |
| **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 | 11316.00 | 1980.3 | 1987.3 |
| 1.58 | 0.00 | 56.6 | 2043.9 |
| 2.22 | 0.00 | 0.0 | 2043.9 |

*EX-10x Infiltration Storage Chambers (6.8 m3)*
*0.35m Static Ponding Depth (1980.3 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

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| 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**

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| 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** | **10.2** |
| 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 |
| 1.55 | 136.00 | 10.2 | 17.2 |
| 1.56 | 0.00 | 0.7 | 17.9 |
| 2.40 | 0.00 | 0.0 | 17.9 |

*EX-10x Infiltration Storage Chambers (6.8 m3)*
*0.15m Static Ponding Depth (10.2 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

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| 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

| 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** | **26.3** |
| Depth (m) | Equivalent Area ($m^2$) | Incremental Volume ($m^3$) | Total Volume ($m^3$) |
| 0.00 | 0.00 | 0.0 | 0.0 |
| 0.40 | 0.00 | 0.0 | 0.0 |
| 0.41 | 0.00 | 0.0 | 0.0 |
| 1.00 | 0.00 | 0.0 | 0.0 |
| 1.20 | 263.00 | 26.3 | 26.3 |
| 1.21 | 0.00 | 1.3 | 27.6 |
| 2.00 | 0.00 | 0.0 | 27.6 |

*-x Stormtech STC-740 Storage Chambers (0 m3)*
*0.2m Static Ponding Depth (26.3 m3)*

**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Storage Curves - Proposed Conditions**

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| 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 |
| 0.95 | 0.00 | 0.0 | 0.0 |
| 1.19 | 320.83 | 38.5 | 38.5 |
| 1.20 | 0.00 | 1.6 | 40.1 |
| 1.95 | 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** | **26.4** |
| 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 |
| 1.24 | 220.00 | 26.4 | 26.4 |
| 1.25 | 0.00 | 1.1 | 27.5 |
| 2.00 | 0.00 | 0.0 | 27.5 |

*-x Stormtech STC-740 Storage Chambers (0 m3)*
*0.24m Static Ponding Depth (26.4 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

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| 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 |
| 1.05 | 0.00 | 0.0 | 0.0 |
| 1.30 | 522.40 | 65.3 | 65.3 |
| 1.31 | 0.00 | 2.6 | 67.9 |
| 2.05 | 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 |
| 1.15 | 0.00 | 0.0 | 0.0 |
| 1.40 | 583.20 | 72.9 | 72.9 |
| 1.41 | 0.00 | 2.9 | 75.8 |
| 2.15 | 0.00 | 0.0 | 75.8 |

*-x Stormtech STC-740 Storage Chambers (0 m3)*
*0.25m Static Ponding Depth (72.9 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)*

Date: 11/7/2022
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## 4837 Albion Road - Hard Rock Ottawa (116111)
## PCSWMM Storage Curves - Proposed Conditions

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| 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)*

| 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)*

# 4837 Albion Road - Hard Rock Ottawa (116111)
## PCSWMM Storage Curves - Proposed Conditions

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| 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)*

| 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)*

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## PCSWMM Storage Curves - Proposed Conditions

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| 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)*

| 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)*

## 4837 Albion Road - Hard Rock Ottawa (116111)
## PCSWMM Storage Curves - Proposed Conditions

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| 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)*

| 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-43** | **63.6** | **49.8** |
| Depth (m) | Equivalent Area ($m^2$) | Incremental Volume ($m^3$) | Total Volume ($m^3$) |
| 0.00 | 0.00 | 0.0 | 0.0 |
| 0.76 | 167.37 | 63.6 | 63.6 |
| 0.77 | 0.00 | 0.8 | 64.4 |
| 1.60 | 0.00 | 0.0 | 64.4 |
| 1.85 | 398.40 | 49.8 | 114.2 |
| 1.86 | 0.00 | 2.0 | 116.2 |
| 2.60 | 0.00 | 0.0 | 116.2 |

*30x Stormtech STC-740 Storage Chambers (63.6 m3)*
*0.25m Static Ponding Depth (49.8 m3)*

**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Storage Curves - Proposed Conditions**

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| 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)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **PR-CB31** | **A-42** | **0.0** | **70.5** |
| 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 |
| 1.45 | 564.00 | 70.5 | 70.5 |
| 1.46 | 0.00 | 2.8 | 73.3 |
| 2.20 | 0.00 | 0.0 | 73.3 |

*-x Stormtech STC-740 Storage Chambers (0 m3)*
*0.25m Static Ponding Depth (70.5 m3)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **PR-CB32** | **A-40** | **59.3** | **3.0** |
| Depth (m) | Equivalent Area (m$^2$) | Incremental Volume (m$^3$) | Total Volume (m$^3$) |
| 0.00 | 0.00 | 0.0 | 0.0 |
| 0.76 | 156.05 | 59.3 | 59.3 |
| 0.77 | 0.00 | 0.8 | 60.1 |
| 2.25 | 0.00 | 0.0 | 60.1 |
| 2.35 | 60.00 | 3.0 | 63.1 |
| 2.36 | 0.00 | 0.3 | 63.4 |
| 3.25 | 0.00 | 0.0 | 63.4 |

*28x Stormtech STC-740 Storage Chambers (59.3 m3)*
*0.1m Static Ponding Depth (3 m3)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **PR-CB35** | **A-58** | **0.0** | **6.8** |
| 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 |
| 1.30 | 0.00 | 0.0 | 0.0 |
| 1.55 | 54.40 | 6.8 | 6.8 |
| 1.56 | 0.00 | 0.3 | 7.1 |
| 2.30 | 0.00 | 0.0 | 7.1 |

*-x Stormtech STC-740 Storage Chambers (0 m3)*
*0.25m Static Ponding Depth (6.8 m3)*

**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Storage Curves - Proposed Conditions**

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **PR-CB36** | **A-50** | **6.3** | **24.3** |
| Depth (m) | Equivalent Area ($m^2$) | Incremental Volume ($m^3$) | Total Volume ($m^3$) |
| 0.00 | 0.00 | 0.0 | 0.0 |
| 0.76 | 16.58 | 6.3 | 6.3 |
| 0.77 | 0.00 | 0.1 | 6.4 |
| 1.60 | 0.00 | 0.0 | 6.4 |
| 1.81 | 231.43 | 24.3 | 30.7 |
| 1.82 | 0.00 | 1.2 | 31.8 |
| 2.60 | 0.00 | 0.0 | 31.8 |

*3x Stormtech STC-740 Storage Chambers (6.3 m3)*
*0.21m Static Ponding Depth (24.3 m3)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **PR-CB40** | **A-45** | **12.7** | **52.0** |
| 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 |
| 1.50 | 0.00 | 0.0 | 12.9 |
| 1.75 | 416.00 | 52.0 | 64.9 |
| 1.76 | 0.00 | 2.1 | 66.9 |
| 2.50 | 0.00 | 0.0 | 66.9 |

*6x Stormtech STC-740 Storage Chambers (12.7 m3)*
*0.25m Static Ponding Depth (52 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 |
| 1.46 | 0.00 | 0.0 | 17.1 |
| 1.71 | 328.00 | 41.0 | 58.1 |
| 1.72 | 0.00 | 1.6 | 59.8 |
| 2.46 | 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** | **25.4** | **22.3** |
| Depth (m) | Equivalent Area ($m^2$) | Incremental Volume ($m^3$) | Total Volume ($m^3$) |
| 0.00 | 0.00 | 0.0 | 0.0 |
| 0.76 | 66.84 | 25.4 | 25.4 |
| 0.77 | 0.00 | 0.3 | 25.7 |
| 1.60 | 0.00 | 0.0 | 25.7 |
| 1.85 | 178.40 | 22.3 | 48.0 |
| 1.86 | 0.00 | 0.9 | 48.9 |
| 2.60 | 0.00 | 0.0 | 48.9 |

*12x Stormtech STC-740 Storage Chambers (25.4 m3)*
*0.25m Static Ponding Depth (22.3 m3)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **PR-CBMH106** | **A-60** | **33.9** | **119.8** |
| **Depth (m)** | **Equivalent Area ($m^2$)** | **Incremental Volume ($m^3$)** | **Total Volume ($m^3$)** |
| 0.00 | 0.00 | 0.0 | 0.0 |
| 0.76 | 89.21 | 33.9 | 33.9 |
| 0.77 | 0.00 | 0.4 | 34.3 |
| 1.49 | 0.00 | 0.0 | 34.3 |
| 1.79 | 798.67 | 119.8 | 154.1 |
| 1.80 | 0.00 | 4.0 | 158.1 |
| 2.49 | 0.00 | 0.0 | 158.1 |

*16x Stormtech STC-740 Storage Chambers (33.9 m3)*
*0.3m Static Ponding Depth (119.8 m3)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **PR-CBMH107** | **A-69** | **25.4** | **50.3** |
| **Depth (m)** | **Equivalent Area ($m^2$)** | **Incremental Volume ($m^3$)** | **Total Volume ($m^3$)** |
| 0.00 | 0.00 | 0.0 | 0.0 |
| 0.76 | 66.84 | 25.4 | 25.4 |
| 0.77 | 0.00 | 0.3 | 25.7 |
| 1.56 | 0.00 | 0.0 | 25.7 |
| 1.86 | 335.33 | 50.3 | 76.0 |
| 1.87 | 0.00 | 1.7 | 77.7 |
| 2.56 | 0.00 | 0.0 | 77.7 |

*12x Stormtech STC-740 Storage Chambers (25.4 m3)*
*0.3m Static Ponding Depth (50.3 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 |
| 1.59 | 0.00 | 0.0 | 38.6 |
| 1.84 | 580.00 | 72.5 | 111.1 |
| 1.85 | 0.00 | 2.9 | 114.0 |
| 2.59 | 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

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| 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

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| 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** | **95.4** | **27.8** |
| Depth (m) | Equivalent Area ($m^2$) | Incremental Volume ($m^3$) | Total Volume ($m^3$) |
| 0.00 | 0.00 | 0.0 | 0.0 |
| 0.76 | 251.05 | 95.4 | 95.4 |
| 0.77 | 0.00 | 1.3 | 96.7 |
| 1.66 | 0.00 | 0.0 | 96.7 |
| 1.91 | 222.40 | 27.8 | 124.5 |
| 1.92 | 0.00 | 1.1 | 125.6 |
| 2.66 | 0.00 | 0.0 | 125.6 |

*45x Stormtech STC-740 Storage Chambers (95.4 m3)*
*0.25m Static Ponding Depth (27.8 m3)*

| STM ID | CB ID | Provided Storage | |
|---|---|---|---|
| | | Underground | Surface |
| **PR-TD1** | **A-70** | **0.0** | **121.4** |
| 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 |
| 0.80 | 0.00 | 0.0 | 0.0 |
| 1.85 | 231.24 | 121.4 | 121.4 |
| 1.86 | 0.00 | 1.2 | 122.6 |
| 1.80 | 0.00 | 0.0 | 122.6 |

*-x Stormtech STC-740 Storage Chambers (0 m3)*
*1.05m Static Ponding Depth (121.4 m3)*

**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Results - Proposed Conditions (ICDs)**

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| 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 | 12.5 | 13.4 | 14.1 | 14.3 | 1.14 | 1.29 | 1.44 | 1.50 |
| EX-CB134 | 83 | HF-85 | 200 | 600x600 | 13.7 | 18.2 | 19.4 | 19.5 | 0.91 | 1.59 | 1.81 | 1.81 |
| EX-CB137 | 135 | HF-137 | 200 | 600x600 | 19.8 | 36.2 | 47.3 | 47.8 | 0.33 | 0.94 | 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 | 31.6 | 31.6 | 1.44 | 1.62 | 1.69 | 1.72 |
| EX-CB64 | 65 | LMF-100 | 250 | 600x600 | 5.2 | 10.7 | 11.0 | 11.0 | 0.37 | 1.44 | 1.56 | 1.58 |
| EX-CB72 | 65 | LMF-100 | 200 | 600x600 | 7.9 | 10.9 | 11.6 | 11.8 | 0.80 | 1.50 | 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 | 1.68 |
| EX-MH105 | 200 | HF-199 | 450 | 1200 | 108.1 | 119.6 | 122.3 | 123.2 | 1.91 | 2.29 | 2.39 | 2.43 |
| EX-MH112 | 250 | HF-218 | 300 | 1200 | 95.7 | 112.8 | 116.8 | 117.6 | 1.05 | 1.39 | 1.50 | 1.54 |
| PR-CB13 | 55 | LMF-85 | 250 | 600x600 | 3.9 | 5.0 | 8.0 | 8.0 | 0.40 | 0.64 | 1.58 | 1.59 |
| PR-CB14 | 55 | LMF-85 | 250 | 600x600 | 2.7 | 3.5 | 7.9 | 8.0 | 0.20 | 0.32 | 1.61 | 1.63 |
| PR-CB16/17 | 200 | HF-202 | 250 | 600x600 | 71.8 | 92.8 | 97.0 | 97.7 | 0.81 | 1.29 | 1.41 | 1.48 |
| PR-CB18 | 60 | LMF-95 | 250 | 600x600 | 4.3 | 5.2 | 9.1 | 9.2 | 0.35 | 0.48 | 1.45 | 1.47 |
| PR-CB29 | 55 | LMF-85 | 250 | 600x600 | 2.4 | 3.1 | 4.4 | 8.0 | 0.17 | 0.25 | 0.49 | 1.60 |
| PR-CB32 | 55 | LMF-80 | 300 | 600x600 | 2.2 | 2.9 | 8.2 | 7.9 | 0.23 | 0.35 | 2.06 | 2.10 |
| PR-CB36 | 50 | LMF-80 | 250 | 600x600 | 2.4 | 3.9 | 6.1 | 6.2 | 0.23 | 0.57 | 1.34 | 1.43 |
| PR-CB40 | 60 | LMF-95 | 250 | 600x600 | 8.6 | 9.6 | 9.9 | 10.0 | 1.29 | 1.62 | 1.73 | 1.76 |
| PR-CB41 | 55 | LMF-85 | 250 | 600x600 | 5.6 | 7.2 | 7.6 | 7.6 | 0.79 | 1.31 | 1.47 | 1.49 |
| PR-CBMH104 | 55 | LMF-85 | 250 | 1200 | 6.4 | 7.1 | 7.3 | 7.4 | 1.01 | 1.24 | 1.32 | 1.35 |
| PR-CBMH105 | 55 | LMF-85 | 250 | 1200 | 5.2 | 7.1 | 7.5 | 7.7 | 0.69 | 1.25 | 1.40 | 1.49 |
| PR-CBMH106 | 55 | LMF-85 | 250 | 1200 | 6.4 | 7.2 | 7.5 | 7.6 | 1.02 | 1.29 | 1.40 | 1.43 |
| PR-CBMH107 | 55 | LMF-85 | 250 | 1200 | 4.1 | 6.5 | 7.9 | 7.7 | 0.44 | 1.08 | 1.62 | 1.64 |
| PR-CBMH108 | 55 | LMF-85 | 250 | 1200 | 7.3 | 7.5 | 7.8 | 7.9 | 1.31 | 1.40 | 1.49 | 1.52 |
| PR-CBMH109 | 60 | LMF-90 | 300 | 1200 | 8.8 | 9.1 | 9.4 | 9.6 | 1.39 | 1.49 | 1.60 | 1.64 |
| PR-CBMH110 | 55 | LMF-85 | 250 | 1200 | 3.8 | 4.5 | 8.5 | 8.5 | 0.38 | 0.51 | 1.79 | 1.82 |
| PR-CBMH111 | 70 | LMF-105 | 300 | 1200 | 5.3 | 6.4 | 14.4 | 14.5 | 0.30 | 0.41 | 1.95 | 1.96 |
| PR-CBMH112 | 70 | LMF-105 | 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 | 127 | HF-130 | 300 | 1200 | 27.9 | 51.0 | 54.2 | 54.2 | 0.44 | 1.36 | 1.64 | 1.69 |
| PR-MH100 | 60 | LMF-95 | 450 | 1200 | 5.6 | 8.4 | 8.7 | 8.8 | 0.63 | 1.30 | 1.42 | 1.46 |
| PR-TD02 | 127 | HF-130 | 200 | 300x1400 | 25.8 | 34.2 | 35.4 | 35.7 | 0.63 | 1.06 | 1.13 | 1.16 |

[1] *3-hour Chicago Storm.*

**IPEX ICD's sized based on 100-year model results.*

Date: 11/7/2022
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**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Results - Proposed Conditions (Ponding)**

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| 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 | 113.22 | 113.39 | 113.53 | 113.59 | 0.00 | 0.00 | 0.03 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| EX-CB117 | 112.09 | 113.35 | 113.65 | 0.30 | 113.23 | 113.38 | 113.53 | 113.59 | 0.00 | 0.03 | 0.18 | 0.24 | 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 | 112.51 | 113.19 | 113.41 | 113.41 | 0.00 | 0.00 | 0.11 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| EX-CB137 | 112.00 | 113.40 | 113.60 | 0.20 | 112.33 | 112.94 | 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 | 113.86 | 0.00 | 0.04 | 0.12 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 |
| EX-CB52 | 112.44 | 113.71 | 113.98 | 0.27 | 113.49 | 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 | 113.50 | 113.79 | 113.89 | 113.92 | 0.00 | 0.00 | 0.06 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| EX-CB58 | 112.44 | 113.73 | 114.00 | 0.27 | 113.30 | 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 | 113.84 | 113.87 | 0.00 | 0.04 | 0.11 | 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 | 112.47 | 113.54 | 113.66 | 113.68 | 0.00 | 0.04 | 0.16 | 0.18 | 0.00 | 0.00 | 0.01 | 0.03 |
| EX-CB72 | 111.18 | 112.67 | 113.00 | 0.33 | 111.98 | 112.68 | 112.88 | 112.94 | 0.00 | 0.01 | 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 | 113.80 | 0.00 | 0.05 | 0.13 | 0.15 | 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 | 113.86 | 113.88 | 0.00 | 0.01 | 0.06 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| EX-CB92 | 112.49 | 113.67 | 113.95 | 0.28 | 113.56 | 113.77 | 113.88 | 113.92 | 0.00 | 0.10 | 0.21 | 0.25 | 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 | 113.84 | 0.00 | 0.08 | 0.19 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 |

**4837 Albion Road - Hard Rock Ottawa (116111)**
**PCSWMM Model Results - Proposed Conditions (Ponding)**

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| 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 | 113.60 | 0.20 | 112.79 | 113.46 | 113.58 | 113.61 | 0.00 | 0.06 | 0.18 | 0.21 | 0.00 | 0.00 | 0.00 | 0.01 |
| PR-CB02 | 112.45 | 113.40 | 113.64 | 0.24 | 112.79 | 113.46 | 113.58 | 113.61 | 0.00 | 0.06 | 0.18 | 0.21 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CB03 | 112.40 | 113.40 | 113.64 | 0.24 | 112.79 | 113.46 | 113.58 | 113.65 | 0.00 | 0.06 | 0.18 | 0.25 | 0.00 | 0.00 | 0.00 | 0.01 |
| PR-CB04 | 111.80 | 113.40 | 113.65 | 0.25 | 112.79 | 113.46 | 113.58 | 113.62 | 0.00 | 0.06 | 0.18 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CB05 | 112.45 | 113.45 | 113.70 | 0.25 | 113.30 | 113.53 | 113.61 | 113.64 | 0.00 | 0.08 | 0.16 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CB08 | 112.45 | 113.50 | 113.75 | 0.25 | 113.28 | 113.56 | 113.66 | 113.70 | 0.00 | 0.06 | 0.16 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CB09 | 112.45 | 113.60 | 113.85 | 0.25 | 113.57 | 113.66 | 113.75 | 113.78 | 0.00 | 0.06 | 0.15 | 0.18 | 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 | 111.90 | 113.65 | 113.72 | 0.07 | 112.55 | 112.79 | 113.73 | 113.74 | 0.00 | 0.00 | 0.08 | 0.09 | 0.00 | 0.00 | 0.01 | 0.02 |
| PR-CB14 | 111.80 | 113.55 | 113.65 | 0.10 | 112.25 | 112.37 | 113.66 | 113.68 | 0.00 | 0.00 | 0.11 | 0.13 | 0.00 | 0.00 | 0.01 | 0.03 |
| PR-CB15 | 112.20 | 113.40 | 113.67 | 0.27 | 112.31 | 112.38 | 113.65 | 113.68 | 0.00 | 0.00 | 0.25 | 0.28 | 0.00 | 0.00 | 0.00 | 0.01 |
| PR-CB16/17 | 112.09 | 113.35 | 113.56 | 0.21 | 112.90 | 113.38 | 113.50 | 113.57 | 0.00 | 0.03 | 0.15 | 0.22 | 0.00 | 0.00 | 0.00 | 0.01 |
| PR-CB18 | 113.49 | 115.05 | 115.20 | 0.15 | 114.09 | 114.22 | 115.19 | 115.21 | 0.00 | 0.00 | 0.14 | 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 | 115.46 | 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 | 115.84 | 0.29 | 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 | 111.10 | 112.70 | 112.95 | 0.25 | 111.52 | 111.60 | 111.84 | 112.95 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CB30 | 111.40 | 112.40 | 112.65 | 0.25 | 111.51 | 112.38 | 112.64 | 112.67 | 0.00 | 0.00 | 0.24 | 0.27 | 0.00 | 0.00 | 0.00 | 0.02 |
| PR-CB31 | 111.20 | 112.40 | 112.65 | 0.25 | 111.48 | 112.38 | 112.64 | 112.67 | 0.00 | 0.00 | 0.24 | 0.27 | 0.00 | 0.00 | 0.00 | 0.02 |
| PR-CB32 | 110.65 | 112.90 | 113.00 | 0.10 | 111.18 | 111.30 | 113.01 | 113.05 | 0.00 | 0.00 | 0.11 | 0.15 | 0.00 | 0.00 | 0.01 | 0.05 |
| PR-CB35 | 112.20 | 113.50 | 113.75 | 0.25 | 112.52 | 113.16 | 113.71 | 113.74 | 0.00 | 0.00 | 0.21 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CB36 | 111.85 | 113.45 | 113.66 | 0.21 | 112.48 | 112.82 | 113.59 | 113.68 | 0.00 | 0.00 | 0.14 | 0.23 | 0.00 | 0.00 | 0.00 | 0.02 |
| PR-CB37 | 112.45 | 113.45 | 113.60 | 0.15 | 112.93 | 113.48 | 113.67 | 113.81 | 0.00 | 0.03 | 0.22 | 0.36 | 0.00 | 0.00 | 0.07 | 0.21 |

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**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-CB38 | 112.48 | 113.45 | 113.65 | 0.20 | 112.93 | 113.48 | 113.63 | 113.72 | 0.00 | 0.03 | 0.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.07 |
| PR-CB39 | 112.65 | 113.80 | 113.80 | 0.00 | 112.93 | 113.48 | 113.63 | 113.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CB40 | 111.50 | 113.00 | 113.25 | 0.25 | 112.79 | 113.12 | 113.23 | 113.26 | 0.00 | 0.12 | 0.23 | 0.26 | 0.00 | 0.00 | 0.00 | 0.01 |
| PR-CB41 | 111.30 | 112.70 | 113.35 | 0.65 | 112.09 | 112.61 | 112.77 | 112.79 | 0.00 | 0.00 | 0.07 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CBMH104 | 112.04 | 113.50 | 113.75 | 0.25 | 113.30 | 113.53 | 113.61 | 113.64 | 0.00 | 0.03 | 0.11 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CBMH105 | 111.85 | 113.45 | 113.65 | 0.20 | 112.92 | 113.48 | 113.63 | 113.72 | 0.00 | 0.03 | 0.18 | 0.27 | 0.00 | 0.00 | 0.00 | 0.07 |
| PR-CBMH106 | 112.01 | 113.50 | 113.80 | 0.30 | 113.28 | 113.55 | 113.66 | 113.69 | 0.00 | 0.05 | 0.16 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CBMH107 | 111.84 | 113.40 | 113.70 | 0.30 | 112.52 | 113.16 | 113.70 | 113.72 | 0.00 | 0.00 | 0.30 | 0.32 | 0.00 | 0.00 | 0.00 | 0.02 |
| PR-CBMH108 | 112.01 | 113.60 | 113.85 | 0.25 | 113.57 | 113.66 | 113.75 | 113.78 | 0.00 | 0.06 | 0.15 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CBMH109 | 111.96 | 113.60 | 113.90 | 0.30 | 113.60 | 113.70 | 113.81 | 113.85 | 0.00 | 0.10 | 0.21 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CBMH110 | 111.62 | 113.40 | 113.60 | 0.20 | 112.25 | 112.38 | 113.66 | 113.69 | 0.00 | 0.00 | 0.26 | 0.29 | 0.00 | 0.00 | 0.06 | 0.09 |
| PR-CBMH111 | 113.00 | 115.05 | 115.40 | 0.35 | 113.55 | 113.66 | 115.20 | 115.21 | 0.00 | 0.00 | 0.15 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-CBMH112 | 113.12 | 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 | 113.51 | 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 | 113.89 | 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 | 110.74 | 112.40 | 112.65 | 0.25 | 111.43 | 112.35 | 112.63 | 112.68 | 0.00 | 0.00 | 0.23 | 0.28 | 0.00 | 0.00 | 0.00 | 0.03 |
| PR-CBMH122 | 112.35 | 113.40 | 113.65 | 0.25 | 112.93 | 113.48 | 113.63 | 113.72 | 0.00 | 0.08 | 0.23 | 0.32 | 0.00 | 0.00 | 0.00 | 0.07 |
| PR-TD02 | 111.65 | 112.70 | 113.30 | 0.60 | 112.28 | 112.71 | 112.78 | 112.81 | 0.00 | 0.01 | 0.08 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| PR-TD1 | 111.90 | 112.70 | 113.50 | 0.80 | 112.35 | 112.36 | 112.67 | 112.75 | 0.00 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |

[1] *3-hour Chicago Storm.*

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**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 | 105.04 | 0.00 | 1.87 | 105.06 |
| EX-MH101A | 107.93 | 112.19 | 107.66 | 0.00 | 4.53 | 107.66 |
| EX-MH101B | 106.08 | 110.41 | 105.74 | 0.00 | 4.67 | 105.74 |
| EX-MH102 | 110.13 | 114.07 | 109.82 | 0.00 | 4.25 | 109.83 |
| 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 | 111.65 | 0.40 | 2.25 | 111.69 |
| EX-MH105 | 111.28 | 114.02 | 113.67 | 2.39 | 0.35 | 113.71 |
| EX-MH106 | 112.60 | 114.99 | 113.72 | 1.12 | 1.27 | 113.76 |
| EX-MH107 | 112.65 | 114.95 | 113.85 | 1.20 | 1.10 | 113.89 |
| EX-MH108 | 111.70 | 113.67 | 113.03 | 1.34 | 0.64 | 113.12 |
| EX-MH109 | 111.58 | 113.61 | 112.51 | 0.93 | 1.10 | 112.59 |
| EX-MH112 | 112.15 | 114.94 | 113.65 | 1.50 | 1.29 | 113.69 |
| EX-MH115 | 105.35 | 106.87 | 106.03 | 0.68 | 0.84 | 106.04 |
| EX-MH116 | 107.87 | 107.87 | 106.90 | 0.00 | 0.97 | 106.90 |
| PR-MH100 | 112.16 | 113.66 | 113.58 | 1.42 | 0.08 | 113.62 |
| PR-MH101 | 112.41 | 113.72 | 112.69 | 0.28 | 1.03 | 112.76 |
| PR-MH102 | 112.23 | 113.97 | 112.67 | 0.44 | 1.30 | 112.75 |
| PR-MH103 | 111.88 | 113.81 | 112.64 | 0.76 | 1.17 | 112.72 |
| PR-MH113 | 113.56 | 115.28 | 113.39 | 0.00 | 1.89 | 113.39 |
| PR-MH116 | 110.90 | 113.20 | 111.37 | 0.47 | 1.83 | 111.48 |
| PR-MH117 | 111.21 | 112.82 | 111.86 | 0.65 | 0.96 | 111.99 |
| PR-MH119 | 113.28 | 115.24 | 113.15 | 0.00 | 2.09 | 113.15 |
| PR-MH120 | 113.98 | 115.58 | 113.78 | 0.00 | 1.80 | 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 | 113.59 | 113.58 | 113.58 | 113.56 | 113.45 |
| EX-CB117 | 113.35 | 113.59 | 113.58 | 113.58 | 113.56 | 113.44 |
| EX-CB64 | 113.50 | 113.68 | 113.67 | 113.68 | 113.68 | 113.61 |
| PR-CBMH110 | 113.40 | 113.69 | 113.67 | 113.68 | 113.68 | 113.59 |
| PR-CB13 | 113.65 | 113.74 | 113.73 | 113.73 | 113.73 | 113.69 |
| PR-CB14 | 113.55 | 113.68 | 113.68 | 113.68 | 113.66 | 112.50 |
| PR-CB15 | 113.40 | 113.68 | 113.68 | 113.68 | 113.66 | 113.59 |
| PR-CB35 | 113.50 | 113.74 | 113.73 | 113.74 | 113.76 | 113.25 |
| PR-CBMH107 | 113.40 | 113.72 | 113.74 | 113.72 | 113.73 | 113.25 |
| PR-CBMH105 | 113.45 | 113.72 | 113.73 | 113.72 | 113.74 | 113.54 |
| PR-CB32 | 112.90 | 113.05 | 113.02 | 113.02 | 113.03 | 112.95 |
| EX-CB134 | 113.30 | 113.41 | 113.06 | 113.30 | 113.41 | 113.32 |

**Lowest building opening (finished floor elevation) = 114.00 m.*

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
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*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 80
Number of nodes ........... 239
Number of links ........... 314
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
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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     51.50     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     66.50    100.00    1.5000 Design_Storms        EX-BLDG01
A-31                       0.05     24.67    100.00    1.5000 Design_Storms        EX-CB116
A-32                       0.08     55.19     80.00    1.5000 Design_Storms        EX-CB64
A-33                       0.24     58.64     77.10    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     53.74     88.60    1.5000 Design_Storms        PR-CB15
A-36                       0.05     49.09    100.00    1.5000 Design_Storms        PR-CB13
A-37                       0.06     22.59     44.30    1.5000 Design_Storms        PR-CB14
A38a-1                     0.98     85.11    100.00    1.5000 Design_Storms        PR-BLDG01
A38a-2                     0.40     53.03    100.00    1.5000 Design_Storms        PR-BLDG02
A-39                       0.07     43.48    100.00    1.5000 Design_Storms        EX-CB134
A-40                       0.15     45.23    100.00    1.5000 Design_Storms        PR-CB32
A-41                       0.28     48.64    100.00    1.5000 Design_Storms        PR-CBMH118
A-42                       0.20     41.44    100.00    1.5000 Design_Storms        PR-CB31
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A-43                        0.12     44.15    100.00     1.5000 Design_Storms        PR-CB29
A-44                        0.09     41.65    100.00     1.5000 Design_Storms        PR-CB30
A-45                        0.14     57.38     92.90     1.5000 Design_Storms        PR-CB40
A-45a                       0.03     19.81    100.00     1.5000 Design_Storms        PR-CB41
A-46                        0.12     34.11    100.00     1.5000 Design_Storms        PR-TD02
A-47                        0.08     33.89     50.00     1.5000 Design_Storms        PR-CB01
A-48                        0.04     48.76     87.10     1.5000 Design_Storms        PR-CB02
A-49                        0.08     48.99     40.00     1.5000 Design_Storms        PR-CB03
A-50                        0.06     28.26     57.10     1.5000 Design_Storms        PR-CB36
A-51                        0.09     69.83     98.60     1.5000 Design_Storms        PR-CB04
A-52                        0.05     25.82     81.40     1.5000 Design_Storms        PR-CB38
A-52a                       0.01     15.62    100.00     1.5000 Design_Storms        PR-CB39
A-53                        0.09     44.37     72.90     1.5000 Design_Storms        PR-CBMH122
A-54                        0.04     23.42     71.40     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                        0.03     28.53     97.10     1.5000 Design_Storms        PR-CB37
A-58                        0.04     26.84     68.60     2.0000 Design_Storms        PR-CB35
A-60                        0.12     62.67     97.10     1.5000 Design_Storms        PR-CBMH106
A-61                        0.10     78.95    100.00     1.5000 Design_Storms        PR-CB08
A-62                        0.11     64.05    100.00     1.5000 Design_Storms        PR-CB09
A-63                        0.13     72.43    100.00     1.5000 Design_Storms        PR-CBMH108
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                        0.11     42.02     62.90     1.5000 Design_Storms        EX-CB54
A-69                        0.14     59.31     74.30     1.5000 Design_Storms        PR-CBMH107
A-70                        0.02     31.75    100.00     4.0000 Design_Storms        PR-TD1


************
Node Summary
************
                                        Invert      Max.    Ponded    External
Name                 Type                Elev.     Depth      Area    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-CB134          JUNCTION           113.40      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-CB01           JUNCTION           113.60      1.00       0.0
HP-PR-CB02           JUNCTION           113.64      1.00       0.0
HP-PR-CB03           JUNCTION           113.64      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-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
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| | | | | |
|---|---|---|---|---|
| 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-CB29 | JUNCTION | 112.95 | 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 | 113.66 | 1.00 | 0.0 |
| HP-PR-CB40 | JUNCTION | 113.25 | 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-CBMH124 | JUNCTION | 113.35 | 1.00 | 0.0 |
| HP-PR-TD02 | JUNCTION | 113.30 | 1.00 | 0.0 |
| HP-EX-CB14 | OUTFALL | 114.10 | 1.00 | 0.0 |
| HP-EX-MH116 | OUTFALL | 106.84 | 1.00 | 0.0 |
| HP-PR-CB11 | OUTFALL | 113.85 | 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 | 112.65 | 1.00 | 0.0 |
| IF-EX-CB116 | OUTFALL | 112.99 | 0.00 | 0.0 |
| IF-EX-CB117 | OUTFALL | 112.09 | 0.00 | 0.0 |

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|---|---|---|---|---|
| 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-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 | 111.10 | 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-CB40 | OUTFALL | 111.50 | 0.00 | 0.0 |
| IF-PR-CBMH104 | OUTFALL | 112.04 | 0.00 | 0.0 |
| IF-PR-CBMH105 | OUTFALL | 111.85 | 0.00 | 0.0 |
| IF-PR-CBMH106 | OUTFALL | 112.01 | 0.00 | 0.0 |
| IF-PR-CBMH107 | OUTFALL | 111.84 | 0.00 | 0.0 |
| IF-PR-CBMH108 | OUTFALL | 112.01 | 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 |
| 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 |

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|---|---|---|---|---|
| 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 | 2.63 | 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 |

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|---|---|---|---|---|
| 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 | 112.45 | 1.95 | 0.0 |
| PR-CB02a | STORAGE | 112.36 | 2.15 | 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-CB08 | STORAGE | 112.45 | 2.05 | 0.0 |
| PR-CB09 | STORAGE | 112.45 | 2.15 | 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 | 111.10 | 2.60 | 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-CB35 | STORAGE | 112.20 | 2.30 | 0.0 |
| PR-CB36 | STORAGE | 111.85 | 2.60 | 0.0 |
| PR-CB37 | STORAGE | 112.45 | 2.00 | 0.0 |
| PR-CB38 | STORAGE | 112.48 | 1.97 | 0.0 |
| PR-CB39 | STORAGE | 112.65 | 2.15 | 0.0 |
| PR-CB40 | STORAGE | 111.50 | 2.50 | 0.0 |
| PR-CB41 | STORAGE | 111.30 | 2.40 | 0.0 |
| PR-CBMH104 | STORAGE | 112.04 | 2.46 | 0.0 |
| PR-CBMH105 | STORAGE | 111.85 | 2.60 | 0.0 |

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|---|---|---|---|---|
| PR-CBMH106 | STORAGE | 112.01 | 2.49 | 0.0 |
| PR-CBMH107 | STORAGE | 111.84 | 2.56 | 0.0 |
| PR-CBMH108 | STORAGE | 112.01 | 2.59 | 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-CBMH122 | STORAGE | 112.35 | 2.05 | 0.0 |
| PR-MH100 | STORAGE | 112.16 | 1.50 | 0.0 |
| PR-MH100a | STORAGE | 112.16 | 1.50 | 0.0 |
| PR-MH101 | STORAGE | 111.96 | 1.76 | 0.0 |
| PR-MH102 | STORAGE | 111.70 | 2.27 | 0.0 |
| PR-MH103 | STORAGE | 111.28 | 2.53 | 0.0 |
| PR-MH104 | STORAGE | 111.10 | 2.59 | 0.0 |
| PR-MH113 | STORAGE | 113.26 | 2.02 | 0.0 |
| PR-MH116 | STORAGE | 110.65 | 2.55 | 0.0 |
| PR-MH117 | STORAGE | 110.91 | 1.91 | 0.0 |
| PR-MH119 | STORAGE | 112.98 | 2.26 | 0.0 |
| PR-MH120 | STORAGE | 113.68 | 1.90 | 0.0 |
| PR-MH123 | STORAGE | 111.12 | 1.94 | 0.0 |
| PR-OGS1 | STORAGE | 111.38 | 1.90 | 0.0 |
| PR-STUB01 | STORAGE | 111.26 | 8.74 | 0.0 |
| PR-TD02 | STORAGE | 111.65 | 2.05 | 0.0 |
| PR-TD1 | STORAGE | 111.90 | 1.80 | 0.0 |

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Link Summary
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| Name | From Node | To Node | Type | Length | %Slope | Roughness |
|---|---|---|---|---|---|---|
| 108_(CB) | PR-CB03 | PR-MH100 | CONDUIT | 9.6 | 0.5208 | 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 |
| 138_(CB)_1 | PR-CB01 | PR-CB02a | CONDUIT | 14.5 | 0.3099 | 0.0130 |
| 138_(CB)_2 | PR-CB02a | PR-MH100 | CONDUIT | 17.6 | 0.3125 | 0.0130 |
| 14_(STM) | EX-MH112a | PR-MH103 | CONDUIT | 45.5 | 0.1978 | 0.0130 |
| 142_(STM) | PR-CB04 | PR-MH100 | CONDUIT | 13.9 | 0.3597 | 0.0130 |
| 145_(CB) | PR-CB09 | PR-CBMH108 | CONDUIT | 36.8 | 0.4891 | 0.0130 |
| 150_(1)_(STM) | PR-MH123 | PR-MH117 | CONDUIT | 36.2 | 0.4972 | 0.0130 |
| 156_(STM) | PR-CB02 | PR-CB02a | CONDUIT | 13.4 | 0.5220 | 0.0130 |
| 163_(STM) | PR-CB30 | PR-CB31 | CONDUIT | 36.1 | 0.5263 | 0.0130 |
| 165_(CB) | PR-CB31 | PR-CBMH118 | CONDUIT | 29.3 | 0.5120 | 0.0130 |
| 17_(1)_(STM) | PR-MH117 | PR-MH116 | CONDUIT | 49.7 | 0.5028 | 0.0130 |
| 20_(STM) | PR-STUB01 | PR-MH116 | CONDUIT | 30.0 | 2.0004 | 0.0130 |
| 226_(CB) | PR-TD1 | PR-MH102 | CONDUIT | 17.5 | 0.5143 | 0.0130 |
| 230_(CB) | PR-CB35 | PR-CBMH107 | CONDUIT | 21.5 | 0.5116 | 0.0130 |
| 246_(CB) | PR-CBMH122 | PR-CBMH105 | CONDUIT | 22.4 | 0.4920 | 0.0130 |
| 250_(CB) | PR-CB37 | PR-CBMH122 | CONDUIT | 18.9 | 0.4772 | 0.0130 |
| 251_(CB) | PR-CB38 | PR-CBMH122 | CONDUIT | 23.7 | 0.5072 | 0.0130 |
| 268_(STM) | PR-OGS1 | PR-MH123 | CONDUIT | 49.4 | 0.5061 | 0.0130 |
| 271_(CB) | PR-CB39 | PR-CB38 | CONDUIT | 27.1 | 0.5170 | 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-MH101 | CONDUIT | 61.3 | 0.2936 | 0.0130 |
| 5_(STM)_2 | PR-MH101 | PR-MH102 | CONDUIT | 61.6 | 0.2922 | 0.0130 |
| 54_(STM) | PR-CB21 | PR-CBMH112 | CONDUIT | 36.8 | 0.4891 | 0.0130 |
| 57_(STM) | PR-CBMH109a | PR-MH102 | 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-MH102 | PR-MH103 | CONDUIT | 106.0 | 0.2925 | 0.0130 |
| 86_(CB) | PR-CB08 | PR-CBMH106 | CONDUIT | 36.8 | 0.4891 | 0.0130 |
| 9_(1)_(STM) | PR-MH104 | EX-MH109 | CONDUIT | 32.9 | 0.3040 | 0.0130 |
| 9_(STM)_2 | PR-MH103 | PR-MH104 | 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 |

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|---|---|---|---|---|---|---|
| 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 |
| C134 | HP-EX-CB134 | PR-CB32 | CONDUIT | 3.0 | 16.9031 | 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 |

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|---|---|---|---|---|---|---|
| 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 |
| C140 | HP-PR-CB29 | PR-CB31 | CONDUIT | 3.0 | 18.6494 | 0.0150 |
| C141 | HP-PR-CB01 | PR-CB40 | CONDUIT | 3.0 | 20.4124 | 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 | -7.0172 | 0.0150 |
| C146 | PR-TD1 | HP-PR-CB34 | CONDUIT | 3.0 | -8.3624 | 0.0150 |
| C147 | HP-PR-CB34 | PR-CBMH107 | CONDUIT | 3.0 | 10.0504 | 0.0130 |
| 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 | -3.3352 | 0.0150 |
| C151 | PR-CB41 | HP-PR-CBMH124 | CONDUIT | 3.0 | -22.1939 | 0.0150 |
| C152 | HP-PR-CBMH124 | PR-CB40 | CONDUIT | 3.0 | 11.7469 | 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 | -8.3624 | 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 |

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|---|---|---|---|---|---|---|
| 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 | -6.6815 | 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 | -8.0257 | 0.0150 |
| C56 | HP-PR-CB03 | PR-CB01 | CONDUIT | 3.0 | 8.0257 | 0.0150 |
| C57 | PR-CBMH105 | HP-PR-CBMH105 | CONDUIT | 3.0 | -8.3624 | 0.0150 |
| C58 | HP-PR-CB36 | PR-CB03 | CONDUIT | 3.0 | 8.6994 | 0.0150 |
| C59 | PR-CB38 | 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-CBMH122 | CONDUIT | 3.0 | 6.6815 | 0.0150 |
| C61 | PR-CBMH122 | 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-CB39 | PR-CB38 | CONDUIT | 3.0 | 11.7469 | 0.0130 |
| 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-TD02 | HP-PR-TD02 | CONDUIT | 3.0 | -20.4124 | 0.0150 |
| C71 | PR-CB20 | HP-PR-CB20 | CONDUIT | 3.0 | -5.0063 | 0.0150 |
| C72 | HP-PR-TD02 | PR-CB40 | CONDUIT | 3.0 | 10.0504 | 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 | HP-EX-MH116 | 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 |
| C80 | PR-CB40 | HP-PR-CB40 | CONDUIT | 3.0 | -8.3624 | 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 |
| C86 | HP-PR-CB40 | PR-CB29 | CONDUIT | 3.0 | 18.6494 | 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 |

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|---|---|---|---|---|---|---|
| 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-MH101 | 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-MH101 | ORIFICE | | | |
| 267_(STM) | PR-CB41 | PR-MH123 | ORIFICE | | | |
| 42_(STM) | PR-CBMH112 | PR-MH113 | ORIFICE | | | |
| 46_(STM) | PR-CBMH114 | PR-MH120 | ORIFICE | | | |
| 66_(CB) | PR-CBMH110 | PR-MH103 | ORIFICE | | | |
| 69_(CB) | EX-CB117 | EX-MH109 | ORIFICE | | | |
| 78_(CB) | PR-CB13 | PR-MH102 | ORIFICE | | | |
| 81_(CB) | PR-CB14 | PR-MH102 | ORIFICE | | | |
| 88_(CB) | PR-CBMH106 | PR-MH101 | ORIFICE | | | |

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|---|---|---|---|
| 96_(CB) | PR-CBMH104 | PR-MH100a | ORIFICE |
| OR1 | PR-CB32 | PR-MH117 | ORIFICE |
| OR10 | PR-CB40 | PR-OGS1 | ORIFICE |
| OR11 | EX-MH112 | EX-MH112a | ORIFICE |
| OR12 | PR-CB36 | PR-MH100a | ORIFICE |
| OR13 | PR-CB29 | PR-MH123 | ORIFICE |
| OR14 | EX-CB134 | PR-MH116 | ORIFICE |
| OR15 | PR-TD02 | PR-OGS1 | ORIFICE |
| OR2 | PR-CBMH115 | PR-CBMH115a | ORIFICE |
| OR3 | EX-CB60 | PR-MH103 | 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-MH104 | ORIFICE |
| OR9 | PR-CBMH107 | PR-MH101 | 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-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-CB40 | PR-CB40 | IF-PR-CB40 | 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 |

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Cross Section Summary
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| Conduit | Shape | Full Depth | Full Area | Hyd. Rad. | Max. Width | No. of Barrels | Full Flow |
|---|---|---|---|---|---|---|---|
| 108_(CB) | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 42.92 |
| 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 |
| 138_(CB)_1 | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 53.84 |
| 138_(CB)_2 | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 54.06 |
| 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 | 58.00 |
| 145_(CB) | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 41.59 |
| 150_(1)_(STM) | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 68.19 |
| 156_(STM) | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 42.97 |
| 163_(STM) | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 70.16 |
| 165_(CB) | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 69.19 |
| 17_(1)_(STM) | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 68.57 |
| 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 |
| 246_(CB) | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 41.71 |
| 250_(CB) | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 41.08 |
| 251_(CB) | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 42.35 |
| 268_(STM) | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 68.80 |
| 271_(CB) | CIRCULAR | 0.20 | 0.03 | 0.05 | 0.20 | 1 | 23.58 |
| 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 | 154.50 |
| 5_(STM)_2 | CIRCULAR | 0.45 | 0.16 | 0.11 | 0.45 | 1 | 154.13 |
| 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 |

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|---|---|---|---|---|---|---|---|
| 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 |
| C134 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 58497.86 |
| 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 |
| C140 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 61445.45 |
| C141 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 64284.19 |
| C142 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 41145.56 |

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|---|---|---|---|---|---|---|---|
| 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 | 37691.14 |
| 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 | 52047.05 |
| 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 | 25984.66 |
| C151 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 67030.66 |
| C152 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 48766.13 |
| 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 | 41145.56 |
| 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 |

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|---|---|---|---|---|---|---|---|
| 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 | 36778.58 |
| 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 | 40308.73 |
| C56 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 40308.73 |
| 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 | 41966.39 |
| 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 | 56268.62 |
| 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 | 64284.19 |
| 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 | 45107.44 |
| 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 |
| C80 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 41145.56 |
| 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 |
| C86 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 61445.45 |
| 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

| Runoff Quantity Continuity | Volume hectare-m | Depth mm |
|---|---|---|
| Total Precipitation ...... | 1.023 | 71.667 |
| Evaporation Loss ......... | 0.000 | 0.000 |
| Infiltration Loss ........ | 0.103 | 7.225 |
| Surface Runoff ........... | 0.906 | 63.434 |
| Final Storage ............ | 0.015 | 1.072 |
| Continuity Error (%) ..... | -0.090 | |

| Flow Routing Continuity | Volume hectare-m | Volume 10^6 ltr |
|---|---|---|
| Dry Weather Inflow ....... | 0.000 | 0.000 |
| Wet Weather Inflow ....... | 0.906 | 9.057 |
| Groundwater Inflow ....... | 0.000 | 0.000 |
| RDII Inflow .............. | 0.000 | 0.000 |
| External Inflow .......... | 0.000 | 0.000 |
| External Outflow ......... | 0.908 | 9.082 |
| 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 (%) .....        -0.285


  *************************
  Highest Continuity Errors
  *************************
  Node PR-TD1 (2.82%)
  Node PR-CB40 (-2.00%)
  Node PR-CBMH118 (-1.54%)
  Node PR-CBMH112 (-1.14%)
  Node EX-CB54 (-1.07%)


  ***************************
  Time-Step Critical Elements
  ***************************
  Link C94 (2.37%)


  ********************************
  Highest Flow Instability Indexes
  ********************************
  Link INFIL-EX-CB14 (19)
  Link OR11 (18)
  Link EX-BLDG01-OUT (16)
  Link INFIL-PR-CBMH118 (11)
  Link INFIL-EX-CB82 (11)


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     0.23 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      :     0.14
  Time Step Frequencies       :
     2.000 -  1.516 sec      :    99.84 %
     1.516 -  1.149 sec      :     0.08 %
     1.149 -  0.871 sec      :     0.03 %
     0.871 -  0.660 sec      :     0.02 %
     0.660 -  0.500 sec      :     0.02 %


  ***************************
  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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 46.89 | 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 | 412.65 | 1.000 |
| A-31 | 71.67 | 0.00 | 0.00 | 0.00 | 70.18 | 0.00 | 70.18 | 0.04 | 24.80 | 0.979 |
| A-32 | 71.67 | 0.00 | 0.00 | 8.80 | 56.16 | 5.55 | 61.71 | 0.05 | 38.89 | 0.861 |
| A-33 | 71.67 | 0.00 | 0.00 | 10.25 | 54.10 | 6.17 | 60.27 | 0.15 | 111.03 | 0.841 |
| 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 | 5.01 | 62.18 | 3.17 | 65.35 | 0.08 | 59.45 | 0.912 |
| 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 | 25.27 | 31.10 | 14.67 | 45.77 | 0.03 | 22.98 | 0.639 |
| A38a-1 | 71.67 | 0.00 | 0.00 | 0.00 | 71.70 | 0.00 | 71.70 | 0.71 | 475.44 | 1.000 |
| A38a-2 | 71.67 | 0.00 | 0.00 | 0.00 | 71.71 | 0.00 | 71.71 | 0.29 | 197.33 | 1.001 |
| A-39 | 71.67 | 0.00 | 0.00 | 0.00 | 70.19 | 0.00 | 70.19 | 0.05 | 32.24 | 0.979 |
| A-40 | 71.67 | 0.00 | 0.00 | 0.00 | 70.16 | 0.00 | 70.16 | 0.11 | 75.36 | 0.979 |
| A-41 | 71.67 | 0.00 | 0.00 | 0.00 | 70.15 | 0.00 | 70.15 | 0.20 | 140.35 | 0.979 |
| A-42 | 71.67 | 0.00 | 0.00 | 0.00 | 70.15 | 0.00 | 70.15 | 0.14 | 97.55 | 0.979 |
| A-43 | 71.67 | 0.00 | 0.00 | 0.00 | 70.17 | 0.00 | 70.17 | 0.08 | 58.03 | 0.979 |
| A-44 | 71.67 | 0.00 | 0.00 | 0.00 | 70.18 | 0.00 | 70.18 | 0.06 | 45.63 | 0.979 |
| A-45 | 71.67 | 0.00 | 0.00 | 3.12 | 65.19 | 1.98 | 67.18 | 0.09 | 68.73 | 0.937 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| A-45a | 71.67 | 0.00 | 0.00 | 0.00 | 70.19 | 0.00 | 70.19 | 0.02 | 14.38 | 0.979 |
| A-46 | 71.67 | 0.00 | 0.00 | 0.00 | 70.16 | 0.00 | 70.16 | 0.09 | 60.48 | 0.979 |
| A-47 | 71.67 | 0.00 | 0.00 | 22.50 | 35.10 | 13.35 | 48.45 | 0.04 | 32.09 | 0.676 |
| A-48 | 71.67 | 0.00 | 0.00 | 5.65 | 61.16 | 3.62 | 64.77 | 0.03 | 20.45 | 0.904 |
| A-49 | 71.67 | 0.00 | 0.00 | 26.91 | 28.09 | 16.11 | 44.20 | 0.04 | 33.30 | 0.617 |
| A-50 | 71.67 | 0.00 | 0.00 | 19.18 | 40.08 | 11.59 | 51.68 | 0.03 | 25.33 | 0.721 |
| 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 | 8.21 | 57.13 | 5.14 | 62.27 | 0.03 | 24.95 | 0.869 |
| A-52a | 71.67 | 0.00 | 0.00 | 0.00 | 70.22 | 0.00 | 70.22 | 0.01 | 4.96 | 0.980 |
| A-53 | 71.67 | 0.00 | 0.00 | 12.01 | 51.17 | 7.43 | 58.60 | 0.05 | 42.87 | 0.818 |
| A-54 | 71.67 | 0.00 | 0.00 | 12.65 | 50.12 | 7.87 | 57.99 | 0.02 | 18.23 | 0.809 |
| 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 | 1.27 | 68.55 | 0.82 | 69.37 | 0.02 | 15.81 | 0.968 |
| A-58 | 71.67 | 0.00 | 0.00 | 13.86 | 48.43 | 8.67 | 57.11 | 0.02 | 16.87 | 0.797 |
| 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 | 0.980 |
| A-62 | 71.67 | 0.00 | 0.00 | 0.00 | 70.19 | 0.00 | 70.19 | 0.08 | 56.05 | 0.979 |
| A-63 | 71.67 | 0.00 | 0.00 | 0.00 | 70.19 | 0.00 | 70.19 | 0.09 | 65.47 | 0.979 |
| 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 | 46.25 | 0.756 |
| A-69 | 71.67 | 0.00 | 0.00 | 11.41 | 52.15 | 7.03 | 59.18 | 0.08 | 65.68 | 0.826 |
| A-70 | 71.67 | 0.00 | 0.00 | 0.00 | 70.21 | 0.00 | 70.21 | 0.01 | 8.93 | 0.980 |

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

| Node | Type | Average Depth Meters | Maximum Depth Meters | Maximum HGL Meters | Time of Max Occurrence days | Time of Max Occurrence 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-CB134 | JUNCTION | 0.00 | 0.01 | 113.41 | 0 | 01:10 | 0.01 |
| 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 | 0.01 | 113.66 | 0 | 01:20 | 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-CB01 | JUNCTION | 0.00 | 0.00 | 113.60 | 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 | 113.64 | 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-CB12 | JUNCTION | 0.00 | 0.00 | 113.87 | 0 | 00:00 | 0.00 |
| HP-PR-CB13 | JUNCTION | 0.00 | 0.01 | 113.73 | 0 | 01:08 | 0.01 |
| HP-PR-CB14 | JUNCTION | 0.00 | 0.01 | 113.66 | 0 | 01:11 | 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-CB29 | JUNCTION | 0.00 | 0.00 | 112.95 | 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 | 113.66 | 0 | 00:00 | 0.00 |
| HP-PR-CB40 | JUNCTION | 0.00 | 0.00 | 113.25 | 0 | 00:00 | 0.00 |
| HP-PR-CBMH104 | JUNCTION | 0.00 | 0.00 | 113.75 | 0 | 00:00 | 0.00 |

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|---|---|---|---|---|---|---|---|
| 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 | 01:29 | 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 | 0.06 | 113.66 | 0 | 01:20 | 0.05 |
| 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-CBMH124 | JUNCTION | 0.00 | 0.00 | 113.35 | 0 | 00:00 | 0.00 |
| HP-PR-TD02 | JUNCTION | 0.00 | 0.00 | 113.30 | 0 | 00:00 | 0.00 |
| HP-EX-CB14 | OUTFALL | 0.00 | 0.00 | 114.10 | 0 | 00:00 | 0.00 |
| HP-EX-MH116 | OUTFALL | 0.00 | 0.02 | 106.86 | 0 | 01:50 | 0.02 |
| HP-PR-CB11 | OUTFALL | 0.00 | 0.00 | 113.85 | 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 | 0.01 | 113.01 | 0 | 01:14 | 0.01 |
| HP-PR-CBMH118 | OUTFALL | 0.00 | 0.00 | 112.65 | 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-CB13 | OUTFALL | 0.00 | 0.00 | 111.90 | 0 | 00:00 | 0.00 |

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|---|---|---|---|---|---|---|---|
| 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 | 111.10 | 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-CB40 | OUTFALL | 0.00 | 0.00 | 111.50 | 0 | 00:00 | 0.00 |
| IF-PR-CBMH104 | OUTFALL | 0.00 | 0.00 | 112.04 | 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 | 112.01 | 0 | 00:00 | 0.00 |
| IF-PR-CBMH107 | OUTFALL | 0.00 | 0.00 | 111.84 | 0 | 00:00 | 0.00 |
| IF-PR-CBMH108 | OUTFALL | 0.00 | 0.00 | 112.01 | 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 |
| SWM_Pond | OUTFALL | 0.08 | 0.47 | 103.42 | 0 | 01:20 | 0.47 |
| EX-BLDG01 | STORAGE | 0.00 | 0.11 | 120.11 | 0 | 01:16 | 0.11 |
| EX-CB116 | STORAGE | 0.03 | 0.54 | 113.53 | 0 | 01:25 | 0.54 |
| EX-CB117 | STORAGE | 0.10 | 1.44 | 113.53 | 0 | 01:25 | 1.44 |
| EX-CB128 | STORAGE | 0.09 | 1.31 | 113.82 | 0 | 01:21 | 1.31 |
| EX-CB134 | STORAGE | 0.03 | 1.81 | 113.41 | 0 | 01:03 | 1.81 |
| EX-CB137 | STORAGE | 0.03 | 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 | 01:21 | 1.44 |
| EX-CB54 | STORAGE | 0.05 | 1.37 | 113.89 | 0 | 01:20 | 1.37 |
| EX-CB58 | STORAGE | 0.05 | 1.39 | 113.83 | 0 | 01:11 | 1.39 |
| EX-CB60 | STORAGE | 0.07 | 1.69 | 113.84 | 0 | 01:21 | 1.69 |
| EX-CB62 | STORAGE | 0.05 | 1.21 | 113.85 | 0 | 01:21 | 1.21 |
| EX-CB64 | STORAGE | 0.09 | 1.56 | 113.66 | 0 | 01:20 | 1.55 |
| 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 | 01:23 | 1.33 |
| EX-CB90 | STORAGE | 0.09 | 1.35 | 113.86 | 0 | 01:11 | 1.35 |

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|---|---|---|---|---|---|---|---|
| EX-CB92 | STORAGE | 0.10 | 1.39 | 113.88 | 0 | 01:30 | 1.39 |
| EX-CB95 | STORAGE | 0.10 | 1.36 | 113.81 | 0 | 01:30 | 1.36 |
| EX-CB96 | STORAGE | 0.12 | 1.59 | 113.81 | 0 | 01:33 | 1.59 |
| EX-MH101 | STORAGE | 0.08 | 0.47 | 105.04 | 0 | 01:20 | 0.47 |
| EX-MH101A | STORAGE | 0.08 | 0.48 | 107.66 | 0 | 01:23 | 0.48 |
| EX-MH101B | STORAGE | 0.07 | 0.41 | 105.74 | 0 | 01:23 | 0.41 |
| EX-MH102 | STORAGE | 0.07 | 0.44 | 109.82 | 0 | 01:22 | 0.44 |
| 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 | 1.00 | 111.65 | 0 | 01:22 | 1.00 |
| EX-MH105 | STORAGE | 0.20 | 2.39 | 113.67 | 0 | 01:24 | 2.39 |
| EX-MH105a | STORAGE | 0.03 | 0.40 | 111.68 | 0 | 01:22 | 0.40 |
| EX-MH106 | STORAGE | 0.12 | 1.57 | 113.72 | 0 | 01:26 | 1.57 |
| EX-MH106a | STORAGE | 0.17 | 2.09 | 113.70 | 0 | 01:24 | 2.09 |
| EX-MH107 | STORAGE | 0.12 | 1.50 | 113.85 | 0 | 01:34 | 1.50 |
| EX-MH107a | STORAGE | 0.13 | 1.59 | 113.79 | 0 | 01:31 | 1.59 |
| EX-MH108 | STORAGE | 0.05 | 1.71 | 113.03 | 0 | 01:22 | 1.71 |
| EX-MH109 | STORAGE | 0.11 | 1.53 | 112.51 | 0 | 01:22 | 1.53 |
| EX-MH112 | STORAGE | 0.07 | 1.50 | 113.65 | 0 | 01:22 | 1.50 |
| EX-MH112a | STORAGE | 0.04 | 0.95 | 113.10 | 0 | 01:23 | 0.95 |
| EX-MH115 | STORAGE | 0.08 | 0.98 | 106.03 | 0 | 01:22 | 0.98 |
| EX-MH116 | STORAGE | 0.11 | 1.40 | 106.90 | 0 | 01:50 | 1.39 |
| EX-STUB02 | STORAGE | 0.06 | 1.83 | 113.21 | 0 | 01:22 | 1.83 |
| PR-BLDG01 | STORAGE | 0.01 | 0.15 | 120.15 | 0 | 01:31 | 0.15 |
| PR-BLDG02 | STORAGE | 0.01 | 0.15 | 120.15 | 0 | 01:24 | 0.15 |
| PR-CB01 | STORAGE | 0.19 | 1.18 | 113.58 | 0 | 01:45 | 1.18 |
| PR-CB02 | STORAGE | 0.18 | 1.13 | 113.58 | 0 | 01:45 | 1.13 |
| PR-CB02a | STORAGE | 0.20 | 1.22 | 113.58 | 0 | 01:45 | 1.22 |
| PR-CB03 | STORAGE | 0.19 | 1.18 | 113.58 | 0 | 01:44 | 1.18 |
| PR-CB04 | STORAGE | 0.52 | 1.78 | 113.58 | 0 | 01:45 | 1.78 |
| PR-CB05 | STORAGE | 0.14 | 1.16 | 113.61 | 0 | 01:37 | 1.16 |
| PR-CB08 | STORAGE | 0.21 | 1.21 | 113.66 | 0 | 01:50 | 1.21 |
| PR-CB09 | STORAGE | 0.24 | 1.30 | 113.75 | 0 | 01:52 | 1.30 |
| 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 | 01:08 | 1.83 |
| PR-CB14 | STORAGE | 0.10 | 1.86 | 113.66 | 0 | 01:11 | 1.86 |
| PR-CB15 | STORAGE | 0.22 | 1.45 | 113.65 | 0 | 01:35 | 1.45 |
| PR-CB16/17 | STORAGE | 0.05 | 1.41 | 113.50 | 0 | 01:13 | 1.41 |
| PR-CB18 | STORAGE | 0.09 | 1.70 | 115.19 | 0 | 01:13 | 1.70 |
| PR-CB19 | STORAGE | 0.12 | 1.55 | 115.20 | 0 | 01:38 | 1.55 |

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|---|---|---|---|---|---|---|---|
| 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 | 0.27 | 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 | 0.37 | 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 | 0.14 | 0.74 | 111.84 | 0 | 01:43 | 0.74 |
| PR-CB30 | STORAGE | 0.07 | 1.24 | 112.64 | 0 | 01:30 | 1.24 |
| PR-CB31 | STORAGE | 0.09 | 1.44 | 112.64 | 0 | 01:30 | 1.44 |
| PR-CB32 | STORAGE | 0.20 | 2.36 | 113.01 | 0 | 01:14 | 2.36 |
| PR-CB35 | STORAGE | 0.15 | 1.51 | 113.71 | 0 | 01:29 | 1.51 |
| PR-CB36 | STORAGE | 0.15 | 1.74 | 113.59 | 0 | 01:22 | 1.74 |
| PR-CB37 | STORAGE | 0.19 | 1.22 | 113.67 | 0 | 01:34 | 1.22 |
| PR-CB38 | STORAGE | 0.18 | 1.15 | 113.63 | 0 | 01:43 | 1.15 |
| PR-CB39 | STORAGE | 0.15 | 0.98 | 113.63 | 0 | 01:44 | 0.98 |
| PR-CB40 | STORAGE | 0.15 | 1.73 | 113.23 | 0 | 01:30 | 1.73 |
| PR-CB41 | STORAGE | 0.04 | 1.47 | 112.77 | 0 | 01:11 | 1.47 |
| PR-CBMH104 | STORAGE | 0.25 | 1.57 | 113.61 | 0 | 01:35 | 1.57 |
| PR-CBMH105 | STORAGE | 0.43 | 1.78 | 113.63 | 0 | 01:43 | 1.78 |
| PR-CBMH106 | STORAGE | 0.35 | 1.65 | 113.66 | 0 | 01:50 | 1.65 |
| PR-CBMH107 | STORAGE | 0.26 | 1.86 | 113.70 | 0 | 01:29 | 1.86 |
| PR-CBMH108 | STORAGE | 0.39 | 1.74 | 113.75 | 0 | 01:51 | 1.74 |
| PR-CBMH109 | STORAGE | 0.69 | 1.85 | 113.81 | 0 | 02:30 | 1.85 |
| PR-CBMH109a | STORAGE | 0.04 | 0.46 | 112.67 | 0 | 01:23 | 0.46 |
| PR-CBMH110 | STORAGE | 0.43 | 2.04 | 113.66 | 0 | 01:20 | 2.03 |
| 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 | 0.16 | 1.89 | 112.63 | 0 | 01:21 | 1.89 |
| PR-CBMH122 | STORAGE | 0.21 | 1.28 | 113.63 | 0 | 01:35 | 1.28 |
| PR-MH100 | STORAGE | 0.24 | 1.42 | 113.58 | 0 | 01:45 | 1.42 |
| PR-MH100a | STORAGE | 0.03 | 0.53 | 112.69 | 0 | 01:24 | 0.53 |
| PR-MH101 | STORAGE | 0.05 | 0.73 | 112.69 | 0 | 01:24 | 0.72 |
| PR-MH102 | STORAGE | 0.08 | 0.97 | 112.67 | 0 | 01:24 | 0.97 |
| PR-MH103 | STORAGE | 0.09 | 1.36 | 112.64 | 0 | 01:23 | 1.36 |
| PR-MH104 | STORAGE | 0.10 | 1.48 | 112.58 | 0 | 01:22 | 1.48 |
| PR-MH113 | STORAGE | 0.05 | 0.13 | 113.39 | 0 | 02:11 | 0.13 |
| PR-MH116 | STORAGE | 0.03 | 0.72 | 111.37 | 0 | 01:22 | 0.72 |
| PR-MH117 | STORAGE | 0.05 | 0.95 | 111.86 | 0 | 01:24 | 0.95 |
| 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-MH123 | STORAGE | 0.03 | 0.82 | 111.94 | 0 | 01:24 | 0.82 |
| PR-OGS1 | STORAGE | 0.02 | 0.64 | 112.02 | 0 | 01:24 | 0.64 |
| PR-STUB01 | STORAGE | 0.01 | 0.21 | 111.47 | 0 | 01:22 | 0.21 |
| PR-TD02 | STORAGE | 0.03 | 1.13 | 112.78 | 0 | 01:11 | 1.13 |
| PR-TD1 | STORAGE | 0.40 | 0.77 | 112.67 | 0 | 01:24 | 0.77 |

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Node Inflow Summary
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| Node | Type | Maximum Lateral Inflow LPS | Maximum Total Inflow LPS | Time of Max Occurrence days | hr:min | Lateral Inflow Volume 10^6 ltr | Total Inflow Volume 10^6 ltr | Flow Balance Error Percent |
|---|---|---|---|---|---|---|---|---|
| HP-01 | JUNCTION | 0.00 | 16.68 | 0 | 01:38 | 0 | 0.0114 | -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-CB134 | JUNCTION | 0.00 | 15.62 | 0 | 01:03 | 0 | 0.00543 | -0.032 |
| 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 |

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|---|---|---|---|---|---|---|---|---|
| HP-EX-CB64 | JUNCTION | 0.00 | 12.65 | 0 | 01:20 | 0 | 0.000617 | -0.381 |
| 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-CB01 | 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-CB12 | JUNCTION | 0.00 | 0.00 | 0 | 00:00 | 0 | 0 | 0.000 ltr |
| HP-PR-CB13 | JUNCTION | 0.00 | 17.64 | 0 | 01:09 | 0 | 0.00426 | 0.920 |
| HP-PR-CB14 | JUNCTION | 0.00 | 9.47 | 0 | 01:11 | 0 | 0.00329 | -0.016 |
| 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 | 6.96 | 0 | 01:38 | 0 | 0.0041 | 0.010 |
| HP-PR-CB20 | JUNCTION | 0.00 | 8.43 | 0 | 01:40 | 0 | 0.00694 | 0.006 |
| HP-PR-CB21 | JUNCTION | 0.00 | 8.25 | 0 | 01:30 | 0 | 0.00923 | 0.001 |
| HP-PR-CB22 | JUNCTION | 0.00 | 10.80 | 0 | 01:30 | 0 | 0.0183 | 0.115 |
| HP-PR-CB23 | JUNCTION | 0.00 | 17.11 | 0 | 01:20 | 0 | 0.0262 | 0.098 |
| 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-CB29 | JUNCTION | 0.00 | 0.00 | 0 | 00:00 | 0 | 0 | 0.000 ltr |

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|---|---|---|---|---|---|---|---|---|
| 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-CB40 | 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 | 6.51 | 0 | 01:29 | 0 | 0.00135 | 0.016 |
| 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 | 31.18 | 0 | 01:19 | 0 | 0.0357 | -0.008 |
| HP-PR-CBMH111 | JUNCTION | 0.00 | 2.16 | 0 | 01:37 | 0 | 0.000345 | 0.084 |
| HP-PR-CBMH112 | JUNCTION | 0.00 | 2.57 | 0 | 01:31 | 0 | 0.000965 | -0.382 |
| 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-CBMH124 | JUNCTION | 0.00 | 0.00 | 0 | 00:00 | 0 | 0 | 0.000 ltr |
| HP-PR-TD02 | JUNCTION | 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-EX-MH116 | OUTFALL | 0.00 | 42.25 | 0 | 01:50 | 0 | 0.124 | 0.000 |
| HP-PR-CB11 | 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 | 19.03 | 0 | 01:14 | 0 | 0.00933 | 0.000 |
| 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 | 0.00162 | 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 | 0.00158 | 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 |

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|---|---|---|---|---|---|---|---|---|
| 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 | 0.0246 | 0.000 |
| IF-PR-CB13 | OUTFALL | 0.00 | 0.15 | 0 | 00:25 | 0 | 0.0027 | 0.000 |
| IF-PR-CB14 | OUTFALL | 0.00 | 0.15 | 0 | 00:26 | 0 | 0.00265 | 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 | 00:28 | 0 | 0.032 | 0.000 |
| IF-PR-CB32 | OUTFALL | 0.00 | 1.61 | 0 | 00:28 | 0 | 0.0434 | 0.000 |
| IF-PR-CB36 | OUTFALL | 0.00 | 0.15 | 0 | 00:25 | 0 | 0.00362 | 0.000 |
| IF-PR-CB40 | OUTFALL | 0.00 | 1.17 | 0 | 00:27 | 0 | 0.0148 | 0.000 |
| IF-PR-CBMH104 | OUTFALL | 0.00 | 0.15 | 0 | 00:25 | 0 | 0.00478 | 0.000 |
| IF-PR-CBMH105 | OUTFALL | 0.00 | 0.27 | 0 | 00:25 | 0 | 0.014 | 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 | 00:24 | 0 | 0.00742 | 0.000 |
| IF-PR-CBMH108 | OUTFALL | 0.00 | 0.58 | 0 | 00:26 | 0 | 0.0214 | 0.000 |
| IF-PR-CBMH109 | OUTFALL | 0.00 | 1.55 | 0 | 00:26 | 0 | 0.0891 | 0.000 |
| IF-PR-CBMH110 | OUTFALL | 0.00 | 1.24 | 0 | 00:26 | 0 | 0.053 | 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 | 0.145 | 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 | 0.0489 | 0.000 |
| Major-01 | OUTFALL | 0.00 | 0.00 | 0 | 00:00 | 0 | 0 | 0.000 ltr |
| SWM_Pond | OUTFALL | 0.00 | 1139.63 | 0 | 01:20 | 0 | 8.19 | 0.000 |
| EX-BLDG01 | STORAGE | 412.65 | 412.65 | 0 | 01:10 | 0.618 | 0.618 | -0.007 |
| EX-CB116 | STORAGE | 24.80 | 53.27 | 0 | 01:02 | 0.0351 | 0.0378 | -0.145 |
| EX-CB117 | STORAGE | 46.74 | 68.50 | 0 | 01:05 | 0.0601 | 0.097 | -0.063 |
| EX-CB128 | STORAGE | 33.71 | 89.60 | 0 | 01:03 | 0.0494 | 0.0532 | -0.327 |
| EX-CB134 | STORAGE | 32.24 | 32.24 | 0 | 01:10 | 0.0456 | 0.0456 | -0.005 |
| EX-CB137 | STORAGE | 77.94 | 77.94 | 0 | 01:10 | 0.0975 | 0.0975 | -0.152 |
| EX-CB14 | STORAGE | 513.32 | 513.32 | 0 | 01:10 | 0.699 | 0.71 | -0.017 |
| EX-CB28 | STORAGE | 111.69 | 111.69 | 0 | 01:10 | 0.154 | 0.155 | 0.136 |
| EX-CB30 | STORAGE | 142.93 | 142.93 | 0 | 01:10 | 0.187 | 0.187 | -0.039 |
| EX-CB50 | STORAGE | 124.00 | 168.64 | 0 | 01:03 | 0.175 | 0.366 | 0.007 |
| EX-CB52 | STORAGE | 97.61 | 146.16 | 0 | 01:03 | 0.135 | 0.196 | -0.082 |
| EX-CB54 | STORAGE | 46.25 | 114.47 | 0 | 01:02 | 0.0574 | 0.0605 | -1.060 |
| EX-CB58 | STORAGE | 75.24 | 75.24 | 0 | 01:10 | 0.106 | 0.106 | 0.038 |
| EX-CB60 | STORAGE | 56.76 | 66.29 | 0 | 01:10 | 0.078 | 0.124 | 0.052 |
| EX-CB62 | STORAGE | 31.10 | 31.10 | 0 | 01:10 | 0.0462 | 0.0462 | 0.107 |
| EX-CB64 | STORAGE | 38.89 | 49.58 | 0 | 01:18 | 0.05 | 0.0753 | -0.254 |

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|---|---|---|---|---|---|---|---|---|
| EX-CB72 | STORAGE | 23.79 | 23.79 | 0 | 01:10 | 0.0302 | 0.0302 | 0.038 |
| EX-CB82 | STORAGE | 195.65 | 195.65 | 0 | 01:10 | 0.271 | 0.271 | -0.358 |
| EX-CB84 | STORAGE | 81.35 | 81.35 | 0 | 01:10 | 0.113 | 0.113 | -0.495 |
| EX-CB87 | STORAGE | 105.23 | 105.23 | 0 | 01:10 | 0.136 | 0.136 | -0.451 |
| EX-CB90 | STORAGE | 74.45 | 74.45 | 0 | 01:10 | 0.103 | 0.103 | -0.029 |
| EX-CB92 | STORAGE | 127.70 | 127.70 | 0 | 01:10 | 0.167 | 0.167 | -0.263 |
| EX-CB95 | STORAGE | 32.81 | 92.11 | 0 | 01:02 | 0.0464 | 0.106 | -0.205 |
| EX-CB96 | STORAGE | 92.08 | 130.99 | 0 | 01:04 | 0.129 | 0.23 | -0.177 |
| EX-MH101 | STORAGE | 94.60 | 1139.58 | 0 | 01:20 | 0.181 | 8.19 | -0.002 |
| EX-MH101A | STORAGE | 0.00 | 967.49 | 0 | 01:23 | 0 | 7.15 | -0.000 |
| EX-MH101B | STORAGE | 0.00 | 967.51 | 0 | 01:23 | 0 | 7.15 | 0.012 |
| EX-MH102 | STORAGE | 0.00 | 910.13 | 0 | 01:22 | 0 | 6.44 | -0.000 |
| EX-MH102A | STORAGE | 0.00 | 59.06 | 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 | 46.89 | 841.15 | 0 | 01:20 | 0.0578 | 5.19 | 0.040 |
| EX-MH105 | STORAGE | 0.00 | 131.85 | 0 | 01:03 | 0 | 0.961 | 0.001 |
| EX-MH105a | STORAGE | 0.00 | 122.26 | 0 | 01:34 | 0 | 0.961 | -0.004 |
| EX-MH106 | STORAGE | 0.00 | 134.36 | 0 | 01:03 | 0 | 0.724 | -0.011 |
| EX-MH106a | STORAGE | 0.00 | 191.87 | 0 | 01:03 | 0 | 0.961 | -0.022 |
| EX-MH107 | STORAGE | 0.00 | 181.35 | 0 | 01:02 | 0 | 0.338 | -0.062 |
| EX-MH107a | STORAGE | 0.00 | 184.34 | 0 | 01:04 | 0 | 0.724 | 0.011 |
| EX-MH108 | STORAGE | 28.79 | 195.38 | 0 | 01:10 | 0.037 | 0.655 | -0.014 |
| EX-MH109 | STORAGE | 0.00 | 584.39 | 0 | 01:22 | 0 | 3.79 | -0.177 |
| EX-MH112 | STORAGE | 0.00 | 142.18 | 0 | 01:03 | 0 | 0.468 | 0.005 |
| EX-MH112a | STORAGE | 0.00 | 116.78 | 0 | 01:03 | 0 | 0.468 | 0.069 |
| EX-MH115 | STORAGE | 0.00 | 103.90 | 0 | 01:09 | 0 | 0.859 | -0.038 |
| EX-MH116 | STORAGE | 0.00 | 138.87 | 0 | 01:09 | 0 | 0.982 | -0.113 |
| EX-STUB02 | STORAGE | 0.00 | 178.60 | 0 | 01:11 | 0 | 0.618 | 0.020 |
| PR-BLDG01 | STORAGE | 475.44 | 475.44 | 0 | 01:10 | 0.706 | 0.706 | 0.010 |
| PR-BLDG02 | STORAGE | 197.33 | 197.33 | 0 | 01:10 | 0.287 | 0.287 | 0.012 |
| PR-CB01 | STORAGE | 32.09 | 46.07 | 0 | 01:05 | 0.0388 | 0.0397 | 0.245 |
| PR-CB02 | STORAGE | 20.45 | 21.45 | 0 | 01:05 | 0.0272 | 0.0285 | -0.069 |
| PR-CB02a | STORAGE | 0.00 | 47.65 | 0 | 01:04 | 0 | 0.0701 | 0.037 |
| PR-CB03 | STORAGE | 33.30 | 37.38 | 0 | 01:04 | 0.0376 | 0.0377 | -0.072 |
| PR-CB04 | STORAGE | 44.06 | 99.12 | 0 | 01:03 | 0.062 | 0.0769 | -0.687 |
| PR-CB05 | STORAGE | 41.17 | 56.62 | 0 | 01:04 | 0.0583 | 0.0613 | 0.331 |
| PR-CB08 | STORAGE | 51.09 | 72.74 | 0 | 01:05 | 0.0723 | 0.0863 | 0.426 |
| PR-CB09 | STORAGE | 56.05 | 74.67 | 0 | 01:04 | 0.0793 | 0.089 | 0.429 |
| PR-CB11 | STORAGE | 73.41 | 73.41 | 0 | 01:10 | 0.104 | 0.105 | 0.107 |
| PR-CB12 | STORAGE | 98.70 | 123.85 | 0 | 01:01 | 0.14 | 0.245 | 0.350 |
| PR-CB13 | STORAGE | 25.79 | 25.79 | 0 | 01:10 | 0.0365 | 0.0365 | -0.043 |

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|---|---|---|---|---|---|---|---|---|
| PR-CB14 | STORAGE | 22.98 | 40.61 | 0 | 01:10 | 0.0284 | 0.0338 | -0.052 |
| PR-CB15 | STORAGE | 59.45 | 99.29 | 0 | 01:08 | 0.0797 | 0.0928 | -0.415 |
| PR-CB16/17 | STORAGE | 216.43 | 216.43 | 0 | 01:10 | 0.279 | 0.279 | -0.140 |
| PR-CB18 | STORAGE | 27.96 | 27.96 | 0 | 01:10 | 0.0365 | 0.0375 | 0.059 |
| PR-CB19 | STORAGE | 31.56 | 95.73 | 0 | 01:10 | 0.0417 | 0.143 | 0.698 |
| PR-CB20 | STORAGE | 41.66 | 57.99 | 0 | 01:10 | 0.059 | 0.0873 | -0.126 |
| PR-CB21 | STORAGE | 82.30 | 183.45 | 0 | 01:03 | 0.116 | 0.339 | 0.211 |
| PR-CB22 | STORAGE | 81.31 | 143.89 | 0 | 01:02 | 0.115 | 0.24 | 0.283 |
| PR-CB23 | STORAGE | 106.11 | 106.11 | 0 | 01:10 | 0.15 | 0.15 | 0.070 |
| PR-CB24 | STORAGE | 87.77 | 184.75 | 0 | 01:03 | 0.124 | 0.417 | 0.232 |
| PR-CB25 | STORAGE | 87.77 | 146.83 | 0 | 01:02 | 0.124 | 0.29 | -0.057 |
| PR-CB26 | STORAGE | 116.53 | 116.53 | 0 | 01:10 | 0.165 | 0.165 | 0.131 |
| PR-CB27 | STORAGE | 78.85 | 121.08 | 0 | 01:02 | 0.112 | 0.221 | 0.229 |
| PR-CB28 | STORAGE | 76.87 | 76.87 | 0 | 01:10 | 0.109 | 0.109 | -0.021 |
| PR-CB29 | STORAGE | 58.03 | 58.03 | 0 | 01:10 | 0.0821 | 0.0841 | -0.190 |
| PR-CB30 | STORAGE | 45.63 | 63.50 | 0 | 01:08 | 0.0646 | 0.0733 | 0.085 |
| PR-CB31 | STORAGE | 97.55 | 136.43 | 0 | 01:06 | 0.138 | 0.223 | 0.400 |
| PR-CB32 | STORAGE | 75.36 | 89.76 | 0 | 01:08 | 0.107 | 0.114 | -0.517 |
| PR-CB35 | STORAGE | 16.87 | 52.99 | 0 | 01:05 | 0.0206 | 0.0243 | 0.137 |
| PR-CB36 | STORAGE | 25.33 | 25.33 | 0 | 01:10 | 0.0305 | 0.0305 | 0.057 |
| PR-CB37 | STORAGE | 15.81 | 26.35 | 0 | 01:04 | 0.0222 | 0.025 | 2.272 |
| PR-CB38 | STORAGE | 24.95 | 43.91 | 0 | 01:04 | 0.0324 | 0.0417 | -0.104 |
| PR-CB39 | STORAGE | 4.96 | 20.56 | 0 | 01:04 | 0.00702 | 0.00773 | 0.054 |
| PR-CB40 | STORAGE | 68.73 | 68.73 | 0 | 01:10 | 0.0941 | 0.0941 | -1.964 |
| PR-CB41 | STORAGE | 14.38 | 14.38 | 0 | 01:10 | 0.0204 | 0.0204 | 0.112 |
| PR-CBMH104 | STORAGE | 27.42 | 61.98 | 0 | 01:03 | 0.0352 | 0.0963 | -0.084 |
| PR-CBMH105 | STORAGE | 18.23 | 72.78 | 0 | 01:03 | 0.0226 | 0.14 | -0.196 |
| PR-CBMH106 | STORAGE | 57.30 | 104.75 | 0 | 01:03 | 0.08 | 0.166 | -0.098 |
| PR-CBMH107 | STORAGE | 65.68 | 99.06 | 0 | 01:05 | 0.0834 | 0.108 | 0.119 |
| PR-CBMH108 | STORAGE | 65.47 | 116.90 | 0 | 01:03 | 0.0926 | 0.181 | -0.176 |
| PR-CBMH109 | STORAGE | 108.62 | 198.88 | 0 | 01:04 | 0.154 | 0.397 | -0.996 |
| PR-CBMH109a | STORAGE | 0.00 | 20.00 | 0 | 01:12 | 0 | 0.312 | 0.000 |
| PR-CBMH110 | STORAGE | 111.03 | 191.49 | 0 | 01:07 | 0.146 | 0.248 | -0.161 |
| PR-CBMH111 | STORAGE | 31.56 | 104.05 | 0 | 01:06 | 0.0417 | 0.186 | -0.516 |
| PR-CBMH112 | STORAGE | 82.80 | 250.99 | 0 | 01:06 | 0.117 | 0.445 | -1.132 |
| PR-CBMH114 | STORAGE | 106.12 | 272.31 | 0 | 01:05 | 0.15 | 0.565 | -0.212 |
| PR-CBMH115 | STORAGE | 76.87 | 174.61 | 0 | 01:05 | 0.109 | 0.329 | -0.332 |
| PR-CBMH115a | STORAGE | 0.00 | 10.47 | 0 | 02:10 | 0 | 0.269 | 0.017 |
| PR-CBMH118 | STORAGE | 140.35 | 264.15 | 0 | 01:05 | 0.199 | 0.413 | -1.518 |
| PR-CBMH122 | STORAGE | 42.87 | 69.02 | 0 | 01:05 | 0.0539 | 0.12 | 0.287 |
| PR-MH100 | STORAGE | 0.00 | 86.78 | 0 | 01:03 | 0 | 0.158 | 0.302 |

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|---|---|---|---|---|---|---|---|---|
| PR-MH100a | STORAGE | 0.00 | 24.33 | 0 | 01:12 | 0 | 0.256 | 0.090 |
| PR-MH101 | STORAGE | 0.00 | 63.01 | 0 | 01:11 | 0 | 0.761 | -0.048 |
| PR-MH102 | STORAGE | 0.00 | 101.31 | 0 | 01:43 | 0 | 1.14 | -0.212 |
| PR-MH103 | STORAGE | 0.00 | 254.73 | 0 | 01:43 | 0 | 1.9 | 0.143 |
| PR-MH104 | STORAGE | 0.00 | 280.24 | 0 | 01:42 | 0 | 1.96 | -0.069 |
| PR-MH113 | STORAGE | 0.00 | 35.90 | 0 | 02:10 | 0 | 1.03 | -0.024 |
| PR-MH116 | STORAGE | 0.00 | 149.48 | 0 | 01:09 | 0 | 0.983 | 0.047 |
| PR-MH117 | STORAGE | 0.00 | 105.67 | 0 | 01:06 | 0 | 0.658 | -0.002 |
| 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-MH123 | STORAGE | 0.00 | 55.18 | 0 | 01:06 | 0 | 0.239 | -0.125 |
| PR-OGS1 | STORAGE | 0.00 | 44.94 | 0 | 01:10 | 0 | 0.167 | 0.232 |
| PR-STUB01 | STORAGE | 0.00 | 37.90 | 0 | 01:20 | 0 | 0.287 | 0.046 |
| PR-TD02 | STORAGE | 60.48 | 60.48 | 0 | 01:10 | 0.0856 | 0.0856 | 0.067 |
| PR-TD1 | STORAGE | 8.93 | 9.11 | 0 | 01:14 | 0.0126 | 0.0129 | 2.907 |

**********************
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 | 0.000 | 2 | 0 | 0 | 0.007 | 34 | 0 | 01:25 | 29.24 |
| EX-CB117 | 0.001 | 2 | 0 | 0 | 0.033 | 39 | 0 | 01:25 | 43.80 |
| EX-CB128 | 0.001 | 3 | 0 | 0 | 0.012 | 51 | 0 | 01:21 | 21.05 |
| EX-CB134 | 0.000 | 1 | 0 | 0 | 0.001 | 46 | 0 | 01:03 | 35.05 |
| EX-CB137 | 0.000 | 2 | 0 | 0 | 0.015 | 86 | 0 | 01:11 | 47.49 |
| EX-CB14 | 0.032 | 8 | 0 | 0 | 0.372 | 93 | 0 | 01:42 | 57.69 |
| EX-CB28 | 0.005 | 2 | 0 | 0 | 0.085 | 35 | 0 | 01:37 | 95.30 |
| EX-CB30 | 0.003 | 2 | 0 | 0 | 0.064 | 36 | 0 | 01:24 | 99.59 |
| EX-CB50 | 0.001 | 0 | 0 | 0 | 0.035 | 20 | 0 | 01:12 | 104.30 |
| EX-CB52 | 0.002 | 1 | 0 | 0 | 0.067 | 41 | 0 | 01:21 | 87.30 |
| EX-CB54 | 0.000 | 1 | 0 | 0 | 0.011 | 24 | 0 | 01:20 | 53.16 |
| EX-CB58 | 0.001 | 0 | 0 | 0 | 0.023 | 18 | 0 | 01:11 | 52.65 |
| EX-CB60 | 0.000 | 1 | 0 | 0 | 0.017 | 41 | 0 | 01:21 | 31.55 |
| EX-CB62 | 0.000 | 1 | 0 | 0 | 0.009 | 39 | 0 | 01:21 | 20.90 |
| EX-CB64 | 0.001 | 2 | 0 | 0 | 0.008 | 37 | 0 | 01:20 | 38.87 |
| EX-CB72 | 0.000 | 0 | 0 | 0 | 0.004 | 39 | 0 | 01:11 | 11.58 |
| EX-CB82 | 0.001 | 1 | 0 | 0 | 0.057 | 63 | 0 | 01:11 | 96.52 |
| EX-CB84 | 0.001 | 0 | 0 | 0 | 0.029 | 16 | 0 | 01:11 | 35.71 |
| EX-CB87 | 0.002 | 1 | 0 | 0 | 0.048 | 35 | 0 | 01:23 | 50.24 |
| EX-CB90 | 0.001 | 1 | 0 | 0 | 0.023 | 23 | 0 | 01:11 | 54.08 |
| EX-CB92 | 0.004 | 3 | 0 | 0 | 0.071 | 58 | 0 | 01:30 | 52.52 |
| EX-CB95 | 0.001 | 3 | 0 | 0 | 0.012 | 42 | 0 | 01:30 | 65.58 |
| EX-CB96 | 0.003 | 2 | 0 | 0 | 0.074 | 33 | 0 | 01:33 | 87.56 |
| EX-MH101 | 0.000 | 3 | 0 | 0 | 0.000 | 20 | 0 | 01:20 | 1139.63 |
| EX-MH101A | 0.000 | 2 | 0 | 0 | 0.000 | 10 | 0 | 01:23 | 967.51 |
| EX-MH101B | 0.000 | 1 | 0 | 0 | 0.000 | 8 | 0 | 01:23 | 967.51 |
| EX-MH102 | 0.000 | 2 | 0 | 0 | 0.000 | 9 | 0 | 01:22 | 910.16 |
| 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 | 2 | 0 | 0 | 0.001 | 31 | 0 | 01:22 | 840.38 |
| EX-MH105 | 0.000 | 7 | 0 | 0 | 0.002 | 87 | 0 | 01:24 | 122.26 |
| EX-MH105a | 0.000 | 1 | 0 | 0 | 0.000 | 15 | 0 | 01:22 | 124.53 |
| EX-MH106 | 0.000 | 4 | 0 | 0 | 0.002 | 55 | 0 | 01:26 | 109.26 |
| EX-MH106a | 0.000 | 7 | 0 | 0 | 0.002 | 88 | 0 | 01:24 | 131.85 |
| EX-MH107 | 0.000 | 5 | 0 | 0 | 0.002 | 58 | 0 | 01:34 | 96.43 |
| EX-MH107a | 0.000 | 5 | 0 | 0 | 0.002 | 57 | 0 | 01:31 | 134.36 |
| EX-MH108 | 0.000 | 2 | 0 | 0 | 0.002 | 73 | 0 | 01:22 | 188.54 |
| EX-MH109 | 0.000 | 4 | 0 | 0 | 0.002 | 58 | 0 | 01:22 | 586.90 |
| EX-MH112 | 0.000 | 2 | 0 | 0 | 0.001 | 54 | 0 | 01:22 | 116.78 |
| EX-MH112a | 0.000 | 2 | 0 | 0 | 0.001 | 53 | 0 | 01:23 | 112.59 |
| EX-MH115 | 0.000 | 4 | 0 | 0 | 0.001 | 54 | 0 | 01:22 | 100.32 |
| EX-MH116 | 0.000 | 5 | 0 | 0 | 0.001 | 59 | 0 | 01:50 | 137.98 |
| EX-STUB02 | 0.000 | 3 | 0 | 0 | 0.002 | 80 | 0 | 01:22 | 178.94 |
| PR-BLDG01 | 0.027 | 1 | 0 | 0 | 0.358 | 8 | 0 | 01:31 | 76.26 |
| PR-BLDG02 | 0.008 | 0 | 0 | 0 | 0.137 | 8 | 0 | 01:24 | 37.90 |
| PR-CB01 | 0.001 | 7 | 0 | 0 | 0.014 | 72 | 0 | 01:45 | 20.81 |
| PR-CB02 | 0.001 | 2 | 0 | 0 | 0.011 | 28 | 0 | 01:45 | 18.96 |
| PR-CB02a | 0.000 | 9 | 0 | 0 | 0.001 | 57 | 0 | 01:45 | 37.60 |
| PR-CB03 | 0.001 | 4 | 0 | 0 | 0.010 | 47 | 0 | 01:44 | 36.38 |
| PR-CB04 | 0.012 | 14 | 0 | 0 | 0.056 | 64 | 0 | 01:45 | 63.48 |
| PR-CB05 | 0.002 | 3 | 0 | 0 | 0.026 | 42 | 0 | 01:37 | 38.11 |
| PR-CB08 | 0.005 | 7 | 0 | 0 | 0.046 | 68 | 0 | 01:50 | 48.55 |
| PR-CB09 | 0.006 | 7 | 0 | 0 | 0.047 | 62 | 0 | 01:52 | 52.62 |
| PR-CB11 | 0.009 | 14 | 0 | 0 | 0.050 | 75 | 0 | 02:30 | 41.57 |
| PR-CB12 | 0.013 | 12 | 0 | 0 | 0.071 | 64 | 0 | 02:30 | 94.57 |
| PR-CB13 | 0.001 | 6 | 0 | 0 | 0.010 | 100 | 0 | 01:07 | 25.80 |
| PR-CB14 | 0.001 | 5 | 0 | 0 | 0.012 | 100 | 0 | 01:11 | 17.17 |
| PR-CB15 | 0.002 | 6 | 0 | 0 | 0.036 | 84 | 0 | 01:35 | 57.46 |
| PR-CB16/17 | 0.001 | 0 | 0 | 0 | 0.052 | 24 | 0 | 01:13 | 97.00 |
| PR-CB18 | 0.001 | 4 | 0 | 0 | 0.012 | 95 | 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 | 169.67 |
| PR-CB22 | 0.005 | 12 | 0 | 0 | 0.039 | 99 | 0 | 01:30 | 108.50 |
| PR-CB23 | 0.004 | 13 | 0 | 0 | 0.033 | 100 | 0 | 01:20 | 71.96 |
| PR-CB24 | 0.014 | 12 | 0 | 0 | 0.071 | 56 | 0 | 02:50 | 168.14 |
| PR-CB25 | 0.014 | 12 | 0 | 0 | 0.069 | 57 | 0 | 02:50 | 106.40 |
| PR-CB26 | 0.012 | 12 | 0 | 0 | 0.057 | 58 | 0 | 02:50 | 71.88 |
| PR-CB27 | 0.007 | 6 | 0 | 0 | 0.050 | 40 | 0 | 02:11 | 99.82 |
| PR-CB28 | 0.007 | 6 | 0 | 0 | 0.047 | 41 | 0 | 02:11 | 50.55 |
| PR-CB29 | 0.008 | 8 | 0 | 0 | 0.060 | 60 | 0 | 01:43 | 5.53 |
| PR-CB30 | 0.001 | 3 | 0 | 0 | 0.030 | 94 | 0 | 01:30 | 41.01 |
| PR-CB31 | 0.002 | 3 | 0 | 0 | 0.051 | 92 | 0 | 01:30 | 128.74 |
| PR-CB32 | 0.009 | 15 | 0 | 0 | 0.063 | 100 | 0 | 01:13 | 27.95 |
| PR-CB35 | 0.000 | 4 | 0 | 0 | 0.003 | 100 | 0 | 01:23 | 38.94 |
| PR-CB36 | 0.001 | 3 | 0 | 0 | 0.013 | 52 | 0 | 01:22 | 6.20 |
| PR-CB37 | 0.001 | 9 | 0 | 0 | 0.010 | 100 | 0 | 01:30 | 20.04 |
| PR-CB38 | 0.000 | 5 | 0 | 0 | 0.006 | 72 | 0 | 01:43 | 19.96 |
| PR-CB39 | 0.000 | 1 | 0 | 0 | 0.000 | 4 | 0 | 01:44 | 10.73 |
| PR-CB40 | 0.003 | 5 | 0 | 0 | 0.043 | 84 | 0 | 01:30 | 11.11 |
| PR-CB41 | 0.000 | 0 | 0 | 0 | 0.003 | 3 | 0 | 01:11 | 7.60 |
| PR-CBMH104 | 0.003 | 6 | 0 | 0 | 0.025 | 44 | 0 | 01:35 | 22.90 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PR-CBMH105 | 0.009 | 22 | 0 | 0 | 0.042 | 100 | 0 | 01:15 | 23.91 |
| PR-CBMH106 | 0.009 | 8 | 0 | 0 | 0.049 | 41 | 0 | 01:50 | 29.47 |
| PR-CBMH107 | 0.007 | 13 | 0 | 0 | 0.057 | 100 | 0 | 01:16 | 44.14 |
| PR-CBMH108 | 0.012 | 11 | 0 | 0 | 0.064 | 58 | 0 | 01:51 | 26.93 |
| PR-CBMH109 | 0.059 | 24 | 0 | 0 | 0.178 | 71 | 0 | 02:30 | 10.99 |
| PR-CBMH109a | 0.000 | 2 | 0 | 0 | 0.000 | 19 | 0 | 01:23 | 17.04 |
| PR-CBMH110 | 0.027 | 22 | 0 | 0 | 0.122 | 100 | 0 | 01:18 | 54.72 |
| PR-CBMH111 | 0.011 | 15 | 0 | 0 | 0.072 | 100 | 0 | 01:37 | 49.53 |
| PR-CBMH112 | 0.053 | 28 | 0 | 0 | 0.187 | 99 | 0 | 01:31 | 24.19 |
| PR-CBMH114 | 0.092 | 34 | 0 | 0 | 0.218 | 80 | 0 | 02:50 | 17.41 |
| 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 | 0.010 | 9 | 0 | 0 | 0.114 | 97 | 0 | 01:21 | 82.93 |
| PR-CBMH122 | 0.002 | 9 | 0 | 0 | 0.022 | 100 | 0 | 01:29 | 57.93 |
| PR-MH100 | 0.000 | 16 | 0 | 0 | 0.001 | 95 | 0 | 01:45 | 60.41 |
| PR-MH100a | 0.000 | 2 | 0 | 0 | 0.001 | 35 | 0 | 01:24 | 30.13 |
| PR-MH101 | 0.000 | 3 | 0 | 0 | 0.001 | 41 | 0 | 01:24 | 79.39 |
| PR-MH102 | 0.000 | 3 | 0 | 0 | 0.001 | 43 | 0 | 01:24 | 120.72 |
| PR-MH103 | 0.000 | 4 | 0 | 0 | 0.001 | 54 | 0 | 01:23 | 269.21 |
| PR-MH104 | 0.000 | 4 | 0 | 0 | 0.001 | 57 | 0 | 01:22 | 289.53 |
| PR-MH113 | 0.000 | 3 | 0 | 0 | 0.000 | 6 | 0 | 02:11 | 35.90 |
| PR-MH116 | 0.000 | 1 | 0 | 0 | 0.001 | 28 | 0 | 01:22 | 138.87 |
| PR-MH117 | 0.000 | 3 | 0 | 0 | 0.001 | 50 | 0 | 01:24 | 98.19 |
| PR-MH119 | 0.000 | 3 | 0 | 0 | 0.000 | 8 | 0 | 01:34 | 59.06 |
| PR-MH120 | 0.000 | 2 | 0 | 0 | 0.000 | 5 | 0 | 02:26 | 21.24 |
| PR-MH123 | 0.000 | 2 | 0 | 0 | 0.001 | 42 | 0 | 01:24 | 53.84 |
| PR-OGS1 | 0.000 | 1 | 0 | 0 | 0.001 | 34 | 0 | 01:24 | 44.79 |
| PR-STUB01 | 0.000 | 0 | 0 | 0 | 0.000 | 2 | 0 | 01:22 | 39.03 |
| PR-TD02 | 0.000 | 0 | 0 | 0 | 0.012 | 3 | 0 | 01:11 | 35.43 |
| PR-TD1 | 0.000 | 0 | 0 | 0 | 0.000 | 0 | 0 | 01:24 | 8.93 |

***********************
Outfall Loading Summary
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| Outfall Node | Flow Freq Pcnt | Avg Flow LPS | Max Flow LPS | Total Volume 10^6 ltr |
|---|---|---|---|---|
| HP-EX-CB14 | 0.00 | 0.00 | 0.00 | 0.000 |
| HP-EX-MH116 | 5.34 | 27.80 | 42.25 | 0.124 |
| HP-PR-CB11 | 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 | 1.44 | 7.60 | 19.03 | 0.009 |
| HP-PR-CBMH118 | 0.00 | 0.00 | 0.00 | 0.000 |
| IF-EX-CB116 | 14.74 | 0.13 | 0.14 | 0.002 |
| IF-EX-CB117 | 15.56 | 0.13 | 0.14 | 0.002 |
| IF-EX-CB128 | 16.76 | 0.12 | 0.14 | 0.002 |
| IF-EX-CB137 | 15.61 | 0.19 | 0.21 | 0.003 |
| IF-EX-CB14 | 32.72 | 0.11 | 0.14 | 0.003 |
| IF-EX-CB28 | 17.14 | 0.13 | 0.14 | 0.002 |
| IF-EX-CB30 | 18.46 | 0.12 | 0.14 | 0.002 |
| IF-EX-CB50 | 18.64 | 0.13 | 0.14 | 0.002 |
| IF-EX-CB52 | 17.77 | 0.12 | 0.14 | 0.002 |
| IF-EX-CB54 | 14.73 | 0.13 | 0.14 | 0.002 |
| IF-EX-CB58 | 17.23 | 0.12 | 0.14 | 0.002 |
| IF-EX-CB64 | 14.19 | 0.13 | 0.14 | 0.002 |
| IF-EX-CB82 | 21.43 | 0.18 | 0.21 | 0.003 |
| IF-EX-CB84 | 16.64 | 0.19 | 0.21 | 0.003 |
| IF-EX-CB87 | 17.27 | 0.12 | 0.14 | 0.002 |
| IF-EX-CB90 | 16.16 | 0.13 | 0.14 | 0.002 |
| IF-EX-CB92 | 19.09 | 0.12 | 0.14 | 0.002 |
| IF-EX-CB95 | 17.47 | 0.12 | 0.14 | 0.002 |
| IF-EX-CB96 | 16.81 | 0.13 | 0.14 | 0.002 |
| IF-PR-CB04 | 73.21 | 0.39 | 0.39 | 0.025 |
| IF-PR-CB13 | 21.12 | 0.15 | 0.15 | 0.003 |
| IF-PR-CB14 | 20.69 | 0.15 | 0.15 | 0.003 |
| IF-PR-CB18 | 20.72 | 0.15 | 0.15 | 0.003 |
| IF-PR-CB29 | 32.08 | 1.16 | 1.17 | 0.032 |
| IF-PR-CB32 | 31.73 | 1.59 | 1.61 | 0.043 |
| IF-PR-CB36 | 28.16 | 0.15 | 0.15 | 0.004 |
| IF-PR-CB40 | 16.41 | 1.06 | 1.17 | 0.015 |
| IF-PR-CBMH104 | 37.13 | 0.15 | 0.15 | 0.005 |
| IF-PR-CBMH105 | 60.57 | 0.27 | 0.27 | 0.014 |
| IF-PR-CBMH106 | 40.49 | 0.52 | 0.52 | 0.018 |
| IF-PR-CBMH107 | 41.42 | 0.21 | 0.21 | 0.007 |
| IF-PR-CBMH108 | 42.97 | 0.58 | 0.58 | 0.021 |
| IF-PR-CBMH109 | 66.69 | 1.55 | 1.55 | 0.089 |
| IF-PR-CBMH110 | 49.75 | 1.24 | 1.24 | 0.053 |

| | | | | |
|---|---|---|---|---|
| IF-PR-CBMH111 | 34.96 | 0.94 | 0.94 | 0.028 |
| IF-PR-CBMH112 | 56.68 | 2.17 | 2.18 | 0.106 |
| IF-PR-CBMH114 | 77.44 | 2.18 | 2.18 | 0.145 |
| IF-PR-CBMH115 | 56.55 | 1.24 | 1.24 | 0.060 |
| IF-PR-CBMH118 | 28.24 | 2.02 | 2.28 | 0.049 |
| Major-01 | 0.00 | 0.00 | 0.00 | 0.000 |
| SWM_Pond | 71.74 | 134.36 | 1139.63 | 8.188 |
| System | 26.12 | 190.13 | 1215.95 | 9.082 |

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Link Flow Summary
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| Link | Type | Maximum \|Flow\| LPS | Time of Max Occurrence days hr:min | Maximum \|Veloc\| m/sec | Max/ Full Flow | Max/ Full Depth |
|---|---|---|---|---|---|---|
| 108_(CB) | CONDUIT | 36.38 | 0 01:04 | 0.74 | 0.85 | 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 |
| 138_(CB)_1 | CONDUIT | 21.06 | 0 01:05 | 0.30 | 0.39 | 1.00 |
| 138_(CB)_2 | CONDUIT | 42.92 | 0 01:04 | 0.61 | 0.79 | 1.00 |
| 14_(STM) | CONDUIT | 112.59 | 0 01:12 | 1.63 | 2.62 | 1.00 |
| 142_(STM) | CONDUIT | 63.09 | 0 01:04 | 0.89 | 1.09 | 1.00 |
| 145_(CB) | CONDUIT | 52.62 | 0 01:03 | 1.07 | 1.27 | 1.00 |
| 150_(1)_(STM) | CONDUIT | 53.84 | 0 01:05 | 0.93 | 0.79 | 1.00 |
| 156_(STM) | CONDUIT | 18.96 | 0 01:03 | 0.47 | 0.44 | 1.00 |
| 163_(STM) | CONDUIT | 41.01 | 0 01:06 | 0.58 | 0.58 | 1.00 |
| 165_(CB) | CONDUIT | 128.74 | 0 01:05 | 1.82 | 1.86 | 1.00 |
| 17_(1)_(STM) | CONDUIT | 96.69 | 0 01:09 | 1.40 | 1.41 | 1.00 |
| 20_(STM) | CONDUIT | 39.03 | 0 01:29 | 1.34 | 0.46 | 0.93 |
| 226_(CB) | CONDUIT | 8.93 | 0 01:10 | 0.66 | 0.21 | 1.00 |
| 230_(CB) | CONDUIT | 38.94 | 0 01:05 | 0.79 | 0.92 | 1.00 |
| 246_(CB) | CONDUIT | 57.93 | 0 01:03 | 1.18 | 1.39 | 1.00 |
| 250_(CB) | CONDUIT | 20.04 | 0 01:04 | 0.41 | 0.49 | 1.00 |
| 251_(CB) | CONDUIT | 21.28 | 0 01:04 | 0.50 | 0.50 | 1.00 |
| 268_(STM) | CONDUIT | 44.79 | 0 01:07 | 0.97 | 0.65 | 1.00 |
| 271_(CB) | CONDUIT | 15.60 | 0 01:04 | 0.50 | 0.66 | 1.00 |
| 28_(1)_(STM) | CONDUIT | 35.90 | 0 02:11 | 1.25 | 0.37 | 0.48 |
| 28_(STM) | CONDUIT | 59.06 | 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 | 50.55 | 0 01:02 | 1.03 | 1.22 | 1.00 |
| 34_(STM) | CONDUIT | 99.82 | 0 01:03 | 2.03 | 1.83 | 1.00 |
| 36_(1)_(STM) | CONDUIT | 106.40 | 0 01:02 | 1.51 | 1.57 | 1.00 |
| 36_(STM) | CONDUIT | 168.14 | 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 | 108.50 | 0 01:03 | 1.53 | 1.60 | 1.00 |
| 49_(STM) | CONDUIT | 71.88 | 0 01:02 | 1.02 | 1.07 | 1.00 |
| 5_(STM)_1 | CONDUIT | 30.13 | 0 01:43 | 0.53 | 0.20 | 1.00 |
| 5_(STM)_2 | CONDUIT | 79.39 | 0 01:44 | 0.92 | 0.52 | 1.00 |
| 54_(STM) | CONDUIT | 169.67 | 0 01:04 | 2.40 | 2.51 | 1.00 |
| 57_(STM) | CONDUIT | 17.04 | 0 01:13 | 0.68 | 0.25 | 1.00 |
| 59_(STM) | CONDUIT | 94.57 | 0 01:02 | 1.93 | 2.27 | 1.00 |
| 61_(STM) | CONDUIT | 41.57 | 0 01:01 | 0.85 | 0.98 | 1.00 |
| 64_(CB) | CONDUIT | 57.46 | 0 01:07 | 1.18 | 0.96 | 1.00 |
| 7_(STM) | CONDUIT | 120.72 | 0 01:44 | 0.97 | 0.52 | 1.00 |
| 86_(CB) | CONDUIT | 48.55 | 0 01:03 | 0.99 | 1.17 | 1.00 |
| 9_(1)_(STM) | CONDUIT | 289.53 | 0 01:42 | 1.02 | 0.86 | 1.00 |
| 9_(STM)_2 | CONDUIT | 269.21 | 0 01:42 | 0.95 | 0.81 | 1.00 |
| 94_(CB) | CONDUIT | 38.11 | 0 01:03 | 0.78 | 0.90 | 1.00 |
| C1 | CONDUIT | 31.00 | 0 01:02 | 1.11 | 0.35 | 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 | 17.64 | 0 | 01:09 | 0.13 | 0.00 | 0.05 |
| C129 | CONDUIT | 17.65 | 0 | 01:09 | 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 | 0.13 |
| 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 |
| C134 | CONDUIT | 12.81 | 0 | 01:10 | 0.86 | 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 |
| C140 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.12 |
| C141 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.11 |
| C142 | CONDUIT | 6.51 | 0 | 01:29 | 0.02 | 0.00 | 0.13 |
| C143 | CONDUIT | 6.50 | 0 | 01:29 | 0.03 | 0.00 | 0.09 |
| C144 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.07 |
| C145 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.07 |
| C146 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.00 |
| C147 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.13 |
| C148 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.08 |
| C149 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.13 |
| C15 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.11 |
| C150 | CONDUIT | 15.62 | 0 | 01:03 | 0.09 | 0.00 | 0.06 |
| C151 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.04 |

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|---|---|---|---|---|---|---|---|
| C152 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.11 |
| 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 | 17.10 | 0 | 01:20 | 0.82 | 0.00 | 0.08 |
| C24 | CONDUIT | 10.80 | 0 | 01:30 | 0.67 | 0.00 | 0.08 |
| C25 | CONDUIT | 8.25 | 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 | 0.00 |
| 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 | 0.01 |
| 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 | 0.07 |
| C4 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.10 |
| C40 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.08 |
| C41 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.07 |
| C42 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.08 |
| C43 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.08 |
| C44 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.08 |
| C45 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.08 |
| C46 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.08 |
| C47 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.08 |
| 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 |

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|---|---|---|---|---|---|---|---|
| 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 | 9.47 | 0 | 01:11 | 0.06 | 0.00 | 0.06 |
| 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 | 0.09 |
| C58 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.09 |
| C59 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.09 |
| C6 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.10 |
| C60 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.09 |
| C61 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.09 |
| C62 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.09 |
| C63 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.09 |
| C65 | CONDUIT | 8.54 | 0 | 01:11 | 0.03 | 0.00 | 0.13 |
| C66 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.13 |
| C67 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.13 |
| C68 | CONDUIT | 2.57 | 0 | 01:31 | 0.01 | 0.00 | 0.10 |
| C69 | CONDUIT | 2.57 | 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 | 0.04 |
| C71 | CONDUIT | 8.43 | 0 | 01:40 | 0.04 | 0.00 | 0.08 |
| C72 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.11 |
| C73 | CONDUIT | 6.96 | 0 | 01:38 | 0.03 | 0.00 | 0.08 |
| C74 | CONDUIT | 2.16 | 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 | 8.43 | 0 | 01:40 | 0.80 | 0.00 | 0.00 |
| C78 | CONDUIT | 42.25 | 0 | 01:50 | 0.56 | 0.00 | 0.03 |
| C79 | CONDUIT | 6.96 | 0 | 01:38 | 0.68 | 0.00 | 0.00 |
| C8 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.10 |
| C80 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.11 |
| C81 | CONDUIT | 2.16 | 0 | 01:37 | 0.00 | 0.00 | 0.00 |
| C82 | CONDUIT | 16.68 | 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 |

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|---|---|---|---|---|---|---|---|
| C86 | 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 | 19.03 | 0 | 01:14 | 0.10 | 0.00 | 0.06 |
| C89 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.09 |
| C9 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.11 |
| C90 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.09 |
| C91 | CONDUIT | 0.00 | 0 | 00:00 | 0.00 | 0.00 | 0.07 |
| C92 | CONDUIT | 12.65 | 0 | 01:20 | 0.05 | 0.00 | 0.08 |
| C93 | CONDUIT | 11.18 | 0 | 01:20 | 0.04 | 0.00 | 0.09 |
| C94 | CONDUIT | 31.18 | 0 | 01:19 | 0.84 | 0.00 | 0.16 |
| C95 | CONDUIT | 38.19 | 0 | 01:18 | 0.28 | 0.00 | 0.10 |
| 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 | 0.08 |
| C-CB22 | CONDUIT | 10.80 | 0 | 01:30 | 0.03 | 0.00 | 0.11 |
| C-CB23 | CONDUIT | 17.11 | 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 | 8.25 | 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 | 1139.63 | 0 | 01:20 | 3.88 | 0.72 | 0.63 |
| EXMH115-101 | CONDUIT | 100.32 | 0 | 02:22 | 1.43 | 1.47 | 1.00 |
| EXMH116-115 | CONDUIT | 103.90 | 0 | 01:09 | 1.47 | 1.53 | 1.00 |
| PRMH116-EX-MH116 | CONDUIT | 138.87 | 0 | 01:09 | 3.11 | 0.96 | 1.00 |
| X-CB-129_(X-CB) | CONDUIT | 65.44 | 0 | 01:03 | 2.08 | 2.39 | 1.00 |
| X-CB-89_(X-CB) | CONDUIT | 50.10 | 0 | 01:03 | 1.59 | 0.78 | 1.00 |
| X-CB-91_(X-CB) | CONDUIT | 53.94 | 0 | 01:03 | 1.72 | 0.73 | 1.00 |
| X-CB-94_(X-CB) | CONDUIT | 52.38 | 0 | 01:02 | 1.67 | 1.37 | 1.00 |
| X-CB-97_(X-CB) | CONDUIT | 69.97 | 0 | 01:02 | 0.99 | 0.86 | 1.00 |
| X-CB-98_(X-CB) | CONDUIT | 76.57 | 0 | 01:04 | 1.08 | 2.21 | 1.00 |
| X-STM-13_(1)_(X-STM) | CONDUIT | 967.51 | 0 | 01:23 | 3.25 | 0.74 | 0.64 |
| X-STM-13_(X-STM) | CONDUIT | 967.51 | 0 | 01:23 | 3.70 | 0.58 | 0.57 |
| X-STM-17_(X-STM) | CONDUIT | 910.16 | 0 | 01:23 | 3.36 | 0.65 | 0.59 |
| X-STM-19_(X-STM) | CONDUIT | 59.06 | 0 | 01:35 | 1.30 | 0.65 | 0.61 |
| X-STM-21_(X-STM) | CONDUIT | 840.38 | 0 | 01:22 | 3.00 | 1.19 | 0.97 |
| X-STM-23_(X-STM) | CONDUIT | 124.53 | 0 | 01:31 | 1.20 | 1.05 | 0.89 |
| X-STM-25_(X-STM)_1 | CONDUIT | 109.26 | 0 | 02:17 | 1.30 | 0.30 | 1.00 |
| X-STM-25_(X-STM)_2 | CONDUIT | 131.85 | 0 | 01:03 | 0.83 | 0.36 | 1.00 |
| X-STM-27_(X-STM)_1 | CONDUIT | 96.43 | 0 | 01:03 | 1.36 | 1.82 | 1.00 |

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|---|---|---|---|---|---|---|---|
| X-STM-27_(X-STM)_2 | CONDUIT | 134.36 | 0 | 01:03 | 1.90 | 3.39 | 1.00 |
| X-STM-29_(X-STM) | CONDUIT | 95.16 | 0 | 01:02 | 1.35 | 3.79 | 1.00 |
| X-STM-31_(X-STM) | CONDUIT | 99.45 | 0 | 01:02 | 1.41 | 1.51 | 1.00 |
| X-STM-33_(X-STM) | CONDUIT | 586.90 | 0 | 01:35 | 2.08 | 1.65 | 1.00 |
| X-STM-51_(X-STM) | CONDUIT | 94.80 | 0 | 01:03 | 1.34 | 3.26 | 1.00 |
| X-STM-53_(X-STM) | CONDUIT | 76.03 | 0 | 01:46 | 1.08 | 1.84 | 1.00 |
| X-STM-55_(X-STM) | CONDUIT | 83.10 | 0 | 01:02 | 1.69 | 1.79 | 1.00 |
| X-STM-59_(X-STM) | CONDUIT | 52.51 | 0 | 01:03 | 1.67 | 1.59 | 1.00 |
| X-STM-63_(X-STM) | CONDUIT | 20.90 | 0 | 01:51 | 0.71 | 0.85 | 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 | 188.54 | 0 | 01:12 | 1.71 | 1.02 | 1.00 |
| X-STM-77_(X-STM) | CONDUIT | 178.94 | 0 | 01:23 | 1.62 | 1.56 | 1.00 |
| 102_(5)_(CB) | ORIFICE | 7.51 | 0 | 01:44 | | | 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 | 54.22 | 0 | 01:50 | | | 1.00 |
| 147_(CB) | ORIFICE | 7.76 | 0 | 01:51 | | | 1.00 |
| 267_(STM) | ORIFICE | 7.60 | 0 | 01:06 | | | 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 | 8.47 | 0 | 01:50 | | | 1.00 |
| 69_(CB) | ORIFICE | 14.08 | 0 | 01:38 | | | 1.00 |
| 78_(CB) | ORIFICE | 8.01 | 0 | 01:08 | | | 1.00 |
| 81_(CB) | ORIFICE | 7.88 | 0 | 01:09 | | | 1.00 |
| 88_(CB) | ORIFICE | 7.52 | 0 | 01:50 | | | 1.00 |
| 96_(CB) | ORIFICE | 7.30 | 0 | 01:43 | | | 1.00 |
| OR1 | ORIFICE | 8.17 | 0 | 01:49 | | | 1.00 |
| OR10 | ORIFICE | 9.94 | 0 | 01:41 | | | 1.00 |
| OR11 | ORIFICE | 116.78 | 0 | 01:03 | | | 1.00 |
| OR12 | ORIFICE | 6.05 | 0 | 01:11 | | | 1.00 |
| OR13 | ORIFICE | 4.36 | 0 | 01:48 | | | 1.00 |
| OR14 | ORIFICE | 19.43 | 0 | 01:03 | | | 1.00 |
| OR15 | ORIFICE | 35.43 | 0 | 01:11 | | | 1.00 |
| OR2 | ORIFICE | 10.47 | 0 | 02:10 | | | 1.00 |
| OR3 | ORIFICE | 31.55 | 0 | 01:10 | | | 1.00 |
| OR4 | ORIFICE | 9.44 | 0 | 02:30 | | | 1.00 |
| OR5 | ORIFICE | 8.74 | 0 | 02:05 | | | 1.00 |
| OR6 | ORIFICE | 97.00 | 0 | 01:10 | | | 1.00 |
| OR7 | ORIFICE | 122.26 | 0 | 01:34 | | | 1.00 |
| OR8 | ORIFICE | 11.04 | 0 | 01:41 | | | 1.00 |
| OR9 | ORIFICE | 7.88 | 0 | 01:48 | | | 1.00 |

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|---|---|---|---|---|---|---|---|
| X-CB-135_(X-CB) | ORIFICE | 47.28 | 0 | 01:09 | | | 1.00 |
| X-CB-83_(X-CB) | ORIFICE | 96.31 | 0 | 01:11 | | | 1.00 |
| X-CB-86_(X-CB) | ORIFICE | 35.50 | 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-CB13 | DUMMY | 0.15 | 0 | 00:25 | | | |
| INFIL-PR-CB14 | DUMMY | 0.15 | 0 | 00:26 | | | |
| INFIL-PR-CB18 | DUMMY | 0.15 | 0 | 00:25 | | | |
| INFIL-PR-CB29 | DUMMY | 1.17 | 0 | 00:28 | | | |
| INFIL-PR-CB32 | DUMMY | 1.61 | 0 | 00:28 | | | |
| INFIL-PR-CB36 | DUMMY | 0.15 | 0 | 00:25 | | | |
| INFIL-PR-CB40 | DUMMY | 1.17 | 0 | 00:27 | | | |
| INFIL-PR-CBMH104 | DUMMY | 0.15 | 0 | 00:25 | | | |
| INFIL-PR-CBMH105 | DUMMY | 0.27 | 0 | 00:25 | | | |
| INFIL-PR-CBMH106 | DUMMY | 0.52 | 0 | 00:26 | | | |
| INFIL-PR-CBMH107 | DUMMY | 0.21 | 0 | 00:24 | | | |
| 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 | | | |

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|---|---|---|---|---|
| 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 | 76.26 | 0 | 01:31 |
| PR-BLDG02-OUT | DUMMY | 37.90 | 0 | 01:20 |

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Flow Classification Summary
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| Conduit | Adjusted /Actual Length | Dry | Up Dry | Down Dry | Sub Crit | Sup Crit | Up Crit | Down Crit | Norm Ltd | Inlet Ctrl |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ---------- Fraction of Time in Flow Class ---------- | | | | | | | | |
| 108_(CB) | 1.00 | 0.02 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.76 | 0.01 | 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 |
| 138_(CB)_1 | 1.00 | 0.02 | 0.01 | 0.00 | 0.97 | 0.00 | 0.00 | 0.00 | 0.77 | 0.00 |
| 138_(CB)_2 | 1.00 | 0.02 | 0.00 | 0.00 | 0.23 | 0.00 | 0.00 | 0.76 | 0.01 | 0.00 |
| 14_(STM) | 1.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |
| 142_(STM) | 1.00 | 0.75 | 0.00 | 0.00 | 0.20 | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 |
| 145_(CB) | 1.00 | 0.02 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.66 | 0.10 | 0.00 |
| 150_(1)_(STM) | 1.00 | 0.02 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.85 | 0.06 | 0.00 |
| 156_(STM) | 1.00 | 0.02 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.77 | 0.02 | 0.00 |
| 163_(STM) | 1.00 | 0.02 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.84 | 0.06 | 0.00 |
| 165_(CB) | 1.00 | 0.02 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.86 | 0.02 | 0.00 |
| 17_(1)_(STM) | 1.00 | 0.01 | 0.01 | 0.00 | 0.03 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 |
| 20_(STM) | 1.00 | 0.01 | 0.00 | 0.00 | 0.12 | 0.10 | 0.00 | 0.77 | 0.20 | 0.00 |
| 226_(CB) | 1.00 | 0.03 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 |
| 230_(CB) | 1.00 | 0.01 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.75 | 0.78 | 0.00 |
| 246_(CB) | 1.00 | 0.01 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | 0.70 | 0.09 | 0.00 |
| 250_(CB) | 1.00 | 0.01 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.73 | 0.20 | 0.00 |
| 251_(CB) | 1.00 | 0.01 | 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.72 | 0.09 | 0.00 |
| 268_(STM) | 1.00 | 0.02 | 0.00 | 0.00 | 0.23 | 0.00 | 0.00 | 0.75 | 0.19 | 0.00 |
| 271_(CB) | 1.00 | 0.02 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.78 | 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 | 0.66 | 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 | 0.27 | 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 | 0.00 | 0.00 | 0.32 | 0.00 | 0.00 | 0.66 | 0.38 | 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 | 0.45 | 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 | 0.37 | 0.00 | 0.00 | 0.62 | 0.21 | 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 | 0.30 | 0.00 | 0.00 | 0.68 | 0.12 | 0.00 |
| 9_(1)_(STM) | 1.00 | 0.01 | 0.01 | 0.00 | 0.17 | 0.00 | 0.00 | 0.81 | 0.01 | 0.00 |
| 9_(STM)_2 | 1.00 | 0.02 | 0.00 | 0.00 | 0.55 | 0.00 | 0.00 | 0.43 | 0.21 | 0.00 |
| 94_(CB) | 1.00 | 0.02 | 0.00 | 0.00 | 0.20 | 0.00 | 0.00 | 0.78 | 0.03 | 0.00 |
| C1 | 1.00 | 0.86 | 0.00 | 0.00 | 0.10 | 0.01 | 0.00 | 0.04 | 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 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.97 | 0.03 | 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 | 0.85 | 0.15 | 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 |
| C134 | 1.00 | 0.96 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.95 | 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 |
| C140 | 1.00 | 0.95 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C141 | 1.00 | 0.92 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C142 | 1.00 | 0.96 | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 |
| C143 | 1.00 | 0.85 | 0.14 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.94 | 0.00 |
| C144 | 1.00 | 0.96 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C145 | 1.00 | 0.96 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C146 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C147 | 1.00 | 0.96 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C148 | 1.00 | 0.97 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C149 | 1.00 | 0.96 | 0.04 | 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 | 0.99 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C151 | 1.00 | 0.98 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C152 | 1.00 | 0.92 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C16 | 1.00 | 0.77 | 0.23 | 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 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.95 | 0.05 | 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 | 0.95 | 0.05 | 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 | 1.00 | 0.00 | 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 | 0.95 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C33 | 1.00 | 0.97 | 0.03 | 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 | 0.83 | 0.17 | 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 | 0.83 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C41 | 1.00 | 0.83 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C42 | 1.00 | 0.84 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C43 | 1.00 | 0.83 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C44 | 1.00 | 0.84 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C45 | 1.00 | 0.84 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C46 | 1.00 | 0.84 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C47 | 1.00 | 0.84 | 0.16 | 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 | 0.77 | 0.23 | 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 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 0.01 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.02 | 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 | 0.85 | 0.15 | 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 | 0.85 | 0.15 | 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 | 0.85 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C61 | 1.00 | 0.85 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C62 | 1.00 | 0.85 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C63 | 1.00 | 0.85 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C65 | 1.00 | 0.85 | 0.12 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.94 | 0.00 |
| C66 | 1.00 | 0.85 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C67 | 1.00 | 0.85 | 0.15 | 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 | 0.01 | 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 | 0.98 | 0.02 | 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 | 0.92 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C73 | 1.00 | 0.95 | 0.04 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.92 | 0.00 |
| C74 | 1.00 | 0.95 | 0.05 | 0.00 | 0.01 | 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 | 0.95 | 0.00 | 0.00 | 0.01 | 0.05 | 0.00 | 0.00 | 0.04 | 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 |
| C80 | 1.00 | 0.92 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C81 | 1.00 | 0.98 | 0.02 | 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 |
| C86 | 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 | 0.97 | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C89 | 1.00 | 0.94 | 0.06 | 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 | 0.94 | 0.06 | 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 | 0.95 | 0.04 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.94 | 0.00 |
| C93 | 1.00 | 0.94 | 0.05 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.94 | 0.00 |
| C94 | 1.00 | 0.85 | 0.09 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.91 | 0.00 |
| C95 | 1.00 | 0.94 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 |
| C96 | 1.00 | 0.97 | 0.03 | 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 | 0.95 | 0.05 | 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 | 0.71 | 0.00 |
| EXMH115-101 | 1.00 | 0.01 | 0.00 | 0.00 | 0.63 | 0.00 | 0.00 | 0.36 | 0.53 | 0.00 |
| EXMH116-115 | 1.00 | 0.01 | 0.00 | 0.00 | 0.98 | 0.01 | 0.00 | 0.00 | 0.85 | 0.00 |
| PRMH116-EX-MH116 | 1.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.05 | 0.00 | 0.91 | 0.03 | 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 | 0.06 | 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 | 0.12 | 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 | 0.11 | 0.00 | 0.88 | 0.10 | 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 | 0.97 | 0.00 | 0.00 |
| X-STM-25_(X-STM)_1 | 1.00 | 0.02 | 0.00 | 0.00 | 0.95 | 0.04 | 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 | 0.03 | 0.00 |
| X-STM-27_(X-STM)_1 | 1.00 | 0.02 | 0.78 | 0.00 | 0.21 | 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 | 0.05 | 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 | 0.01 | 0.00 | 0.00 | 0.95 | 0.00 |
| X-STM-77_(X-STM) | 1.00 | 0.01 | 0.00 | 0.00 | 0.90 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |

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Conduit Surcharge Summary
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| Conduit | Hours Full Both Ends | Hours Full Upstream | Hours Full Dnstream | Hours Above Full Normal Flow | Hours Capacity Limited |
|---|---|---|---|---|---|
| 108_(CB) | 4.07 | 4.07 | 4.12 | 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 |
| 138_(CB)_1 | 4.02 | 4.02 | 4.06 | 0.01 | 0.01 |
| 138_(CB)_2 | 4.06 | 4.06 | 4.12 | 0.01 | 0.01 |
| 14_(STM) | 0.43 | 1.00 | 0.43 | 1.24 | 0.43 |
| 142_(STM) | 4.02 | 4.02 | 4.06 | 0.01 | 0.01 |
| 145_(CB) | 4.82 | 4.82 | 5.88 | 0.04 | 0.04 |
| 150_(1)_(STM) | 0.65 | 0.65 | 1.12 | 0.01 | 0.01 |
| 156_(STM) | 4.03 | 4.03 | 4.09 | 0.01 | 0.01 |
| 163_(STM) | 1.36 | 1.36 | 1.41 | 0.01 | 0.01 |
| 165_(CB) | 1.40 | 1.43 | 1.89 | 0.08 | 0.05 |
| 17_(1)_(STM) | 0.59 | 1.28 | 0.59 | 1.31 | 0.59 |
| 20_(STM) | 0.01 | 0.01 | 0.66 | 0.01 | 0.01 |
| 226_(CB) | 0.30 | 0.30 | 0.39 | 0.01 | 0.01 |
| 230_(CB) | 3.50 | 3.50 | 3.97 | 0.01 | 0.01 |
| 246_(CB) | 4.23 | 4.23 | 4.86 | 0.03 | 0.03 |
| 250_(CB) | 4.06 | 4.06 | 4.18 | 0.01 | 0.01 |
| 251_(CB) | 4.03 | 4.03 | 4.18 | 0.01 | 0.01 |
| 268_(STM) | 0.40 | 0.40 | 0.64 | 0.01 | 0.01 |
| 271_(CB) | 3.94 | 3.94 | 4.05 | 0.01 | 0.01 |
| 34_(1)_(STM) | 5.67 | 5.67 | 5.74 | 0.02 | 0.02 |
| 34_(STM) | 5.73 | 5.75 | 7.75 | 0.08 | 0.07 |
| 36_(1)_(STM) | 8.78 | 8.78 | 9.11 | 0.09 | 0.09 |
| 36_(STM) | 9.25 | 9.27 | 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) | 8.67 | 8.67 | 8.76 | 0.01 | 0.01 |
| 5_(STM)_1 | 0.25 | 0.25 | 0.44 | 0.01 | 0.01 |
| 5_(STM)_2 | 0.45 | 0.45 | 0.56 | 0.01 | 0.01 |
| 54_(STM) | 5.19 | 5.22 | 7.24 | 0.13 | 0.08 |
| 57_(STM) | 0.35 | 0.35 | 0.51 | 0.01 | 0.01 |
| 59_(STM) | 8.07 | 8.07 | 10.11 | 0.09 | 0.09 |
| 61_(STM) | 7.37 | 7.37 | 7.95 | 0.01 | 0.01 |
| 64_(CB) | 3.64 | 3.64 | 6.16 | 0.01 | 0.02 |
| 7_(STM) | 0.56 | 0.56 | 0.72 | 0.01 | 0.01 |
| 86_(CB) | 4.41 | 4.41 | 5.38 | 0.03 | 0.04 |
| 9_(1)_(STM) | 0.82 | 0.82 | 0.84 | 0.01 | 0.30 |
| 9_(STM)_2 | 0.74 | 0.74 | 0.81 | 0.01 | 0.01 |
| 94_(CB) | 3.08 | 3.08 | 3.54 | 0.01 | 0.01 |
| C1 | 1.47 | 1.47 | 1.89 | 0.01 | 0.01 |
| C82 | 0.01 | 0.01 | 22.45 | 0.01 | 0.01 |
| EXMH115-101 | 1.16 | 1.95 | 1.19 | 1.94 | 1.15 |
| EXMH116-115 | 1.92 | 1.94 | 1.95 | 1.96 | 1.91 |
| PRMH116-EX-MH116 | 0.67 | 0.67 | 1.80 | 0.01 | 0.01 |
| X-CB-129_(X-CB) | 1.95 | 1.95 | 1.99 | 0.01 | 0.01 |
| X-CB-89_(X-CB) | 1.92 | 1.92 | 2.29 | 0.01 | 0.01 |
| X-CB-91_(X-CB) | 1.91 | 1.91 | 2.29 | 0.01 | 0.01 |
| X-CB-94_(X-CB) | 1.99 | 1.99 | 2.26 | 0.02 | 0.03 |
| X-CB-97_(X-CB) | 1.92 | 1.92 | 2.09 | 0.01 | 0.01 |
| X-CB-98_(X-CB) | 2.14 | 2.15 | 2.15 | 0.33 | 1.07 |
| X-STM-21_(X-STM) | 0.01 | 0.60 | 0.01 | 0.64 | 0.01 |
| X-STM-23_(X-STM) | 0.01 | 0.01 | 0.01 | 1.12 | 0.01 |
| X-STM-25_(X-STM)_1 | 1.98 | 1.98 | 2.25 | 0.01 | 0.01 |
| X-STM-25_(X-STM)_2 | 2.25 | 2.25 | 2.40 | 0.01 | 0.01 |
| X-STM-27_(X-STM)_1 | 2.03 | 2.03 | 2.15 | 0.24 | 0.24 |
| X-STM-27_(X-STM)_2 | 2.11 | 2.15 | 2.11 | 2.28 | 2.11 |
| X-STM-29_(X-STM) | 1.96 | 1.96 | 1.97 | 0.48 | 0.87 |
| X-STM-31_(X-STM) | 1.89 | 1.89 | 1.98 | 0.01 | 0.01 |
| X-STM-33_(X-STM) | 0.55 | 0.86 | 0.55 | 0.93 | 0.55 |
| X-STM-51_(X-STM) | 1.03 | 1.12 | 1.03 | 1.26 | 1.03 |
| X-STM-53_(X-STM) | 1.01 | 1.01 | 1.12 | 0.27 | 0.28 |

| | | | | | |
|---|---|---|---|---|---|
| X-STM-55_(X-STM) | 0.99 | 0.99 | 1.06 | 0.02 | 0.02 |
| X-STM-59_(X-STM) | 1.04 | 1.04 | 1.21 | 0.22 | 0.51 |
| X-STM-63_(X-STM) | 0.88 | 0.88 | 0.88 | 0.01 | 0.01 |
| X-STM-75_(X-STM) | 0.84 | 0.84 | 1.25 | 0.16 | 0.47 |
| X-STM-77_(X-STM) | 0.83 | 0.83 | 0.84 | 0.61 | 0.67 |

```
Analysis begun on:  Mon Nov  7 14:09:36 2022
Analysis ended on:  Mon Nov  7 14:09:58 2022
Total elapsed time: 00:00:22
```

# 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 | |

| **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 | |

**Hard Rock Hotel Casino**
**4837 Albion Road, Ottawa**
**DEVELOPMENT SERVICING STUDY CHECKLIST**

| **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