

Site Servicing Report

2625 Sheffield Road, Ottawa, Ontario

Amazon Logistics

60634622

March 2023

Kelby Lodoen Unseth, MCIP, RPP
Planner II/Development Review
City of Ottawa
100 Laurier Avenue West, 4th Floor
Ottawa, Ontario K1P 1J1

March 24, 2023

Project #
60634622

Subject: Site Servicing Report – 2625 Sheffield Road, Ottawa, Ontario

Dear Mr. Unseth:

Please find our Site Servicing Report, which is provided in support of the proposed Site Plan Application for the proposed works located at 2625 Sheffield Road, Ottawa, Ontario, Canada (to be referred to in this report as "Site").

This report presents the stormwater management plan and how the layout of the proposed site servicing (sanitary, water, stormwater) satisfy requirements set by the City of Ottawa and the Ministry of Environment, Conservation, and Parks (MECP). Please also be advised that no portion of the Site is located within a regulated area designated by the Rideau Valley Conservation Authority (RVCA) as per Ontario Regulation 174/06.

We request an approval of the subject application. If you have any questions or require additional information or clarification, please do not hesitate to contact the undersigned at 519-650-8669 or via e-mail: kosta.paliouras@aecom.com.

Sincerely,
AECOM Canada Ltd.



Konstantinos (Kosta) Paliouras, P.Eng
Senior Water Resources Engineer/Project Manager
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Encl.

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Executive Summary

This report addresses the proposed site servicing at 2625 Sheffield Road in Ottawa, Ontario, Canada.

The proposed works consists of demolishing the existing building structure and construction of a proposed building structure with a regrade and repave an existing parking lot area. Due to the construction of the proposed building, additional water quality and quantity controls are required to prevent detrimental impacts to the downstream outlets (municipal infrastructure on Sheffield Road and Humber Place). The objective for these stormwater management facilities is to provide water quality treatment, water quantity control, and groundwater recharge in accordance with the City's requirements for development.

The proposed water servicing would consist of two (2) 200 mm diameter service laterals, one located on the northwest side through the office entrance driveway along Sheffield Road and the other one located northeast side of the proposed building connected by the about mentioned loop. The proposed development will discharge to one (1) proposed 250 mm sanitary pipe to ex MH1A on Sheffield Road as shown on drawing C104. A Sanitary Monitoring Maintenance Hole as per Ottawa Design Standard 4.4.4.7 is shown on property line.

The proposed stormwater management facilities will consist of multiple infiltration basins and two (2) underground chamber storage systems (StormTech MC-3500 systems or approved equivalent) with the capacity to accept surface runoff up to and including the 100-year storm event for the proposed building and parking lot area and provide water quality and quantity treatment prior to discharging downstream. The proposed infiltration basins will consist of clear stone bedding and capture runoff from the roof areas to encourage groundwater recharge. The chamber storage systems will consist of storage chambers with clear stone granular material bedding, surrounded by an impermeable liner to discourage infiltration of runoff from the parking lot area. The proposed underground chamber storage systems will then discharge to the municipal infrastructure on Humber Place and Sheffield Road and ultimately to Green's Creek.

The proposed stormwater management measures have met the design objectives of the City of Ottawa.

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- Appendix E. Supporting Engineering Documentation and Calculations – Water and Wastewater Calculations and Correspondence
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- Appendix G. Supporting Engineering Documentation and Calculations – Oil/Grit Separator and Storm Sewer
- Appendix H. Supporting Engineering Documentation and Calculations – Underground Storage System
- Appendix I. PCSWMM Input/Output Documentation – Existing Conditions
- Appendix J. PCSWMM Input/Output Documentation – Proposed Conditions

1. Introduction

AECOM Canada Limited (AECOM) has prepared the following Site Servicing Report for the industrial facility located at 2625 Sheffield Road in Ottawa, Ontario, Canada (to be referred to in this report as “Site”).

The proposed works consists of demolishing the existing building structure and construction of a proposed building structure with a regrade and repave an existing parking lot area. Due to the construction of the proposed building, additional servicing (sanitary, water and stormwater) is required to prevent detrimental impacts to the downstream receivers (municipal infrastructure on Sheffield Road and Humber Place). The key objective of this report is to provide a summary of existing Site conditions and illustrate how the proposed water, stormwater, and sanitary objectives detailed by City of Ottawa staff and regulatory agencies.

2. Background Information

2.1 General Site Information

The Site is located at 2625 Sheffield Road in Ottawa, Ontario (Site location is provided in **Figure 1**). The Site is bordered by Humber Place to the south, industrial property to the north, Sheffield Road to the west, and a CN Rail railway to the east. The Site is approximately 7.05 hectares (ha) in total size, with an existing building structure footprint of approx. 3.346 ha.

The existing building structure was constructed in multiple stages. The Site was first developed in the 1960s, with building expansions in the 1970s and 1990s.

A Draft Geotechnical Study was completed by AECOM for the Site in January 2021 and borehole logs are provided in **Appendix A**. According to borehole investigations within the vicinity of the Site, the underlying soils consist of clayey silt material. No groundwater was observed during the investigation and in the monitoring wells.

The Site is located within the Ottawa Drain, a tributary of Green's Creek. AECOM has reviewed updated regulated area mapping available from the Rideau Valley Conservation Authority (RVCA) via the online regulated area mapping tool and mapping is provided in **Appendix B**. No portions of the Site is located within a regulated area as per Ontario Regulation 174/06 (Regulation of Development, Interference, with Wetlands and Alterations to Shorelines and Watercourses) and a permit from the RVCA would not be required.

There is also no Certificate of Approval or Environmental Compliance Approval permit associated with the Site, according to Ministry of Environment, Conservation, and Parks (MECP) records. Pre-consultation with the MECP (included in **Appendix C**) indicates that no ECA is required for the Site, as under Ontario Regulation 525/98 states that Subsection 53 (1) and (3) of the Act do not apply to lands designed as:

- one parcel, for which the Site and all proposed works will be contained;
- that discharge into a storm sewer that is not combined, for which is not the case at the Site, as sanitary and storm services currently are and will continue to be separate;
- does not service industrial or a structure located on industrial land; and
- is not located on industrial land.

Ontario Water Resources Act defines industrial land as “land used for the production, processing, repair, maintenance or storage of goods of materials, or the processing, storage, transfer or disposal of waste, but does not include land used primarily for the purpose of buying or selling, (a) goods or materials other than fuel, or (b) services other than vehicle repair services.”

Though the Site is located within a “Heavy Industrial Zone” according to the zoning by-law, the primary purpose of the proposed development will be for the distribution of goods and material, with only van and truck traffic through the proposed parking lot area. There will be no machinery or on-site processes that would require industrial water use to discharge to the municipal system and no outdoor storage of processed material or any contaminate material. Contaminates would include total suspended solids (TSS), vehicular oil and chlorides from the parking lot area. The proposed infiltration basins will only accept discharge from the proposed roof areas and an impermeable liner is proposed for the proposed underground chamber storage systems and therefore none of the runoff from the parking lot area will infiltrated into the underlying soil. The level of concern would be minimal.



Aerial photography provided by: City of Ottawa (2019)

Legend

- Property Limit
- Base Layers**
- Railway
- Freeway
- Watercourse



Base map provided by: MECP

Map Extents

<p>Amazon LDC DYT3 2625 Sheffield Road Site Servicing Report</p>		
<p>Site Location Plan</p>		
<p>Datum: North American 1983</p>		
<p>Feb, 2021</p>	<p>1:5,000</p>	<p>Data Sources MECP, MMAH, City of Ottawa</p>
<p>P:60634622</p>	<p>Rev:00</p>	
<p>AECOM</p>		<p>Figure: 1</p>
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Project Location: E:\PRJ\AMZN_LDC_DYT3_2625SHEFFIELD\AMZN_LDC_DYT3_2625SHEFFIELD.dwg Date Saved: 2/17/2021 10:36:46 AM User: orvis

2.2 Existing Water and Wastewater Services

The site is currently serviced from the existing 300 mm diameter watermain on Sheffield Road by two existing 200 mm diameter water service connections. The water service enters the west of the site through the office entrance driveway along Sheffield Road as well as the second most southern truck entrance. The service along the office entrance driveway supplies domestic water to the building in a 75 mm shoot-off, as well to an on-site hydrant system located around the building in a 200 mm diameter firemain. This firemain loop re-connects to the existing 300 mm diameter municipal main on Humber Place at the southeast corner of the site. The post-development design is not proposing any changes to the water servicing on the site.

The building currently discharges to two (2) sanitary services, one connection at the existing MH 1A on Sheffield and another connection to the existing MH 5A on Sheffield. The southerly sanitary service flow into a 200 mm sanitary flows in a 200 mm diameter service by gravity to the existing 375 mm diameter sanitary sewer on Sheffield Drive, in the southwest corner of the site.

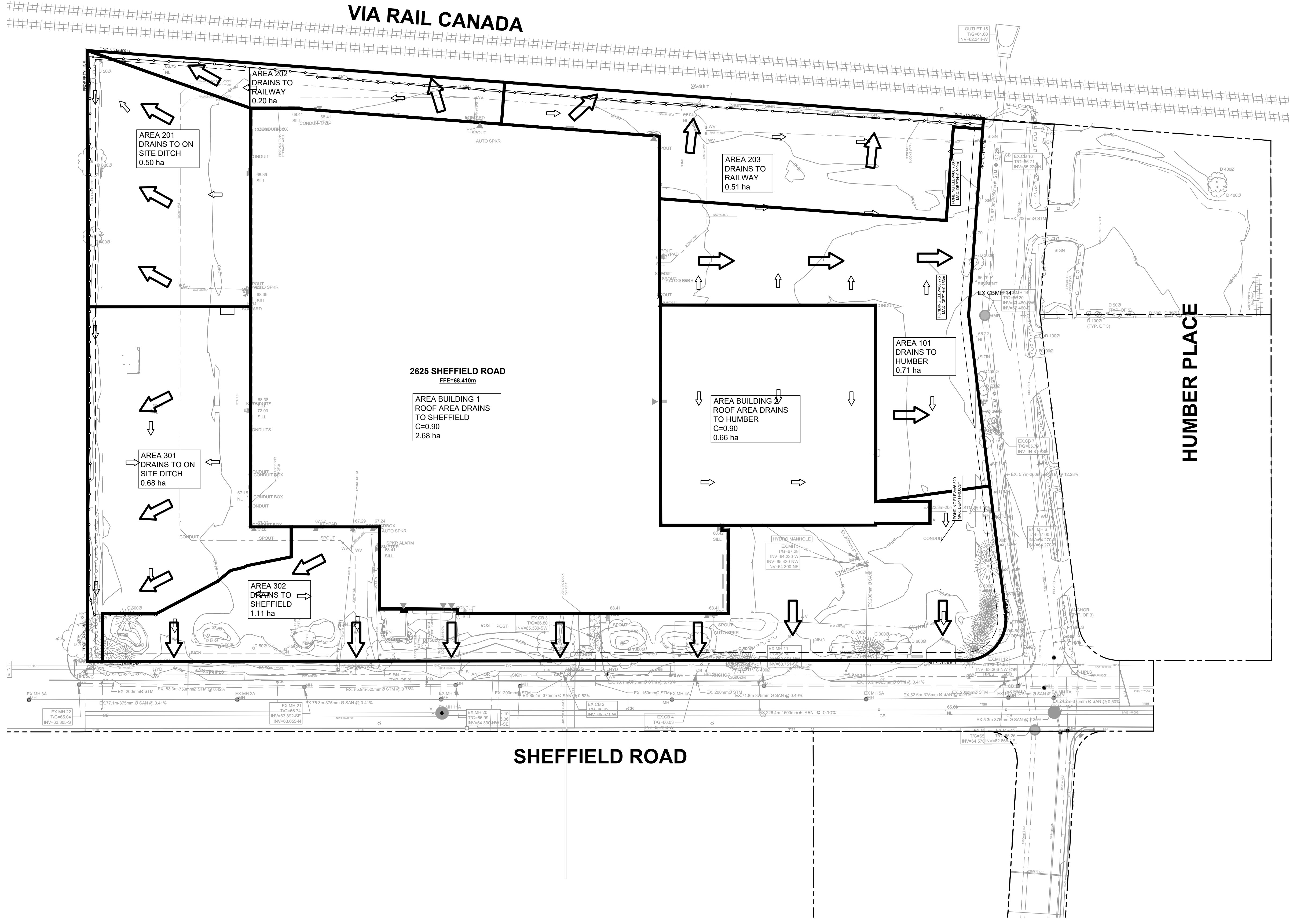
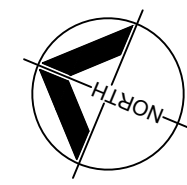
2.3 Existing Stormwater Management and Drainage Patterns

Existing drainage patterns at 2625 Sheffield Road (as indicated in **Figure 2** and **Figure 3**) consist of overland flow into an existing municipal storm sewer system and ultimately discharging into the City municipal system on Humber Place and Sheffield Road. Plan and profile servicing drawings for the Humber Place and Sheffield Road were obtained from the City and are provided in **Appendix D**.

The existing drainage patterns consist of the following flow paths:

- Runoff from the main parking lot area, located south of the existing building structure (Area 101) discharges overland directly into the existing City municipal storm sewer system on Humber Place. The existing storm sewer system ultimately discharges to the Ottawa Drain then to Green Creek.
- Runoff from the roof of the existing building structure is collected and discharges into the municipal storm sewer system on Sheffield Road and Humber place. A portion of the building roof structure (Building #1) discharges to the municipal storm sewer system on Sheffield Road, with another portion of the building roof structure (Building #2) discharges to the municipal storm sewer system on Humber Place.
- A portion of the existing parking lot area located north of the building structure, the access road east of the existing building structure, and portion of the main parking lot area (Area 200 series) discharges directly to a vegetated swale adjacent to the CN Rail railway and ultimately discharges to Green's Creek.
- A portion of the parking lot area located north of the existing building structure and the landscaped area adjacent to Sheffield Road (Areas 300 series) discharges directly to the City municipal storm sewer system on Sheffield Road. The existing storm sewer system ultimately discharges to Green's Creek.

According to site assessments, there are currently no on-Site surface water quality and quantity control infrastructure.



SURVEY NOTES

METRIC NOTE
 ALL DISTANCES SHOWN HEREON ARE IN METERS AND CAN BE CONVERTED TO IMPERIAL FEET BY DIVIDING BY 0.3048.

DISTANCE NOTE
 ALL DISTANCES ELECTRONICALLY MEASURED ON THIS PLAN ARE GRID DISTANCES.

HORIZONTAL DATUM
 UNIVERSAL TRANSVERSE MERCATOR (UTM) PROJECTION, ZONE 18 NORTH, NAD-83 CSRS.

VERTICAL DATUM
 NAD-83 VERTICAL DATUM - 1978 RE-ADJUSTMENT (GEODETIC)

COMPLETION NOTE
 TOPOGRAPHIC DETAIL SHOWN HEREON WAS ACQUIRED IN JUNE, 2020 BY AECOM.

PROPERTY BOUNDARIES

PROPERTY BOUNDARY INFORMATION SHOWN HEREIN IS DERIVED FROM GIS AND FIELD OBSERVATIONS AND REGISTERED PLANS SR-12728 DATED MAY 25, 1989 AS WELL AS REF. NO. 8-783 GR DATED NOV 12, 1982. ALL DIMENSIONS ARE APPROXIMATE. THIS DOCUMENT IN ITSELF CAN NOT BE USED TO ESTABLISH PROPERTY LIMITS.

SITE BENCHMARKS

TBM #1 - TOP NUT OF HYDRANT LOCATED AT NORTH WEST CORNER OF 2625 SHEFFIELD ROAD ELEVATION = 67.198m

TBM #2 - STANDARD IRON BAR (SIB) LOCATED AT SOUTH WEST CORNER OF 2625 SHEFFIELD ROAD ELEVATION = 66.015m

LEGEND

- PROPERTY LINE
- SIB PROPERTY BAR
- 247.00 EX. CONTOUR
- X 247.50 EX. SPOT ELEVATION
- ~ EX. VEGETATION
- EX. CB, DCB, CBMH AND MH
- ~ EX. SWALE/ DITCH
- EX. CHAIN LINK FENCE
- EX. POST & WIRE FENCE
- EXISTING DRAINAGE AREA BOUNDARY
- ➔ MAJOR OVERLAND FLOW



PROJECT
 DYT3
 OTTAWA, ONTARIO
 2625 SHEFFIELD ROAD

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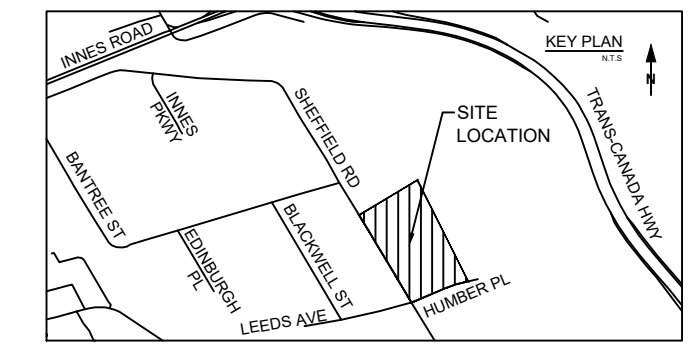
WITH THE SOLE EXCEPTION OF THE BENCHMARK(S) SPECIFICALLY DESCRIBED FOR THIS PROJECT, NO ELEVATION INDICATED OR ASSUMED HEREON IS TO BE USED AS A REFERENCE ELEVATION FOR ANY PURPOSE.

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN



PROJECT NUMBER

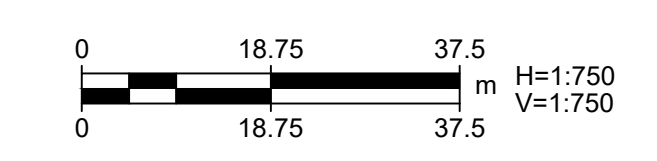
60634622

SHEET TITLE

EXISTING STORM WATER DRAINAGE AREAS

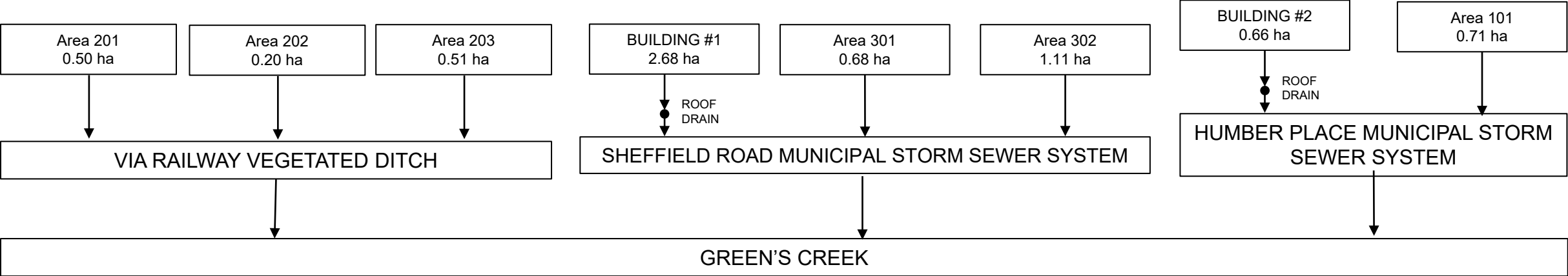
SHEET NUMBER

FIGURE 2



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FIGURE 3: EXISTING CONDITIONS FLOW SCHEMATIC (DYT3)



3. Design Criteria

Stormwater management within City of Ottawa conforms to the following regulatory documents:

- City of Ottawa Sewer Design Guidelines (October 2012) and subsequent Technical Bulletins.
- Ministry of Environment, Conservation, and Parks (MECP) Stormwater Management Planning and Design Manual (MECP, March 2003)
- TRCA/Credit Valley Conservation (CVC)/Lake Simcoe Region Conservation Authority (LSRC) Low Impact Development Stormwater Management Planning and Design Guide (2019)

Pre-consultation was completed in December 2020 with the City of Ottawa and RVCA, and comments are included in **Appendix C**. Based on the prevailing policy framework, general design criteria, objectives and practices have been identified to complete the assessment of the proposed drainage infrastructure within the study area limits using current policies and guidelines. Below are the design criteria, based on those regulations noted above:

- **Water Quantity**
It is the policy of the City to require that 100-year post-development peak flows are controlled to pre-development 2-year peak flow to Humber Place. In their pre-consultation response, the City has requested that the allowable runoff coefficient for the pre-development drainage area is the lesser of the existing pre-development conditions to a maximum of 0.5.
- **Water Quality**
According to the correspondence from the RVCA, the proposed water quality control measures are to be designed to provide Enhanced (Level 1) water quality control (80% total suspended solids [TSS] removal) and shall use the treatment train approach to stormwater management with source, conveyance, and end-of-pipe measures.
- **Water Balance**
The general hydrological cycle of the Site to be maintained, by replenishing the underlying aquifer through infiltration (where possible). The vast majority of the current Site conditions is impervious, and the proposed works would have similar impervious levels and therefore infiltrative capacity. Roof drainage will be directed to proposed infiltration basins to provide additional annual infiltrative volume, which will be greater than infiltrative volumes provided current Site conditions.

According to the 2012 TRCA/CVC Low Impact Development (LID) Guidelines though, it is not advised that runoff from high traffic areas to infiltrate into the underlying soils. Due to the purpose of the Site, there will be consistent van and truck traffic through the proposed parking lot area. The extent of untreated surface runoff discharging into any proposed infiltrative infrastructure during proposed conditions would originate from parking lot area and would include high levels of TSS and untreated contaminants such as oil and chlorides. Utilizing infiltrative infrastructure as part of the “treatment train” approach, before discharging through an oil/grit separator, would result in the infiltrative infrastructure becoming clogged with sediment quickly (becoming more ineffective when used in low permeable underlying soils) and allow for contaminants such as chlorides and oil to infiltrate into the groundwater when operational.

Additional measures that were consider include the following:

- Maintaining existing drainage patterns, where possible;
- Adjoining and/or downstream properties not to be adversely impacted by the proposed development;
- Water quality and quantity of runoff discharged from the Site to be controlled at the source;
- Discharge water may not also exceed over 45 degrees Celsius; and
- Erosion is limited to preserve the stability of small streams and rivers.

4. Proposed Conditions Site Servicing

Proposed Conditions Site Servicing Drawings are provided at the end of the report.

4.1 Proposed Water and Wastewater Services

4.1.1 Water Supply Servicing Design

The development is proposed to be serviced via two 200 mm diameter service laterals, one located on the northwest side through the office entrance driveway along Sheffield Road and the other one located northeast side of the proposed building connected by the about mentioned loop.

The following table summarizes the preliminary water supply demand estimate for the proposed development based on Ottawa’s Water Distribution Design Guidelines (Water Distribution First Edition, July 10-WDG001) and fire flow requirements using 2020 Fire Underwriters Survey (FUS) method. The detailed calculations are in **Appendix E**.

Table 1: Water Demand Proposed Conditions

Parameter	Demand (L/s)	Demand (gpm)
Average Daily Demand	2.86	45.33
Max. Day Demand	4.29	68.00
Peak Hour Demand	7.72	122.36
Fire Flow Demand	267.00	4232.05
Total Demand = Max. Day + Fire Flow	271.29	4300.05

Boundary conditions have been provided by the City of Ottawa and all associated correspondence including but not limited to water boundary condition correspondence, water demands (mentioned above), water boundary conditions from City of Ottawa, hydrant flow test results, estimated sanitary load and domestic water calculation chart, sprinkler zones and estimated conservative FUS Fire flow Calculations based on 2020 FUS Method are provided in **Appendix E**.

The amount of fire flow required, and all the sprinkler hydraulic calculations will be submitted to the authorities for approval (insurance authority and local fire department) after the building permit is issued, but before any work commences. The hydraulic calculations and water demand will be conducted by a professional engineer, signed, and sealed.

4.1.2 Sanitary Servicing Design

The proposed development will discharge to one (1) proposed 250 mm sanitary pipe to ex MH1A on Sheffield Road as shown on drawing C104. A Sanitary Monitoring Maintenance Hole as per Ottawa Design Standard 4.4.4.7 is shown on property line.

The post-development sanitary flow was calculated according to Ontario Building Code Section 7. Refer to **Appendix E** for detailed fixture unit calculations. Proposed sanitary building load is 189FU (4.35 L/S).

Table 2: Sanitary Proposed Conditions

Parameter	Flows (L/s)	Flows (gpm)
Sanitary Flow (Building)	4.35	69

4.2 Proposed Stormwater Management and Drainage Patterns

Due to the demolition of the existing building structure and the expansion of the parking lot area, additional surface runoff will discharge off-Site and would require additional water quality and quantity control to not cause detrimental impacts to the downstream outlet.

Subcatchments under the proposed conditions were revised as shown in **Figure 4** and the respective flow schematic is shown in **Figure 5**. Proposed drainage patterns consist of the following flow paths:

- Runoff from a portion of the proposed roof of the building structure (Area 101) will be collected and discharges into a proposed infiltration basin to store up to 10 mm depth of runoff (Calculations are provided in **Appendix F**). The proposed infiltration basins will consist of 50 mm diameter clear stone, with an overflow outlet to the proposed storm sewer system and ultimately to the municipal storm sewer system on Sheffield Road. The municipal storm sewer system ultimately discharges to Green's Creek. Stormwater building loads are 678,500 L (per 25 mm @ 15 min rainfall interval).
- The parking lot area located north of the proposed building structure and existing vegetated area (Areas 1 to 10) will be regraded to allow conveyance of all storm events up to and including the 100-year storm event through a proposed storm sewer infrastructure (sizing calculations provided in **Appendix G**). Surface ponding will be limited to 0.30 m depth over the proposed catch basin and catch basin structures during storm events greater than the 100-year storm event.

The proposed storm sewer system will discharge into a proposed underground storage system (StormTech MC-3500 or approved equivalent with total storage volume capacity of approximately 1,530 m³) to provide water quality and quantity control. Stage-storage table and product information for the proposed underground storage system is provided in **Appendix H**. The proposed system consists of an open bottom chamber, with surface runoff intercepted by the open-bottom chambers, which will then enter into the underground stone reservoirs and discharged controlled off-Site. The underground storage system will be wrapped with impermeable liner to discourage infiltration of surface runoff from the parking lot area. The system will also provide pre-treatment, which will consist of a row of chambers (known as an 'isolator row') wrapped in woven geotextile fabric (with two layers at the bottom). This acts as a filter strip that provides additional enhanced suspended solids and pollutant removal while providing surface area for runoff reduction.

The proposed underground storage system will then discharge into the proposed MH44 via two (2) outlet pipes w/ orifice plates to control flow during various storm events. A 75 mm orifice opening on a proposed 300 mm pipe will control flow for storms less than the 4-hour 25 mm storm event, allowing for discharge over a minimum 24-hr detention period. For storm event larger than the 4-hour 25 mm storm event, a proposed 150 mm pipe will provide additional flow control for discharging downstream.

The propose MH44 ultimately discharges to a proposed oil/grit separator (OGS, ADS FD-5HC or approved equivalent) to provide water quality control during first-flush conditions. The proposed OGS unit is Canadian ETV certified and is sized as part of a proposed treatment train approach to ultimately provide Enhanced-level treatment from the proposed parking lot areas. Sizing calculations and Canadian ETV certification for the proposed OGS unit is provided in **Appendix G**. Ultimately the proposed OGS discharges into the existing municipal storm sewer system on Sheffield Road and to Green's Creek.

- A portion of the landscaped area and entrance way along Sheffield Road (Area 2003) discharges to the existing municipal storm sewer system on Sheffield Road and ultimately to Green's Creek.

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NOTE:
IT IS THE RESPONSIBILITY OF THE CONTRACTORS TO INFORM THEMSELVES OF THE EXACT LOCATION OF AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN, THE ACCURACY CANNOT BE GUARANTEED.

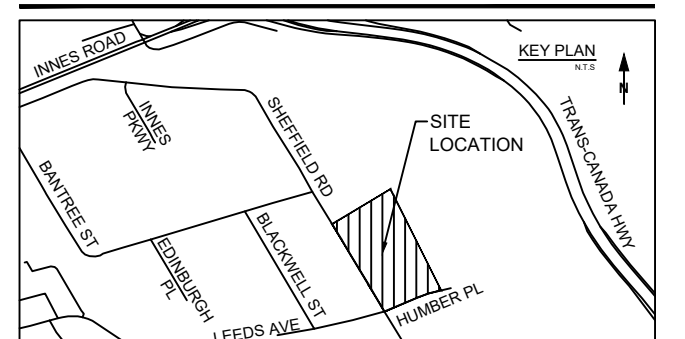
WITH THE SOLE EXCEPTION OF THE BENCHMARKS SPECIFICALLY DESCRIBED FOR THIS PROJECT, NO ELEVATION INDICATED OR ASSUMED HEREON IS TO BE USED AS A REFERENCE ELEVATION FOR ANY PURPOSE.

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	2022-09-16	ISSUED FOR SPA

KEY PLAN



PROJECT NUMBER

60634622

SHEET TITLE

PROPOSED STORMWATER
DRAINAGE AREAS

SHEET NUMBER

FIGURE 4

SURVEY NOTES

METRIC NOTE
ALL DISTANCES SHOWN HEREON ARE IN METERS AND CAN BE CONVERTED TO IMPERIAL FEET BY DIVIDING BY 0.3048.

DISTANCE NOTE
ALL DISTANCES ELECTRONICALLY MEASURED ON THIS PLAN ARE GRID DISTANCES.

HORIZONTAL DATUM
UNIVERSAL TRANSVERSE MERCATOR (UTM) PROJECTION, ZONE 18 NORTH, NAD-83 CSRS.

VERTICAL DATUM
NAD-83 VERTICAL DATUM - 1978 RE-ADJUSTMENT (GEODETTIC)

COMPLETION NOTE
TOPOGRAPHIC DETAIL SHOWN HEREON WAS ACQUIRED IN JUNE, 2020 BY AECOM.

PROPERTY BOUNDARIES

PROPERTY BOUNDARY INFORMATION SHOWN HEREIN IS DERIVED FROM GIS AND FIELD OBSERVATIONS AND REGISTERED PLANS SR-12728 DATED MAY 25, 1989 AS WELL AS REF. NO. S-733 GR DATED NOV 12, 1992. ALL DIMENSIONS ARE APPROXIMATE. THIS DOCUMENT IN ITSELF CAN NOT BE USED TO ESTABLISH PROPERTY LIMITS.

SITE BENCHMARKS

TBM #1 - TOP NUT OF HYDRANT LOCATED AT NORTH WEST CORNER OF 2625 SHEFFIELD ROAD ELEVATION = 67.198m

TBM #2 - STANDARD IRON BAR (SIB) LOCATED AT SOUTH WEST CORNER OF 2625 SHEFFIELD ROAD ELEVATION = 66.015m

LEGEND

- PROPERTY LINE
- PROPERTY BAR
- - - EX. CONTOUR
- - - EX. SPOT ELEVATION
- ~ ~ ~ EX. VEGETATION
- EX. CB, DCB, CBMH AND MH
- EX. PROPOSED CB, DCB, CBMH, DCB/MH AND MH
- EX. SWALE/DITCH
- EX. CHAIN LINK FENCE
- EX. POST & WIRE FENCE
- EXISTING DRAINAGE
- AREA BOUNDARY
- ➔ MAJOR OVERLAND FLOW

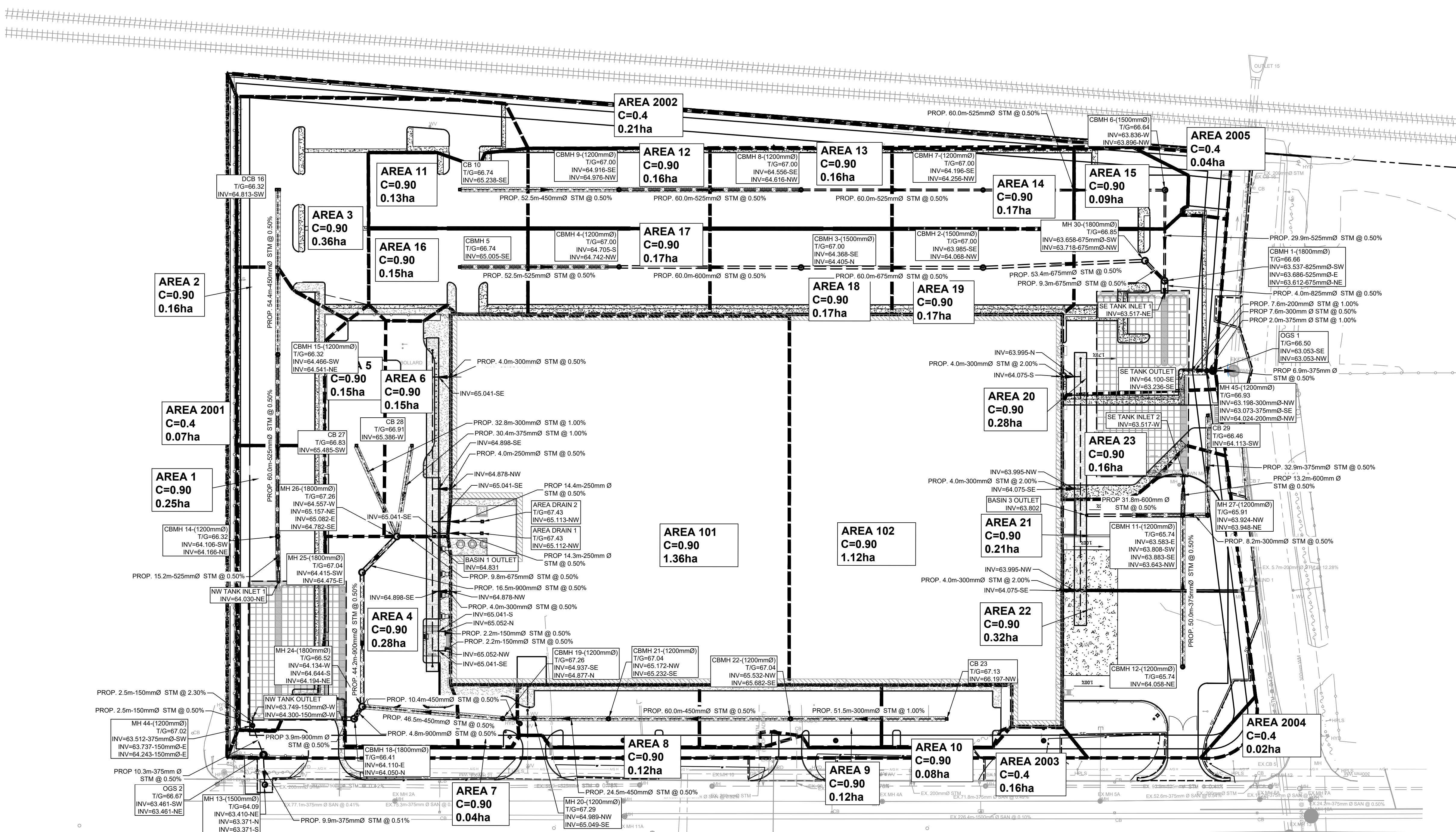
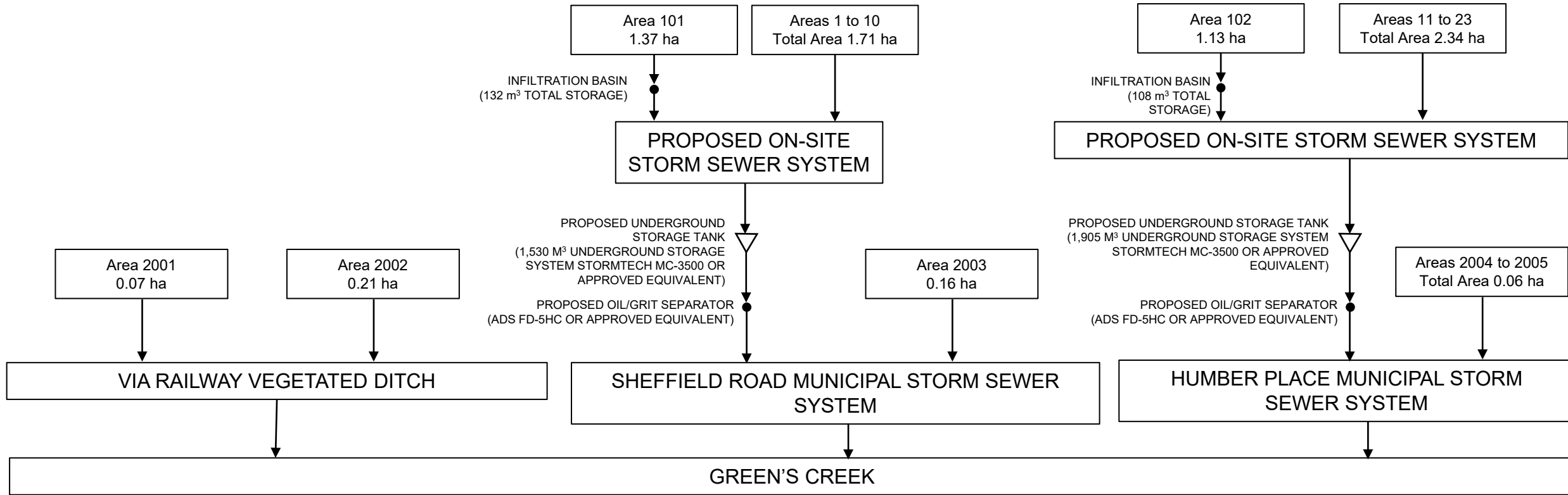


FIGURE 5: PROPOSED CONDITIONS FLOW SCHEMATIC (DYT3)



- Runoff from a portion of the proposed roof of the building structure (Area 102) will be collected and discharges into a proposed infiltration basin to store up to 10 mm depth of runoff. The proposed infiltration basins will consist of 50 mm diameter clear stone, with an overflow outlet to the proposed storm sewer system and ultimately to the municipal storm sewer system on Sheffield Road. The municipal storm sewer system ultimately discharges to Green's Creek. Infiltration calculations are provided in **Appendix F**.
- The parking lot area located south and west of the proposed building structure and existing vegetated area (Areas 11 to 24) will be regraded to allow conveyance of all storm events up to and including the 100-year storm event through a proposed storm sewer infrastructure (sizing calculations provided in **Appendix G**). Surface ponding will be limited to 0.30 m depth over the proposed catch basin and catch basin structures during storm events greater than the 100-year storm event.

The proposed storm sewer system will discharge into a proposed underground storage system (StormTech MC-3500 or approved equivalent with total storage volume capacity of approximately 1,905 m³) to provide water quality and quantity control. Stage-storage table and product information for the proposed underground storage system is provided in **Appendix H**. The proposed system consists of an open bottom chamber, with surface runoff intercepted by the open-bottom chambers, which will then enter into the underground stone reservoirs and discharged controlled off-Site. The underground storage system will be wrapped with impermeable liner to discourage infiltration of surface runoff from the parking lot area. The system will also provide pre-treatment via an isolator row.

The proposed underground storage system will then discharge into the proposed MH45 via two (2) outlet pipes w/ orifice plates to control flow during various storm events. A 75 mm orifice opening on a proposed 300 mm pipe will control flow for storms less than the 4-hour 25 mm storm event, allowing for discharge over a minimum 24-hr detention period. For storm event larger than the 4-hour 25 mm storm event, a proposed 300 mm pipe will provide additional flow control for discharging downstream.

The propose MH45 ultimately discharges to a proposed oil/grit separator (OGS, ADS FD-5HC or approved equivalent) to provide water quality control during first-flush conditions. The proposed OGS unit is Canadian ETV certified and is sized as part of a proposed treatment train approach to ultimately provide Enhanced-level treatment from the proposed parking lot areas. Sizing calculations and Canadian ETV certification for the proposed OGS unit is provided in **Appendix G**. The proposed OGS discharges into the existing municipal storm sewer system on Humber Place and ultimately to Green's Creek.

- A portion of the landscaped area along Humber Place (Areas 2004 and 2005) discharges to the existing municipal storm sewer system on Humber Place and ultimately to Green's Creek.
- A portion of the landscaped area along the CN Rail (Area 2002) discharges to the CN Railway land and ultimately to Green's Creek

4.3 Water Quantity

4.3.1 Hydrological Model Development

AECOM developed PCSWMM (Personal Computer Stormwater Management Model, 2021 version 7.4.3240) model for both existing and proposed conditions to confirm and compare the proposed peak flow and runoff volumes from the Site to those under existing conditions.

Site conditions were determined using aerial photography, discussions with design staff, and Site inspections. General modelling Site parameters are listed in **Table 3**. Existing and proposed conditions catchment parameters

are provided in **Appendix I** and **Appendix J**, respectively. Stage-storage and stage-discharge curves presented in **Appendix H** were provided by the manufacturer for the underground retention chamber system and were included in the hydrological model for analysis.

Table 3: Main Hydrological Parameters Used

Hydrological Parameters	Values
Manning Roughness Coefficient (Impervious Surface)	0.013
Manning Roughness Coefficient (pervious Surface)	0.2
Depression Storage – Impervious Surface (mm)	1.57
Depression Storage – Pervious Surface (mm)	4.67
Drying Time (hr)	7
Maximum Infiltration Rate (mm/hr)	75
Minimum Infiltration Rate (mm/hr)	0.5

The model was simulated for 4-hour 25 mm storm event, Chicago 3-hour and 6-hour 2-year, 5-year and 100-year design storm events which were derived from Section 5.4.2 and 5.4.3.2 respectively of the City of Ottawa Stormwater Management Design Guidelines (October 2012). Rainfall amounts are provided in **Table 4**. The proposed conditions peak discharge rates leaving the Site would be compared to that under existing condition to design the stormwater management requirements for water quantity and erosion control.

Table 4: Rainfall Amounts

Storm Event	Rainfall Amount (mm)	
4-hour 25 mm	25.00	
2-year	3-hour	31.88
	6-hour	36.86
5-year	3-hour	42.54
	6-hour	49.04
100-year	3-hour	71.68
	6-hour	82.33

4.3.2 Hydrological Model Results

The PCSWMM hydrological modelling simulations were completed for existing and proposed Site conditions, with output files provided in **Appendix I** and **Appendix J**, respectively. Peak flows to the City’s municipal storm sewer system on Humber Place and Sheffield Road for the 25 mm storm and Chicago 3-hr and 6-hr, 2-year, 5-year and 100-year storm events during existing and proposed conditions are provided in **Table 5** and **Table 6**, respectively. A stage-discharge table of the proposed north and south underground storage system is presented in **Table 7** and **Table 8**, respectively.

The hydrological model produced the following results:

- For proposed conditions, as per City guidelines and reiterated during pre-consultation, the 100-year proposed development discharge to Humber Place and Sheffield Road was compared to the 2-year existing development flow rate (with a runoff coefficient of 0.5). Comparable flows are highlighted. Utilizing the proposed stormwater management measures indicated in Section 4.2, proposed conditions discharge rates to Humber Place and Sheffield Road will be maintained to less than the allocated existing conditions discharge rate. For **Table 5** and **Table 6** below, flows were taken at the outfall node.
- Maximum runoff volumes and water depths within the proposed underground storage system were modelled during the 6-hour 100-year storm event.

Table 5: Simulated Discharge Rate to Humber Place (m³/s)

Scenario	Drainage Area (ha)	25 mm	2-year Chicago		5-year Chicago		100-year Chicago	
			3-hr	6-hr	3-hr	6-hr	3-hr	6-hr
Existing	1.370	0.090	0.150	0.150	0.210	0.220	0.380	0.390
Existing (allowable) ⁺	1.43	0.089	0.145	0.143	0.199	0.206	0.352	0.424
Proposed ^{&}	3.53	0.010	0.012	0.018	0.054	0.060	0.133	0.142

Note: ⁺ – Existing conditions discharge, plus uncontrolled proposed conditions flow; [&] - Proposed Conditions (controlled flow only, taken at junction nodes OGS_1.

Table 6: Simulated Discharge Rate to Sheffield Road (m³/s)

Scenario	Drainage Area (ha)	25 mm	2-year Chicago		5-year Chicago		100-year Chicago	
			3-hr	6-hr	3-hr	6-hr	3-hr	6-hr
Existing	4.47	0.300	0.480	0.490	0.690	0.730	1.220	1.280
Existing (allowable) ⁺	4.63	0.280	0.450	0.460	0.64	0.680	1.140	1.200
Proposed ^{&}	3.24	0.010	0.021	0.027	0.064	0.074	0.207	0.223

Note: ⁺ – Existing conditions discharge, plus uncontrolled proposed conditions flow; [&] - Proposed Conditions (controlled flow only, taken at junction nodes OGS_2.

Table 7: Proposed Storage – Stage-Discharge (DYT3-N – 6-hour Storm Duration)

Storm Event	Water Depth m	Water Elevation m	Storage Volume m ³	Peak Flow (m ³ /s)		Max. Outflow (m ³ /s)
				75 mm Orifice	200 mm	
25 mm*	0.74	64.49	587.0	0.010	0	0.010
2-year	0.93	64.68	783.0	0.012	0.015	0.027
5-year	1.06	64.81	924.6	0.013	0.061	0.074
100-yr	1.51	65.26	1371	0.014	0.208	0.223
Max. Capacity	1.676	65.317	1530.40			

Note: * – 4-hour storm duration

Table 8: Proposed Storage - Stage-Discharge (DTY3-S – 6-hour Storm Duration)

Storm Event	Water Depth m	Water Elevation m	Storage Volume m ³	Peak Flow (m ³ /s)		Max. Outflow (m ³ /s)
				75 mm Orifice	200 mm	
25 mm*	0.70	63.93	679.7	0.010	0	0.010
2-year	0.91	64.15	956.8	0.012	0.007	0.018
5-year	1.04	64.27	1115.0	0.012	0.048	0.060
100-yr	1.54	64.78	1228	0.015	0.117	0.132
Max. Capacity	1.676	64.898	1364.1			

Note: * – 4-hour storm duration

4.4 Water Quality

Annual TSS loading removal calculations were completed to determine if the proposed stormwater management measures would meet regulatory requirements for TSS. Treatment effectiveness information for the OGS and isolator row are provided in **Appendix H**.

Currently, there are no on-Site water quality controls. According to the calculations (summarized in **Appendix G**), the proposed stormwater management measures would provide over 80% annual pollutant loadings removal for TSS (and associated contaminants associated with particulates). The proposed OGS and isolator row, working as part of a ‘treatment train’ approach, will improve water quality discharging from the Site.

5. Erosion and Sediment Control

All activities should be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the natural features during construction. To prevent the discharge of these substances, several on-Site erosion and sediment controls (E&SC) measures are recommended. These would include the following E&SC measures (at a minimum):

- Light duty silt fencing; and
- Vegetate exposed graded soils with native, non-invasive grass seed species until final landscaping transpires.

These E&SC controls are illustrated in drawings provided with the report. The E&SC Plan is in concordance with City and MECP guidelines and are recommended to be inspected daily, maintained, and continuously evaluated and upgraded when necessary or when directed by AECOM or City staff. The E&SC controls would be required to be installed prior to construction, especially prior to Site clearing. During construction, the selected contractor should monitor the local weather forecast to anticipate weather conditions and inspection of the E&SC controls should occur within 24 hrs of a 15 mm or greater rainfall event. Additional E&SC materials should be kept on-Site for emergencies and repairs. The selected contractor would seek final permission for the stockpile of material and storage of petroleum products and ensure that the proper E&SC controls are in place prior to placement or storage of material on-Site. At the end of construction, E&SC controls should be removed only when the Site conditions have been stabilized and vegetation has been established on disturbed areas, as approved by the on-Site inspector and City staff.

Groundwater levels is expected to fluctuate seasonally and dependent on precipitation events. The dewatering may not be required as no groundwater was observed during the current investigation. However, the dewatering assessment will be done during the construction, if necessary.

Please note that the E&SC Plan is a dynamic document that may be subject to change or modifications as a result of site developments or changes on-Site.

6. Operations and Maintenance

To meet regulatory requirements, the proposed stormwater management measures would need to be operated and maintained regularly effectively and efficiently. The following operation and maintenance measures would be required once the proposed stormwater management measures have been installed and in operation:

- The underground retention chamber system, isolator row, and OGS should be operated and maintained as per manufacturer's recommendations. The Operations and Maintenance (O&M) reports for the recommended products are provided in **Appendix G** and **H**, respectively.
- The catch basins and storm sewer systems should be inspected and clean of sediment accumulation, with catch basin sumps to be clear of sediment accumulated as needed.

7. Conclusions

AECOM has prepared the above Site Servicing Report for the industrial facility located at 2625 Sheffield Road in Ottawa, Ontario, Canada.

The proposed works consists of demolishing the existing building structure and construction of a proposed building structure with a regrade and repave an existing parking lot area. Due to the construction of the proposed building, additional servicing (sanitary, water and stormwater) is required to prevent detrimental impacts to the downstream receivers (municipal infrastructure on Sheffield Road and Humber Place). The key objective of this report is to provide a summary of existing Site conditions and illustrate how the proposed water, stormwater, and sanitary objectives detailed by City of Ottawa staff and regulatory agencies.

The proposed water servicing would consist of two (2) 200 mm diameter service laterals, one located on the northwest side through the office entrance driveway along Sheffield Road and the other one located northeast side of the proposed building connected by the about mentioned loop. The proposed development will discharge to one (1) proposed 250 mm sanitary pipe to ex MH1A on Sheffield Road as shown on drawing C104. A Sanitary Monitoring Maintenance Hole as per Ottawa Design Standard 4.4.4.7 is shown on property line.

The proposed stormwater management facilities will consist of multiple infiltration basins and two (2) underground chamber storage systems (StormTech MC-3500 systems or approved equivalent) with the capacity to accept surface runoff up to and including the 100-year storm event for the proposed building and parking lot area and provide water quality and quantity treatment prior to discharging downstream. The proposed infiltration basins will consist of clear stone bedding and capture runoff from the roof areas to encourage groundwater recharge. The chamber storage systems will consist of storage chambers with clear stone granular material bedding, surrounded by an impermeable liner to discourage infiltration of runoff from the parking lot area. The proposed underground chamber storage systems will then discharge to the municipal infrastructure on Humber Place and Sheffield Road and ultimately to Green's Creek.

The proposed site servicing meets the design objectives of the City.

Appendix **A**

Geotechnical Report



LEGEND

- Geotechnical Borehole - 1.5m Depth - Asphalt Pavement
- Geotechnical Borehole/Corehole - 1.5m Depth - Asphalt Pavement

NOTES:

This drawing has been prepared for the use of AECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any party that modifies this drawing without AECOM's express written consent.

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2021.02.08	BH Plan	JH	TA

CLIENT NAME: **AMAZON LOGISTICS**

PROJECT LOCATION:
2625 Sheffield Rd, Ottawa ON
PROJECT NUMBER: 60634622

AS-BUILT BOREHOLE LOCATION PLAN

DRAWN BY: JH	SCALE: 1:1500	DRAWING No. 1
CHECKED: TA	DATE: FEB 2021	REVISION 0

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031369.8; E 451948.7
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-1

SHEET 1 OF 1

START DATE: Jan 12, 2021
 END DATE: Jan 12, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa nat V. - + Q - ● rem V. - ⊕ U - △				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80					
								100 200 300 400				Wp WI					
		PAVEMENT		64.30												GR SA SI CL	
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	ASPHALT: 60 mm thick FILL: sand and gravel, 700 mm thick, some clay with buried asphalt, grey, moist, very dense		0.06	1	SS	53									33 62 (5)	
1		SILTY CLAY: some sand, grey/brown, moist, very stiff		63.54 0.76	2	SS	25										
2					62.17 2.13	3	SS	17									0 10 46 44
3	END OF BOREHOLE Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.																
4																	
5																	
6																	
7																	
8																	
9																	
10																	

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031340.7; E 451960.8
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-2

SHEET 1 OF 1

START DATE: Jan 12, 2021
 END DATE: Jan 12, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.
 PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE			SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80						
								100 200 300 400				10 20 30 40						
		PAVEMENT														GR SA SI CL		
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	ASPHALT: 150 mm thick	64.60 64.98															
		FILL: sand and gravel, 600 mm thick, some silt, grey, moist, very dense	0.15		1	SS	42											23 67 (10)
1		FILL: sand, some gravel, trace silt, brown, moist, dense	63.85 0.75		2	SS	46											
2		SILTY CLAY: trace gravel, some sand, brown, moist, stiff	63.08 1.52		3	SS	12											
		END OF BOREHOLE Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.																
3	DRAFT																	
4																		
5																		
6																		
7																		
8																		
9																		
10																		

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031373.6; E 451984.0
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-3

SHEET 1 OF 1

START DATE: Jan 12, 2021
 END DATE: Jan 12, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.
 PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80					
								100 200 300 400				10 20 30 40					
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.00												GR SA SI CL	
		ASPHALT: 90 mm thick		0.00													
		FILL: sand and gravel, some silt, 670 mm thick, grey, moist, very dense with crushed granulars		0.09	1	SS	57										27 72 (1)
1		SILTY CLAY: trace gravel, some sand, brown, moist, stiff to very stiff		63.24													
				0.76	2	SS	12										
2				61.87	3	SS	15										
		END OF BOREHOLE		2.13													
3		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole.															
4																	
5																	
6																	
7																	
8																	
9																	
10																	

DRAFT

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE
1 : 50



LOGGED: WH
CHECKED: TA

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 50314365.9; E 452069.5
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-7

SHEET 1 OF 1

START DATE: Jan 12, 2021
 END DATE: Jan 12, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20	40	60	80	20	40	60			80
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.00 0.00 0.08												GR SA SI CL	
		ASPHALT: 80 mm thick															
		FILL: sand and gravel, some silt and clay, 680 mm thick, grey, moist, dense with crushed granulars				1	SS	40									13 75 (12)
1		CLAYEY SILT: some to trace gravel, trace sand, grey, moist, stiff to very stiff			63.24 0.76												
						2	SS	8									
2																	
					3	SS	16									1 13 40 46	
3		SILTY CLAY: grey, moist, firm		60.95 3.05													
					4	SS	4										
4																	
5					5	SS	6									0 1 92 7	
5.82 5.18		END OF BOREHOLE															
6		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. Water level encountered at approximately 4.0 mbgs during drilling operations.															
7																	
8																	
9																	
10																	

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031373.2; E 452134.3
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-10

SHEET 1 OF 1

START DATE: Jan 12, 2021
 END DATE: Jan 12, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE			SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa nat V. - + Q - ● rem V. - ⊕ U - △				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	WATER CONTENT PERCENT											
								Wp ○ W WI											
		PAVEMENT		64.60															
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	ASPHALT: 180 mm thick		0.00 64.42															
		FILL: sand and gravel, 660 mm thick, some silt, brown, moist, very dense		0.18	1	SS	74												
1		FILL: gravelly sand, some silt, moist, compact with possible cobbles		63.84 0.76	2	SS	23												
				62.77 1.83	3A	SS	8												
2		CLAYEY SILT: some sand, grey, moist, stiff		62.47 2.13	3B														
3		END OF BOREHOLE Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.																	
4		DRAFT																	
5																			
6																			
7																			
8																			
9																			
10																			

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031311.5; E 452152.4
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-11

SHEET 1 OF 1

START DATE: Jan 12, 2021
 END DATE: Jan 12, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20	40	60	80	20	40	60			80
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.90												GR SA SI CL	
		ASPHALT: 180 mm thick		64.90 64.72													
		FILL: sand and gravel, 1040 mm thick, trace silt and clay, brown, moist, very dense to compact		0.18	1	SS	56										21 78 (1)
1					63.68	2A	SS	15									
		CLAYEY SILT: trace gravel, trace sand, grey, moist, stiff		63.68 1.22	2B	SS											
2				62.77	3	SS	11										
		END OF BOREHOLE		62.77 2.13													
3		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.															
4																	
5																	
6																	
7																	
8																	
9																	
10																	

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031275.1; E 452165342.0
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-12

SHEET 1 OF 1

START DATE: Jan 12, 2021
 END DATE: Jan 12, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.
 PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE			SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80							
								100 200 300 400				10 20 30 40							
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.60															
		ASPHALT: 90 mm thick		0.00															
		FILL: sand and gravel, some silt, brown, moist, compact with crushed granulars		0.09	1	SS	22												
1					63.38	2A	SS	18											
		CLAYEY SILT: some gravel, trace sand, brown, moist, very stiff		1.22	2B	SS													
2				62.47	3	SS	16										0 21 51 28		
3		END OF BOREHOLE Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.		2.13															
4																			
5																			
6																			
7																			
8																			
9																			
10																			

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031239.3; E 452118.1
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-14

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.
 PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE			SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80								
								100 200 300 400				10 20 30 40								
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.60																
		ASPHALT: 40 mm thick FILL: sand and gravel, 1330 mm thick, trace silt and clay, brown/grey, moist, compact to dense with buried asphalt		0.04	1	SS	23													
1					63.23	2	SS	42												
2		END OF BOREHOLE		1.37																
3		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.																		
4		DRAFT																		
5																				
6																				
7																				
8																				
9																				
10																				

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031205.4; E 452137.5
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-15

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.
 PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa nat V. - + Q - ● rem V. - ⊕ U - △				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	WATER CONTENT PERCENT										
								Wp ○ WI										
		PAVEMENT																
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	ASPHALT: 90 mm thick	64.30															
		FILL: sand and gravel, some silt, brown, moist, compact with buried asphalt and construction debris	0.00 0.09			1	SS	>50										
1		CLAYEY SILT: some to trace sand, grey, moist, stiff	63.39 0.91			2A	SS	6										
						2B	SS											
2			62.17 2.13			3	SS	12										
3	END OF BOREHOLE Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.																	
4																		
5																		
6																		
7																		
8																		
9																		
10																		

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031180.9; E 452172.4
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-16

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.
 PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80					
								100 200 300 400				10 20 30 40					
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.30												GR SA SI CL	
		ASPHALT: 90 mm thick		0.00													
		FILL: sand and gravel, some silt, brown, moist, compact with buried asphalt and construction debris		0.09	1	SS	77										37 62 (1)
1		CLAYEY SILT: some to trace sand, grey, moist, stiff		63.54													
				0.76	2	SS	19										
2					3	SS	14										
		END OF BOREHOLE		62.17													
		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.		2.13													

DRAFT

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031175.2; E 452190.1
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-17

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.
 PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa nat V. - + Q - ● rem V. - ⊕ U - △				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	WATER CONTENT PERCENT										
								Wp ○ W WI										
		PAVEMENT		64.00														
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	ASPHALT: 110 mm thick		60.00														
		FILL: sand and gravel, some silt, brown, moist, very dense with crushed granulars		0.11	1	SS	79										46 53 (1)	
1		CLAYEY SILT: some to trace sand, grey, moist, stiff		63.24														
				0.76	2	SS	8											
2				61.87	3	SS	13											
		END OF BOREHOLE Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.		2.13														
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MASS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031139.8; E 452131.3
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-18

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa nat V. - + Q - ● rem V. - ⊕ U - △				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	WATER CONTENT PERCENT											
								Wp ○ W WI											
							100 200 300 400				10 20 30 40								
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT	63.40																
		ASPHALT: 60 mm thick	0.06																
		FILL: sand and gravel, 700 mm thick, trace silt and clay, brown/grey, moist, very dense	62.64																
1		SILTY CLAY: some sand, grey, moist, firm to stiff	0.76	1	SS	>50													
2			61.27																
		END OF BOREHOLE	2.13																
3	<p>Notes:</p> <ol style="list-style-type: none"> This log is to be read with the subject report and project number as presented above. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. No abnormal odour or staining was observed unless otherwise indicated. No groundwater was observed in the open hole upon the completion. 																		
4																			
5																			
6																			
7																			
8																			
9																			
10																			

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031134.8; E 452084.5
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-19

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS				
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80								
								100 200 300 400				10 20 30 40								
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.00																
		ASPHALT: 130 mm thick		60.00																
		FILL: crusher run limestone, grey, moist, very dense		0.13	1A	SS	72													44 56 (0)
		FILL: sand and gravel, some silt and clay, grey, moist, very dense		0.46	1B	SS														
1		CLAYEY SILT: some to trace sand, grey/brown, moist, very stiff to stiff		0.76	2	SS	13													
2				3	SS	8													0 10 49 41	
2.13		END OF BOREHOLE		61.87																
3		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.		2.13																
4																				
5																				
6																				
7																				
8																				
9																				
10																				

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031101.7; E 452049.5
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-20

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.
 PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80						
								100 200 300 400				10 20 30 40						
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.00														
		ASPHALT: 100 mm thick		0.00														
		FILL: sand and gravel, 660 mm thick, trace silt, grey, moist, very dense		0.10	1	SS	>50											
1		CLAYEY SILT: trace sand, grey/brown, moist, very stiff		63.24														
				0.76	2	SS	21											
2				61.87														
				2.13	3	SS	18											
3		END OF BOREHOLE																
		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.																
4																		
5																		
6																		
7																		
8																		
9																		
10																		

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031155.8; E 452042.6
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-21

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH C_u , kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80					
								100 200 300 400				10 20 30 40					
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.00												GR SA SI CL	
		ASPHALT: 100 mm thick		0.00													
		FILL: sand and gravel, some to trace silt, brown/grey, moist, very dense to compact		0.10	1	SS	61										47 49 (4)
1				62.48													
		CLAYEY SILT: trace gravel, grey, moist, stiff		1.52													
2				61.87													
				2.13													
3		END OF BOREHOLE															
		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.															
4																	
5																	
6																	
7																	
8																	
9																	
10																	

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

PROJECT: DYT3 - Ottawa
 LOCATION: 2625 Sheffield Road
 COORDINATES: N 5031125.4; E 452039.9
 DATUM: Geodetic
 AECOM PROJECT #: 60634622
 CLIENT: Amazon Logistics

RECORD OF BOREHOLE: BH-22

SHEET 1 OF 1

START DATE: Jan 11, 2021
 END DATE: Jan 11, 2021
 BORING METHOD: 203 mm O.D. Solid Stem Auger
 CONTRACTOR: Aardvark Drilling Inc.

PENETRATION TEST HAMMER, 64kg; DROP, 760mm
 SAMPLER HAMMER, 64kg; DROP, 760mm

DEPTH SCALE (METRES)	BORING METHOD	SOIL PROFILE		SAMPLES			Standard Penetration Testing (SPT) Number (blows/0.3m)				SHEAR STRENGTH Cu, kPa				ADDITIONAL LAB. TESTING & GRAIN SIZE DISTRIBUTION (%)	WELL INSTALLATION AND WATER LEVELS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	N VALUE	20 40 60 80				20 40 60 80					
								100 200 300 400				10 20 30 40					
0	Power Auger Drilling 203 mm O.D. Solid Stem Auger	PAVEMENT		64.30												GR SA SI CL	
		TOPSOIL: 50 mm thick		0.05	1	SS	19										
		FILL: silty clay, trace gravel, some sand, brown, moist, very stiff with buried organics		63.64													
		CLAYEY SILT: trace gravel, grey/brown, moist, very stiff		0.66	2	SS	28										
1																	
2					3	SS	21									0 19 49 32	
2		END OF BOREHOLE		62.17													
3		Notes: 1. This log is to be read with the subject report and project number as presented above. 2. Interpretation assistance by AECOM is required for projects excluding the above mentioned project. 3. No abnormal odour or staining was observed unless otherwise indicated. 4. No groundwater was observed in the open hole upon the completion.		2.13													
4																	
5																	
6																	
7																	
8																	
9																	
10																	

(LOG TO BE READ IN CONJUNCTION WITH REPORT)

DEPTH SCALE

1 : 50



LOGGED: WH

CHECKED: TA

AECOM_BH_001_60634622_DYT3.GPJ_GAL-MISS.GDT_21-2-16

Jan 14, 2021

Appendix **B**

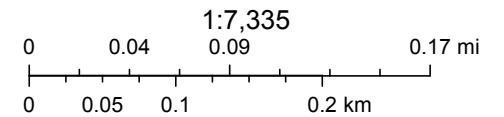
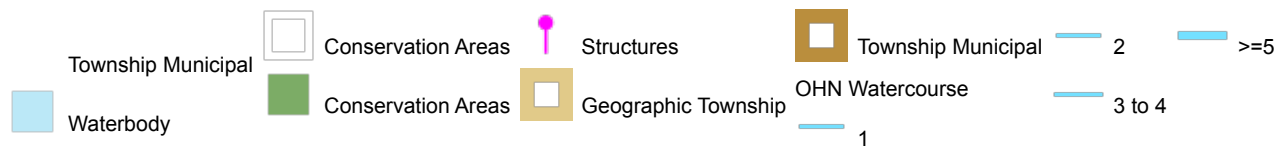
Regulatory Information



RVCA Regulations Mapping



2/16/2021, 8:49:30 AM



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

RVCA Regulations Mapping - Online Mapping
Rideau Valley Conservation Authority (RVCA)

Appendix **C**

Pre-consultation Comments





APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.

A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer to:

<http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans>

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S		1. Site Servicing Plan	2. Site Servicing Study	S	
S		3. Grade Control and Drainage Plan	4. Geotechnical Study	S	
		5. Composite Utility Plan	6. Groundwater Impact Study		
		7. Servicing Options Report	8. Wellhead Protection Study		
S		9. Community Transportation Study and / or Transportation Impact Study	10. Erosion and Sediment Control Plan	S	
S		11. Storm water Management Report	12. Hydro geological and Terrain Analysis		
		13. Hydraulic Water main Analysis	14. Noise / Vibration Study		
		15. Roadway Modification Design Plan	16. Confederation Line Proximity Study		

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
		17. Draft Plan of Subdivision	18. Plan Showing Layout of Parking Garage		
		19. Draft Plan of Condominium	20. Planning Rationale	S	
S		21. Site Plan	22. Minimum Distance Separation (MDS)		
		23. Concept Plan Showing Proposed Land Uses and Landscaping	24. Agrology and Soil Capability Study		
		25. Concept Plan Showing Ultimate Use of Land	26. Cultural Heritage Impact Statement		
S		27. Landscape Plan	28. Archaeological Resource Assessment Requirements: S (site plan) A (subdivision, condo)		
S		29. Survey Plan	30. Shadow Analysis		
S		31. Architectural Building Elevation Drawings (dimensioned)	32. Design Brief	S	
		33. Wind Analysis			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
S		34. Phase 1 Environmental Site Assessment	35. Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		
A		36. Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37. Assessment of Landform Features		
		38. Record of Site Condition	39. Mineral Resource Impact Assessment		
S		40. Tree Conservation Report	41. Environmental Impact Statement / Impact Assessment of Endangered Species	A	
		42. Mine Hazard Study / Abandoned Pit or Quarry Study	43. Integrated Environmental Review (Draft, as part of Planning Rationale)		

Number of copies
Digital versions of all submissions

Meeting Date: August 18, 2022

Application Type: SPC – complex

File Lead (Assigned Planner): Kelby Lodoen Unseth

Infrastructure Approvals Project Manager: Sharif Sharif

Site Address (Municipal Address): 2625 Sheffield Rd

*Preliminary Assessment: 1 2 3 4 5

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

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the Planning, Infrastructure and Economic Development Department will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the Planning, Infrastructure and Economic Development Department.

Pre-consultation Notes

Meeting: Thursday August 18, 2022 @ 11am

City Attendees:

Kelby Lodoen Unseth – Planner
Sharif Sharif – Infrastructure Project
Manager
Matthew Hayley – Environmental
Planner

Ann O'Connor – Urban Design
Mark Richardson – Forestry

Location:

2625 Sheffield Road

Property Overview and Discussion:

The property is zone Heavy Industrial (IH). The purpose of the IH Zone is to:

- 1) permit a wide range of industrial uses, including those which, by their nature, generate noise, fumes, odours, and are hazardous or obnoxious, in accordance with the Employment Area designation of the Official Plan or, the General Urban Area designation where applicable;
- 2) allow in certain Employment Areas or General Urban Areas, a variety of complementary uses such as recreational, health and fitness uses and service commercial (e.g. convenience store, personal service business, restaurant, automobile service station and gas bar), occupying small sites as individual occupancies or in groupings as part of a small plaza, to serve the employees of the Employment or General Urban Area, the general public in the immediate vicinity, and passing traffic;
- 3) prohibit retail uses in areas designated as Employment Area but allow limited sample and showroom space that is secondary and subordinate to the primary use of buildings for the manufacturing or warehousing of the product; and
- 4) provide development standards that would ensure that the industrial uses would not impact on the adjacent non-industrial areas.

The current City of Ottawa Official Plan designates the property as Urban Employment, which identifies lands for a range of employment uses.

The new City of Ottawa Official Plan designates the property as Industrial and Logistics (Section 6.4) under Transect B3 (Outer Urban Transect). The Industrial and Logistics designation is characterized by traditional land uses such as warehousing, distribution, among other uses, requiring a range of parcel sizes.

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Discussion:

The site appears to have strong pedestrian connections through the parking areas which is a positive. It is understood that the pedestrian walkway will be extended to the street near the north end of the property with a bus pad to be constructed. It may also be helpful to extend the walkway from the southern portion of the building to the street for pick-up and drop offs.

The City will be looking for a strong landscape plan as the site has substantial street frontage on both Sheffield Road and Humber Place. Although it is noted that above ground hydro lines run along Sheffield Road.

The vehicle and bicycle parking requirements will be confirmed through the Site Plan Control application, and the RVCA and VIA rail will be circulated on the development application.

The outdoor amenity area will be an asset, but consideration should be made to how much the location is shaded, due to the building height on three sides, and if a secondary space with more sun could be accommodated.

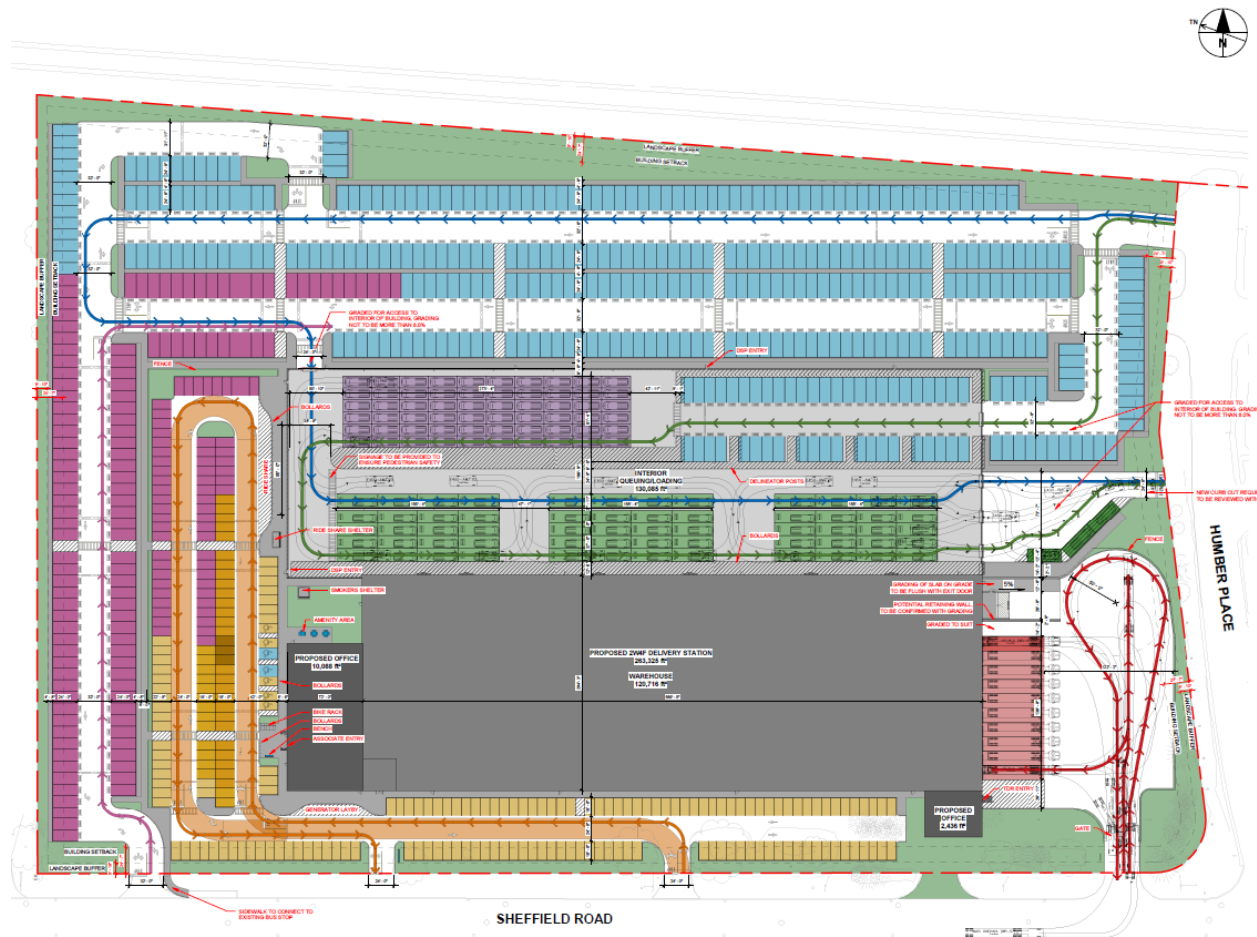
Property:



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Site Plan Concept:



Transportation:

1. A TIA is warranted proceed to scoping.
2. The application will not be deemed complete until the submission of the draft step 2-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
3. Although a full review of the TIA Strategy report (Step 4) is not required prior to an application, it is strongly recommended.
4. Synchro files are required at Step 4.
5. ROW protection is N/A.
6. Corner sight triangle: 5m x 5m

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7. The throat length requirements should follow the TAC guidelines for a collector road.
8. Noise study is not required.

Environment:

9. Natural Heritage - The property to the east is part of the National Capital Commission (NCC) Greenbelt and is identified New OP as Greenbelt Linkage in Schedule C12 and is indicated as a natural heritage feature on Schedule C11-C. As described above, adjacent lands to the development are to be identified as “greenbelt linkage”, this means that the site will need to ensure there is no negative impact on the linkage. However, an EIS is not triggered if the proposed development site is more than 30 m from the NCC lands. Given the adjacent natural area, lighting of the site will be a concern since it may attract wildlife from the greenbelt lands, some advice and guidance available in the EIS Guidelines and the Bird-safe guidelines.
10. Bird-safe Design - Given the size and type of the proposal the proposal will need to review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf
11. Extreme heat - Please consider features that reduce the urban heat island effect (see OP 10.3.3) produced by the parking lot and a building footprint. For example, this impact can be reduced by adding large canopy trees, green roofs or vegetation walls, or constructing the parking lot or building differently.

Forestry:

TCR requirements:

12. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
 - a) an approved TCR is a requirement of Site Plan approval.
 - b) The TCR may be combined with the LP provided all information is supplied
13. Any removal of privately-owned trees 10cm or larger in diameter, or city-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.

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14. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
 - a) If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
 - b) Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit

15. The TCR just contain 2 separate plans:
 - a) Plan/Map 1 - show existing conditions with tree cover information
 - b) Plan/Map 2 - show proposed development with tree cover information
 - c) Please ensure retained trees are shown on the landscape plan

16. the TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition

17. please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)

18. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained

19. All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at [Tree Protection Specification](#) or by searching [Ottawa.ca](#)
 - a) the location of tree protection fencing must be shown on the plan

20. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.

21. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on [City of Ottawa](#)

LP tree planting requirements:

For additional information on the following please contact adam.palmer@Ottawa.ca

22. Minimum Setbacks

- a) Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.
- b) Maintain 2.5m from curb
- c) Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
- d) Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas. Adhere to

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Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

23. Tree specifications

- a) Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- b) Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
- c) Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
- d) Plant native trees whenever possible
- e) No root barriers, dead-man anchor systems, or planters are permitted.
- f) No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

24. Hard surface planting

- a) Curb style planter is highly recommended
- b) No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- c) are to be planted at grade

25. Soil Volume

- a) Please document on the LP that adequate soil volumes can be met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

- b) Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

26. Sensitive Marine Clay

- a) Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

27. Tree Canopy Cover

- a) The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40%

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- b) At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate.
- c) Indicate on the plan the projected future canopy cover at 40 years for the site.

Urban Design:

28. A Design Brief that follows the provided Terms of Reference is required upon submission of the application.
29. Consider ways to simplify wayfinding and vehicular circulation on site.
- a) Consider reducing the amount of egresses. It appears there are six egresses proposed: two onto Humber Place and four onto Sheffield Road. Are all of these necessary to meet the needs of the site?
 - b) Clarify on the Site Plan if there are fences/barriers proposed between the different programmed areas (areas of different colour-coding on the concept plan).
 - c) If different egresses are needed for different purposes, consider clearly labelling these egresses for the benefit of drivers, so they are able to clearly understand which entrance is appropriate for them. Please illustrate the signs on the Site Plan.
30. Consider providing a simplified Site Plan that removes the various flow directions and colour-coded parking breakdowns. This other Site Plan should focus on providing clarity on:
- a) setbacks (to building, parking lot, and internal roads);
 - b) providing all dimensions in metres (including for the proposed building, proposed amenity area, parking spaces, width of drive aisles and egresses, all setbacks etc.);
 - c) clearly identifying building entrances, all pedestrian pathways, surface materials, vehicular access/navigation on-site, etc.
 - d) clearly identifying the building footprint (including the loading area in the back that will be within the footprint).
31. Consider how the building facade facing Sheffield Rd can be designed to announce the building to the street. For example, consider:
- a) Incorporating glazing into the office portion
 - b) Making prominent entrances
 - c) Incorporating design elements to identify that this is the front of the building, and
 - d) Removing/reducing blank walls facing Sheffield
32. Consider pedestrian flow on site.
- a) Support for the design of the pathways connecting to the bus stop and the provision of a new bus stop.

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- b) Consider providing a pedestrian pathway from Sheffield Rd to the entrance of the building, facing Sheffield Rd.
 - c) Continue to consider the desire-lines and safety of the drivers/staff walking around the site.
33. Consider how to facilitate a great amenity space.
- a) Consider moving the smoking area away from the picnic tables where non-smokers may choose to eat;
 - b) Consider adding a tree to provide shade;
 - c) Consider a location that will get sunlight;
 - d) Consider the most convenient location for staff;
 - e) Consider the views from people using the amenity area.
34. Consider ways to incorporate meaningful landscaping and tree plantings on-site.

Planning:

35. Stie Plan Control: <https://ottawa.ca/en/planning-development-and-construction/development-information-residents/development-application-review-process/development-application-submission/development-applications/site-plan-control>
36. City of Ottawa Accessibility Design Standards: https://documents.ottawa.ca/sites/documents/files/documents/accessibility_design_standards_en.pdf
37. Please ensure that the Parking, Queuing and Loading Provisions are following and appropriate vehicle and bicycle parking is provided on-site (<https://ottawa.ca/en/part-4-parking-queuing-and-loading-provisions-sections-100-114#bicycle-parking-space-rates-and-provisions-sec-111>).
38. Please ensure that the Landscaping Provisions for Parking Lots is followed (<https://ottawa.ca/en/part-4-parking-queuing-and-loading-provisions-sections-100-114#section-110-landscaping-provisions-parking-lots>).
39. The Planning Rationale Terms of Reference may be found [here](#).
40. For information on Applications, including fees, please visit: <https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/development-application-forms#site-plan-control>
41. The application processing timeline generally depends on the quality of the submission. For more information on standard processing timelines, please visit: <https://ottawa.ca/en/city-hall/planning-and-development/information->

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[developers/development-application-review-process/development-application-submission/development-application-forms#site-plan-control](#)

42. Bird-safe design guidelines:

https://documents.ottawa.ca/sites/documents/files/birdsafe_designguidelines_en.pdf

Engineering:

List of Reports and Plans (Site Plan Control):

- Site Servicing Plan
- Grading Plan
- Drainage/ Ponding Plan
- Erosion and Sediment Control Plan
- Stormwater Management and Site Servicing Report
- Geotechnical Investigation Report

Please note the following information regarding the engineering design submissions for the above noted site:

46. The Servicing Study Guidelines for Development Applications are available at the following address:

<https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans>

47. Servicing and site works shall be in accordance with the following documents:

- Ottawa Sewer Design Guidelines, Second Edition, (October 2012), including Technical Bulletins, ISDTB-2014-01, PIEDTB-2016-01, ISTB 2018-01, ISTB-2018-04, and ISTB-2019-02
- Ottawa Design Guidelines – Water Distribution, First Edition, (July 2010), including Technical Bulletins ISD-2010-2, ISDTB-2014-02, ISTB-2018-02, and ISTB-2021-03
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (Revised 2008)
- City of Ottawa Slope Stability Guidelines for Development Applications (Revised 2012)

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- City of Ottawa Environmental Noise Control Guidelines (January, 2016)
- City of Ottawa Hydrogeological and Terrain Analysis Guidelines (March 2021)
- City of Ottawa Park and Pathway Development Manual (2012)
- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)
- Ontario Provincial Standards for Roads & Public Works (2013)

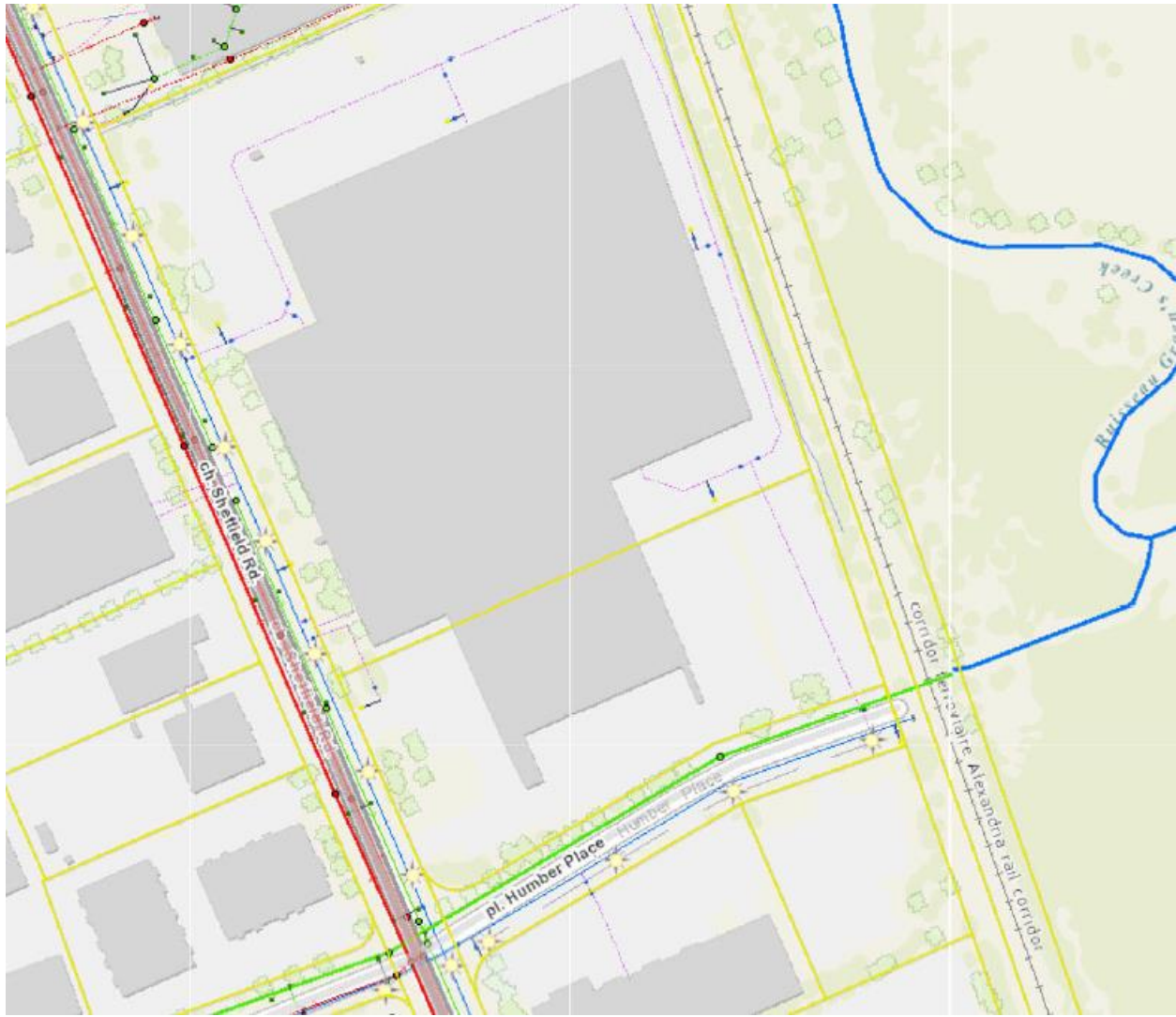
48. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x 44455

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

- The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
- For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.
- Flows to the storm sewer in excess of the 2-year pre-development storm release rate, up to and including the 100-year storm event, must be detained on site
- Ensure no overland flow for all storms up to and including the 100-year event.
- The 2-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
- A calculated time of concentration (Cannot be less than 10 minutes).
- Quality control and sub watershed requirements to be provided by Rideau Valley Conservation Authority (RVCA)

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50. Deep Services:

Hydrants



Hydrant Laterals



Trunk Sewers

- Sanitary Pipe (Red dashed line)
- Combined Pipe (Orange dashed line)
- Storm Pipe (Green dashed line)

Water Pipes

- Public (Blue solid line)
- Private (Cyan dashed line)

Valves

- Valve (Blue circle)
- TVS, A, D (Black square)

Storm Manholes



Storm Inlets



Pre-consultation Notes

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- i. *A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:*
 - a. Humber PI:
 - i. Storm – 1950 mm (Trunk Sewer).
 - b. Sheffield Road:
 - i. Sanitary – 370 mm.
 - ii. Storm – 375/525 mm.
 - iii. Water – 300 mm.
- ii. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*
- iii. *Connections to trunk sewers and easement sewers are not permitted.*
- iv. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).*
- v. *Review provision of a high-level sewer.*
- vi. *Provide information on the type of connection permitted*

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

- a. *Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.*
- b. *Std Dwg S11 (For rigid main sewers) – lateral must be less than 50% the diameter of the sewermain,*
- c. *Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less than 50% the diameter of the sewermain,*
- d. *Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.*
- e. *No submerged outlet connections.*
- vii. *Please provide estimated storm and sanitary flows before the first submission, to allow the City to confirm whether there are any downstream capacity constraints.*

51. Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

- i. Location of service(s)

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- ii. Type of development and the amount of fire flow required (as per FUS, 1999).
- iii. Average daily demand: ____ l/s.
- iv. Maximum daily demand: ____ l/s.
- v. Maximum hourly daily demand: ____ l/s.
- vi. Hydrant location and spacing to meet City's Water Design guidelines.
- vii. Water supply redundancy will be required for more than 50 m³/day water demand.

52. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

53. All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP);

- a. The consultants determine if an approval for sewage works under Section 53 of OWRA is required and determines what type of application. The City's project manager may help confirm and coordinate with the MECP as required.
- b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.
- c. Pre-consultation is not required if applying for standard or additional works (Schedule A of the Agreement) under Transfer Review.
- d. Pre-consultation with local District office of MECP is recommended for direct submission.
- e. Consultant completes an MECP request form for a pre-consultation. Send request to moeccottawasewage@ontario.ca
- f. ECA applications are required to be submitted online through the MECP portal. A business account required to submit ECA application. For more information visit <https://www.ontario.ca/page/environmental-compliance-approval>

NOTE: Site Plan Approval, or Draft Approval, is required before an application is sent to the MECP.

54. General Engineering Submission requirements:

- a. All industrial zone site must be verified eligibility/exemption for ECA process.
- b. Water supply redundancy will be required for more than 50 m³/day water demand.

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- c. Discharge to Humber PI storm trunk require back water valve for storm sewer within the site as per previous discussion. Provide the correspondence with the report.
- d. As per section 53 of the Professional Engineers Act, O. Reg 941/40, R.S.O. 1990, all documents prepared by engineers must be signed and dated on the seal.
- e. All required plans are to be submitted on standard A1 size sheets (594mm x 841mm) sheets, utilizing a reasonable and appropriate metric scale as per City of Ottawa Servicing and Grading Plan Requirements: title blocks are to be placed on the right of the sheets and not along the bottom. Engineering plans may be combined, but the Site Plans must be provided separately. Plans shall include the survey monument used to confirm datum. Information shall be provided to enable a non-surveyor to locate the survey monument presented by the consultant.
- f. All required plans & reports are to be provided in *.pdf format (at application submission and for any, and all, re-submissions).

Parks

55. Comments outstanding.

Attachments:

- Plan and study list
- Urban Design Terms of Reference

For any questions, please feel free to contact me at the information below. Please provide all submission documents electronically as paper copies of plans and reports are not being requested at this time.

Best regards,



Kelby Lodoen Unseth MCIP, RPP

Planner II | Urbaniste II

Development Review (South Services) | Examen des projets d'aménagement (services sud)

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Planning, Infrastructure and Economic Development | Services de planification, d'infrastructure et de développement économique

City of Ottawa | Ville d'Ottawa

☎ 613.580.2424 ext./poste 12852

ottawa.ca/planning / ottawa.ca/urbanisme

Enc.

Description:

A Design Brief is the core submission document that illustrates how the development is designed to work with its existing and planned context, to improve its surroundings and also demonstrate how the proposal supports the overall goals of the Official Plan, relevant secondary plans, Council approved plans and design guidelines. The purpose of the Terms of Reference is to assist the applicant to organize and substantiate the design justification in support of the proposed development and to assist staff and the public in the review of the proposal.

Authority to Request a Design Brief:

The *Planning Act* gives municipalities the authority to require that a Design Brief be prepared. Under Sections 22(4), (5) and Section 41(4) of the *Planning Act*, a Council has the authority to request such other information or material that the authority needs in order to evaluate and make a decision on an application. Section 5.2.6 of the Official Plan sets out the general requirement for a Design Brief.

Preparation:

The Design Brief should be signed by an urban designer, licenced architect, landscape architect, or a full member of the Canadian Institute of Planners.

When Required:

A Design Brief is required for a Site Plan Control planning application.

A Scoped Design Brief* is required when the following planning applications are applied for and not accompanied by a Site Plan Control application:

- Official Plan Amendment
- Zoning By-law Amendment (exception: a change in use which does not result in an increase in height or massing)

The requirement and scope of a Design Brief will be determined at the formal pre-application consultation meeting. Should an application be required to go to the [Urban Design Review Panel \(UDRP\)](#), the Design Brief may be submitted as part of the submission materials to the panel.

Contents for Design Brief Submissions:

A Design Brief will contain and/or address the points identified during the pre-consultation meeting. Failure to address the critical elements identified in the pre-consultation meeting may result in the application being considered incomplete.

* A *Scoped Design Brief* is composed of:

- Section 1 should be combined into the *Planning Rationale* submission, and
- Section 2 items will be confirmed in the pre-application consultation meeting.

SECTION 1 Note: This section may be combined with the Planning Rationale report

Application Submission:

Not Required

Required

State the: type of application, legal description, municipal address, purpose of the application and provide an overall vision statement and goals for the proposal.

Response to City Documents:

Not Required

Required

State the Official Plan land use designation for the subject property and demonstrate how the proposal conforms to the Official Plan as it relates to the design of the subject site. Reference specific policy numbers from the Official Plan to show consistency. Justify areas of non-compliance and explain why there is non-compliance.

State the applicable plans which apply to the subject proposal: community design plan, secondary plan, concept plan and design guideline. Reference the relevant design related policies within the applicable plans/guidelines and provide a comprehensive analysis as to how the proposed development incorporates the objectives or why it does not incorporate the objectives.

Context Plan:

Not Required

Required

Provide a contextual analysis that discusses/illustrates abutting properties, key destinations and linkages within a 100 meter radius (a larger radius may be requested for larger/more complex projects), such as transit stations, transportation networks for cars, cyclists, and pedestrians, focal points/nodes, gateways; parks/open spaces, topography, views towards the site, the urban pattern (streets, blocks), future and current proposals (if applicable), public art and heritage resources.

Photographs to illustrate existing site conditions and surrounding contexts. Include a map pinpointing (with numbers) where each photo is taken and correspond these numbers with the site photos. Arrows illustrating the direction the photo is taken is also useful.

SECTION 2

Design Proposal:

The purpose of the Design Proposal is to show the building elevations, exterior details, transitions in form, treatment of the public realm and compatibility with adjacent buildings, using 3-D models, illustrations, diagrams, plans, and cross sections. Referencing Official Plan, Section 5.2.1, as determined at time of pre-application consultation meeting, submissions will need to address the following in the form of labelled graphics and written explanation:

Massing and Scale

Not Required

Required

Images which show:

Building massing – from:

- at least two sides set within its current context (showing the entire height and width of the building) **OR**
- all four sides set within its current context (showing the entire height and width of the building).

Views – of the entire block, from:

- at least two perspectives to show how the proposed building is set within its current context **OR**
- all four perspectives to show how the proposed building is set within its current context.

Building transition – to adjacent uses, with labelled explanation of the transition measures used.

Grading – if grades are an issue.

Alternative building massing – additional imagery and site layouts considered and provide justification for the ultimate proposal sought.

Public Realm

Not Required

Required

Labelled graphics and a written explanation which show:

Streetscape – cross sections which illustrate the street design and right of way (referencing the City's design manuals).

Relationship to the public realm – illustrating how the first few storeys of the proposed development responds to and relates to the existing context (e.g. through a podium plan and first floor plan). This is to include detailed explanation on:

- Architectural responses
- Landscaping details
- Public art features (in accordance with Official Plan, Section 4.11)
- For developments in Design Priority Areas, detail the building and site features, (in accordance with Official Plan, Section 4.11) which will enhance the public realm. Provide explanation for features which are not provided.

Building Design

Not Required

Required

Labelled graphics (e.g. building elevations and floor plans) and a written explanation which document the proposed exterior architectural details and design (in accordance with Official Plan, Section 5.2.1).

For high-rise development applications, detail the building design and massing and scale elements and how they relate to the proposed high-rise development (in accordance with Official Plan, Section 5.2.1).

Sustainability

Not Required

Required

Any sustainable design features to be incorporated, such as green roofs or walls, sun traps, reflective or permeable surfaces.

Heritage

Not Required

Required

How the building relates to the historic details, materials, site and setting of any existing historic resources on or adjacent to the subject property (if applicable).

Additional Contents:

Some proponents may be requested to provide submission material which complements the Design Brief. These additional requirements could be incorporated into the Design Brief submission for ease of review. These will be identified at the time of application consultation meeting:

- Site Plan
- Landscape Plan
- Elevations
- Plan showing existing and proposed servicing
- Shadow Analysis
- Wind Analysis

Submission Requirements

- Digital copies only

Paliouras, Kosta

From: Ahmed, Aziz (MECP) <Aziz.Ahmed@ontario.ca>
Sent: Monday, August 29, 2022 9:22 AM
To: Paliouras, Kosta
Cc: Kuljanin, Milan; Warnock, Charles; Primeau, Charlie (MECP)
Subject: [EXTERNAL] RE: 2625 Sheffield Road Ottawa ON

Kosta,

All is well, hope the same with you.

Based on the analysis you have provided that the works meets the criteria in s.3 of R525/98, I agree that the change in configuration of the development alone does not alter the exemption from the requirement to obtain an ECA.

Stay safe,

Aziz

Aziz S. Ahmed, P.Eng. | Manager

Municipal Water and Wastewater Permissions Section, Environmental Permissions Branch | Environmental Assessment and Permissions Division

Ministry of the Environment, Conservation and Parks | 40 St. Clair Ave. West, 2nd Floor, Toronto, ON M4V 1M2

Tel: 416.314.4625 | Cell: 416.712.7427 | Toll Free: 1-888-999-1305 | Fax: 416.314.1037 | ✉: Aziz.Ahmed@ontario.ca

If you have any accommodation needs or require communication supports or alternate formats, please let me know.

Si vous avez des besoins en matière d'adaptation, ou si vous nécessitez des aides à la communication ou des médias substitués, veuillez me le faire savoir.

From: Paliouras, Kosta <kosta.paliouras@aecom.com>

Sent: August-29-22 9:16 AM

To: Ahmed, Aziz (MECP) <Aziz.Ahmed@ontario.ca>

Cc: Kuljanin, Milan <Milan.Kuljanin@aecom.com>

Subject: FW: 2625 Sheffield Road Ottawa ON

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good morning Aziz

I hope all is fine and you've had a good summer.

In October 2021, you indicated to the City of Ottawa staff that the proposed works at 2625 Sheffield Road in Ottawa, ON would not require a Sewage Works ECA permit (email chain is below). Since October 2021, there was a change to the layout of the Site but the nature of the Site has not changed.

Attached is a letter requesting an exemption from requiring an Sewage Works ECA for the Site works.

Please review and let me know if you have any questions

Thank you,
Kosta

Kosta Paliouras, P.Eng
Senior Water Resources Engineer/Project Manager/Group Leader, Water
D +1-519-650-8669
M +1-226-749-0964
kosta.paliouras@aecom.com

In light of the COVID-19 situation, I am currently working remotely away from the office. In any instance, please contact me at any of the numbers above

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Tuesday, October 26, 2021 11:30 AM
To: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Subject: [EXTERNAL] FW: 2625 Sheffield Road Ottawa ON

Good Morning Milan,

I have received a confirmation from the Toronto Office regarding the MECP ECA exemption. Please see the response below. I believe, according to the information you provided for the proposed development the land use do not fall under industrial use, thus Toronto Office confirmed no ECA will be required.

Please include this correspondence in your updated SWM and servicing report.

Thank you.

Sharif

From: Warnock, Charles <Charles.Warnock@ottawa.ca>
Sent: October 26, 2021 10:53 AM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Subject: 2625 Sheffield Road Ottawa ON

Hi Sharif, please see the response below from the MECP.
They have concluded that the land use is not Industrial.
If the proposal meets all conditions of O.Reg. 525/98 then I see no requirement to obtain an ECA.
Thanks.
Charles

From: Ahmed, Aziz (MECP) <Aziz.Ahmed@ontario.ca>
Sent: October 26, 2021 9:54 AM
To: Warnock, Charles <Charles.Warnock@ottawa.ca>
Subject: RE: 2625 Sheffield Road Ottawa ON

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Charles,

Hope you are well. Based on the landuse described, I agree that this does not fall under the classification of industrial use.

I would also like to draw your attention to the following:

We are happy to inform you that we have posted a notice on the Environmental Registry of Ontario (ERO) about our proposal to amend O. Reg. 525/98 under the *Ontario Water Resources Act*. The proposed changes would remove the requirement to obtain an Environmental Compliance Approval for low risk sewage works.

The proposal notice will be available for public comment for 45 days, closing on December 9, 2021. The [posting](#) can be accessed on the Environmental Registry of Ontario. The feedback that we receive during this 45-day consultation period will help finalize the amendments to the regulations.

Please provide comments on this if you are interested, including the definition of industrial land, and services on private property which you have raised previously.

Stay safe,

Aziz

Aziz S. Ahmed, P.Eng. | Manager

Municipal Water and Wastewater Permissions Section, Environmental Permissions Branch | Environmental Assessment and Permissions Division

Ministry of the Environment, Conservation and Parks | 40 St. Clair Ave. West, 2nd Floor, Toronto, ON M4V 1M2

Tel: 416.314.4625 | Cell: 416.712.7427 | Toll Free: 1-888-999-1305 | Fax: 416.314.1037 ✉: Aziz.Ahmed@ontario.ca

If you have any accommodation needs or require communication supports or alternate formats, please let me know.

Si vous avez des besoins en matière d'adaptation, ou si vous nécessitez des aides à la communication ou des médias substitués, veuillez me le faire savoir.

From: Warnock, Charles <Charles.Warnock@ottawa.ca>

Sent: October-26-21 9:50 AM

To: Ahmed, Aziz (MECP) <Aziz.Ahmed@ontario.ca>

Subject: 2625 Sheffield Road Ottawa ON

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Ahmed, I hope you are well and having a good day.

I am just following up on this email.

Thanks and have a good day.

Charles

From: Warnock, Charles

Sent: October 21, 2021 11:38 AM

To: Aziz Ahmed (aziz.ahmed@ontario.ca) <aziz.ahmed@ontario.ca>

Subject: 2625 Sheffield Road Ottawa ON

Hi Ahmed, I hope you are well and having a good day.

I am just following up on this email.

Thanks and have a good day.

Charles

From: Warnock, Charles

Sent: October 13, 2021 1:40 PM

To: Aziz Ahmed (aziz.ahmed@ontario.ca) <aziz.ahmed@ontario.ca>

Subject: 2625 Sheffield Road Ottawa ON

Hi Aziz, I hope all is well with you and that you had a nice long weekend.

Would the MECP consider that an Industrial ECA is not required for this site?

Furthermore, if no Industrial ECA is required it meets the other requirements for an exemption and therefore no ECA would be required.

We have a site plan application at 2625 Sheffield Road Ottawa ON.

The owner is Choice Properties Reit.

AECOM the civil consultant for the owner has made a request to ask the MECP if an Industrial ECA is required

The proposed works consists of developing an existing vegetated area to expand a large parking area only. There is no expansion of the existing building and will not require an expansion of the existing sanitary and water servicing. Due to the expansion of the parking lot area into existing vegetated area, additional surface runoff will discharge off-Site and would require additional water quality and quantity controls to minimize detrimental impacts to the downstream outlet. The objective for these stormwater management facilities is to provide water quality treatment, water quantity control, and groundwater recharge in accordance with the City's requirements for development.

The proposed stormwater management facilities will consist of an underground chamber storage systems (StormTech MC-3500 systems or approved equivalent) with the capacity to accept surface runoff up to and including the 100-year storm event for the proposed parking lot area and provide water quality treatment prior to discharging downstream. The chamber storage systems will consist of storage chambers with clear stone granular material bedding, surrounded by a permeable liner to encourage infiltration of runoff from the parking lot area. The proposed underground chamber storage systems will then ultimately discharge to the municipal infrastructure on Leeds Road. Existing drainage patterns from the existing building structure and parking lot area located north and west of the building structure will be maintained. The existing discharge control and location will be maintained to regulate discharge as per City's requirements.

The Site is zoned 'IH' (Heavy Industrial Use). AECOM has indicated that *"there will be no machinery or on-site processes that would require industrial water use to discharge to the municipal system and no outdoor storage of processed material or any contaminate material. Due to the purpose of the Site, there will be consistent van and truck traffic through the proposed parking lot area. The extent of untreated surface runoff would originate from parking lot area and would include total suspended solids (TSS), vehicular oil and chlorides. The level of concern is minimal."*

Ontario Water Resources act defines industrial land as “land used for the production, processing, repair, maintenance or storage of goods or materials, or the processing, storage, transfer or disposal of waste, but does not include land used primarily for the purpose of buying or selling, (a) goods or materials other than fuel, or (b) services other than vehicle repair services.”

The proposed use meets the MECP’s definition of Industrial lands however the consultant has indicated that “*The level of concern is minimal.*”

The SWMF services only the subject parcel and the site outlets to an existing storm sewer.

Ontario Regulation 525/98 states that Subsection 53 (1) and (3) of the Act do not apply to lands designed as:

- one parcel,
- that discharge into a storm sewer that is not combined,
- does not service industrial and or located on industrial land.”

The development is a single parcel of land, out letting to a storm sewer that is not combined.

Please let of us know if an Industrial ECA is required.

Thank you in advance.
Charles

,

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

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,

Aziz S. Ahmed, P.Eng.
Manager, Municipal Water and Wastewater Permissions Section
Environmental Branch - Environmental Assessment and Permissions
Division
Ministry of the Environment, Conservation, and Parks
40 St. Clair Avenue West, 2nd Floor
Toronto, Ontario M4V 1M2

August 29, 2022

Project #
60684725

DRAFT

**Subject: Environmental Compliance Approval (ECA) Exemption
DYT3 Distribution Facility
2625 Sheffield Road, Ottawa, Ontario**

Dear Mr. Ahmed:

The following letter is to indicate that the proposed distribution facility at 2625 Sheffield Road in Ottawa, Ontario (Site) is exempted from requiring an Environmental Compliance Approval (ECA) permit from the Ministry of Environment, Conservation, and Parks (MECP), as per Ontario Regulation 525/98.

Existing Site conditions consist of a building structure, parking lot area, and vegetated area. The Site is approximately 7.06 hectares (ha) in total size, with an existing building structure footprint of approx. 3,796 square metres (m²). The proposed works consists of demolishing the existing building structure and parking lot area and redeveloping for a proposed 2,490 m² building structure and regraded parking lot area. Additional stormwater management infrastructure (such as infiltration basins, storm sewers, underground chamber storage, etc.) will be required to meet City of Ottawa discharge requirements.

Exemption Reasoning

Ontario Regulation 525/98 states that Subsection 53 (1) and (3) of the Act do not apply to lands designed as:

- one parcel, for which the Site and all proposed works will be contained;
- that discharge into a storm sewer that is not combined, for which is not the case at the Site, as sanitary and storm services currently are and will continue to be separate;
- does not service industrial or a structure located on industrial land; and
- is not located on industrial land.

Ontario Water Resources Act defines industrial land as “land used for the production, processing, repair, maintenance or storage of goods of materials, or the processing, storage, transfer or disposal of waste, but does not include land used primarily for the purpose of buying or selling, (a) goods or materials other than fuel, or (b) services other than vehicle repair services.”

Though the Site is located within a “Heavy Industrial Zone” according to the zoning by-law, the primary purpose of the proposed development will be for the distribution of goods and material, with only van and truck traffic through the proposed parking lot area. There will be no machinery or on-site processes that would require industrial water use to discharge to the municipal system and no outdoor storage of processed material or any contaminate material. Contaminates would include total suspended solids (TSS), vehicular oil and chlorides from the parking lot area. The proposed infiltration basins will only accept discharge from the proposed roof areas and an impermeable liner is proposed for the proposed underground chamber storage systems and

therefore none of the runoff from the parking lot area will infiltrated into the underlying soil. The level of concern would be minimal.

I hope this letter is to your satisfaction. If there are any questions, feel free to contact me at kosta.paliouras@aecom.com or 519-650-8669.

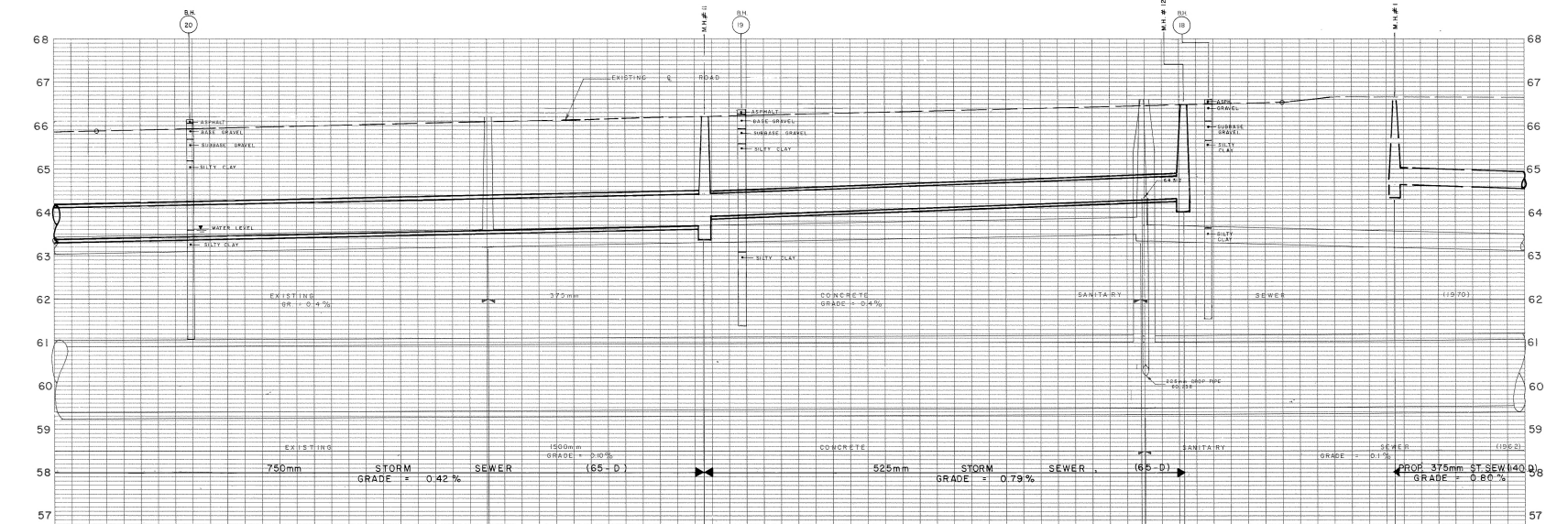
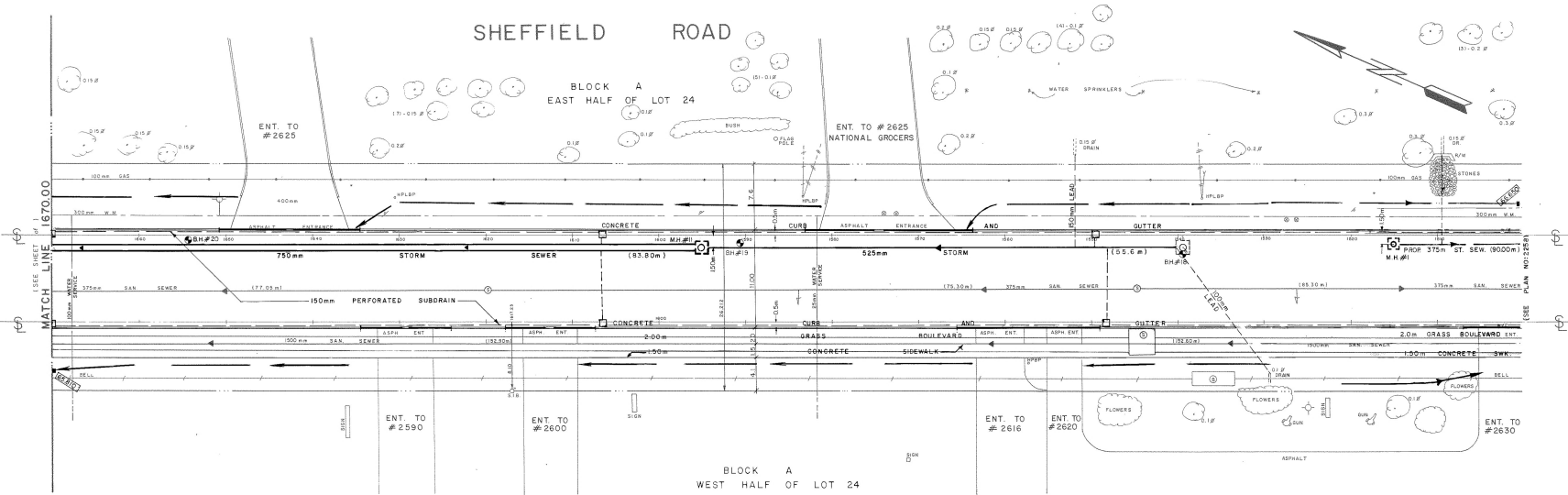
Sincerely,
AECOM Canada Ltd.

A handwritten signature in blue ink, appearing to read 'K. Paliouras', with a long horizontal flourish extending to the right.

Kosta Paliouras, P.Eng.
Senior Water Resources Engineer/Project
Manager/Group Leader, Water
kosta.paliouras@aecom.com

Appendix **D**

City of Ottawa Existing Drawings



Stations	Existing Surface Elevation	Type & Diameter (sewer)	Inverts (Exist & Prop. (sewer))
1670.00	65.882		
1680.00	65.974		
1690.00	66.058		
1700.00	66.150		
1710.00	66.232		
1720.00	66.315		
1730.00	66.397		
1740.00	66.479		
1750.00	66.561		
1760.00	66.643		
1770.00	66.725		
1780.00	66.807		
1790.00	66.889		
1800.00	66.971		
1810.00	67.053		
1820.00	67.135		
1830.00	67.217		
1840.00	67.299		
1850.00	67.381		
1860.00	67.463		
1870.00	67.545		
1880.00	67.627		
1890.00	67.709		
1900.00	67.791		
1910.00	67.873		
1920.00	67.955		
1930.00	68.037		
1940.00	68.119		
1950.00	68.201		
1960.00	68.283		
1970.00	68.365		
1980.00	68.447		
1990.00	68.529		
2000.00	68.611		

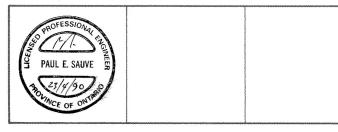
Revisions:

No.	Date	Description	Drawn By	Appr'd By

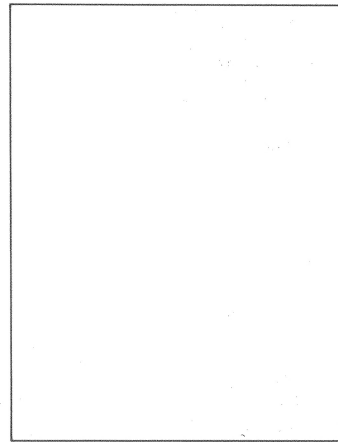
Final Measurements:
 Construction Type: SEWER AND ROAD Inspector: S. SAUVE
 Work Commenced: JUNE 25, 1990 Instrumentman: J. PINNEY
 Work Completed: NOV. 16, 1990 Field Book #: 8226, 8228, 8227
 Contractor: DISBLEE Date: MARCH/1991
 Drafting Revisions: J. PINNEY Checked By:

Designed By: [Signature] Date: Structural Check By: [Signature]
 Survey Detail By: [Signature] Checked By: [Signature]
 Drafting By: [Signature] Checked By: [Signature]

Chief: [Signature] Senior Const. Coord.



Notes:
 - Utilities shown are taken from best available records. Contractor is requested to check with all utility companies before digging.
 - Soil information shown is not guaranteed and contractors are advised to collect additional soils information as deemed necessary.
 - Reference bench mark:
 - Proposed storm and sanitary sewers may be constructed in a common trench provided that a minimum horizontal distance of 450mm is maintained between outside barrels of pipe.
 - All pipes shall conform to the Canadian Standards Association (C.S.A.) A257.2 reinforced concrete sewer pipe with approved rubber gaskets.
 - A minimum of 460mm vertical clearance to be maintained between sewers and watermains where practical.
 - Borehole soil descriptions are not based on sieve analysis but on visual inspection only, except where otherwise noted.
 - Soil information taken from:
 - Date of television inspection:
 - This plan supersedes (in whole or in part) plan no. [blank]
 - Actual rock line recorded during construction of existing sewer.
 - Registered plan no. [blank]
 - Caution, while illustrations and utilities shown are taken from best available information, they cannot be guaranteed.
 - See additional notes on sheet #1



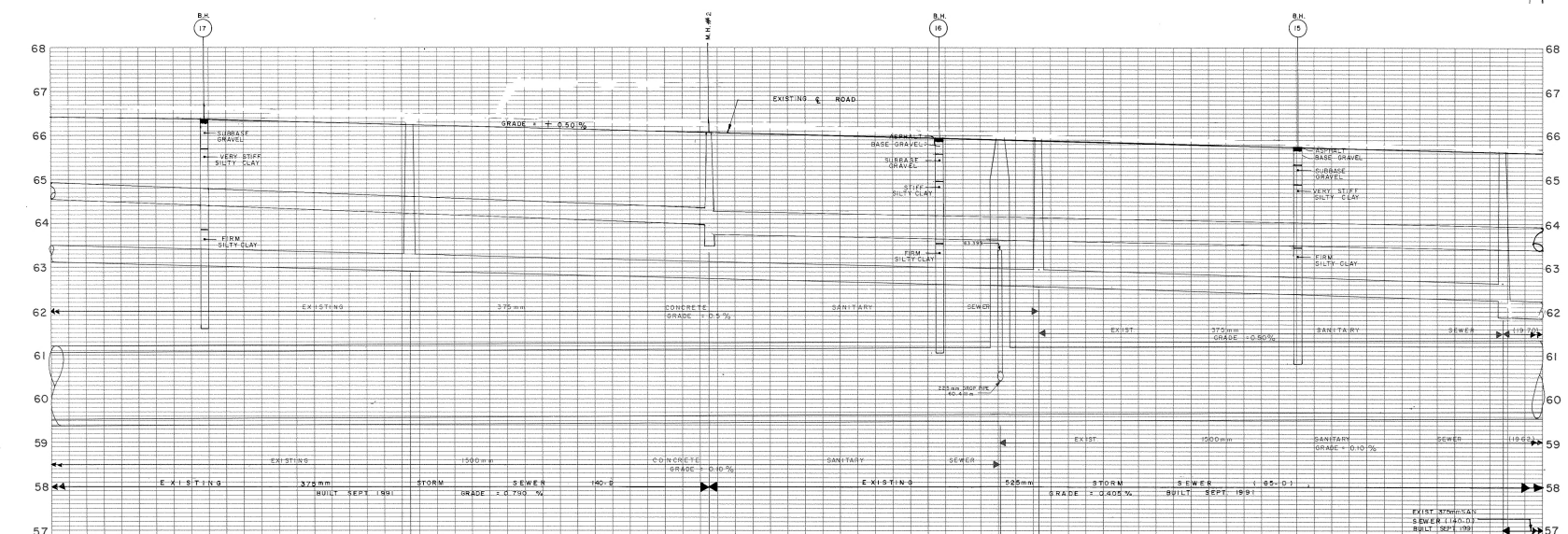
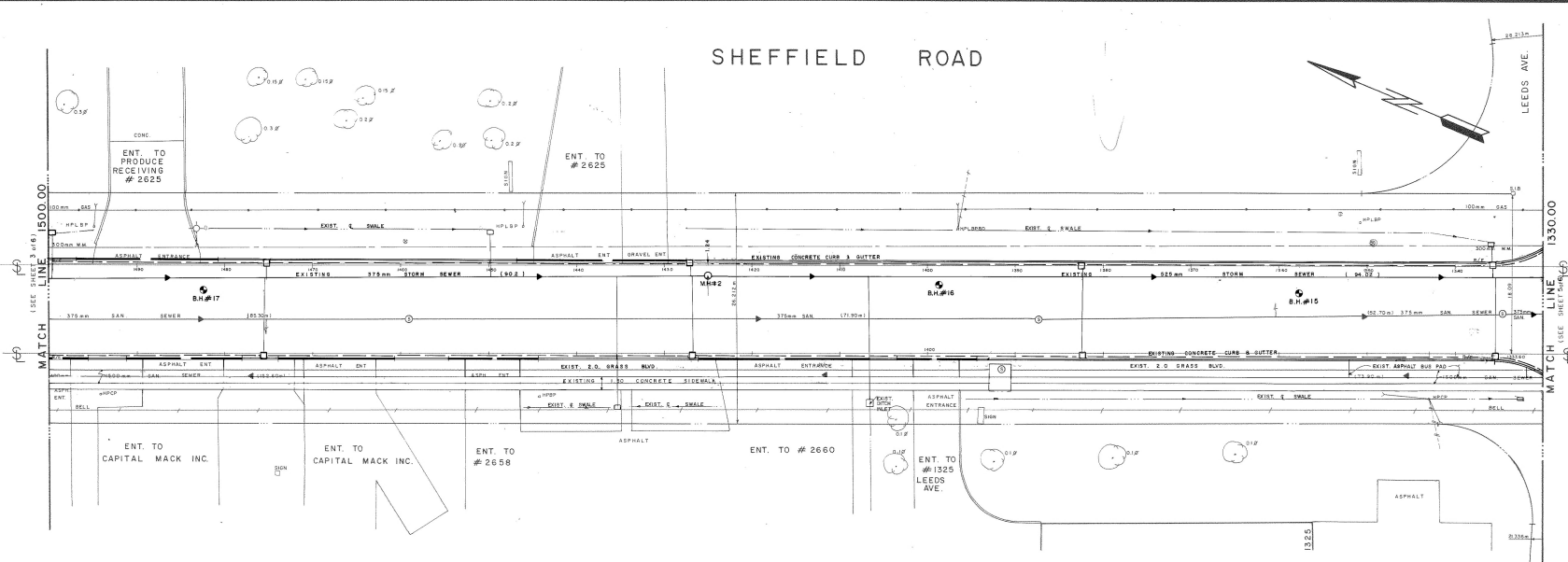
City of Ottawa
 Department of Engineering And Works
 Engineering Branch
 Design And Construction Division
 800 SCOTT STREET - OTTAWA ONTARIO K1Y 4N7

Commissioner: D. Curry P. Eng. Branch Director: W.R. Cole P. Eng.

STORM SEWER AND ROAD RECONSTRUCTION
 SHEFFIELD ROAD
 FROM CH: 1500.00 TO CH: 1670.00

Contract No.: 90-25 Survey Books: 4706, 4761, 4869, 4879, 4886 Sheet: 10 of 10
 Scale: HOR. 1:250 VERT. 1:50
 Date: 1990

SHEFFIELD ROAD



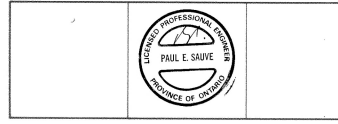
Stations	Existing Surface Elevation	Type & Diameter (sewer)	Inverts (Exist & Prop. Sewer)	Existing Surface Elevation
15000.00	66.415			66.415
14500.00	66.384			66.384
14800.00	66.352			66.352
14700.00	66.274			66.274
14500.00	66.335			66.335
14500.00	66.091			66.091
14400.00	66.04			66.04
14300.00	66.071			66.071
14220.00	66.0071	375mm ST	66.0071	66.0071
14200.00	66.044			66.044
14100.00	66.072			66.072
14000.00	66.930			66.930
13900.00	66.897			66.897
13820.00	66.944	375mm ST	66.944	66.944
13800.00	66.932			66.932
13700.00	66.890			66.890
13600.00	66.748			66.748
13500.00	66.673			66.673
13400.00	66.631			66.631
13340.00	66.600			66.600
13300.00	66.575			66.575

Revisions:

No.	Date	Description	Drawn By	Appr'd By

Final Measurements:

Construction Type	Storm & San Sewer	Inspector	Rick Lester	Bill Corde
Work Commenced	May 1991	Instrumentation	John France	
Work Completed	Sept 1991	Field Book #	5327	5328
Contractor	Bracewell Construction Ltd. C.P.	Scale	Sept 30 1991	
Drafting Revision	Drawn By: Doug McEwen	Checked By: [Signature]		



Notes:

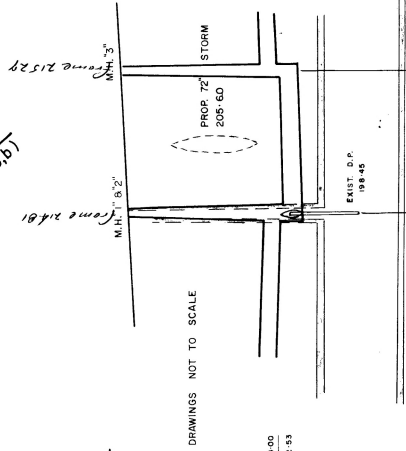
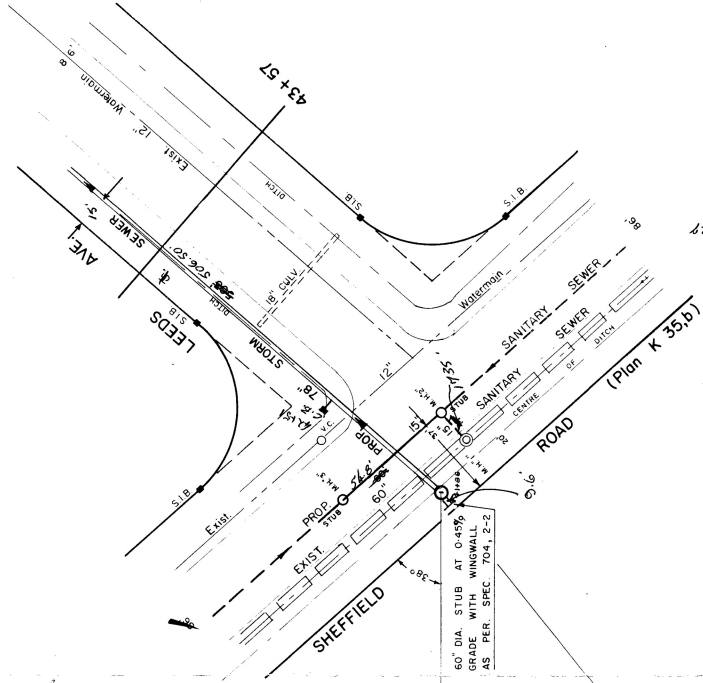
- Utilities shown are taken from best available records. Contractor is requested to check with all utility companies before digging.
- Soil information shown is not guaranteed and contractors are advised to collect additional soils information as deemed necessary.
- Reference bench mark: Proposed storm and sanitary sewers may be constructed in a common trench provided that a minimum horizontal distance of 400mm is maintained between outside barrels of pipe.
- All pipes shall conform to the Canadian Standards Association (C.S.A.), A2572 reinforced concrete sewer pipe with approved rubber gaskets.
- A minimum of 450mm vertical clearance to be maintained between sewers and watermain where practical.
- Borehole soil descriptions are not based on sieve analysis but on visual inspection only, except where otherwise noted.
- Soil information taken from:
 - Date of television inspection: [Blank]
 - This plan supercedes (in whole or in part) plan no: [Blank]
 - Actual rock line recorded during construction of existing sewer: [Blank]
 - Registered plan no: [Blank]
- Caution, while illustrations and utilities shown are taken from best available information, they cannot be guaranteed.
- See additional notes on sheet # 1.
- When reduced, the scale of this drawing is approximately 1:400 horizontally and 1:81 vertically. Do not scale this plan.

City of Ottawa
 Department Of Engineering And Works
 Engineering Branch
 Design And Construction Division
 1600 SCOTT STREET - OTTAWA, ONTARIO - K1V 4N7

Commissioner: D. Curry P. Eng. Branch Director: W.R. Cole P. Eng.

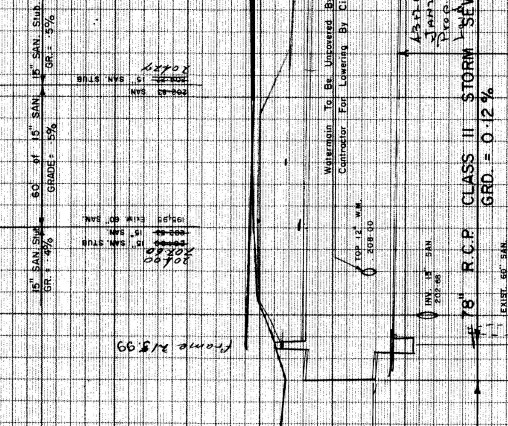
SHEFFIELD ROAD

Contract No.: 91-38 Survey Book: 4706, 4761, 4869, 4879, 4886 Scale: HOR. 1:250 VERT. 1:50 Plan No.: 2459 Sheet 4 of 6



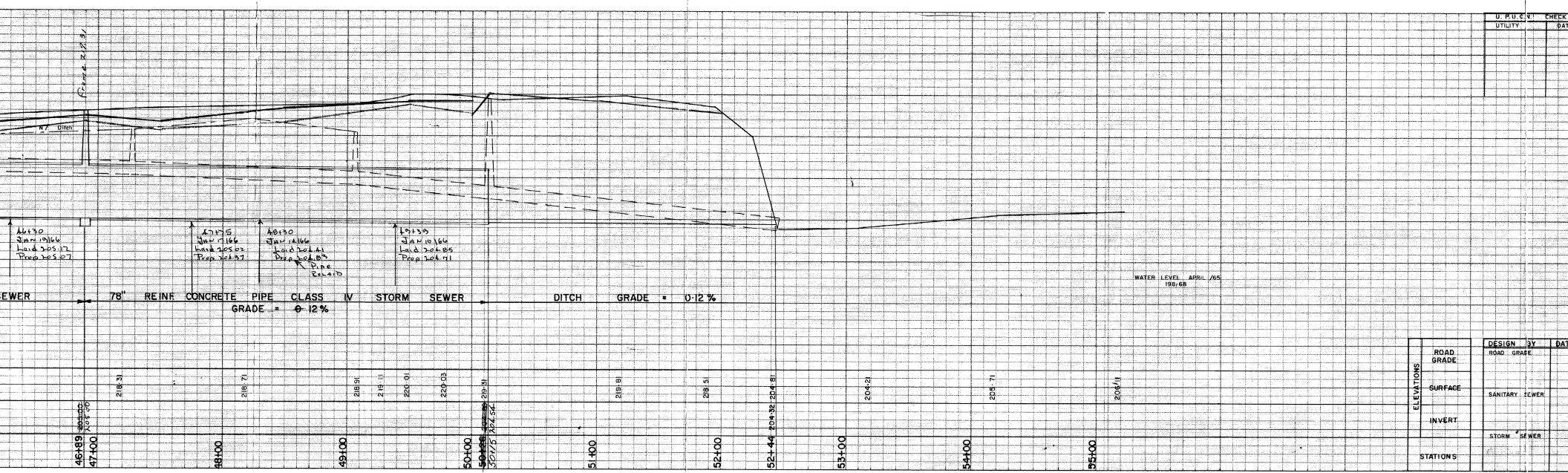
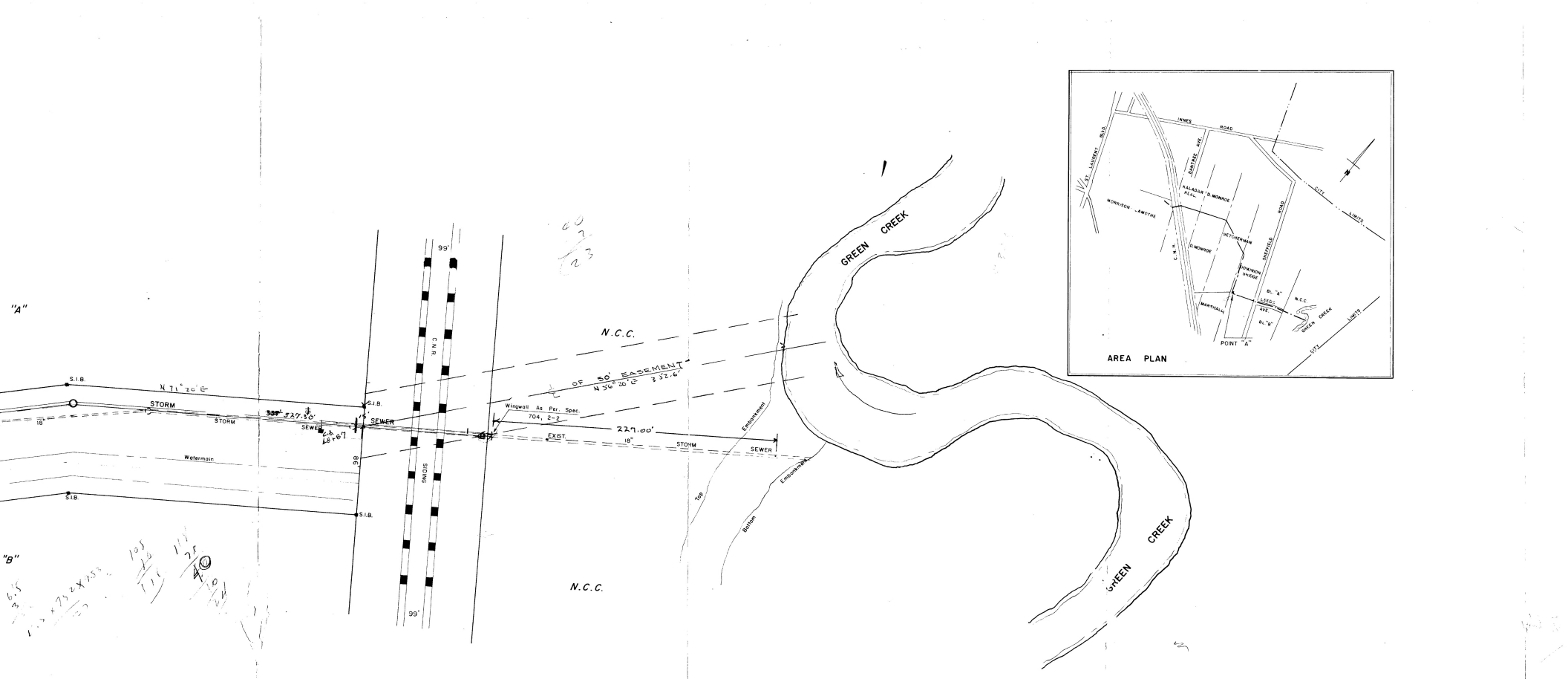
NOTE
 ALL SANITARY SEWERS TO BE
 EXTRA STR. CONC. PIPE ASTM
 C-14-61 WITH APPR. RUBBER GASKETS

235	230	225	220	215	210	205	200
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43+57	43+00	42+00	41+00	40+00	39+00
215.5	215.4	213.25	207.25	207.25	

54
 12
 72



U. P. U. C. V	CHECK
UTILITY	DATE

WATER LEVEL APRIL /65
190.68

ELEVATIONS	ROAD GRADE	DESIGN BY	DATE
	SURFACE	ROAD GRADE	
INVERT	SANITARY SEWER		
	STORM SEWER		
STATIONS			

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50115
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Appendix **E**

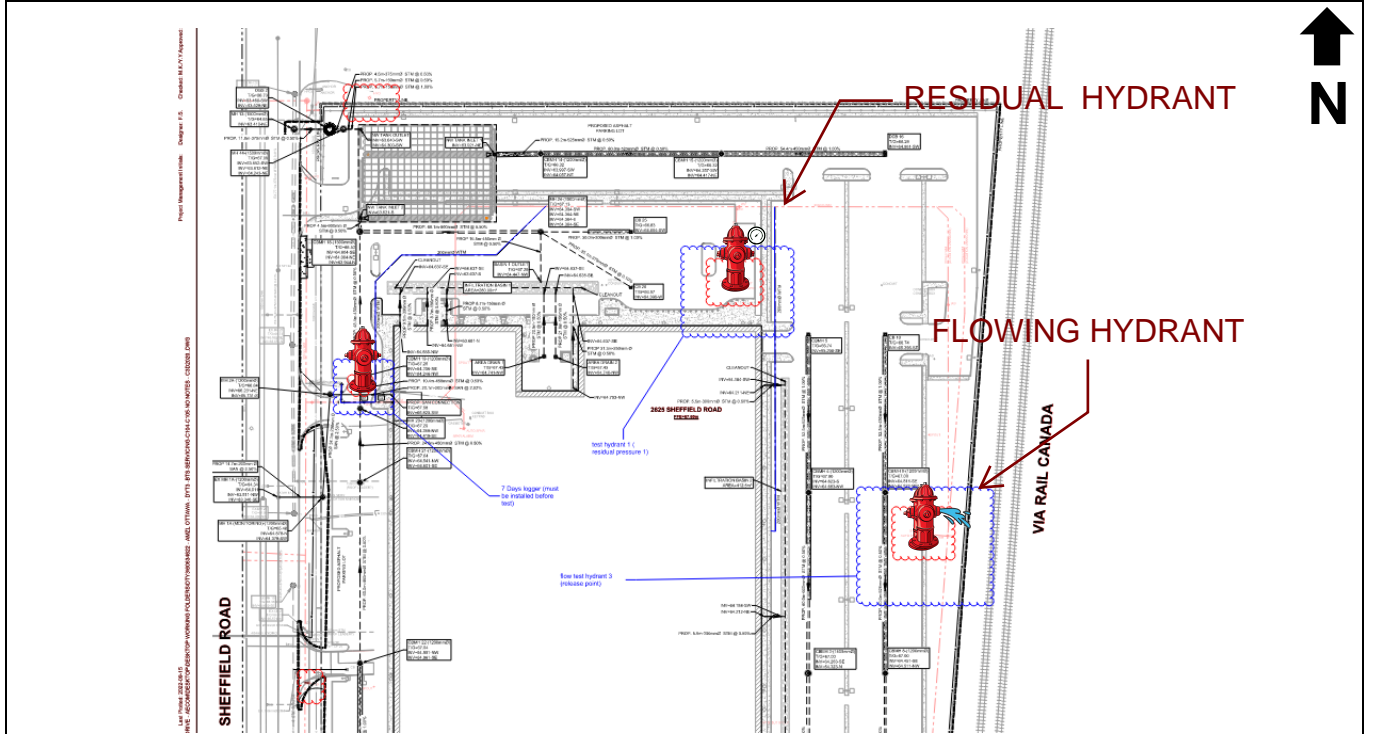
**Supporting Engineering Documentation
and Calculations – Water and Wastewater
Calculations and Correspondence**

PROJECT INFORMATION

Project Name:	2625 Sheffield Rd Flow Test	Const. Project #:	SMC-0005255
Site Address:	2625 Sheffield Rd Ottawa ON	Design Project #:	2022-CFLS-606
City Contact:	Ottawa Utilities	Phone #:	613-580-2400x2226
CFLS Contact:	Trevor Brownrigg	Phone #:	613-240-5665
Technical Contact:	Andy Coghlin	Phone #:	519-476-0761

SITE INFORMATION

SITE MAP



Note: If the main is a dead end, the flowing hydrant shall be closest to the dead end

ITEMS TO LABEL ON MAP	HYDRANTS USED	MAIN SIZE
<input checked="" type="checkbox"/> Static / Residual & Flow Hydrants	<input checked="" type="checkbox"/> City Hydrant(s)	City:
<input type="checkbox"/> Flow Direction (if the main is dead end)	<input type="checkbox"/> Site Hydrant(s)	Site:

SITE NOTES

Blank area for site notes.

TEST INFORMATION

Minimum Required Flow:	NA	Min Ports:	2
CFLS Personnel Present:	Trevor Brownrigg	Test Date:	2022-10-12
City / External Company:	City of Ottawa	Test Time:	1:00pm

TEST EQUIPMENT

<input checked="" type="checkbox"/> Hose Monsters with built in Pitot	Hose length used:
<input type="checkbox"/> Hand held pitot gauge	<input type="checkbox"/> Pollard diffuser elbow with built in Pitot
<input type="checkbox"/> Other:	

TEST RESULTS

Number of Ports	Outlet Size (IN)	Discharge Coefficient	Pitot Reading (PSI)			Total Flow (GPM)	Static / Residual Pressure (PSI)
0 Ports	STATIC						72
1 Port	2.5	0.9	42			1,088	66
2 Ports	2.5	0.9	32	31		1,884	60
3 Ports	2.5	0.9				0	
4 Ports	2.5	0.9				0	
0 Ports	STATIC RE-CHECK						72

TEST NOTES

--

HYDRAULIC ADJUSTMENTS (FOR OFFICE USE ONLY)

ADJUSTMENTS FOR HYDRAULIC GRADE LINE (HGL)

Reservoir HGL (m):		Site Elevation (m):	
Theoretical Static Head (PSI):	0	PSI to subtract from test pressures:	72

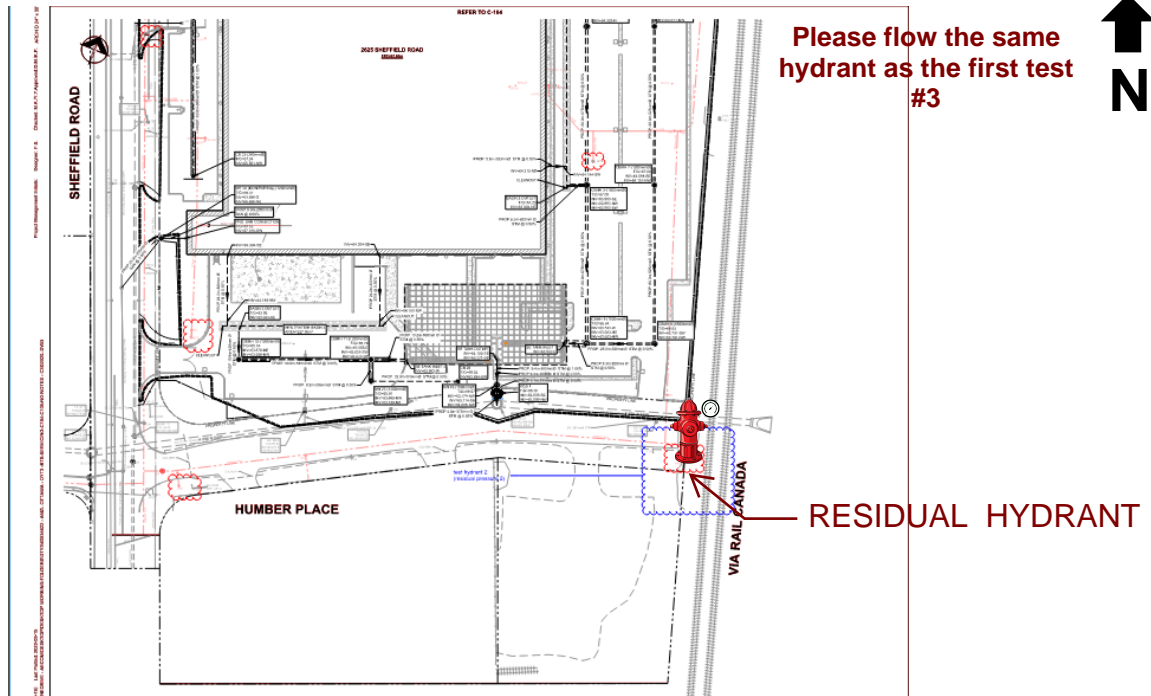
OTHER HYDRAULIC ADJUSTMENTS

Other adjustment as required by the City / AHJ:	
---	--

PROJECT INFORMATION			
Project Name:	#2 2625 Sheffield Rd Flow Test	Const. Project #:	SMC-0005255
Site Address:	2625 Sheffield Rd Ottawa ON	Design Project #:	2022-CFLS-606
City Contact:	Ottawa Utilities	Phone #:	613-580-2400x2226
CFLS Contact:	Trevor Brownrigg	Phone #:	613-240-5665
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SITE NOTES

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0 Ports	STATIC						71
1 Port	2.5	0.9	42			1,088	66
2 Ports	2.5	0.9	32	32		1,899	64
3 Ports	2.5	0.9				0	
4 Ports	2.5	0.9				0	
0 Ports	STATIC RE-CHECK						71

TEST NOTES

--

HYDRAULIC ADJUSTMENTS (FOR OFFICE USE ONLY)

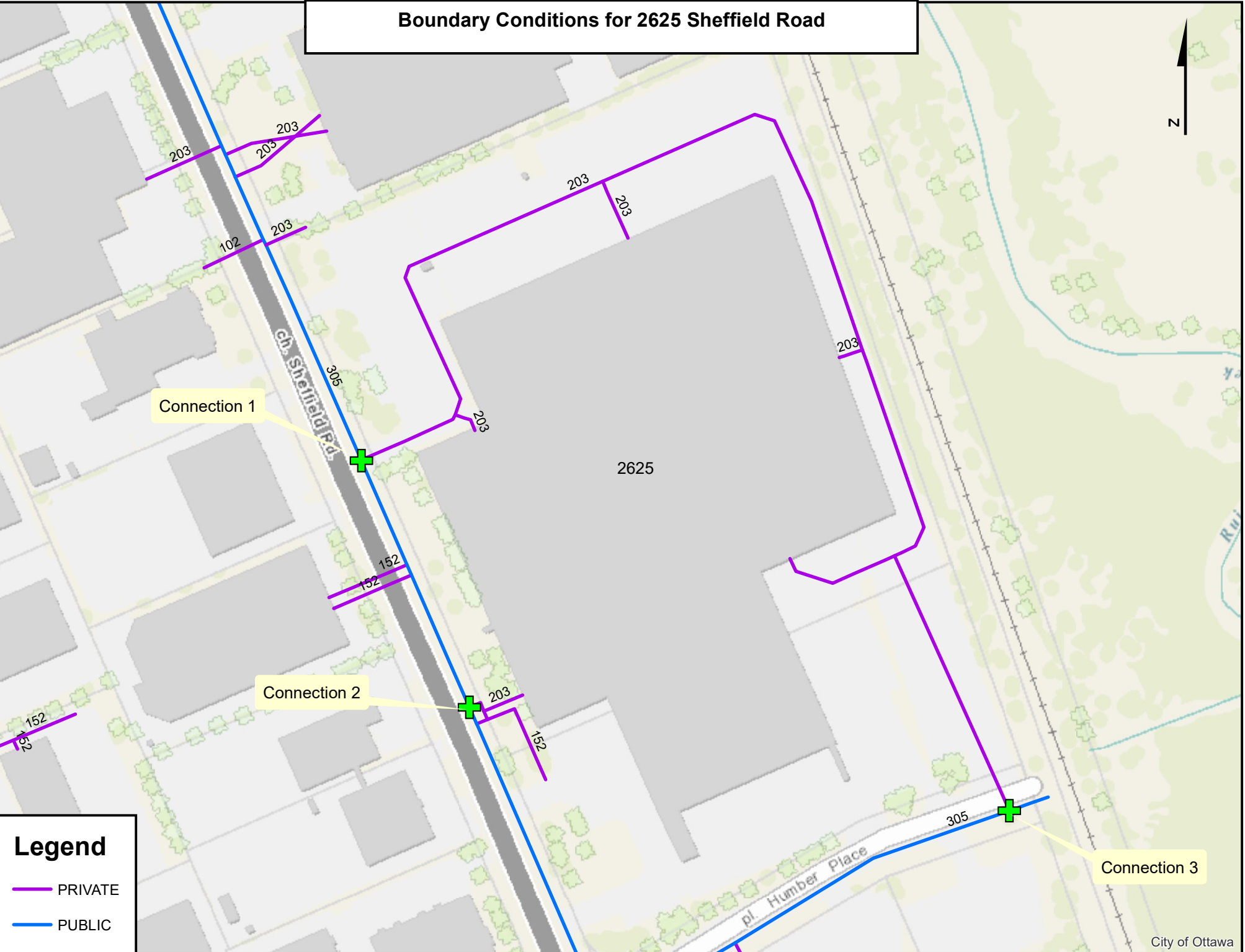
ADJUSTMENTS FOR HYDRAULIC GRADE LINE (HGL)

Reservoir HGL (m):		Site Elevation (m):	
Theoretical Static Head (PSI):	0	PSI to subtract from test pressures:	71

OTHER HYDRAULIC ADJUSTMENTS

Other adjustment as required by the City / AHJ:	
---	--

Boundary Conditions for 2625 Sheffield Road



Connection 1

Connection 2

Connection 3

Legend

- PRIVATE
- PUBLIC

Fire Flow Calculations
2020 Fire Underwriters Survey (FUS) Method



Project: DYT3 2625 Sheffield Road Ottawa, Ontario
Project #: 60648725

Calculated by: GV
Date: 13-Oct-22

Checked by:
Date:

Building A

Fire Flow Formula $RFF = 220 \cdot C \cdot \sqrt{A}$

A) C = Construction Coefficient

- 1.5 Type V Wood Frame Construction
- 0.8 Type IV-A Mass Timber Construction
- 0.9 Type IV-B Mass Timber Construction
- 1.0 Type IV-C Mass Timber Construction
- 1.5 Type IV-D Mass Timber Construction
- 1.0 Type III Ordinary Construction
- 0.8 Type II Noncombustible Construction
- 0.6 Type I Fire Resistive Construction

Construction Type of Building A:
Noncombustible

C =

B) A = Total Effective Floor Area (effective building area)
Floors (excl. basement)

A =

24460.00	m ²
1	

The largest floor area plus the following percentages of the total area of the other floors (exclude basements >50% below grade):

-For a building classified with a Construction Coefficient from 1.0 to 1.5: 100% of all floor areas.

-For a building classified with a Construction Coefficient below 1.0:

a) Unprotected vertical openings: two largest adjoining floor areas plus 50% of all floors immediately above up to eight.

b) Protected vertical openings and exterior vertical communications: one largest floor area plus 25% of each of the two immediately adjoining floors.

C)

F = (L/min)
Rounded = (L/min)

Occupancy Reduction/Surcharge

D) **Type of occupancy/contents**

- Non-Combustible Free Burning
- Limited Combustible Rapid Burning
- Combustible

Fire hazard adjustment =
Adjustment = (L/min)
F_{adj} = (L/min)

Recommended Occupancy and Contents Adjustment Factor for example Major Occupancies from the National Building Code of Canada provided in the Table 3 of 2020 FUS Guidelines.

E) Sprinkler System Reduction

Revised F may be reduced up to:

- 50% for a complete automatic sprinkler system (incl. water flow/control valve alarm system)
- 30% for a sprinkler system conforming to NFPA Code 13
- Add'l credit up to 10% can be applied if water supply is standard for both the sprinkler system and fire dept hose lines
- Add'l credit up to 10% for fully supervised system

Reduction =
Reduction = (L/min)

F) Exposure Surcharge

Sum of all exposures must be less than 75%

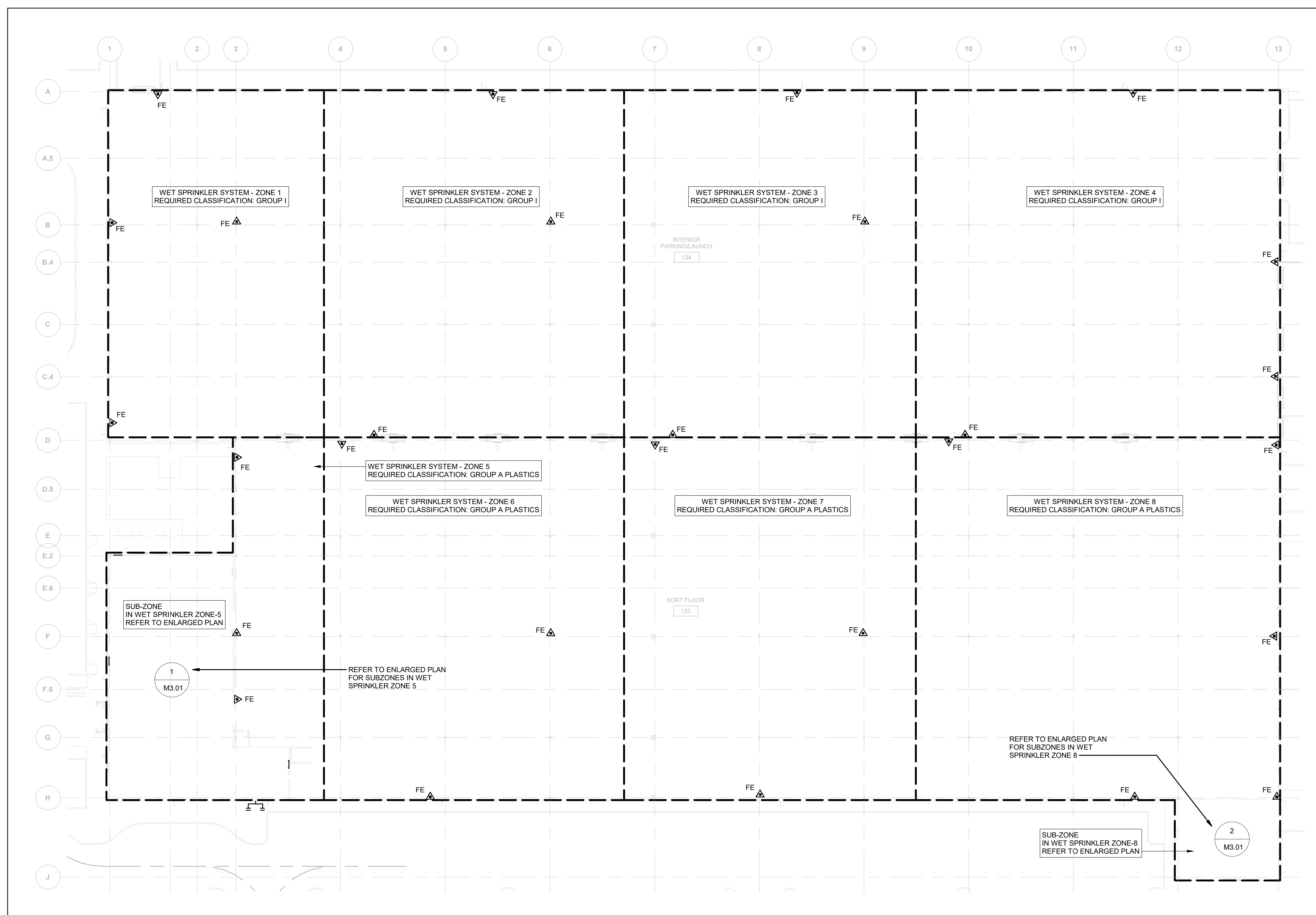
If building face is unpierced party wall (min. 2hr rating), choose "Fire Wall"

Distance to nearest building (m) % addition

North	>45m	0%
East	>45m	0%
South	>45m	0%
West	>45m	0%
Surcharge %		0%
Surcharge Add'n		<input style="width: 80px;" type="text" value="0"/> (L/min)

G) Required Fire Flow

= L/min
= L/sec



1 GROUND FLOOR - FIRE PROTECTION
 M3.00 1 : 350

SPRINKLER HAZARD CLASSIFICATIONS			
OCCUPANCY	MAX PROTECTION AREA	DESIGN DENSITY	MINIMUM PRESSURE REQUIREMENT
LIGHT HAZARD	20 m ²	4.1 mm/min	15 PSI
ORDINARY HAZARD GROUP 1	12 m ²	6.1 mm/min	20 PSI
ORDINARY HAZARD GROUP 2	12 m ²	8.1 mm/min	20 PSI
OCCUPANCY	K FACTOR	MAX PROTECTION AREA	NO. OF SPRINKLERS IN DESIGN AREA
GROUP A PLASTICS	25.2	9 m ²	12

WEIGHT OF FULL SPRINKLER MAINS	
SIZE OF SPRINKLER MAIN	WEIGHT
	kg/m lbs/ft.
150 mm (6 in.)	35 23
200 mm (8 in.)	60 40
250 mm (10 in.)	83 56

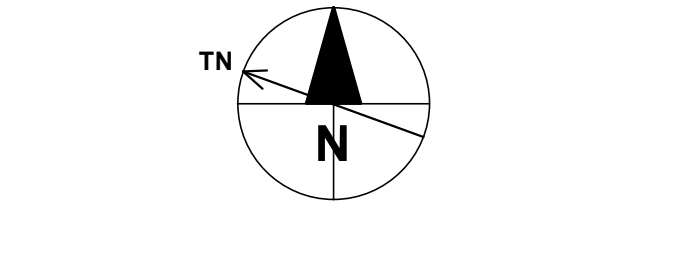
GENERAL FIRE PROTECTION SYSTEM NOTES:

- FIRE PROTECTION CONTRACTOR SHALL PROVIDE DRAWINGS AND HYDRAULIC CALCULATIONS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.
- THE SPRINKLER LAYOUTS SHALL INCLUDE ALL PIPING AND SPRINKLERS NECESSARY TO SUIT THE ARCHITECTURAL CEILING PLANS. PROPOSED LAYOUTS SHALL BE PROVIDED AS SHOP DRAWINGS FOR REVIEW PRIOR TO INSTALLATION.
- INSTALL AUTOMATIC SPRINKLERS BELOW OBSTRUCTIONS 600 mm WIDE AND LARGER SUCH AS DUCTS, DECKS, OPEN GRATE FLOORING, CUTTING TABLES, AND OVERHEAD DOORS IN ACCORDANCE WITH NFPA 13. REFER TO STANDARD DETAILS FOR MORE OBSTRUCTION REQUIREMENTS AND CLEARANCES OF ESFR SPRINKLERS. COORDINATE WITH ALL OTHER TRADES PRIOR TO SYSTEM INSTALLATION.
- OFFSET SPRINKLER PIPING AWAY FROM VERTICAL OBSTRUCTIONS SUCH AS VERTICAL DUCTWORK AND COLUMNS IN ACCORDANCE WITH NFPA 13. SPRINKLERS SHOULD BE KEPT 30mm AWAY FROM VERTICAL OBSTRUCTIONS UP TO 300 mm WIDE, 600 mm AWAY FROM VERTICAL OBSTRUCTIONS 300 mm TO 600 mm WIDE, AND ON EITHER SIDE OF THE OBSTRUCTION OR VERTICAL OBSTRUCTIONS LARGER THAN 600 mm WIDE.
- INSTALL AUTOMATIC SPRINKLERS TO ACCOMMODATE HVLS FANS IN ACCORDANCE WITH NFPA 13.
- FIRE PROTECTION CONTRACTOR TO PROVIDE VENTS AND DRAINAGE CONNECTION FOR COMMISSIONING AND SERVICING OF THE SYSTEM.
- PROVIDE HIGH TEMPERATURE HEADS WITH GUARDS IN ALL ELECTRICAL, COMMUNICATIONS AND SPRINKLER ROOMS.
- FLOW INDICATION AND PRESSURE SWITCHES ARE SHOWN ON SCHEMATICS FOR CLARITY AND ARE CONSIDERED PART OF A COMPLETE LISTED ALARM CHECK VALVE ASSEMBLY.
- ELEVATED PLATFORMS AND CONVEYERS WIDER THAN 1.2 m (48 in.) SHALL BE PROVIDED WITH SPRINKLER PROTECTION UNDERNEATH. SPRINKLER SHALL BE UPRIGHT OR PENDENT K11.2 QUICK-RESPONSE SPRINKLERS LISTED FOR STORAGE APPLICATIONS. SYSTEMS SHALL BE DESIGNED TO PROTECT EXTRA HAZARD GROUP 2 AND ALL CRITERIA SHALL BE VALIDATED BY THE AUTHORITY HAVING JURISDICTION.
- SPRINKLERS SHALL NOT BE REQUIRED BELOW CONVEYORS THAT ARE 1.2 m (4 ft.) WIDE OR LESS, ARE OVER PERSONNEL WALKWAYS, WOULD NOT ALLOW FOR COMBUSTIBLE STORAGE UNDERNEATH, AND/OR ARE FLOOR MOUNTED UP TO A HEIGHT OF 900 mm (3 ft.), UNLESS REQUESTED BY THE AUTHORITY HAVING JURISDICTION.
- WHERE SPRINKLERS ARE REQUIRED UNDERNEATH CONVEYORS AND/OR CONVEYOR EQUIPMENT PLATFORMS, PROVIDE HEAD GUARDS FOR THOSE SPRINKLERS.
- AT THE COMPLETION OF THE PROJECT, FIRE PROTECTION CONTRACTOR SHALL ISSUE A LETTER SIGNED AND SEALED BY A PROFESSIONAL ENGINEER CONFIRMING THE INSTALLATION COMPLIES WITH NFPA 13.
- REFER TO ARCHITECTURAL DRAWINGS FOR REFLECTED CEILING PLANS.

AECOM
 PROJECT
DYT3 GEN 3.1 BTS,
OTTAWA, ONTARIO
2625 SHEFFIELD ROAD

CLIENT
 AECOM Canada Architects Ltd.
 50 Sportsworld Crossing Road, Suite 290
 Kitchener, Ontario, N2P 0A4
 519 650 5313 tel 519 650 3424 fax
 www.aecom.com

THIS DRAWING HAS BEEN PREPARED FOR THE USE OF AECOM'S CLIENT AND MAY NOT BE USED, REPRODUCED OR RELEASSED BY THIRD PARTIES, EXCEPT AS AGREED BY AECOM AND ITS CLIENT. AS REQUIRED BY LAW OR FOR USE BY GOVERNMENTAL REVIEWING AGENCIES, AECOM ACCEPTS NO RESPONSIBILITY, AND DENIES ANY LIABILITY WHATSOEVER, TO ANY PARTY THAT MODIFIES THIS DRAWING WITH OUT AECOM'S EXPRESS WRITTEN CONSENT.
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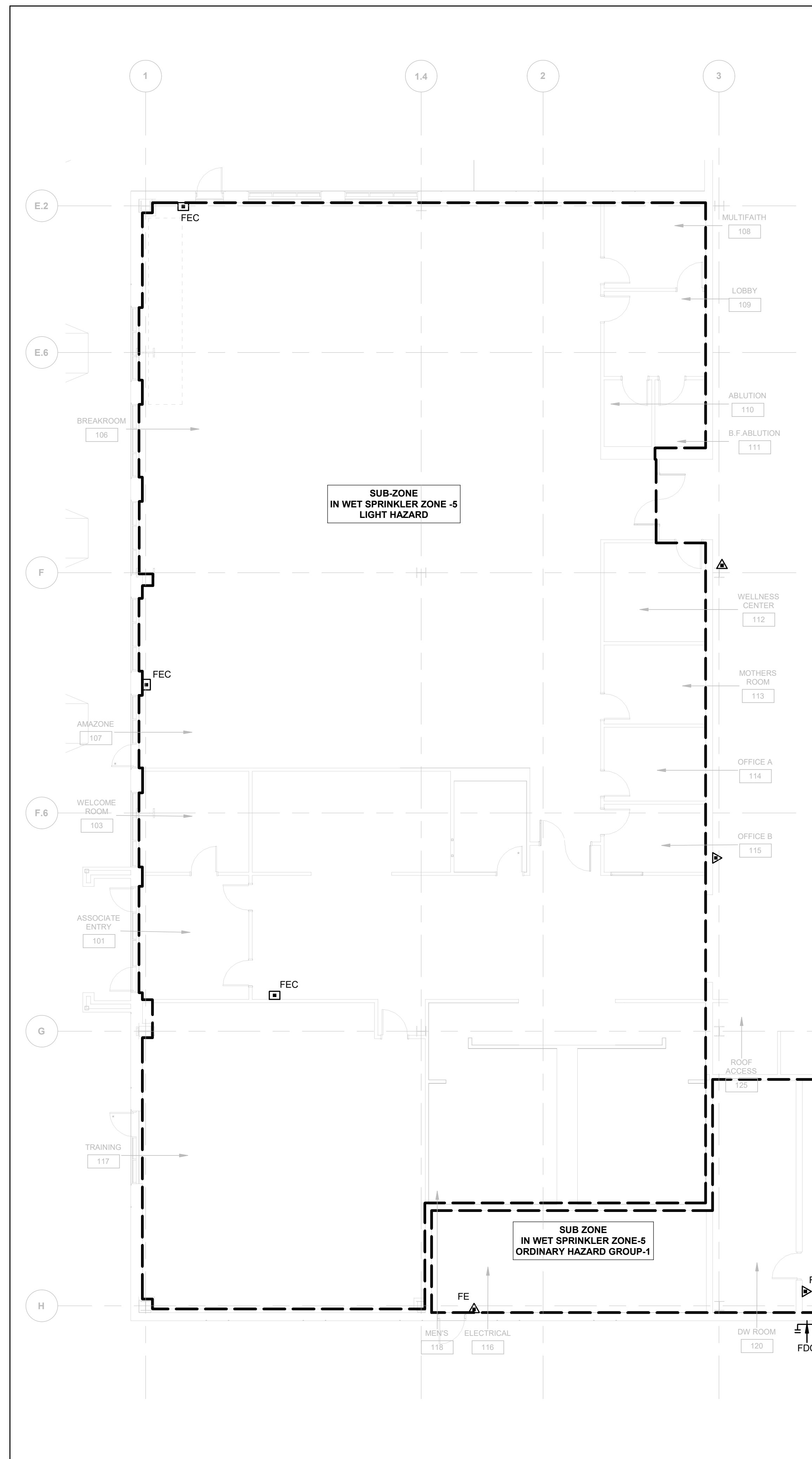


REGISTRATION

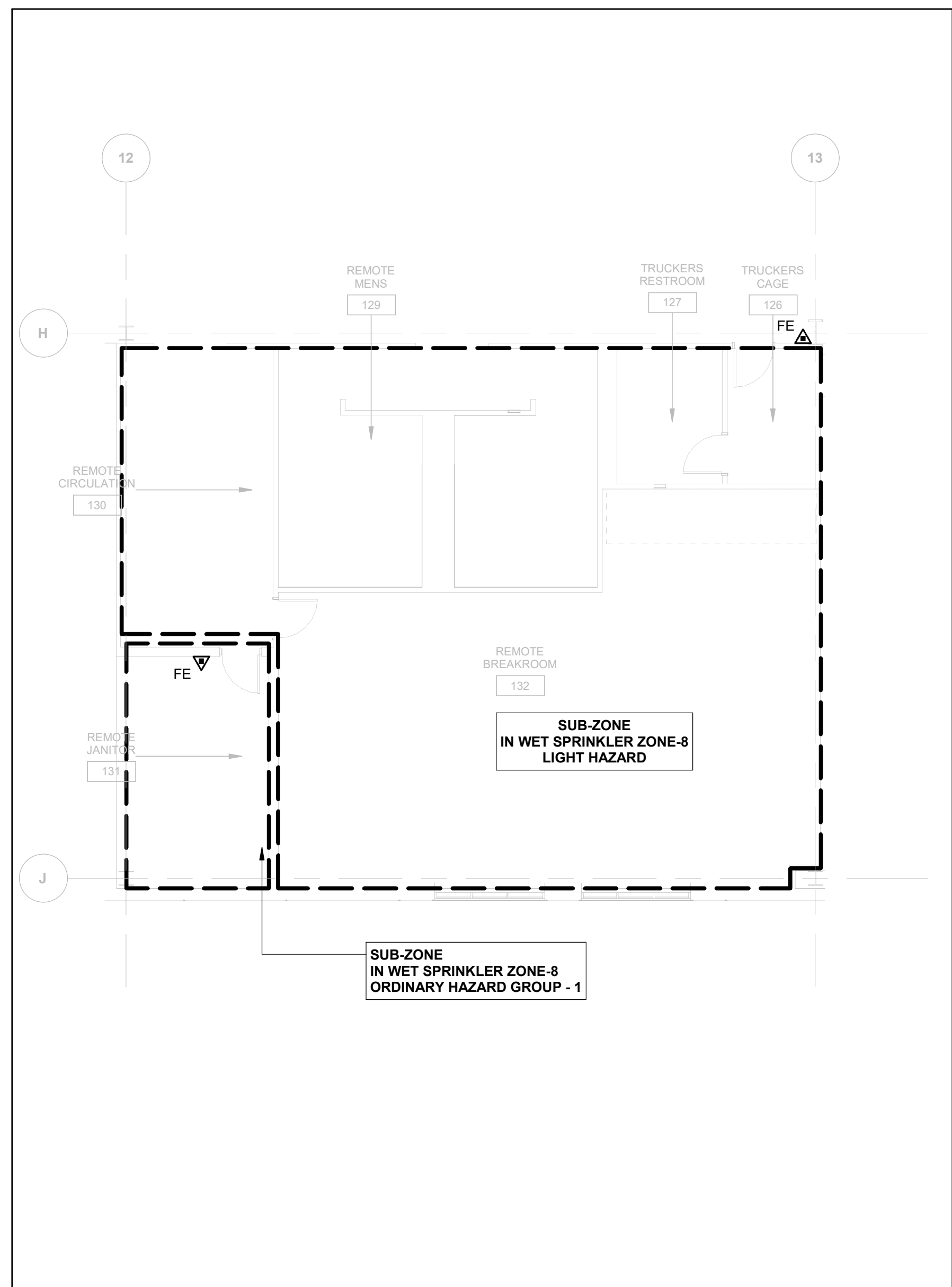
ISSUE/REVISION		
IR	DATE	DESCRIPTION

PROJECT NUMBER
 00000000
 SHEET TITLE
 OVERALL FLOOR PLAN - FIRE PROTECTION
 SHEET NUMBER
 M3.00

NOT FOR CONSTRUCTION



1 ENLARGED PLAN - OFFICE BLOCK - FIRE PROTECTION
 MS.01 1:100



2 ENLARGED PLAN -REMOTE AREA -FIRE PROTECTION
 MS.01 1:100

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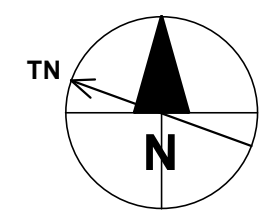
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ISSUE/REVISION

IR	DATE	DESCRIPTION

NOT FOR CONSTRUCTION

Domestic Water and Sanitary Load Calculation Chart

Project Name:	DYT3
Project Number:	60634622
Date:	14-Sep-2022

References

FUs: OBC 2012 Tables 7.4.9.3., 7.6.3.2.A, B, C and D
 FUs to gpm for drains: OBC 2012 Tables 7.4.10.5 and A.7.4.10.5
 Horizontal sanitary sizing: OBC 2012 7.4.10.8

Number of floors	1
Basement (Yes/No)	No
Building type	Office Building

DOMESTIC WATER & SANITARY LOAD CALCULATION CHART												
FIXTURE	SUPPLY / OUTLET	No of FIXTURES PRIVATE	No of FIXTURES PUBLIC	TOTAL	SANITARY		PUBLIC USE					
					F.U.	TOTAL	COLD		HOT		TOTAL	
							F.U.	TOTAL	F.U.	TOTAL	F.U.	TOTAL
Bathroom group with 6 LPF flush tank (max 3 fixtures)	N/A			0	6	0	-	-	-	-	-	-
Bathtub, regular	1/2" H&CW / 1.5"			0	1.5	0	3	0	3	0	4	0
Bathtub with 3/4" spout	3/4" H&CW / 1.5"			0	1.5	0	7.5	0	7.5	0	10	0
Clothes washer, 3.5 kg	1/2" H&CW / 2"			0	1.5	0	2.25	0	2.25	0	3	0
Clothes washer, 6.8 kg	1/2" H&CW / 2"			0	2	0	3	0	3	0	4	0
Clothes washer, commercial	manufact.			0	3	0	0	0	0	0	0	0
Dishwasher, commercial	manufact. / 2"			0	3	0	0	0	0	0	0	0
Dishwasher, domestic	1/2" HW / 1.5"			0	1	0	-	-	-	-	-	-
Drinking fountain	1/2" CW / 1.25"		14	14	2	28	0.25	3.5	-	-	0.25	3.5
Floor drain	- / 3"		16	16	3	48	-	-	-	-	-	-
Hose bib	1/2" CW / -		4	4	-	-	2.5	10	-	-	2.5	10
Hose bib	3/4" CW / -			0	-	-	6	0	-	-	6	0
Hose bib, combination	1/2" H&CW / -			0	-	-	1.9	0	1.9	0	2.5	0
Lavatory, 8.3 L/min or less	1/2" H&CW / 1.25"		13	13	1	13	1.5	19.5	1.5	19.5	2	26
Shower head, 9.5 L/min or less	1/2" H&CW / 1.5"			0	1.5	0	3	0	3	0	4	0
Shower, multi-head, FU per head	manufact. / 2"			0	3	0	3	0	3	0	4	0
Sink, bar	1/2" H&CW / 1.5"			0	1.5	0	1.5	0	1.5	0	2	0
Sink, kitchen, commercial, per faucet	1/2" H&CW / 2"		1	1	2	2	3	3	3	3	4	4
Sink, kitchen, domestic, 8.3 L/min or less	1/2" H&CW / 1.5"		2	2	1.5	3	1	2	1	2	1.4	2.8
Sink, laundry	1/2" H&CW / 1.5"			0	1.5	0	1	0	1	0	1.4	0
Sink, mop (janitor's)	1/2" H&CW / 3"		2	2	3	6	2.25	4.5	2.25	4.5	3	6
Urinal, flush valve	3/4" CW / 2"		3	3	4	12	N/A	45	-	-	N/A	45
Urinal, flush tank	1/2" CW / 1.5"			0	1.5	0	3	0	-	-	3	0
WC, 6 LPF or less, tank	1/2" CW / 3"			0	4	0	2.2	0	-	-	2.2	0
WC, flush valve	1" CW / 3"		12	12	6	72	N/A	185	-	-	N/A	185
Penal Fixture	1" CW / 3"			0	6	0	N/A	0	-	-	N/A	0
Reserve for MHE-Sanitary only			1	1	5	5		0		0		0
Reserve for Landscape and MHE-Plumbing only			1	1		0	75	75	10	10	85	85
				69	69	Total = 189	Total = 347.5	Total = 39	Total = 367.3			

SANITARY							
Plumbing System Sanitary Load	=	189 FUs	= 69 gpm	Main Drain Size	=	6"	per OBC
Other Sanitary Load (pool drain, cooling tower, sump pit)			= [] gpm		Building Sewer Size	=	6"
Building Sanitary Load	=	189 FUs	= 69 gpm				

DOMESTIC COLD AND HOT WATER							
Total Cold Water	=	348 FUs	= 119.08 gpm	Dom. Cold Water Pipe	=	3"	per OBC
Total Hot Water	=	39 FUs	= 40.8 gpm		Dom. Hot Water Pipe	=	2"
System Domestic Water	=	367 FUs	= 121.94 gpm	Main Cold Water Pipe	=	3"	per OBC

Kuljanin, Milan

From: Adams, Reed <reed.adams@ottawa.ca>
Sent: March 17, 2023 2:20 PM
To: Sharif, Golam; Kuljanin, Milan; Lodoen Unseth, Kelby
Cc: Abela, Joseph; Paliouras, Kosta
Subject: RE: 2625 Sheffield - 2nd circulation comments update

This Message Is From an External Sender

This message came from outside your organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Report Suspicious

Hi Milan,

Per our conversation, we're okay with allowing the two storm connections, provided both OGS units are moved to be within the 2625 Sheffield's property limit. I'll also give you access to the cost estimate portal since there will not be any changes to material quantities with this next submission.

Thanks,

Reed

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: March 17, 2023 11:14 AM
To: Kuljanin, Milan <Milan.Kuljanin@aecom.com>; Lodoen Unseth, Kelby <Kelby.LodoenUnseth@ottawa.ca>; Adams, Reed <reed.adams@ottawa.ca>
Cc: Abela, Joseph <Joseph.Abela@aecom.com>; Paliouras, Kosta <kosta.paliouras@aecom.com>
Subject: RE: 2625 Sheffield - 2nd circulation comments update

Hi Milan,

I discussed with Reed about the two storm connections. I do remember I discussed internally to discharge to the Humber PI trunk sewer. However, I do not recall discussion for 2 storm discharge connection one at Sheffield. I believe during the first application stage we were only discharging to the Humber PI sewer, however for this new application I saw new discharge to Sheffield from a new storage tank, thus I made comment on my first review to explain that and to use high level storm system instead within the site. Hope this is clear. Thanks.

Sharif

From: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Sent: March 17, 2023 10:21 AM
To: Lodoen Unseth, Kelby <Kelby.LodoenUnseth@ottawa.ca>; Adams, Reed <reed.adams@ottawa.ca>
Cc: Abela, Joseph <Joseph.Abela@aecom.com>; Paliouras, Kosta <kosta.paliouras@aecom.com>; Sharif, Golam

<sharif.sharif@ottawa.ca>

Subject: RE: 2625 Sheffield - 2nd circulation comments update

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Hi Kelby,

Any update on RVCA comments? We would like to resubmit our SPA early next week. Do you have the contact for RVCA and I can follow up directly.

Hi Reed,

Any update from your conversations with Sharif (copied). I would also request to gain access to the online cost estimate tool so I can start preparing the cost estimate to generate the securities and fees? Could we do that considering the comments received thus far and do not impact the site from a cost perspective?

Thank you and regards,

Milan Kuljanin, P.Eng

Project Manager/Land Development Manager, Community Infrastructure, Water

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From: Kuljanin, Milan

Sent: March 15, 2023 10:42 AM

To: Lodoen Unseth, Kelby <Kelby.LodoenUnseth@ottawa.ca>

Cc: Abela, Joseph <Joseph.Abela@aecom.com>; Paliouras, Kosta <kosta.paliouras@aecom.com>

Subject: RE: 2625 Sheffield - 2nd circulation comments update

Thanks Kelby! Are we still waiting for RVCA comments this week?

Thank you and regards,

Milan Kuljanin, P.Eng

Project Manager/Land Development Manager, Community Infrastructure, Water
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milan.kuljanin@aecom.com

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From: Lodoen Unseth, Kelby <Kelby.LodoenUnseth@ottawa.ca>

Sent: March 14, 2023 3:00 PM

To: Kuljanin, Milan <Milan.Kuljanin@aecom.com>

Cc: Abela, Joseph <Joseph.Abela@aecom.com>; Paliouras, Kosta <kosta.paliouras@aecom.com>

Subject: RE: 2625 Sheffield - 2nd circulation comments update

Good day Milan, I do also have updated comments from Forestry and Surveys. I've updated the comments letter and attached for your reference.

Best regards,

Kelby Lodoen Unseth MCIP, RPP

Planner II | Urbaniste II

Development Review (South Services) | Examen des projets d'aménagement (services sud)

Planning, Real Estate and Economic Development Department | Direction générale de la planification, des biens immobiliers et du développement économique

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Please note I am working from home due to Covid19 and my work hours may be affected, but I will respond to emails at my earliest opportunity. The best way to reach me is through email.

From: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Sent: March 13, 2023 9:55 AM
To: Lodoen Unseth, Kelby <Kelby.LodoenUnseth@ottawa.ca>
Cc: Abela, Joseph <Joseph.Abela@aecom.com>; Paliouras, Kosta <kosta.paliouras@aecom.com>
Subject: RE: 2625 Sheffield - 2nd circulation comments update

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Hi Kelby,

Thank you for the comments. Hope you and your family had a great weekend.

Do you and Reed have time today to discuss these comments? We just want to make sure we address them adequately for the next re-submission. It might make sense to include Sharif as we have correspondence with him thus far on this Application. It might help resolve and clarify some of the comments.

Also, is there any other SPA comments coming or have we received all the comments for this round?

Thank you and regards,

Milan Kuljanin, P.Eng
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From: Lodoen Unseth, Kelby <Kelby.LodoenUnseth@ottawa.ca>
Sent: March 10, 2023 1:04 PM
To: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Subject: 2625 Sheffield - 2nd circulation comments update

Good afternoon Milan,

The comment period for this circulation isn't slated to end until March 13, 2023, but I do have some updates for you (attached).

I will note that the engineering comments are included as comments within the document, as shown here:

File No. D07-12-22-0131
Date: December 16, 2022

To / Destinataire : Kelby Lodoen Unseth

From / Expéditeur : Golam Sharif, P.Eng.
Project Manager
Development Review, South Branch

Subject / Objet : Engineering Comments – 1st Review
2625 Sheffield Road
Ward 18 - Alta Vista, Councillor Marty Carr
Choice Properties REIT

I have reviewed the application first circulated on November 18, 2022. Please include the following engineering comments in the consolidated response to the proponent:

A. List of Drawing(s):

A1. Existing Conditions and Removals, Drawing No. C101, prepared by AECOM, Consultant's Project No. 60634622, dated 2022-08-30, revision # 2, dated 2022-10-07.
Looks like existing watermain from Sheffield Road to be removed until the property line and then re-use. Provide information on the plan.
AECOM Response: This is correct. Noted in existing and removals drawing. A new watermain line will be installed as per the drawings.

A2. Proposed Site Grading and Sediment and Erosion Control, Drawing No. C102, prepared by AECOM, Consultant's Project No. 60634622, dated 2022-08-30, revision # 2, dated 2022-10-07.
Private approach By-law requires that the slope from the ROW into the site be set at a maximum of 2% towards the ROW. Ensure the requirement is met.
AECOM Response: We are matching grades into the property line. Based on existing grades and pipe infrastructure, it is not advisable to reduce existing grading to 2% at the driveways. It would create deficient cover on some sewer infrastructure. Proposed driveway grades are improved compared to the existing driveway slopes. Existing and proposed driveway slopes are indicated on C102 and C103 to further illustrate the driveway grade improvements. Humber Place driveway has been designed to maintain the trees in the boulevard as requested by Forestry comments. Furthermore, reducing grades to 2% would result in more uncontrolled stormwater runoff to the road. Keeping the design as is, controls the stormwater runoff within the Site.

A3. All renovated and new site entrances to be per SC7.1. Provide the City standard SC7.1 on the plan.
AECOM Response: City standard SC7.1 has been added to drawings and legend.

A4. Depressed curb to be per SC1.1. Provide the DC symbol clearly on the plan.
AECOM Response: DC symbol has been added to the drawings and legend

Page 14 of 23

7 comments

PAGE 14

adamsre Mar 6

The DC symbol that has been added to the legend has not been added to the drawing where it should. Please revise the drawing: include it.

Add a reply...

PAGE 15

adamsre Mar 6

Please add W22 insulation note to the crossing table.

PAGE 16

adamsre Mar 7

Please provide the correspondence with w City staff indicating that two connections different connections can be made in the appendices of these report.

adamsre Mar 6

Both the latest boundary conditions and associated correspondence have not been included in the site servicing report. Please revise the report to include the latest water boundary conditions as well as the associated correspondence to the appendix.

adamsre Mar 7

Please include a storage summary table showing the required storage is achieved.

adamsre Mar 9

Removing the uncontrolled drainage area flows from the allowable release rate is the typical approach when designing a stormwater management system. Please clearly demonstrate why it was not necessary to do this with these calculations.

PAGE 17

adamsre Mar 6

Please provide a more detailed conclusion that summarizes all of the servicing criteria provided in the report and how it meets the City's standards.

I will follow up on the outstanding comments next week. Feel free to reach out should you have any questions.

Best regards,

Kelby Lodoen Unseth MCIP, RPP

Planner II | Urbaniste II

Development Review (South Services) | Examen des projets d'aménagement (services sud)

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,

Kuljanin, Milan

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: October 31, 2022 1:11 PM
To: Kuljanin, Milan
Cc: Verbel Gutierrez, German
Subject: RE: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation
Attachments: 2625 Sheffield Road October 2022.pdf

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Good afternoon Milan,

Here is the updated water boundary condition. [Please use this information.](#)

The following are boundary conditions, HGL, for hydraulic analysis at 2625 Sheffield Road (zone 1E) assumed to be a connected to the 305 mm watermain on Sheffield and the 305 mm watermain on Humber Place (see attached PDF for location).

All Connections:

Minimum HGL: 109.7 m

Maximum HGL: 117.9 m

Max Day + FF (267 L/s): 91.7 m (Connection 1), 91.6 m (Connection 2), and 83.4 m (Connection 3)

These are for current conditions and are based on computer model simulation.

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.

Thanks.

Sharif

From: Sharif, Golam
Sent: October 27, 2022 3:20 PM
To: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Cc: Verbel Gutierrez, German <German.VerbelGutierrez@aecom.com>
Subject: RE: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation

Hi Milan,

Please discard this email. Water group need to update something on the boundary condition. I will send you the updated version soon. Thanks.

Sharif

From: Sharif, Golam
Sent: October 27, 2022 2:36 PM
To: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Cc: Verbel Gutierrez, German <German.VerbelGutierrez@aecom.com>
Subject: RE: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation

Good afternoon Milan,

Here is the requested water boundary condition:

The following are boundary conditions, HGL, for hydraulic analysis at 2625 Sheffield Road (zone 2W2C) assumed to be a connected to the 305 mm watermain on Sheffield and the 305 mm watermain on Humber Place (see attached PDF for location).

All Connections:

Minimum HGL: 109.8 m

Maximum HGL: 117.9 m

Max Day + FF (267 L/s): 92.0 m (Connection 1), 91.9 m (Connection 2), and 83.8 m (Connection 3)

These are for current conditions and are based on computer model simulation.

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.

Regards,

Sharif

From: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Sent: October 13, 2022 9:38 PM
To: Sharif, Golam <sharif.sharif@ottawa.ca>

Cc: Verbel Gutierrez, German <German.VerbelGutierrez@aecom.com>
Subject: RE: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation

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Hi Sharif,

Attached are the revised calculations.

Thank you and regards,

Milan Kuljanin, P.Eng
Project Manager, Community Infrastructure, Water
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milan.kuljanin@aecom.com

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I will be accessible by cell phone, email, or Microsoft Teams.

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From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: October 4, 2022 10:47 AM
To: Verbel Gutierrez, German <German.VerbelGutierrez@aecom.com>
Cc: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Subject: RE: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation

Hi German/ Milan,

Could you please update the FUS calculation based on 2020 guideline. The example was based on the 1999 FUS guideline. I believe, there is new one which the water group require the calculation must be based on. Thanks.

Sharif

From: Verbel Gutierrez, German <German.VerbelGutierrez@aecom.com>
Sent: September 27, 2022 10:03 AM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Kuljanin, Milan <Milan.Kuljanin@aecom.com>
Subject: RE: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation
Importance: High

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Hi Sharif,

Please find below the water demand information as requested.

Parameter	Water Demand Processed Condit ions	Art iculated Demand (L/s)
Average Daily Demand		2.85
Max. Day Demand		4.25
Peak Hour Demand		7.72
Fire Flow Demand		257.00
Total Demand = Max. Day + Fire Flow		271.25

Best regards,

German Verbel, B.Eng;
Project Engineer/EIT, Community Infrastructure, Water
M +1-226-752-4672
German.VerbelGutierrez@aecom.com

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From: Kuljanin, Milan <Milan.Kuljanin@aecom.com>

Sent: Tuesday, September 27, 2022 9:32 AM

To: Sharif, Golam <sharif.sharif@ottawa.ca>; Verbel Gutierrez, German <German.VerbelGutierrez@aecom.com>

Subject: RE: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation

Hi Sharif,

I don't believe hydrant flow tests were required in the pre-consultation and scheduling hydrant tests at this time of year has challenges and large lead times as everyone is doing them before the winter. Hydrant flow tests is a due diligence check on our end but we believe we have provided the information requested within the pre-con comments. The schedule and launch date for this site will be impacted if we wait for the hydrant flow test completion and report production. We will surely provide the results and update the report in the 2nd submission. Give me a call if you wish to chat further.

Thank you and regards,

Milan Kuljanin, P.Eng

Project Manager, Community Infrastructure, Water

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From: Sharif, Golam <sharif.sharif@ottawa.ca>

Sent: September 26, 2022 11:06 AM

To: Verbel Gutierrez, German <German.VerbelGutierrez@aecom.com>

Cc: Kuljanin, Milan <Milan.Kuljanin@aecom.com>

Subject: RE: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation

Hi German,

Thanks for the FUS calculation, however, without all the water demand information our water group wont be able to provide the boundary condition. Therefore, I would suggest plz send everything once you have it. Thanks.

Sharif

From: Verbel Gutierrez, German <German.VerbelGutierrez@aecom.com>

Sent: September 23, 2022 4:45 PM

To: Sharif, Golam <sharif.sharif@ottawa.ca>

Cc: Kuljanin, Milan <Milan.Kuljanin@aecom.com>

Subject: 2625 Sheffield Road-DYT3-Ottawa DYT3-WM FUS Calculation

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Please see attached the required fire flow calculations based Fire Underwriters Survey (FUS).
Fire flow tests are not available at the moment, and they will be provided at the SPA or detail design stage.

Please do not hesitate to contact us if you have any questions,

Best regards,

German Verbel, B.Eng;

Project Engineer/EIT, Community Infrastructure, Water

M +1-226-752-4672

German.VerbelGutierrez@aecom.com

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'

Kuljanin, Milan

From: Kuljanin, Milan
Sent: September 13, 2022 11:49 AM
To: Lodoen Unseth, Kelby; sharif.sharif@ottawa.ca
Cc: Celic, Daniel; Abela, Joseph; Vang, Lao; Paliouras, Kosta
Subject: DYT3-Boundary Conditions
Attachments: 60634622 - AMZL OTTAWA - DYT3-Servicing Locations.pdf

Hi Sharif/Kelby,

In response to your pre-con comments needed before first submission, see below. Let me know if you wish to have a call to further discuss or if there are any concerns with these values. Could you also please clarify if ESA is required? It mentions ESA conformity but does not explicitly say it is required as part of SPA. It is unclear from pre-con comments that it is required and it was not needed with previous SPA for this site. Just wanted to clarify.

Please provide estimated storm and sanitary flows before the first submission, to allow the City to confirm whether there are any downstream capacity constraints.

AECOM Response:

Sanitary Building Loads: 130FU+60 FU=190 FU (4.5 L/s)

Stormwater Building Loads: 678,500 L (per 25 mm @15 min rainfall MMAH SB-1)

SWM Discharge rates to ROW: Humber Place: 0.321 m³/s, Sheffield Road: 0.130 m³/s

6. Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

- a. Location of service(s).*
- b. Type of development and the amount of fire flow required (as per FUS, 1999).*
- c. Average daily demand:*
- d. Maximum daily demand:*
- e. Maximum hourly daily demand:*
- f. Hydrant location and spacing to meet City's Water Design guidelines.*

g. Water supply redundancy will be required for more than 50 m³/day water demand.

AECOM Response:

- a. Please refer to attached DWG C-104 and C-105 within spa drawings for location of services
- b. The amount of the fire flow required and all the sprinkler hydraulic calculations will be submitted to the authorities for approval (insurance authority and local fire department) after the permit, but before any work commenced. The hydraulic calculations and water demand will be carried out by a professional engineer, signed and sealed.
- c. 6.0 l/s (not including fire sprinkler demand)
- d. 8.0 l/s (not including fire sprinkler demand)
- e. 8.0 l/s (not including fire sprinkler demand)
- f. Please refer to DWG C-104 and C-105 within spa drawings for location of services
- g. For potable water, the facility does not require a redundant water supply. But fire sprinkler system has two water mains (one combined with fire sprinkler and potable water main and the other for sprinkler system only)

Thank you and regards,

Milan Kuljanin, P.Eng

Project Manager, Community Infrastructure, Water

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milan.kuljanin@aecom.com

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Appendix **F**

Supporting Engineering Documentation and Calculations – Infiltration Basin Calculations

Infiltration Basin Sizing - DYT3

Site Conditions			
Rainfall Amount	10 mm		
	0.01 m		
Site Areas			
Total Building Area	2 ha		
	24800 m ²		
Area 101 Footprint Area	1.36 ha		
	13600 m ²		
Area 102 Footprint Area	1.12 ha		
	11200 m ²		
Runoff Coefficient			
Impervious Area	0.9		
Area 101		Area 102	
Required Clear Stone Bedding Infiltration Basin Sizing Calculation		Required Clear Stone Bedding Infiltration Basin Sizing Calculation	
Volume (Total - Building Area)	122.40 m³	Volume (Total - Building Area)	100.80 m³
Stone Void Ratio	0.4	Stone Void Ratio	0.4
Depth	0.75 m	Depth	0.75 m
Length	66.72 m	Length	165.00 m
Width	6.12 m	Width	2.04 m
Proposed Clear Stone Bedding Infiltration Basin Sizing Calculation		Proposed Clear Stone Bedding Infiltration Basin Sizing Calculation	
Volume (Total - Building Area)	132.00 m³	Volume (Total - Building Area)	108.00 m³
Stone Void Ratio	0.4	Stone Void Ratio	0.4
Depth	0.75 m	Depth	0.75 m
Length	110.00 m	Length	90.00 m
Width	4.00 m	Width	4.00 m
Infiltration Basin Bottom Area (Equation 4.3, MECP 2003)		Infiltration Basin Bottom Area (Equation 4.3, MECP 2003)	
Runoff Volume	132.00 m ³	Runoff Volume	108.00 m ³
Percolation Rate	42 mm/hr	Percolation Rate	42 mm/hr
Factor of Safety	2.5	Factor of Safety	2.5
Porosity	0.4	Porosity	0.4
Retention Time	48 hr	Retention Time	48 hr
Bottom Area	409.23 m²	Bottom Area	334.82 m²
Proposed Bottom Area	440.00 m²	Proposed Bottom Area	360.00 m²
Maximum Allowable Basin Depth (Equation 4.2, MECP, 2003)		Maximum Allowable Basin Depth (Equation 4.2, MECP, 2003)	
Percolation Rate	42 mm/hr	Percolation Rate	42 mm/hr
Factor of Safety	2.5	Factor of Safety	2.5
Retention Time	48 hr	Retention Time	48 hr
Maximum Allowable Depth	0.81 m	Maximum Allowable Depth	0.81 m
Proposed Depth	0.75 m	Proposed Depth	0.75 m

Appendix **G**

**Supporting Engineering Documentation
and Calculations – Oil/Grit Separator
and Storm Sewer**



ADS Treatment Train Sizing

Project Name:	DYT3 - North	
Consulting Engineer:	AECOM	
Location:	Ottawa, ON	
Sizing Completed By:	C. Neath	Email: cody.neath@adspipe.com

Summary of Results	
Isolator Row PLUS TSS Removal:	80.1%
FD-4HC TSS Removal:	35.0%
Combined TSS Removal:	86.7%
Total Volume Treated:	98.9%

Individual OGS Results		
Model	TSS Removal	Volume Treated
FD-4HC	35.0%	>90%
FD-5HC	41.0%	>90%
FD-6HC	44.0%	>90%
FD-8HC	48.0%	>90%
FD-10HC	52.0%	>90%

Overall System Capacities	
Total Sediment Storage Capacity:	6.88 m ³
Oil Storage Capacity:	723 L
Max. OGS Pipe Diameter:	600 mm
Peak OGS Flow Capacity:	510 L/s
Peak Stormtech Inlet Flow Capacity:	311 L/s
Peak IR PLUS Water Quality Flow:	211.1 L/s

OGS Specifications	
Inlet Pipe Diameter (A):	375 mm
Unit Diameter (B):	1,200 mm
Outlet Pipe Diameter (C):	375 mm
Rim Elevation (D):	66.74 m
Bottom of Sump Elevation (E):	61.97 m
Inlet Pipe Elevation (F):	63.53 m
Outlet Pipe Elevation (G):	63.47 m

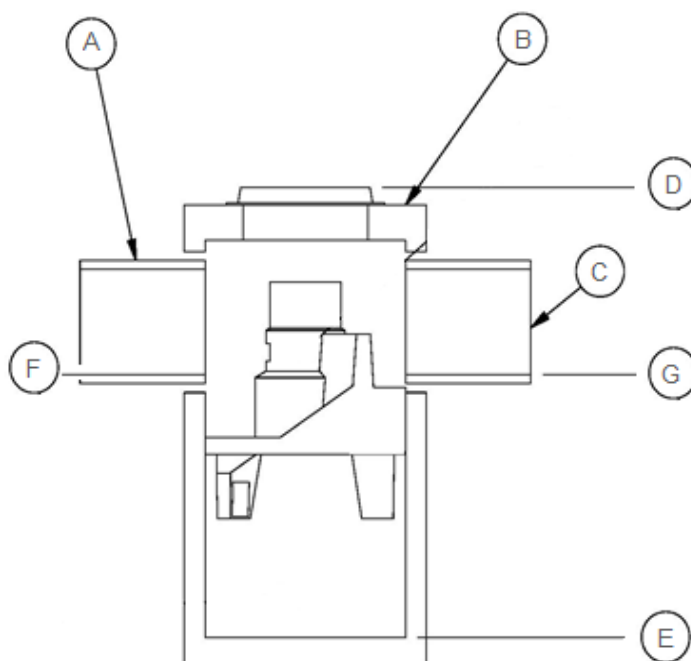
Site Details	
Site Area (ha):	3.08
Rational C:	0.9
Particle Size Distribution:	ETV
Rainfall Station:	Ottawa, ONT

Notes: OGS results based on ETV PSD and results from ETV testing protocols.

Stormtech Details	
Chamber Model:	MC-3500
No. Chambers in Isolator Row PLUS:	19
Volume Treated by Isolator Row PLUS:	98.6%

Notes: Refer to Stormtech drawings for full IR+ configuration.

Isolator Row PLUS must include Flared End Ramp (FLAMP) for proper performance.



Notes:

Isolator Row PLUS removal efficiency based on verified ETV test report. For dimensions and configuration of Isolator Row PLUS, please see Stormtech drawing package.



Project Name: DYT3 - North
 Consulting Engineer: AECOM
 Location: Ottawa, ON

Net Annual Removal Efficiency Summary

Rainfall Intensity	Fraction of Rainfall	Removal Efficiency		Combined Removal Efficiency	Combined Weighted Removal Efficiency
		FD-4HC	IR PLUS ⁽²⁾		
mm/hr	%	%	%	%	%
0.50	0.1%	53.1%	81.2%	91.2%	0.1%
1.00	14.1%	48.1%	81.2%	90.2%	12.7%
1.50	14.2%	45.2%	81.2%	89.7%	12.7%
2.00	14.1%	43.1%	81.2%	89.3%	12.6%
2.50	4.2%	41.5%	81.2%	89.0%	3.7%
3.00	1.5%	40.2%	81.2%	88.8%	1.3%
3.50	8.5%	39.1%	81.2%	88.6%	7.6%
4.00	5.4%	38.2%	81.2%	88.4%	4.8%
4.50	1.2%	37.3%	81.2%	88.2%	1.0%
5.00	5.5%	36.5%	81.2%	88.1%	4.9%
6.00	4.3%	35.2%	81.2%	87.8%	3.8%
7.00	4.5%	34.1%	81.2%	87.6%	4.0%
8.00	3.1%	33.2%	81.2%	87.4%	2.7%
9.00	2.3%	32.3%	81.2%	87.3%	2.0%
10.00	2.6%	31.6%	81.2%	87.1%	2.2%
20.00	9.2%	0.0%	81.2%	81.2%	7.5%
30.00	2.6%	0.0%	74.2%	74.2%	1.9%
40.00	1.2%	0.0%	55.7%	55.7%	0.6%
50.00	0.5%	0.0%	44.5%	44.5%	0.2%
100.00	0.7%	0.0%	22.3%	22.3%	0.2%
150.00	0.1%	0.0%	14.8%	14.8%	0.0%
200.00	0.0%	0.0%	11.1%	11.1%	0.0%
Total Net Annual Removal Efficiency				86.7%	
Total Runoff Volume Treated				98.9%	

Notes:

- (1) Rainfall Data: 1960:2007, HLY03, Ottawa, ONT, 6105976 & 6105978.
- (2) IR PLUS removal based on ETV PSD and ETV protocols.
- (3) Rainfall adjusted to 5 min peak intensity based on hourly average.
- (4) Combined removal efficiencies calculated based on NCDENR Stormwater BMP Manual, Section 3.9.4, where
 Total Removal Efficiency = 1st BMP Efficiency + 2nd BMP Efficiency - (1st BMP Efficiency x 2nd BMP Efficiency)



ADS Treatment Train Sizing

Project Name:	DYT3 - South	
Consulting Engineer:	AECOM	
Location:	Ottawa, ON	
Sizing Completed By:	C. Neath	Email: cody.neath@adspipe.com

Summary of Results	
Isolator Row PLUS TSS Removal:	78.2%
FD-4HC TSS Removal:	34.0%
Combined TSS Removal:	84.7%
Total Volume Treated:	97.6%

Individual OGS Results		
Model	TSS Removal	Volume Treated
FD-4HC	34.0%	>90%
FD-5HC	40.0%	>90%
FD-6HC	43.0%	>90%
FD-8HC	48.0%	>90%
FD-10HC	51.0%	>90%

Overall System Capacities	
Total Sediment Storage Capacity:	5.28 m ³
Oil Storage Capacity:	723 L
Max. OGS Pipe Diameter:	600 mm
Peak OGS Flow Capacity:	510 L/s
Peak Stormtech Inlet Flow Capacity:	311 L/s
Peak IR PLUS Water Quality Flow:	155.5 L/s

OGS Specifications	
Inlet Pipe Diameter (A):	375 mm
Unit Diameter (B):	1,200 mm
Outlet Pipe Diameter (C):	375 mm
Rim Elevation (D):	66.64 m
Bottom of Sump Elevation (E):	61.56 m
Inlet Pipe Elevation (F):	63.12 m
Outlet Pipe Elevation (G):	63.06 m

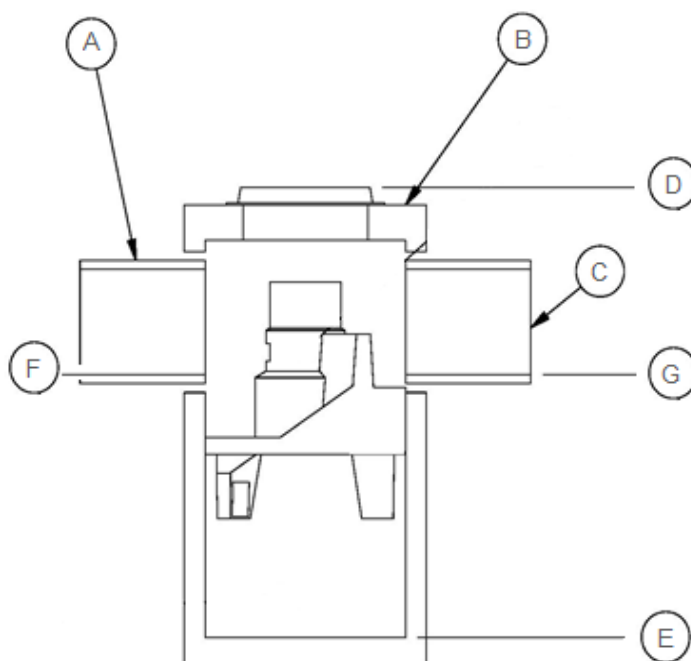
Site Details	
Site Area (ha):	3.47
Rational C:	0.9
Particle Size Distribution:	ETV
Rainfall Station:	Ottawa, ONT

Notes: OGS results based on ETV PSD and results from ETV testing protocols.

Stormtech Details	
Chamber Model:	MC-3500
No. Chambers in Isolator Row PLUS:	14
Volume Treated by Isolator Row PLUS:	96.4%

Notes: Refer to Stormtech drawings for full IR+ configuration.

Isolator Row PLUS must include Flared End Ramp (FLAMP) for proper performance.



Notes:

Isolator Row PLUS removal efficiency based on verified ETV test report. For dimensions and configuration of Isolator Row PLUS, please see Stormtech drawing package.



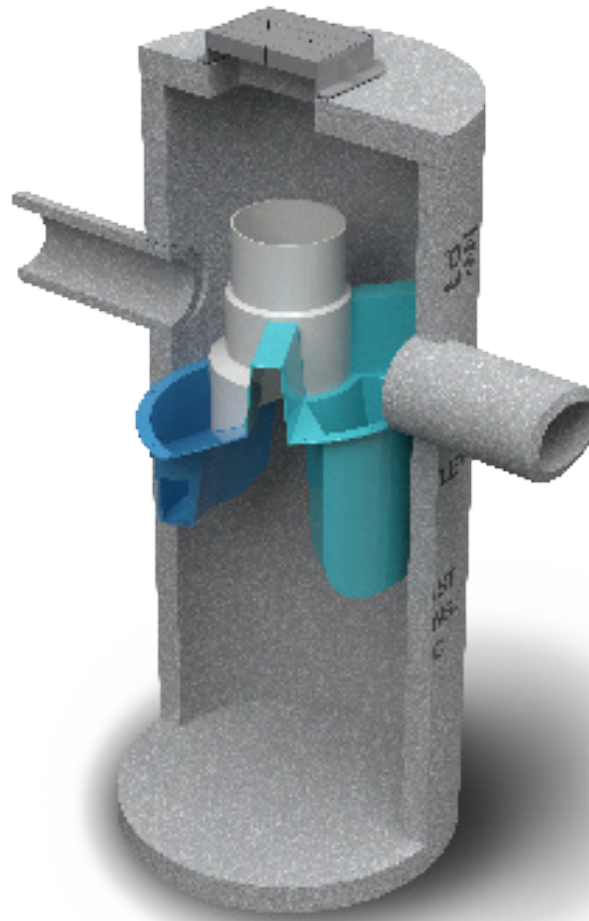
Project Name: DYT3 - South
 Consulting Engineer: AECOM
 Location: Ottawa, ON

Net Annual Removal Efficiency Summary

Rainfall Intensity	Fraction of Rainfall	Removal Efficiency		Combined Removal Efficiency	Combined Weighted Removal Efficiency
		FD-4HC	IR PLUS ⁽²⁾		
mm/hr	%	%	%	%	%
0.50	0.1%	52.3%	81.2%	91.0%	0.1%
1.00	14.1%	47.3%	81.2%	90.1%	12.7%
1.50	14.2%	44.4%	81.2%	89.5%	12.7%
2.00	14.1%	42.3%	81.2%	89.1%	12.6%
2.50	4.2%	40.7%	81.2%	88.8%	3.7%
3.00	1.5%	39.4%	81.2%	88.6%	1.3%
3.50	8.5%	38.3%	81.2%	88.4%	7.6%
4.00	5.4%	37.3%	81.2%	88.2%	4.8%
4.50	1.2%	36.4%	81.2%	88.1%	1.0%
5.00	5.5%	35.7%	81.2%	87.9%	4.9%
6.00	4.3%	34.4%	81.2%	87.7%	3.8%
7.00	4.5%	33.3%	81.2%	87.5%	3.9%
8.00	3.1%	32.3%	81.2%	87.3%	2.7%
9.00	2.3%	31.5%	81.2%	87.1%	2.0%
10.00	2.6%	30.7%	81.2%	87.0%	2.2%
20.00	9.2%	0.0%	72.8%	72.8%	6.7%
30.00	2.6%	0.0%	48.5%	48.5%	1.3%
40.00	1.2%	0.0%	36.4%	36.4%	0.4%
50.00	0.5%	0.0%	29.1%	29.1%	0.2%
100.00	0.7%	0.0%	14.6%	14.6%	0.1%
150.00	0.1%	0.0%	9.7%	9.7%	0.0%
200.00	0.0%	0.0%	7.3%	7.3%	0.0%
Total Net Annual Removal Efficiency				84.7%	
Total Runoff Volume Treated				97.6%	

Notes:

- (1) Rainfall Data: 1960:2007, HLY03, Ottawa, ONT, 6105976 & 6105978.
- (2) IR PLUS removal based on ETV PSD and ETV protocols.
- (3) Rainfall adjusted to 5 min peak intensity based on hourly average.
- (4) Combined removal efficiencies calculated based on NCDENR Stormwater BMP Manual, Section 3.9.4, where
 Total Removal Efficiency = 1st BMP Efficiency + 2nd BMP Efficiency - (1st BMP Efficiency x 2nd BMP Efficiency)



Operation and Maintenance Manual

First Defense[®] High Capacity and First Defense[®] Optimum

Vortex Separator for Stormwater Treatment

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3	FIRST DEFENSE® BY HYDRO INTERNATIONAL <ul style="list-style-type: none">- INTRODUCTION- OPERATION- POLLUTANT CAPTURE AND RETENTION
4	MODEL SIZES & CONFIGURATIONS <ul style="list-style-type: none">- FIRST DEFENSE® COMPONENTS
5	MAINTENANCE <ul style="list-style-type: none">- OVERVIEW- MAINTENANCE EQUIPMENT CONSIDERATIONS- DETERMINING YOUR MAINTENANCE SCHEDULE
6	MAINTENANCE PROCEDURES <ul style="list-style-type: none">- INSPECTION- FLOATABLES AND SEDIMENT CLEAN OUT
8	FIRST DEFENSE® INSTALLATION LOG
9	FIRST DEFENSE® INSPECTION AND MAINTENANCE LOG

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's First Defense®. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc has a policy of continuous product development and reserves the right to amend specifications without notice.

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints.

The two product models described in this guide are the First Defense® High Capacity and the First Defense® Optimum; they are inspected and maintained identically.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

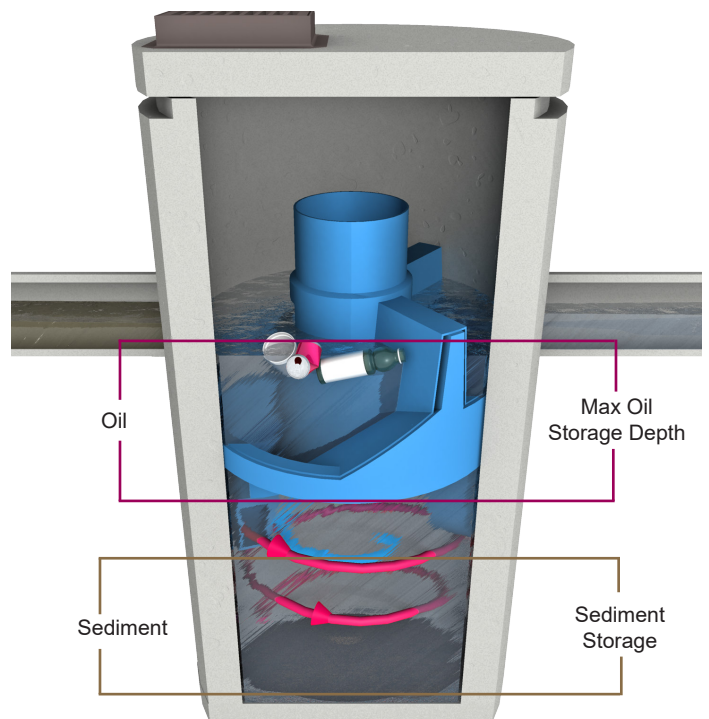


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components have modified geometries allowing greater design flexibility to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2). First Defense® model sizes (diameter) are shown in Table 1.

III. Maintenance

First Defense® Components

- 1. Built-In Bypass
- 2. Inlet Pipe
- 3. Inlet Chute
- 4. Floatables Draw-off Port
- 5. Outlet Pipe
- 6. Floatables Storage
- 7. Sediment Storage
- 8. Inlet Grate or Cover

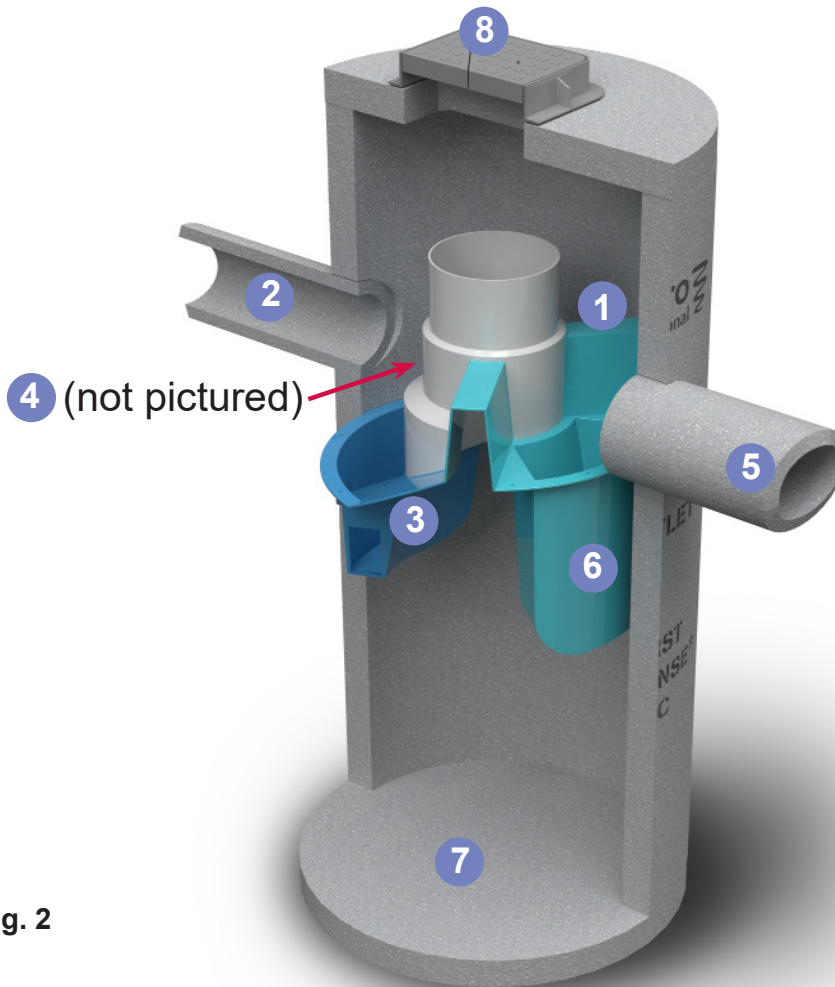


Fig. 2

Table 1

First Defense® Model Sizes
(ft / m) diameter
3 / 0.9
4 / 1.2
5 / 1.5
6 / 1.8
8 / 2.4
10 / 3.0

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense® have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

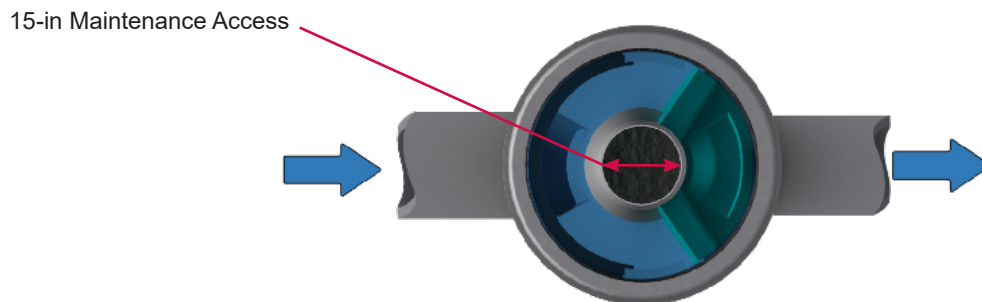


Fig.3 The central opening to the sump of the First Defense® is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / floatables removal, for First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.
6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
7. Securely replace the grate or lid.
8. Take down safety equipment.
9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.4).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.
- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.



Fig.4 Floatables are removed with a vactor hose

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Remove oil and floatables stored on the surface of the water with the vacator hose or with the skimmer or net
5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).
6. Once all floatables have been removed, drop the vacator hose to the base of the sump. Vacator out the sediment and gross debris off the sump floor
7. Retract the vacator hose from the vessel.
8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.
9. Securely replace the grate or lid.

Maintenance at a Glance

Inspection	<ul style="list-style-type: none"> - Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	<ul style="list-style-type: none"> - Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	<ul style="list-style-type: none"> - Once per year or as needed - Following a spill in the drainage area

NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.



First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): [3-FT] [4-FT] [5-FT] [6-FT] [8-FT] [10-FT]

INLET (CIRCLE ALL THAT APPLY): GRATED INLET (CATCH BASIN) INLET PIPE (FLOW THROUGH)



First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments



Stormwater Solutions

94 Hutchins Drive
Portland, ME 04102

Tel: (207) 756-6200

Fax: (207) 756-6212

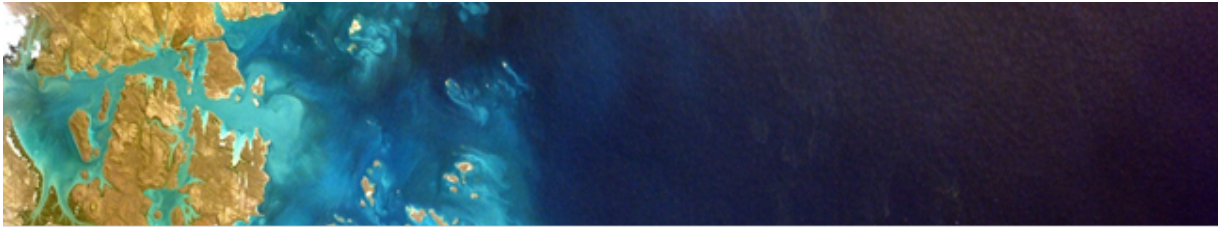
stormwaterinquiry@hydro-int.com

www.hydro-int.com

Turning Water Around...®

FD_O+M_J_2009(2)

Verification Statement



Hydro International First Defense® HC Oil Grit Separator Registration number: (V-2018-10-01) Date of issue: 2018-October-15 (rev 2019-02-01)

Technology type	Oil Grit Separator
Application	Technology to remove oil, sediment, trash and debris from stormwater and snowmelt runoff as well as other pollutants that attach to sediment particles, such as nutrients and metals
Company	Hydro International
Address	94 Hutchins Drive, Portland, Maine Phone +1-207-756 6200 USA 04102
Website	https://www.hydro-int.com
E-mail	dscott@hydro-int.com

Verified Performance Claims

The Hydro International First Defense® High Capacity (HC) Oil Grit Separator (OGS) was tested by Good Harbour Laboratories Inc. (GHL), Mississauga, Ontario, Canada in 2018. The performance test results were verified by Toronto and Region Conservation Authority (TRCA), Vaughan, Ontario, Canada following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. The following performance claims were verified:

Capture test¹:

With a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and an influent test sediment concentration of 200 mg/L, the First Defense® HC OGS device removes 67, 60, 55, 50, 45, 45, and 41 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m², respectively.

Scour test¹:

With 10.2 cm (4 inches) of test sediment pre-loaded onto a false floor reaching 50% of the manufacturer's recommended maximum sediment storage depth, the First Defense® HC OGS device generates adjusted effluent² concentrations of 0, 0, 11, 2, and 0 mg/L at 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m², respectively.

¹ The claims can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)

² The effluent suspended sediment concentration is adjusted based on the background concentration and the smallest 5% of particles captured during the 40 L/min/m² sediment capture test (see Table 2)

Technology Application

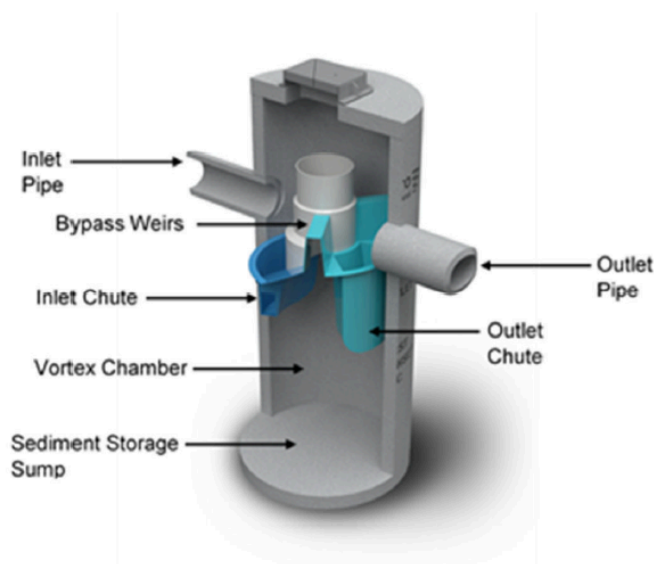
The First Defense® HC (FDHC) Oil Grit Separator can be used as a stand-alone stormwater treatment technology, depending on water quality objectives, or as a pretreatment component in a treatment train when higher TSS removals are required and polishing or volume reduction best management practices (BMPs), such as infiltration or bio-infiltration, are installed downstream. FDHC applications include: stormwater treatment at the point of entry into the drainage line; sites constrained by space, topography or drainage profiles with limited slope and depth of cover; retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line; pre-treatment for filters, infiltration, other sedimentation BMPs and storage.

Technology Description

The Hydro International First Defense® HC (FDHC) is an Oil Grit Separator designed to remove oil, sediment, trash and debris from stormwater and snowmelt runoff as well as other pollutants that attach to sediment particles, such as nutrients and metals. The patented flow modifying internal components are designed to be inserted into standard precast concrete manholes where they collect and treat runoff as part of the drainage system (Figure 1).

Flow entering the manhole via an inlet pipe or inlet grate is diverted into a vortex chamber beneath a separation module that includes both inlet/outlet chutes and bypass weirs. The internal bypass weirs divert flows greater than the maximum design treatment flow rate over the separation module and away from the vortex chamber where oil, sediment, debris and attached pollutants are accumulating. This function prevents high velocities from re-suspending previously captured pollutants during large storm events. The FDHC can be designed and sized to function effectively in either online or offline configurations.

Figure 1: Hydro International First Defense® HC Oil Grit Separator



The test unit was 1.2 m (4 foot) in diameter with a 1.51 m (59 5/8 inches) sump depth measured from the outlet invert to the floor of the unit. The effective treatment area (also known as the effective sedimentation area) is 1.2 m² (12.6 ft²). The maximum sediment storage depth is 0.457 m (18 inches).

Description of Test Procedure

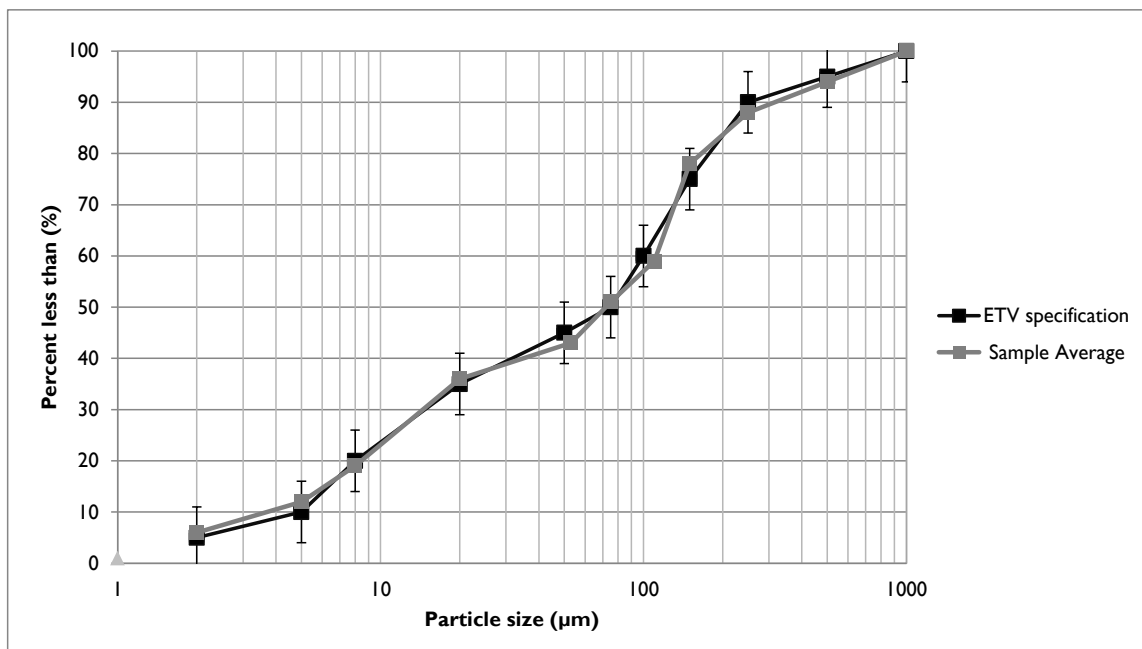
The test data and results for this verification were obtained from independent testing conducted on a 1.2 m (48 inch) diameter Hydro International First Defense® HC OGS device, in accordance with the *Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014)*. The laboratory test procedure was originally prepared by the Toronto and Region Conservation Authority (TRCA) in association with a 31 member advisory committee from various stakeholder groups.

Verification Results

Toronto and Region Conservation Authority verified the performance test data and other information pertaining to the First Defense® HC Oil Grit Separator. A Verification Plan was prepared to guide the verification process based on the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol.

The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the testing procedure. The *Procedure for Laboratory Testing of Oil Grit Separators* requires that the three sample average of the test sediment particle size distribution (PSD) meet the specified PSD percent less than values within a boundary threshold of 6%, and a median particle size no greater than 75 µm. Comparison of the individual sample and average test sediment PSD to the specified PSD shown in Figure 2 indicates that the test sediment used for the capture and scour tests met this condition. The median particle size was 73 µm. Samples from test sediment batches used for each run met the specified PSD within the required tolerance thresholds.

Figure 2 - The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD



The capacity of the device to retain sediment was determined at seven surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer’s recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1).

In some instances, the removal efficiencies were above 100% for certain particle size fractions. These discrepancies are not unique to any one test laboratory and are attributed to errors relating to the blending of sediment, collection of representative samples for laboratory submission, and laboratory analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for “all particle sizes by mass balance” (see Table 1) are based on measurements of the total injected and retained sediment mass, and are therefore not subject to blending, sampling or PSD analysis errors.

Table 1 - Removal efficiencies (%) of the First Defence HC at specified surface loading rates

Particle size fraction (µm)	Surface loading rate (L/min/m ²)						
	40	80	200	400	600	1000	1400
>500	100*	100*	100*	81	72	86	80
250 - 500	100*	97	99	100*	100*	59	88
150 - 250	100*	91	95	93	47	100*	84
105 - 150	96	89	94	89	90	70	75
75 - 105	100*	90	95	77	-20**	100	51
53 - 75	74	100*	97	62	100*	46	37
20 - 53	60	33	10	5	4	0	0
8 - 20	29	16	8	3	3	1	1
5 - 8	8	5	8	4	4	4	3
<5	5	3	0	0	0	3	3
All particle sizes By mass balance	66.5	59.9	55.4	50.2	44.9	45.2	40.5

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 101 and 184% (average 115%). See text and Bulletin # CETV 2016-11-0001 for more information.

** An outlier in the retained sediment sample sieve data resulted in negative removal for this size fraction. The outlier at the 75 µm particle size is shown in Figure 3.

Figure 3 - Particle size distribution of sediment retained in the First Defence HC in relation to the injected test sediment average

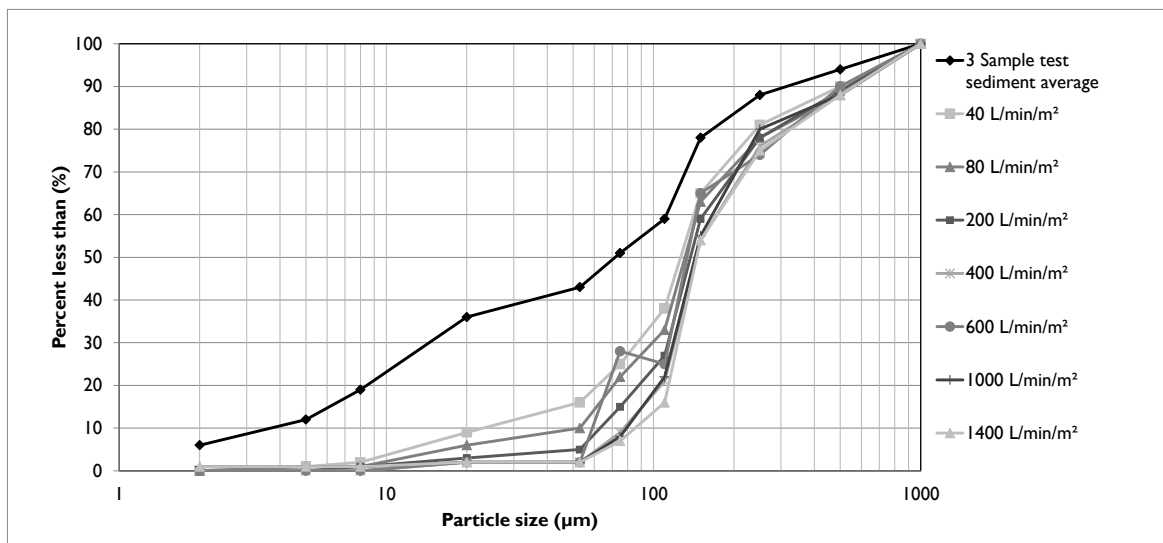


Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the sediment retained by the FDHC device at each of the tested surface loading rates. As expected, the capture efficiency for fine particles was generally found to decrease as surface loading rates increased, particularly in the 40 to 400 L/min/m² range.



Table 2 shows the results of the sediment scour and re-suspension test for the First Defense® HC unit. The scour test involved preloading 10.2 cm (4 inches) of fresh test sediment into the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Clean water was run through the device at five surface loading rates over a 30 minute period. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water. The smallest 5% of particles captured during the 40 L/min/m² sediment capture test (13.5 μm in this case) was used to further adjust the effluent sediment concentrations, as per the method described in Bulletin # CETV 2016-09-0001. Results showed average adjusted effluent sediment concentrations below 11 mg/L at all surface loading rates. Effluent concentrations would be expected to decrease at higher flow rates since bypass over the insert bypass weirs was observed to begin at 1,032 L/min/m².

Table 2 - Scour test adjusted effluent sediment concentration at each surface loading rate

Run	Surface loading rate (L/min/m ²)	Run time (min)	Background sample concentration (mg/L)	Average adjusted effluent suspended sediment concentration (mg/L)*
1	200	1:00 – 6:00	0.8	0
2	800	7:00 – 12:00	1.0	0
3	1400	13:00 – 18:00	1.1	10.6
4	2000	19:00 – 24:00	2.8	2.4
5	2600	25:00 – 30:00	6.6	0

*The effluent suspended sediment concentration is adjusted based on the background concentration and the smallest 5% of particles captured during the 40 L/min/m² sediment capture test, as per the method described in Bulletin # CETV 2016-09-0001.

Variations from the Procedure

Minor variations from the *Procedure for Laboratory Testing of Oil-Grit Separators* used as the basis of testing for this verification were as follows:

1. The *Procedure* states that the tested device “must be a full scale commercially available device with the same configuration and components as would be typical for an actual installation.” The unit tested for this verification had the same internal components as would be typical for a commercial installation, but the internal components were placed inside a structure constructed of composite materials, rather than a manhole made of concrete, the latter of which is typical for most installations. The dimensions of the structure were the same as would have been the case had the manhole been concrete. The use of alternate materials for the structure was not believed to significantly affect system performance.
2. As part of the capture test, evaluation of the 40 and 80 L/min/m² surface loading rate was split into 3 and 2 parts, respectively. The test was conducted in parts because of the long duration (i.e. over 10 hours) needed to feed the required minimum 11.3 kg of test sediment into the unit. At the end of the first and second parts of the test, the flow rates were gradually decreased to prevent capture of particles that would have been washed out under normal circumstances. The requirement to split the test into parts was not anticipated in the *Procedure for Laboratory Testing of Oil-Grit Separators*, but has been a common feature of testing at the 40 L/min/m² surface loading rate. Conducting the test in two parts for the 80 L/min/m² surface loading rate is less common. The testing did not assess the significance of the breaks, however, the test laboratory and verifier do not believe that the breaks significantly affected the test results.



3. During the sediment scour test, the flow rate coefficient of variation (COV) at the 200 L/min/m² surface loading rate of 0.045 slightly exceeded the target COV of 0.04. The average flow rate during the test remained within ±10% of the target flow rate.

Quality assurance

Performance testing and verification of the First Defense® HC Oil Grit Separator were performed in accordance with the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. The verifier, Toronto and Region Conservation Authority, has confirmed that quality assurance requirements were addressed throughout the performance testing process and in the generation of performance test results. This includes reviewing all data sheets and data downloads, as well as overall management of the test system, quality control and data integrity.

Verification Summary

In summary, the First Defense® HC Oil Grit Separator is designed to remove oil, sediment, trash and debris from stormwater and snowmelt runoff as well as other pollutants that attach to sediment particles, such as nutrients and metals. Verification of performance claims for the Hydro International First Defense® HC Oil Grit Separator was conducted by Toronto and Region Conservation Authority based on independent third-party performance test results provided by Good Harbour Laboratories, as well as additional information provided by Hydro International. Table 3 summarizes the verification results in relation to the technology performance parameters that were identified to determine the efficacy of the First Defense® HC Oil Grit Separator.

Table 3 - Summary of Verification Results Against Performance Parameters

Performance Parameter	Verified Performance
Sediment Removal Rate	The sediment removal rate of the FDHC is dependent upon flow rate, particle density and particle size. Removal efficiency decreased with increasing surface loading rate from 67% at 40 L/min/m ² to 41% at 1400 L/min/m ² . The weighted average removal efficiency achieved by the unit will vary depending on the rainfall distribution of the jurisdiction in which it is installed, and site characteristics.
Sediment Scour	When pre-loaded with sediment with a particle size distribution matching that of the feed sediment used in the sediment capture test, the FDHC generated effluent suspended solids concentrations of less than 11 mg/L at surface loading rates ranging from 200 to 2600 L/min/m ² .
Bypass flow rate	The flow rate at which bypass occurs will vary based on model size. For the 1.2 m (4 foot) diameter test unit, the flow rate at which bypass occurred over the insert bypass weirs was 1238 L/min (327 gpm).
Head loss	The loss of hydraulic head across the FDHC was determined by measuring the water elevation difference between the inlet and outlet sides of the insert. Head loss may vary based on model size. For the tested unit the head loss ranged from 2 mm (0.08 inches) at 93.5 L/min (12.3 gpm) to 100 mm (3.94 inches) at 1238 L/min (327 gpm) when bypass was observed to occur. At 327 gpm, when bypass occurred, the depth of the water was 177 mm upstream and 77 mm downstream for a difference of 100 mm (3.94 inches). The highest water elevation difference was 111mm (4.37 inches) at a flow rate of 1635 L/min (431.8 gpm), after which head loss declined up to the maximum measured flow rate of 3036 L/min (801.9 gpm).



What is ISO 14034?

The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.

Benefits of ETV

ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

For more information on the First Defense® HC Oil Grit Separator, contact:	For more information on VerifiGlobal, contact:
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Signed for Hydro International: <i>Original signed by:</i> David Scott David Scott Technical Product Manager, Americas Stormwater	Signed for VerifiGlobal: <i>Original signed by:</i> Thomas Bruun Thomas Bruun, Managing Director <i>Original signed by:</i> John Neate John Neate, Managing Director

NOTICE: Verifications are based on an evaluation of technology performance under specific, predetermined operational conditions and parameters and the appropriate quality assurance procedures. VerifiGlobal and the Verification Expert, Toronto and Region Conservation Authority, make no expressed or implied warranties as to the performance of the technology and do not certify that a technology will always operate as verified. The end user is solely responsible for complying with any and all applicable regulatory requirements. Mention of commercial product names does not imply endorsement.

VerifiGlobal and the Verification Expert, Toronto and Region Conservation Authority, provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

Appendix **H**

Supporting Engineering Documentation and Calculations – Underground Storage System

Project: DYT3 - North - Rev 2



Include Perimeter Stone in Calculations

Click for Stage Area Data

Click to Invert Stage Area Data

[Click Here for Imperial](#)

Chamber Model -
 Units -
 Number of Chambers -
 Number of End Caps -
 Voids in the stone (porosity) -
 Base of Stone Elevation -
 Amount of Stone Above Chambers -
 Amount of Stone Below Chambers -

MC-3500
Metric
285
30
40 %
63.55 m
305 mm
229 mm

1477.325 sq.meters Min. Area - 1357.38 sq.meters

StormTech MC-3500 Cumulative Storage Volumes

Height of System (mm)	Incremental Single Chamber (cuic meters)	Incremental Single End Cap (cuic meters)	Incremental Chambers (cuic meters)	Incremental End Cap (cuic meters)	Incremental Stone (cuic meters)	Incremental Ch, EC and Stone (cuic meters)	Cumulative System (cuic meters)	Elevation (meters)
1676	0.00	0.00	0.00	0.00	15.002	15.00	1530.15	65.22
1651	0.00	0.00	0.00	0.00	15.002	15.00	1515.15	65.20
1626	0.00	0.00	0.00	0.00	15.002	15.00	1500.14	65.17
1600	0.00	0.00	0.00	0.00	15.002	15.00	1485.14	65.15
1575	0.00	0.00	0.00	0.00	15.002	15.00	1470.14	65.12
1549	0.00	0.00	0.00	0.00	15.002	15.00	1455.14	65.10
1524	0.00	0.00	0.00	0.00	15.002	15.00	1440.14	65.07
1499	0.00	0.00	0.00	0.00	15.002	15.00	1425.13	65.05
1473	0.00	0.00	0.00	0.00	15.002	15.00	1410.13	65.02
1448	0.00	0.00	0.00	0.00	15.002	15.00	1395.13	64.99
1422	0.00	0.00	0.00	0.00	15.002	15.00	1380.13	64.97
1397	0.00	0.00	0.00	0.00	15.002	15.00	1365.13	64.94
1372	0.00	0.00	0.47	0.00	14.815	15.28	1350.12	64.92
1346	0.01	0.00	1.57	0.02	14.367	15.95	1334.84	64.89
1321	0.01	0.00	2.37	0.03	14.040	16.44	1318.89	64.87
1295	0.01	0.00	3.26	0.04	13.682	16.98	1302.44	64.84
1270	0.02	0.00	5.55	0.06	12.761	18.36	1285.46	64.82
1245	0.03	0.00	8.30	0.07	11.653	20.03	1267.10	64.79
1219	0.04	0.00	10.08	0.09	10.932	21.11	1247.07	64.77
1194	0.04	0.00	11.48	0.11	10.368	21.95	1225.96	64.74
1168	0.04	0.00	12.70	0.12	9.875	22.69	1204.01	64.72
1143	0.05	0.00	13.78	0.14	9.436	23.35	1181.32	64.69
1118	0.05	0.01	14.76	0.15	9.038	23.95	1157.96	64.66
1092	0.05	0.01	15.64	0.17	8.679	24.49	1134.02	64.64
1067	0.06	0.01	16.47	0.19	8.340	25.00	1109.53	64.61
1041	0.06	0.01	17.23	0.20	8.031	25.46	1084.53	64.59
1016	0.06	0.01	17.95	0.21	7.737	25.90	1059.07	64.56
991	0.07	0.01	18.62	0.23	7.465	26.31	1033.17	64.54
965	0.07	0.01	19.25	0.24	7.209	26.69	1006.87	64.51
940	0.07	0.01	19.85	0.25	6.964	27.06	980.17	64.49
914	0.07	0.01	20.40	0.26	6.736	27.40	953.11	64.46
889	0.07	0.01	20.93	0.27	6.520	27.73	925.71	64.44
864	0.08	0.01	21.44	0.28	6.314	28.03	897.99	64.41
838	0.08	0.01	21.91	0.29	6.119	28.33	869.95	64.39
813	0.08	0.01	22.37	0.31	5.934	28.60	841.63	64.36
787	0.08	0.01	22.80	0.32	5.757	28.87	813.02	64.33
762	0.08	0.01	23.21	0.33	5.589	29.12	784.15	64.31
737	0.08	0.01	23.60	0.34	5.428	29.36	755.03	64.28
711	0.08	0.01	23.97	0.35	5.276	29.59	725.67	64.26
686	0.09	0.01	24.31	0.36	5.135	29.80	696.08	64.23
660	0.09	0.01	24.64	0.36	5.000	30.01	666.28	64.21
635	0.09	0.01	24.97	0.37	4.864	30.21	636.27	64.18
610	0.09	0.01	25.26	0.38	4.743	30.39	606.06	64.16
584	0.09	0.01	25.55	0.39	4.626	30.57	575.67	64.13
559	0.09	0.01	25.82	0.40	4.514	30.73	545.10	64.11
533	0.09	0.01	26.08	0.41	4.408	30.89	514.37	64.08
508	0.09	0.01	26.32	0.42	4.308	31.04	483.48	64.06
483	0.09	0.01	26.55	0.42	4.211	31.19	452.43	64.03
457	0.09	0.01	26.78	0.43	4.119	31.33	421.25	64.00
432	0.09	0.01	26.99	0.44	4.032	31.46	389.92	63.98
406	0.10	0.01	27.19	0.44	3.950	31.58	358.46	63.95
381	0.10	0.01	27.38	0.45	3.871	31.70	326.88	63.93
356	0.10	0.02	27.56	0.46	3.797	31.81	295.18	63.90
330	0.10	0.02	27.74	0.46	3.722	31.92	263.37	63.88
305	0.10	0.02	27.91	0.47	3.653	32.03	231.45	63.85
279	0.10	0.02	28.07	0.47	3.584	32.13	199.43	63.83
254	0.10	0.02	28.29	0.51	3.485	32.28	167.30	63.80
229	0.00	0.00	0.00	0.00	15.002	15.00	135.02	63.78
203	0.00	0.00	0.00	0.00	15.002	15.00	120.02	63.75
178	0.00	0.00	0.00	0.00	15.002	15.00	105.01	63.72
152	0.00	0.00	0.00	0.00	15.002	15.00	90.01	63.70
127	0.00	0.00	0.00	0.00	15.002	15.00	75.01	63.67
102	0.00	0.00	0.00	0.00	15.002	15.00	60.01	63.65
76	0.00	0.00	0.00	0.00	15.002	15.00	45.01	63.62
51	0.00	0.00	0.00	0.00	15.002	15.00	30.00	63.60
25	0.00	0.00	0.00	0.00	15.002	15.00	15.00	63.57

Project: **DYT3 - S**



- Chamber Model -
- Units -
- Number of Chambers -
- Number of End Caps -
- Voids in the stone (porosity) -
- Base of Stone Elevation -
- Amount of Stone Above Chambers -
- Amount of Stone Below Chambers -
- Area of system -

MC-3500	
Metric	Click Here for Imperial
354	
38	
40	%
63.15	m
305	mm
229	mm
1841.8	sq.meters

Min. Area - 1748.581 sq.meters

 Include Perimeter Stone in Calculations

StormTech MC-3500 Cumulative Storage Volumes

Height of System (mm)	Incremental Single Chamber (cubic meters)	Incremental Single End Cap (cubic meters)	Incremental Chambers (cubic meters)	Incremental End Cap (cubic meters)	Incremental Stone (cubic meters)	Incremental Chamber, End Cap and Stone (cubic meters)	Cumulative System (cubic meters)	Elevation (meters)
1676	0.00	0.00	0.00	0.00	18.703	18.70	1905.36	64.83
1651	0.00	0.00	0.00	0.00	18.703	18.70	1886.65	64.80
1626	0.00	0.00	0.00	0.00	18.703	18.70	1867.95	64.78
1600	0.00	0.00	0.00	0.00	18.703	18.70	1849.25	64.75
1575	0.00	0.00	0.00	0.00	18.703	18.70	1830.54	64.73
1549	0.00	0.00	0.00	0.00	18.703	18.70	1811.84	64.70
1524	0.00	0.00	0.00	0.00	18.703	18.70	1793.14	64.68
1499	0.00	0.00	0.00	0.00	18.703	18.70	1774.43	64.65
1473	0.00	0.00	0.00	0.00	18.703	18.70	1755.73	64.63
1448	0.00	0.00	0.00	0.00	18.703	18.70	1737.03	64.60
1422	0.00	0.00	0.00	0.00	18.703	18.70	1718.32	64.57
1397	0.00	0.00	0.00	0.00	18.703	18.70	1699.62	64.55
1372	0.00	0.00	0.58	0.00	18.470	19.05	1680.92	64.52
1346	0.01	0.00	1.95	0.03	17.915	19.89	1661.86	64.50
1321	0.01	0.00	2.95	0.04	17.508	20.50	1641.98	64.47
1295	0.01	0.00	4.05	0.06	17.063	21.16	1621.48	64.45
1270	0.02	0.00	6.89	0.07	15.919	22.88	1600.32	64.42
1245	0.03	0.00	10.31	0.09	14.542	24.94	1577.44	64.40
1219	0.04	0.00	12.53	0.12	13.647	26.29	1552.49	64.37
1194	0.04	0.00	14.26	0.14	12.946	27.34	1526.20	64.35
1168	0.04	0.00	15.77	0.16	12.333	28.26	1498.87	64.32
1143	0.05	0.00	17.11	0.18	11.788	29.08	1470.61	64.30
1118	0.05	0.01	18.33	0.20	11.293	29.82	1441.53	64.27
1092	0.05	0.01	19.42	0.22	10.847	30.49	1411.71	64.24
1067	0.06	0.01	20.46	0.23	10.426	31.12	1381.23	64.22
1041	0.06	0.01	21.40	0.25	10.043	31.69	1350.11	64.19
1016	0.06	0.01	22.30	0.27	9.677	32.24	1318.41	64.17
991	0.07	0.01	23.12	0.29	9.339	32.75	1286.17	64.14
965	0.07	0.01	23.91	0.30	9.021	33.23	1253.42	64.12
940	0.07	0.01	24.65	0.32	8.717	33.68	1220.19	64.09
914	0.07	0.01	25.34	0.33	8.434	34.11	1186.51	64.07
889	0.07	0.01	26.00	0.35	8.165	34.51	1152.40	64.04
864	0.08	0.01	26.62	0.36	7.909	34.89	1117.89	64.02
838	0.08	0.01	27.22	0.37	7.667	35.26	1083.00	63.99
813	0.08	0.01	27.78	0.39	7.436	35.60	1047.74	63.96
787	0.08	0.01	28.32	0.40	7.217	35.93	1012.14	63.94
762	0.08	0.01	28.82	0.41	7.008	36.25	976.20	63.91
737	0.08	0.01	29.31	0.43	6.808	36.55	939.96	63.89
711	0.08	0.01	29.77	0.44	6.619	36.83	903.41	63.86
686	0.09	0.01	30.20	0.45	6.444	37.09	866.58	63.84
660	0.09	0.01	30.61	0.46	6.276	37.34	829.49	63.81
635	0.09	0.01	31.02	0.47	6.107	37.60	792.15	63.79
610	0.09	0.01	31.38	0.49	5.957	37.82	754.55	63.76
584	0.09	0.01	31.73	0.50	5.812	38.04	716.72	63.74
559	0.09	0.01	32.07	0.51	5.672	38.25	678.68	63.71
533	0.09	0.01	32.39	0.52	5.541	38.45	640.43	63.69
508	0.09	0.01	32.69	0.53	5.415	38.64	601.99	63.66
483	0.09	0.01	32.98	0.54	5.296	38.81	563.35	63.63
457	0.09	0.01	33.26	0.54	5.181	38.99	524.54	63.61
432	0.09	0.01	33.52	0.55	5.073	39.15	485.55	63.58
406	0.10	0.01	33.77	0.56	4.971	39.30	446.40	63.56
381	0.10	0.01	34.01	0.57	4.872	39.45	407.10	63.53
356	0.10	0.02	34.23	0.58	4.781	39.59	367.65	63.51
330	0.10	0.02	34.45	0.58	4.688	39.73	328.06	63.48
305	0.10	0.02	34.66	0.59	4.602	39.85	288.34	63.46
279	0.10	0.02	34.87	0.60	4.516	39.98	248.48	63.43
254	0.10	0.02	35.14	0.64	4.393	40.17	208.50	63.41
229	0.00	0.00	0.00	0.00	18.703	18.70	168.33	63.38
203	0.00	0.00	0.00	0.00	18.703	18.70	149.63	63.36
178	0.00	0.00	0.00	0.00	18.703	18.70	130.92	63.33
152	0.00	0.00	0.00	0.00	18.703	18.70	112.22	63.30
127	0.00	0.00	0.00	0.00	18.703	18.70	93.52	63.28
102	0.00	0.00	0.00	0.00	18.703	18.70	74.81	63.25
76	0.00	0.00	0.00	0.00	18.703	18.70	56.11	63.23
51	0.00	0.00	0.00	0.00	18.703	18.70	37.41	63.20
25	0.00	0.00	0.00	0.00	18.703	18.70	18.70	63.18

STORMTECH MC-3500 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 MC-3500 CHAMBER (not to scale)

Nominal Chamber Specifications

Size (L x W x H)
90" x 77" x 45"
2,286 mm x 1,956 mm x 1,143 mm

Chamber Storage
109.9 ft³ (3.11 m³)

Min. Installed Storage*
175.0 ft³ (4.96 m³)

Weight
134 lbs (60.8 kg)

Shipping
15 chambers/pallet
7 end caps/pallet
7 pallets/truck

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below chambers, 6" (150 mm) of stone between chambers/end caps and 40% stone porosity.

STORMTECH MC-3500 END CAP (not to scale)

Nominal End Cap Specifications

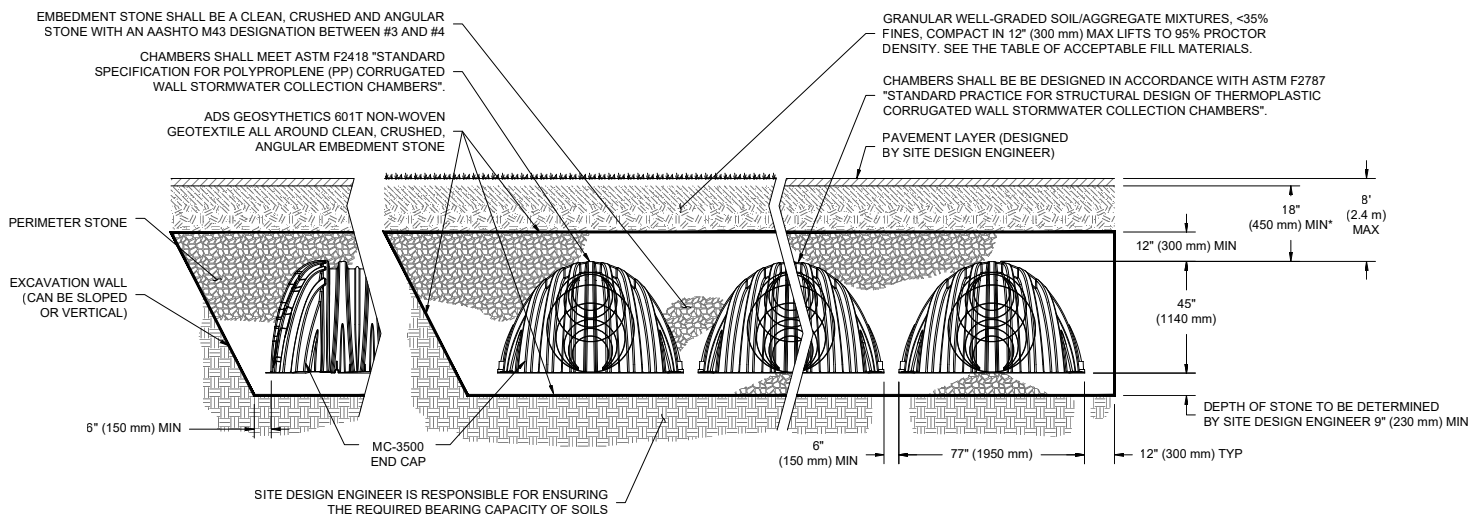
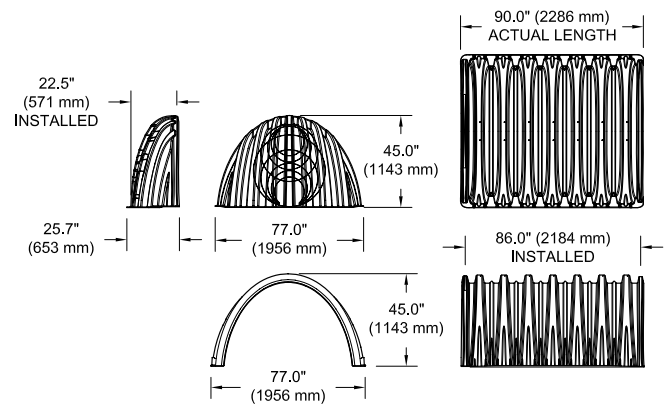
Size (L x W x H)
26.5" x 71" x 45.1"
673 mm x 1,803 mm x 1,145 mm

End Cap Storage
14.9 ft³ (0.42 m³)

Min. Installed Storage*
45.1 ft³ (1.28 m³)

Weight
49 lbs (22.2 kg)

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below, 6" (150 mm) of stone between chambers, 6" (150 mm) of stone between chambers/end caps and 40% stone porosity.



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

MC-3500 CHAMBER SPECIFICATION

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft ³ (m ³)	Chamber and Stone Foundation Depth in. (mm)			
		9" (230 mm)	12" (300 mm)	15" (375 mm)	18" (450 mm)
MC-3500 Chamber	109.9 (3.11)	175.0 (4.96)	179.9 (5.09)	184.9 (5.24)	189.9 (5.38)
MC-3500 End Cap	14.9 (.42)	45.1 (1.28)	46.6 (1.32)	48.3 (1.37)	49.9 (1.41)

Note: Assumes 6" (150 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds ³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-3500 Chamber	8.5 (6.0)	9.1 (6.5)	9.7 (6.9)	10.4 (7.4)
MC-3500 End Cap	3.9 (2.8)	4.1 (2.9)	4.3 (3.1)	4.5 (3.2)
METRIC KILOGRAMS (m ³)	230 mm	300 mm	375 mm	450 mm
MC-3500 Chamber	7711 (4.6)	8255 (5.0)	8800 (5.3)	9435 (5.7)
MC-3500 End Cap	3538 (2.1)	3719 (2.2)	3901 (2.4)	4082 (2.5)

Note: Assumes 12" (300 mm) of stone above and 6" (150 mm) row spacing and 6" (150 mm) of perimeter stone in front of end caps.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15" (375mm)	18" (450 mm)
MC-3500 Chamber	11.9 (9.1)	12.4 (9.5)	12.8(9.8)	13.3 (10.2)
MC-3500 End Cap	4.0 (3.1)	4.1 (3.2)	4.3 (3.3)	4.4 (3.4)

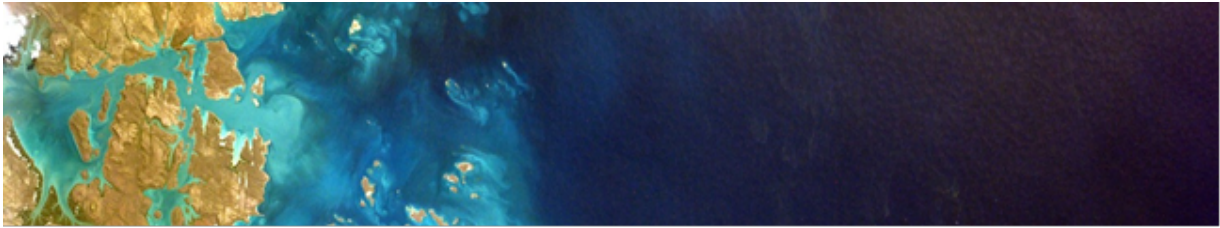
Note: Assumes 6" (150 mm) of separation between chamber rows and 24" (600 mm) of cover. The volume of excavation will vary as depth of cover increases.



Working on a project?
Visit us at www.stormtech.com
and utilize the StormTech Design Tool

For more information on the StormTech MC-3500 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

Verification Statement



StormTech Isolator® Row PLUS Registration number: (V-2020-10-01) Date of issue: (2020-October-27)

Technology type	Stormwater Filtration Device
Application	Stormwater filtration technology to remove sediments, nutrients, heavy metals, and organic contaminants from stormwater runoff
Company	StormTech, LLC.
Address	520 Cromwell Avenue, Rocky Hill, CT 06067 USA
Phone	+1-888-892-2694
Website	www.stormtech.com
E-mail	info@stormtech.com

Verified Performance Claims

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Based on the laboratory testing conducted, the verified performance claims are as follows:

Total Suspended Solids (TSS) Removal Efficiency - The StormTech Isolator® Row PLUS achieved 82% ± 1% removal efficiency of suspended sediment concentration (SCC) at a 95% confidence level.

Average Loading Rate - Based on the reported flow rate data and the effective sedimentation and filtration treatment area of the test unit, the average loading rate of the test unit was 4.15 ± 0.03 GPM/ft² at a 95% confidence level.

Maximum Treatment Flow Rate (MTFR) - Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 gpm/ ft² of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft².

Detention Time and Volume - The StormTech Isolator Row PLUS detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft³ and a detention time of 2.2 minutes.

Maximum Sediment Storage Depth and Volume - The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft³ at a sediment depth of 0.5 inches.

Effective Sedimentation/Filtration Treatment Areas - The Effective Sedimentation Area (ESA) and the Effective Filtration Treatment Area (EFTA) increase as the size of the system increases. For the two overlapping StormTech SC-740 chambers tested, the ESA and the ratio of ESA/EFTA were 54.5 ft² and 1.0, respectively.

Sediment Mass Load Capacity - The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs ± 0.8 lbs (2.91 ± 0.01 lbs/ ft²) following a total sediment loading of 195.2 lbs.

Technology Application

The StormTech “Isolator® Row PLUS” is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers covered in a non-woven geotextile fabric with a single layer of proprietary woven fabric at the bottom that serves as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal. The following features make the Isolator® Row PLUS effective as a water quality solution:

- Enhanced infiltration Surface Area
- Runoff Volume Reduction
- Peak Flow Reduction
- Sediment/Pollutant Removal
- Internal Water Storage (IWS)
- Water Temperature Cooling (Thermal Buffer).

Technology Description

The Isolator® Row PLUS (shown in Figures 1 and 2) is the first row of StormTech chambers that is surrounded with filter fabric and connected to a closely located manhole for easy access. The Isolator® Row PLUS provides for settling and filtration of sediment as stormwater rises in the chamber and ultimately passes through the filter fabric. The open-bottom chambers allow stormwater to flow out of the chambers, while sediment is captured in the Isolator® Row PLUS.

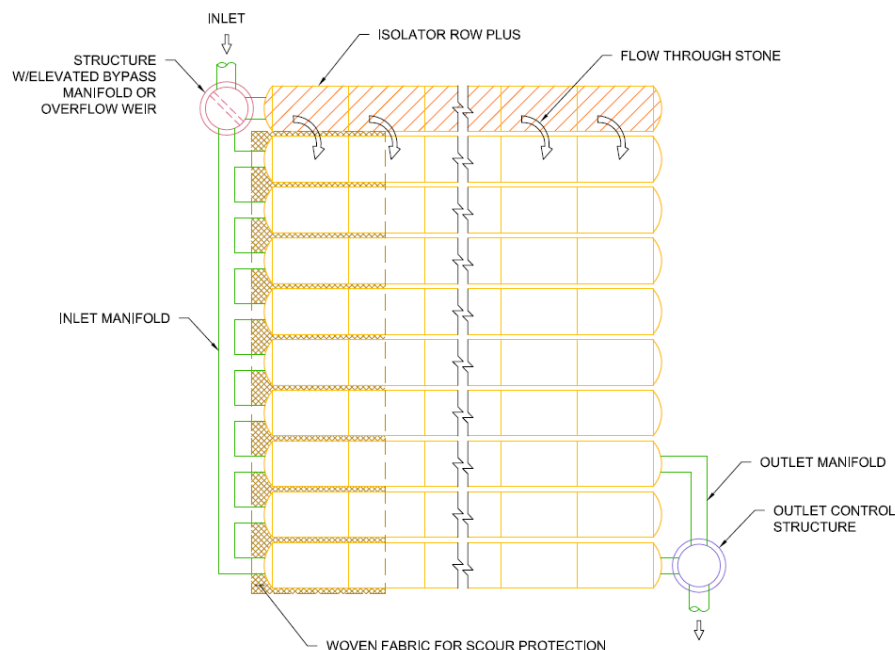


Figure 1: Schematic of the StormTech Isolator® Row PLUS System

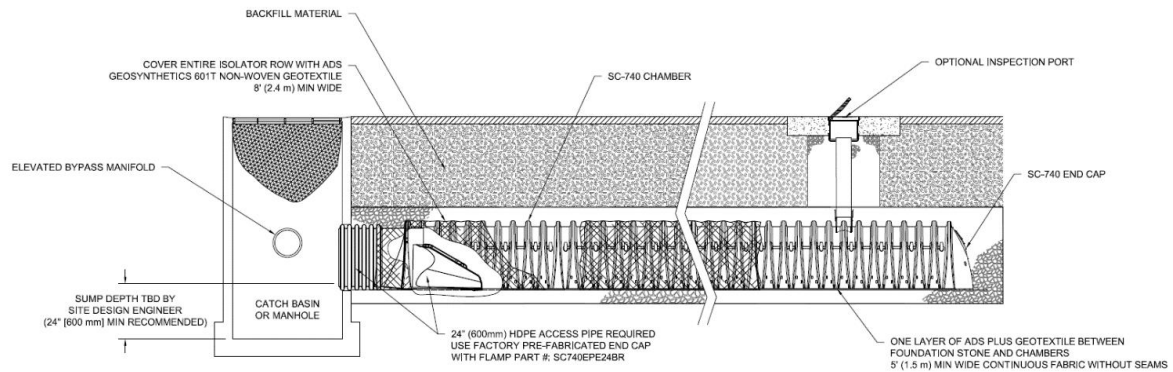


Figure 2: Isolator® Row PLUS Detail

A single layer of proprietary Advanced Drainage Systems (ADS) PLUS fabric is placed between the angular base stone and the Isolator Row PLUS chamber. The geotextile provides the means for stormwater filtration and provides a durable surface for maintenance operations. A 6 oz. non-woven fabric is placed over the chambers.

The Isolator® Row PLUS is designed to capture the “first flush” and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole not only provides access to the Isolator® Row PLUS but includes a high low/concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator® Row PLUS bypass through a manifold to the other chambers. This is achieved with either a high-flow weir or an elevated manifold. This creates a differential between the Isolator® Row PLUS and the manifold, thus allowing for settlement time in the Isolator® Row PLUS. After Stormwater flows through the Isolator® Row PLUS and into the rest of the StormTech chamber system it is either infiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

StormTech developed and owns the Isolator® Row PLUS technology and has filed a number of patent applications relating to the Isolator® Row PLUS system.¹

Description of Test Procedure for the StormTech Isolator® Row PLUS

In January 2020, two overlapping StormTech SC-740 Isolator® Row PLUS commercial size chambers were installed at the Mid-Atlantic Storm Water Research Center (MASWRC, a subsidiary of BaySaver), in Mount Airy, Maryland, to evaluate the performance of the Isolator® Row PLUS system for Total Suspended Solid (TSS) removal (Figure 3) All testing and data collection procedures were supervised by Boggs Environmental Consultants, Inc. (BEC), who was hired by ADS for third party oversight, and were in accordance with the *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device (January 2013)*.

Prior to the start of testing, a Quality Assurance Project Plan (QAPP), revision dated January 09, 2020, was submitted and approved by the New Jersey Corporation for Advanced Technology (NJCAT), c/o Center for Environmental Systems, Stevens Institute of Technology, Castle Point on Hudson, Hoboken, NJ 07030.

¹ (U.S. Provisional Application No. 62/753,050, filed October 30, 2018; U.S. Non-Provisional Application No. 16/670,628, filed October 31, 2019; International Application No. PCT/US2019/059283, filed October 31, 2019; U.S. Application No. 16/938,482, filed July 24, 2020; U.S. Application No. 16/938,657, filed July 24, 2020; PCT International Application No. PCT/US2020/043543, filed July 24, 2020; PCT International Application No. PCT/US2020/043557, filed July 24, 2020.

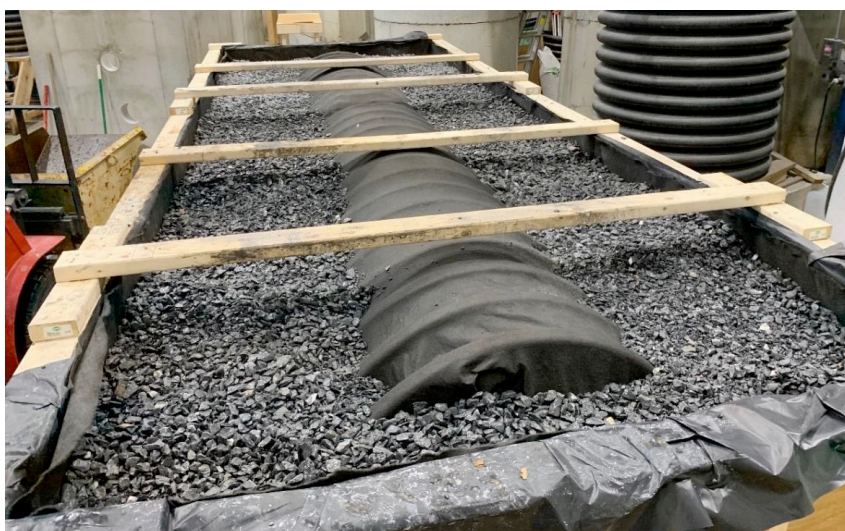


Figure 3: StormTech “Isolator® Row PLUS” Test Set-up at MASWRC

Verification Results

The verification process for the StormTech Isolator® Row PLUS technology was conducted by GHIL in accordance with the VerifiGlobal Verification Plan for the StormTech “Isolator® Row PLUS” Technology – 2020-09-09. The technology performance claims verified by GHIL are summarized at the front of this Verification Statement and in Table 6 on Page 8 under the heading “Verification Summary”.

Particle size distribution analysis was performed by ECS Mid-Atlantic, LLC of Frederick, MD in accordance with ASTM D422-63(2007). ECS is accredited by the American Association of State Highways and Transportation Officials (AASHTO).

ASTM D422-63(2007) is a sieve and hydrometer method where the larger particles, > 75 microns, are measured using a standard sieve stack while the smaller particles are measured based on their settling time using a hydrometer.

The PSD meets the requirements of NJDEP, which is generally accepted as representative of the type of particle sizes an OGS would be designed to treat. Actual PSD is site and rainfall event specific, so it was necessary to choose a standard PSD to make testing and comparison manageable.

Table 1 shows the NJDEP PSD specification. Table 2 and Figure 4 show the incoming material PSD as determined by ECS Mid-Atlantic and confirmed by the verifier.

Table 1: NJDEP PSD Specification

Particle Size (µm)	NJDEP Minimum Specification
1000	98
500	93
250	88
150	73
100	58
75	48
50	43
20	33
8	18
5	8
2	3
d ₅₀	< 75 µm

Table 2 – Particle Size Distribution (PSD) of Test Sediment

Mesh (mm)	US Sieve Size	Sample ID		
		PSD A	PSD B	PSD C
		Percent Finer		
9.525	0.375	100.0	100.0	100.0
4.750	#4	100.0	100.0	100.0
4.000	#5	100.0	100.0	100.0
2.360	#8	100.0	100.0	100.0
2.000	#10	100.0	100.0	100.0
1.180	#16	100.0	100.0	100.0
1.000	#18	100.0	100.0	100.0
0.500	#35	100.0	100.0	100.0
0.425	#40	93.3	93.0	93.6
0.250	#60	90.3	89.8	90.2
0.150	#100	79.3	78.1	78.1
0.125	#120	73.6	71.7	71.7
0.106	#140	68.4	65.2	64.8
0.090	#170	60.2	58.3	57.5
0.075	#200	52.0	50.9	50.3
0.053	#270	48.0	48.3	47.8
0.045	Hydrometer	46.6	46.7	46.7
0.032		42.8	42.9	41.0
0.021		37.1	37.2	35.3
0.0125		25.7	25.7	25.8
0.0090		20.1	20.1	19.2
0.0064		16.3	16.4	14.5
0.0032		8.8	8.7	7.8
0.0014		3.8	3.7	3.8

The suspended sediment concentration analysis was completed by Fredericktowne Labs Inc., Myersville, MD. Fredericktowne Labs is accredited by the Maryland Department of Environment as Maryland Certified Water Quality Laboratory. The analysis procedure was ASTM D3977-97, Suspended Sediment Concentration. The sampling procedure and submission of samples to the test lab were overseen by the independent observer, Boggs Environmental Consultants, Inc.

All test data and calculations were detailed in the report “NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC”, July 2020, which was submitted to and verified by the New Jersey Corporation for Advanced Technology (NJCAT).

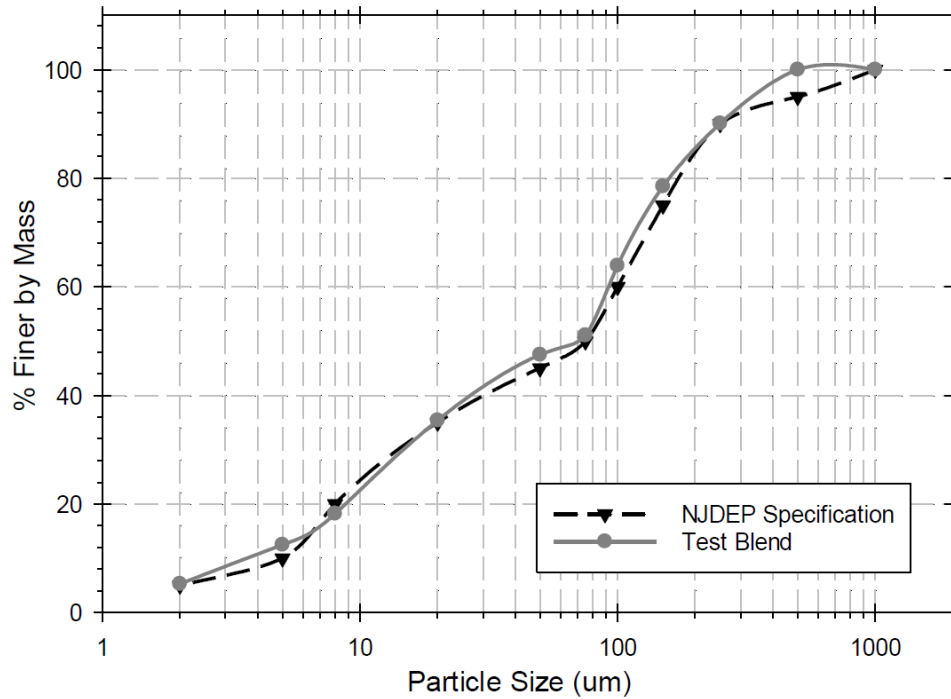


Figure 4– Particle Size Distribution (PSD)

The data in Table 3 (Flow Rate and Temperature) and Table 4 (Removal Efficiency) form the basis for the verified technology performance claim, specifically, flow rate, sediment captured and removal efficiency.

Table 3: Flow Rate and Temperature Summary

Run	Max Flow (gpm)	Min Flow (gpm)	Average Flow (gpm)	Flow COV	Flow Compliance (COV < 0.1)	Maximum Temperature (Fahrenheit)	NJDEP Temperature Compliance (< 80 F)
1	232.8	223.9	226.3	0.0078	Y	48.2	Y
2	228.9	218.6	220.8	0.0104	Y	51.5	Y
3	229.4	220.0	227.2	0.0094	Y	44.7	Y
4	230.2	218.7	223.2	0.0138	Y	40.5	Y
5	228.7	216.9	222.2	0.0103	Y	44.7	Y
6	227.6	217.0	224.2	0.0115	Y	46.7	Y
7	229.7	221.9	226.4	0.0092	Y	44.6	Y
8	230.3	222.2	226.8	0.0089	Y	43.5	Y
9	233.2	218.4	225.6	0.0136	Y	45.5	Y
10	232.2	219.7	228.4	0.0126	Y	44.7	Y
11	226.9	219.2	224.1	0.0088	Y	52.4	Y
12	232.2	222.1	226.9	0.0107	Y	48.5	Y
13	234.7	221.2	226.1	0.0109	Y	48.5	Y
14	231.9	223.4	228.7	0.0103	Y	45.6	Y
15	236.8	224.1	231.4	0.0131	Y	52.2	Y
16	232.5	221.3	229.0	0.0137	Y	47.8	Y

Table 4: Removal Efficiency Results

Run	Average Influent TSS (mg/L)	Influent Water Volume (gal)	Adjusted Average Effluent TSS (mg/L)	Effluent Water Volume (gal)	Adjusted Average Drain Down TSS (mg/L)	Drain Down Water Volume (gal)	Single Run Removal Efficiency (%)	Mass of Captured Sediment (g)	Cumulative Removal Efficiency (%)
1	203	7166	46	6881	34	285	77.8	4282	77.8
2	199	6993	32	6639	27	354	84.0	4415	80.8
3	207	7197	37	6793	27	403	82.6	4654	81.4
4	217	7068	33	6635	29	433	84.9	4923	82.3
5	215	7037	39	6593	29	444	82.2	4705	82.3
6	207	7097	40	6643	31	454	81.2	4504	82.1
7	198	7169	37	6693	30	476	81.6	4386	82.0
8	201	7184	37	6716	32	468	81.6	4473	82.0
9	205	7147	38	6675	30	472	81.8	4539	82.0
10	203	7235	38	6759	31	476	81.4	4523	81.9
11	208	7096	38	6624	30	472	81.8	4567	81.9
12	209	7185	41	6709	30	476	80.7	4584	81.8
13	198	7162	41	6680	32	482	79.7	4277	81.6
14	200	7242	43	6757	34	485	78.8	4318	81.4
15	196	7329	41	6842	32	487	79.5	4320	81.3
16	202	7254	44	6769	31	485	78.9	4384	81.2
Avg.	204.2	7160	39	6713	31	447	81.2	4491	N/A
Cumulative Mass Removed (g)							71854		
Cumulative Mass Removed (lb)							158.4		
Total Mass Loaded (lb)							195.2		
Cumulative Removal Efficiency (%)							81.2		

Quality Assurance

Performance verification of the StormTech Isolator® Row PLUS technology was performed in accordance with the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. This included reviewing all data sheets and calculated values, as well as overall management of the test system, quality control and data integrity.

Additional information on quality control measures taken can be found in section 5 of the QAPP for StormTech Isolator Row New Jersey Department of Environmental Protection Testing, Rev. 1/9/2020.

Specific QA/QC measures reviewed by the verifier are summarized in Table 5 below.

Table 5. Validation of QA/QC Procedures

QC Parameter	Acceptance Criteria
Independence of observer	Confirmed in letter from Boggs Environmental Consultants, Inc. to NJCAT
Consistency of procedure	Daily logs confirm proper procedure
Existence of QAPP	Confirmed. "QAPP For StormTech Isolator Row New Jersey Department of Environmental Protection Testing", Rev. 1/9/2020)
Use of appropriate sample analysis method – ASTM D3799	Confirmed by method reference on lab reports from Fredericktowne Labs Inc.
Test method appropriate for the technology	Used industry stakeholder approved protocol: <i>New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids</i>

	<i>Removal by a Filtration Manufactured Treatment Device (January 2013)</i>
Test parameters stayed within required limits	Confirmed in report “NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC”, July 2020
Third party verified data	All testing was observed and reviewed by Boggs Environmental Consultants, Inc.

Variance

Performance claims regarding structural load limitations were not verified as they are outside the scope of the performance testing that was conducted in accordance with the ‘Quality Assurance Project Plan (QAPP) for StormTech Isolator Row, New Jersey Department of Environmental Protection Testing’, revision dated January 09, 2020.

Verification Summary

The StormTech “Isolator® Row PLUS” is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers wrapped in woven geotextile fabric with two layers at the bottom that serve as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal.

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Table 6 summarizes the verification results in relation to the technology performance parameters that were identified in the Verification Plan to determine the efficacy of the StormTech Isolator® Row PLUS technology.

Table 6 - Summary of Verification Results Against Performance Parameters

Parameters	Verified Claims	Accuracy
Total Suspended Solids (TSS) Removal Efficiency	Based on the laboratory testing conducted, the StormTech Isolator® Row PLUS achieved an average 82% removal efficiency of SSC	± 1% (95% confidence level)
Average Loading Rate	Based on the laboratory testing parameters, the StormTech Isolator® Row PLUS maintained a loading rate of 4.15 GPM/sf	±0.03 GPM/sf (95% confidence level)
Maximum Treatment Flow Rate (MTFR)	Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 GPM/ft ² of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft ² .	± 1.4 GPM (95% confidence level)
Detention Time and Volume	Detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft ³ (based on	N/A

	physical measurement) and a detention time of 2.2 minutes.	
Maximum Sediment Storage Depth and Volume	The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft ³ at a sediment depth of 0.5 inches.	N/A
Effective Sedimentation/ Filtration Treatment Area	The effective sedimentation and filtration treatment area increases as the size of the chamber increases. Under the tested conditions using 2 overlapping chambers, the treatment area was 54.5 ft ²	The sedimentation /filtration area was determined from the actual physical dimensions of the test unit*
Sediment Mass Load Capacity	The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs (2.91 lbs/ ft ²) following a total sediment loading of 195.2 lbs	± 0.8 lbs (±0.01 lbs/ft ²) (95% confidence level)

*Note: These numbers are determined based on physical measurement or a dimensional drawing, which is standard practice. Highly accurate measurements are not practical.

In conclusion, the StormTech Isolator® Row PLUS is a viable technology that can be used to remove contaminants from stormwater runoff via filtration. This technology has proven effective at removing suspended sediment from stormwater through in-lab testing using an industry recognized laboratory protocol.

By extension of sediment removal, this technology should also remove particle bound nutrients, heavy metals, and a wide variety of organic contaminants. Performance is a function of pollutant properties, hydraulic retention time, filter media, pre-treatment, and flow rate, such that proper design of the system is critical to achieving the desired results.

What is ISO 14034?

The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.



Benefits of ETV

ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

For more information on the StormTech “Isolator® Row PLUS” technology, contact:	For more information on VerifiGlobal, contact:
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Signed for StormTech: <i>Original signed by:</i> <i>Greg Spires</i> Greg Spires, P.E. General Manager	Signed for VerifiGlobal: <i>Original signed by:</i> <i>Thomas Bruun</i> Thomas Bruun, Managing Director <i>Original signed by:</i> <i>John Neate</i> John Neate, Managing Director

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Isolator[®] Row O&M Manual



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 overflow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

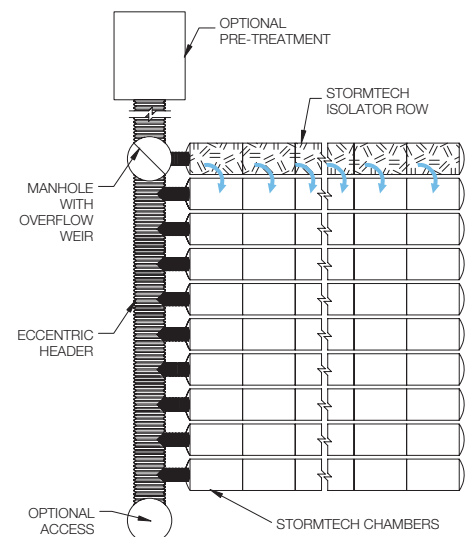
Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

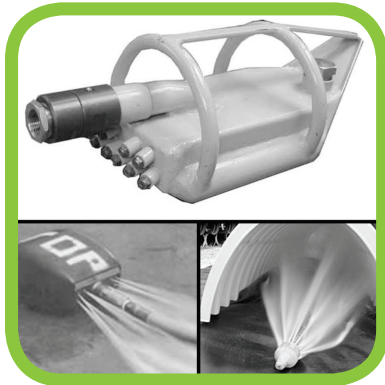


Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.



StormTech Isolator Row with Overflow Spillway (not to scale)





ISOLATOR ROW INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

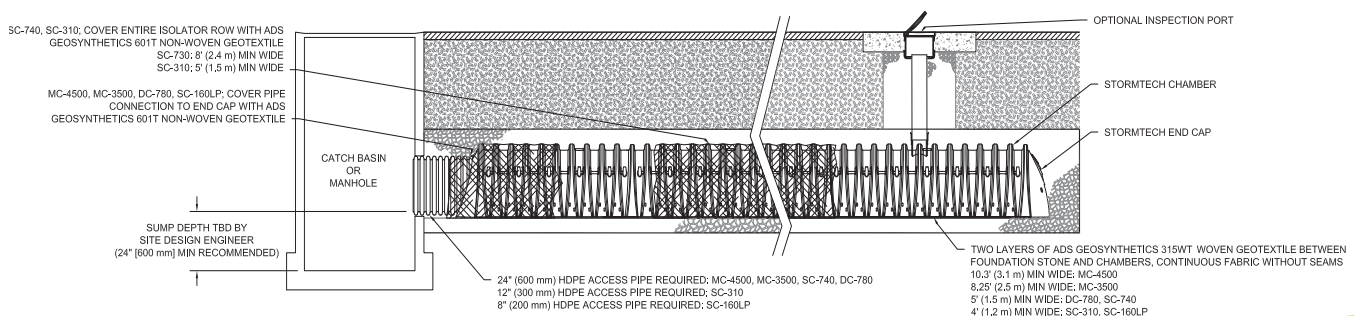
MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.



ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

STEP 1

Inspect Isolator Row for sediment.

- A) Inspection ports (if present)
 - i. Remove lid from floor box frame
 - ii. Remove cap from inspection riser
 - iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.
 - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.
- B) All Isolator Rows
 - i. Remove cover from manhole at upstream end of Isolator Row
 - ii. Using a flashlight, inspect down Isolator Row through outlet pipe
 - 1. Mirrors on poles or cameras may be used to avoid a confined space entry
 - 2. Follow OSHA regulations for confined space entry if entering manhole
 - iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2

Clean out Isolator Row using the JetVac process.

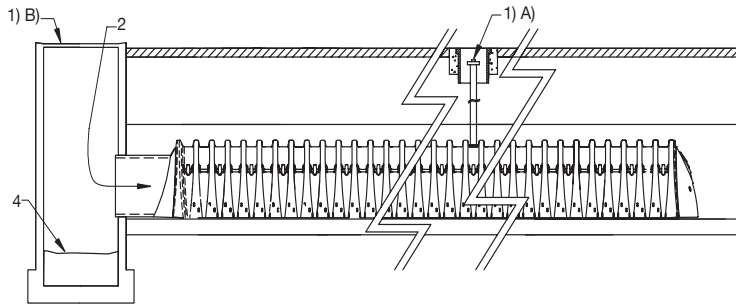
- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

STEP 3

Replace all caps, lids and covers, record observations and actions.

STEP 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings		Sediment Depth (1)-(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

Appendix **I**

PCSWMM Input/Output Documentation – Existing Conditions

Input

[TITLE]

;;Project Title/Notes

[OPTIONS]

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

START_DATE 12/11/2020
START_TIME 00:00:00
REPORT_START_DATE 12/11/2020
REPORT_START_TIME 00:00:00
END_DATE 12/21/2020
END_TIME 00:00:00
SWEEP_START 01/01
SWEEP_END 12/31
DRY_DAYS 0
REPORT_STEP 00:01:00
WET_STEP 00:05:00
DRY_STEP 00:05:00
ROUTING_STEP 5
RULE_STEP 00:00:00

INERTIAL_DAMPING PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP 0.75
LENGTHENING_STEP 0
MIN_SURFAREA 0
MAX_TRIALS 8
HEAD_TOLERANCE 0.0015
SYS_FLOW_TOL 5
LAT_FLOW_TOL 5
MINIMUM_STEP 0.5
THREADS 6

[EVAPORATION]

;;Data Source Parameters
;;-----
CONSTANT 0.0
DRY_ONLY NO

[RAINGAGES]

;;Name	Format	Interval	SCF	Source
25mm	INTENSITY	0:05	1.0	TIMESERIES 25mm
3hr-100yr	INTENSITY	0:10	1.0	TIMESERIES 3hr-100yr
3hr-2yr	INTENSITY	0:05	1.0	TIMESERIES 3hr-2yr
3hr-5yr	INTENSITY	0:05	1.0	TIMESERIES 3hr-5yr
6hr-100yr	INTENSITY	0:10	1.0	TIMESERIES 6hr-100yr
6hr-2yr	INTENSITY	0:05	1.0	TIMESERIES 6hr-2yr
6hr-5yr	INTENSITY	0:05	1.0	TIMESERIES 6hr-5yr

[SUBCATCHMENTS]

;;Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope	CurbLen	SnowPack
EX_N	6hr-100yr	SHEFFIELD_RD	4.47	40	447	1	0	
EX_S	6hr-100yr	HUMBER_PL	1.37	40	137	1	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
EX_N	0.013	0.2	1.57	4.67	0	OUTLET	
EX_S	0.013	0.2	1.57	4.67	0	OUTLET	

[INFILTRATION]

;;Subcatchment	Param1	Param2	Param3	Param4	Param5
EX_N	75	0.5	4	7	0
EX_S	75	0.5	4	7	0

[OUTFALLS]

;;Name	Elevation	Type	Stage Data	Gated	Route To
HUMBER_PL	62.477	FREE		NO	
SHEFFIELD_RD	64	FREE		NO	

[CURVES]

;;Name	Type	X-Value	Y-Value
ADS	Storage	0.025	530
ADS		0.051	530
ADS		0.076	530
ADS		0.102	530
ADS		0.127	530
ADS		0.152	530
ADS		0.178	530
ADS		0.203	530

ADS	0.229	530
ADS	0.254	590
ADS	0.279	638
ADS	0.305	678
ADS	0.33	711
ADS	0.356	739
ADS	0.381	764
ADS	0.406	785
ADS	0.432	803
ADS	0.457	819
ADS	0.483	833
ADS	0.508	846
ADS	0.533	857
ADS	0.559	866
ADS	0.584	875
ADS	0.61	883
ADS	0.635	889
ADS	0.66	895
ADS	0.686	901
ADS	0.711	905
ADS	0.737	910
ADS	0.762	913
ADS	0.787	916
ADS	0.813	919
ADS	0.838	921
ADS	0.864	922
ADS	0.889	924
ADS	0.914	925
ADS	0.94	925
ADS	0.965	925
ADS	0.991	925
ADS	1.016	925
ADS	1.041	924
ADS	1.067	923
ADS	1.092	921
ADS	1.118	919
ADS	1.143	917
ADS	1.168	914
ADS	1.194	911
ADS	1.219	908
ADS	1.245	903
ADS	1.27	898
ADS	1.295	892
ADS	1.321	886
ADS	1.346	880
ADS	1.372	874
ADS	1.397	868
ADS	1.422	862
ADS	1.448	856
ADS	1.473	850
ADS	1.499	845
ADS	1.524	840
ADS	1.549	834
ADS	1.575	830
ADS	1.6	825
ADS	1.626	820
ADS	1.651	816
ADS	1.676	811

STORAGE_N	Storage	0	1500
STORAGE_N		1	1500
STORAGE_S	Storage	0	1800
STORAGE_S		1	1800

[TIMESERIES]

;;Name	Date	Time	Value
;;-----	-----	-----	-----
25mm		0:00	1.423
25mm		0:05	1.423
25mm		0:10	1.574
25mm		0:15	1.574
25mm		0:20	1.769
25mm		0:25	1.769
25mm		0:30	2.028
25mm		0:35	2.028
25mm		0:40	2.389
25mm		0:45	2.389
25mm		0:50	2.933
25mm		0:55	2.933
25mm		1:00	3.859
25mm		1:05	3.859
25mm		1:10	5.821
25mm		1:15	5.821
25mm		1:20	13.337
25mm		1:25	13.337
25mm		1:30	61.503
25mm		1:35	61.503
25mm		1:40	15.65
25mm		1:45	15.65
25mm		1:50	7.793
25mm		1:55	7.793
25mm		2:00	5.294
25mm		2:05	5.294
25mm		2:10	4.057

25mm	2:15	4.057
25mm	2:20	3.314
25mm	2:25	3.314
25mm	2:30	2.817
25mm	2:35	2.817
25mm	2:40	2.459
25mm	2:45	2.459
25mm	2:50	2.189
25mm	2:55	2.189
25mm	3:00	1.977
25mm	3:05	1.977
25mm	3:10	1.805
25mm	3:15	1.805
25mm	3:20	1.664
25mm	3:25	1.664
25mm	3:30	1.545
25mm	3:35	1.545
25mm	3:40	1.444
25mm	3:45	1.444
25mm	3:50	1.356
25mm	3:55	1.356
25mm	4:00	0

3hr-100yr	0:00	0
3hr-100yr	0:10	6.05
3hr-100yr	0:20	7.54
3hr-100yr	0:30	10.17
3hr-100yr	0:40	15.98
3hr-100yr	0:50	40.76
3hr-100yr	1:00	178.56
3hr-100yr	1:10	54.04
3hr-100yr	1:20	27.31
3hr-100yr	1:30	18.23
3hr-100yr	1:40	13.73
3hr-100yr	1:50	11.05
3hr-100yr	2:00	9.28
3hr-100yr	2:10	8.02
3hr-100yr	2:20	7.08
3hr-100yr	2:30	6.34
3hr-100yr	2:40	5.76
3hr-100yr	2:50	5.28
3hr-100yr	3:00	4.88

;Chicago design storm, a = 732.951, b = 6.199, c = 0.81, Duration = 180 minutes, r = 0.35, rain units = mm/hr.

3hr-2yr	0:00	2.393
3hr-2yr	0:05	2.588
3hr-2yr	0:10	2.823
3hr-2yr	0:15	3.109
3hr-2yr	0:20	3.466
3hr-2yr	0:25	3.927
3hr-2yr	0:30	4.543
3hr-2yr	0:35	5.41
3hr-2yr	0:40	6.721
3hr-2yr	0:45	8.935
3hr-2yr	0:50	13.427
3hr-2yr	0:55	26.893
3hr-2yr	1:00	103.571
3hr-2yr	1:05	49.651
3hr-2yr	1:10	27.587
3hr-2yr	1:15	17.967
3hr-2yr	1:20	13.238
3hr-2yr	1:25	10.466
3hr-2yr	1:30	8.658
3hr-2yr	1:35	7.391
3hr-2yr	1:40	6.455
3hr-2yr	1:45	5.737
3hr-2yr	1:50	5.169
3hr-2yr	1:55	4.707
3hr-2yr	2:00	4.326
3hr-2yr	2:05	4.005
3hr-2yr	2:10	3.731
3hr-2yr	2:15	3.494
3hr-2yr	2:20	3.288
3hr-2yr	2:25	3.107
3hr-2yr	2:30	2.945
3hr-2yr	2:35	2.801
3hr-2yr	2:40	2.672
3hr-2yr	2:45	2.555
3hr-2yr	2:50	2.449
3hr-2yr	2:55	2.351
3hr-2yr	3:00	0

;Chicago design storm, a = 998.071, b = 6.053, c = 0.814, Duration = 180 minutes, r = 0.35, rain units = mm/hr.

3hr-5yr	0:00	3.128
3hr-5yr	0:05	3.385
3hr-5yr	0:10	3.693
3hr-5yr	0:15	4.069
3hr-5yr	0:20	4.54
3hr-5yr	0:25	5.147
3hr-5yr	0:30	5.959
3hr-5yr	0:35	7.105
3hr-5yr	0:40	8.84
3hr-5yr	0:45	11.775
3hr-5yr	0:50	17.755
3hr-5yr	0:55	35.83

3hr-5yr	1:00	141.179
3hr-5yr	1:05	66.682
3hr-5yr	1:10	36.749
3hr-5yr	1:15	23.822
3hr-5yr	1:20	17.501
3hr-5yr	1:25	13.81
3hr-5yr	1:30	11.408
3hr-5yr	1:35	9.727
3hr-5yr	1:40	8.488
3hr-5yr	1:45	7.538
3hr-5yr	1:50	6.786
3hr-5yr	1:55	6.177
3hr-5yr	2:00	5.673
3hr-5yr	2:05	5.25
3hr-5yr	2:10	4.889
3hr-5yr	2:15	4.577
3hr-5yr	2:20	4.306
3hr-5yr	2:25	4.066
3hr-5yr	2:30	3.854
3hr-5yr	2:35	3.665
3hr-5yr	2:40	3.495
3hr-5yr	2:45	3.341
3hr-5yr	2:50	3.201
3hr-5yr	2:55	3.073
3hr-5yr	3:00	0

6hr-100yr	0:00	0
6hr-100yr	0:10	2.91
6hr-100yr	0:20	3.17
6hr-100yr	0:30	3.48
6hr-100yr	0:40	3.88
6hr-100yr	0:50	4.39
6hr-100yr	1:00	5.08
6hr-100yr	1:10	6.05
6hr-100yr	1:20	7.55
6hr-100yr	1:30	10.17
6hr-100yr	1:40	15.98
6hr-100yr	1:50	40.67
6hr-100yr	2:00	178.56
6hr-100yr	2:10	54.04
6hr-100yr	2:20	27.31
6hr-100yr	2:30	18.23
6hr-100yr	2:40	13.73
6hr-100yr	2:50	11.05
6hr-100yr	3:00	9.28
6hr-100yr	3:10	8.02
6hr-100yr	3:20	7.08
6hr-100yr	3:30	6.34
6hr-100yr	3:40	5.76
6hr-100yr	3:50	5.28
6hr-100yr	4:00	4.88
6hr-100yr	4:10	4.54
6hr-100yr	4:20	4.25
6hr-100yr	4:30	3.99
6hr-100yr	4:40	3.77
6hr-100yr	4:50	3.57
6hr-100yr	5:00	3.4
6hr-100yr	5:10	3.24
6hr-100yr	5:20	3.1
6hr-100yr	5:30	2.97
6hr-100yr	5:40	2.85
6hr-100yr	5:50	2.74
6hr-100yr	6:00	2.64

;Chicago design storm, a = 732.951, b = 6.199, c = 0.81, Duration = 360 minutes, r = 0.35, rain units = mm/hr.

6hr-2yr	0:00	1.274
6hr-2yr	0:05	1.32
6hr-2yr	0:10	1.37
6hr-2yr	0:15	1.425
6hr-2yr	0:20	1.485
6hr-2yr	0:25	1.55
6hr-2yr	0:30	1.623
6hr-2yr	0:35	1.703
6hr-2yr	0:40	1.793
6hr-2yr	0:45	1.894
6hr-2yr	0:50	2.008
6hr-2yr	0:55	2.139
6hr-2yr	1:00	2.29
6hr-2yr	1:05	2.467
6hr-2yr	1:10	2.677
6hr-2yr	1:15	2.93
6hr-2yr	1:20	3.242
6hr-2yr	1:25	3.636
6hr-2yr	1:30	4.15
6hr-2yr	1:35	4.851
6hr-2yr	1:40	5.864
6hr-2yr	1:45	7.456
6hr-2yr	1:50	10.31
6hr-2yr	1:55	16.817
6hr-2yr	2:00	41.518
6hr-2yr	2:05	103.571
6hr-2yr	2:10	39.807
6hr-2yr	2:15	22.769
6hr-2yr	2:20	15.728
6hr-2yr	2:25	11.97

6hr-2yr	2:30	9.658
6hr-2yr	2:35	8.101
6hr-2yr	2:40	6.985
6hr-2yr	2:45	6.147
6hr-2yr	2:50	5.495
6hr-2yr	2:55	4.973
6hr-2yr	3:00	4.546
6hr-2yr	3:05	4.191
6hr-2yr	3:10	3.89
6hr-2yr	3:15	3.632
6hr-2yr	3:20	3.409
6hr-2yr	3:25	3.213
6hr-2yr	3:30	3.04
6hr-2yr	3:35	2.886
6hr-2yr	3:40	2.748
6hr-2yr	3:45	2.624
6hr-2yr	3:50	2.511
6hr-2yr	3:55	2.409
6hr-2yr	4:00	2.315
6hr-2yr	4:05	2.229
6hr-2yr	4:10	2.149
6hr-2yr	4:15	2.076
6hr-2yr	4:20	2.008
6hr-2yr	4:25	1.944
6hr-2yr	4:30	1.885
6hr-2yr	4:35	1.83
6hr-2yr	4:40	1.778
6hr-2yr	4:45	1.729
6hr-2yr	4:50	1.684
6hr-2yr	4:55	1.64
6hr-2yr	5:00	1.599
6hr-2yr	5:05	1.561
6hr-2yr	5:10	1.524
6hr-2yr	5:15	1.489
6hr-2yr	5:20	1.456
6hr-2yr	5:25	1.425
6hr-2yr	5:30	1.395
6hr-2yr	5:35	1.366
6hr-2yr	5:40	1.339
6hr-2yr	5:45	1.312
6hr-2yr	5:50	1.287
6hr-2yr	5:55	1.263
6hr-2yr	6:00	0

;Chicago design storm, a = 998.071, b = 6.053, c = 0.814, Duration = 360 minutes, r = 0.35, rain units = mm/hr.

6hr-5yr	0:00	1.659
6hr-5yr	0:05	1.72
6hr-5yr	0:10	1.786
6hr-5yr	0:15	1.857
6hr-5yr	0:20	1.936
6hr-5yr	0:25	2.022
6hr-5yr	0:30	2.117
6hr-5yr	0:35	2.222
6hr-5yr	0:40	2.34
6hr-5yr	0:45	2.472
6hr-5yr	0:50	2.623
6hr-5yr	0:55	2.794
6hr-5yr	1:00	2.993
6hr-5yr	1:05	3.225
6hr-5yr	1:10	3.501
6hr-5yr	1:15	3.834
6hr-5yr	1:20	4.244
6hr-5yr	1:25	4.763
6hr-5yr	1:30	5.442
6hr-5yr	1:35	6.367
6hr-5yr	1:40	7.706
6hr-5yr	1:45	9.813
6hr-5yr	1:50	13.603
6hr-5yr	1:55	22.285
6hr-5yr	2:00	55.656
6hr-5yr	2:05	141.179
6hr-5yr	2:10	53.291
6hr-5yr	2:15	30.263
6hr-5yr	2:20	20.826
6hr-5yr	2:25	15.811
6hr-5yr	2:30	12.736
6hr-5yr	2:35	10.669
6hr-5yr	2:40	9.189
6hr-5yr	2:45	8.079
6hr-5yr	2:50	7.217
6hr-5yr	2:55	6.528
6hr-5yr	3:00	5.965
6hr-5yr	3:05	5.496
6hr-5yr	3:10	5.099
6hr-5yr	3:15	4.759
6hr-5yr	3:20	4.464
6hr-5yr	3:25	4.206
6hr-5yr	3:30	3.979
6hr-5yr	3:35	3.776
6hr-5yr	3:40	3.595
6hr-5yr	3:45	3.431
6hr-5yr	3:50	3.283
6hr-5yr	3:55	3.148
6hr-5yr	4:00	3.025
6hr-5yr	4:05	2.912

6hr-5yr	4:10	2.808
6hr-5yr	4:15	2.711
6hr-5yr	4:20	2.622
6hr-5yr	4:25	2.539
6hr-5yr	4:30	2.461
6hr-5yr	4:35	2.389
6hr-5yr	4:40	2.32
6hr-5yr	4:45	2.257
6hr-5yr	4:50	2.196
6hr-5yr	4:55	2.14
6hr-5yr	5:00	2.086
6hr-5yr	5:05	2.035
6hr-5yr	5:10	1.987
6hr-5yr	5:15	1.942
6hr-5yr	5:20	1.898
6hr-5yr	5:25	1.857
6hr-5yr	5:30	1.818
6hr-5yr	5:35	1.78
6hr-5yr	5:40	1.744
6hr-5yr	5:45	1.71
6hr-5yr	5:50	1.677
6hr-5yr	5:55	1.646
6hr-5yr	6:00	0

[REPORT]

```
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES      ALL
LINKS      ALL
```

[TAGS]

[MAP]

```
DIMENSIONS      922195.2104      5041730.342      922454.7796      5042003.582
UNITS            Meters
```

[COORDINATES]

```
;;Node          X-Coord          Y-Coord
;;-----
HUMBER_PL       922268.498          5041894.2
SHEFFIELD_RD    922422.12           5041745.436
```

[VERTICES]

```
;;Link          X-Coord          Y-Coord
;;-----
```

[POLYGONS]

```
;;Subcatchment X-Coord          Y-Coord
;;-----
EX_N            922405.17           5041835.648
EX_N            922442.981           5041761.954
EX_N            922393.45           5041742.762
EX_N            922362.523           5041813.337
EX_N            922405.17           5041835.648
EX_S            922249.656           5041991.162
EX_S            922287.467           5041917.468
EX_S            922237.936           5041898.276
EX_S            922207.009           5041968.851
EX_S            922249.656           5041991.162
```

[SYMBOLS]

```
;;Gage          X-Coord          Y-Coord
;;-----
```

25 mm

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

Element Count

Number of rain gages 7
Number of subcatchments ... 2
Number of nodes 2
Number of links 0
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
EX_N	4.47	447.00	40.00	1.0000	25mm	SHEFFIELD_RD
EX_S	1.37	137.00	40.00	1.0000	25mm	HUMBER_PL

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HUMBER_PL	OUTFALL	62.48	0.00	0.0	
SHEFFIELD_RD	OUTFALL	64.00	0.00	0.0	

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing NO
 Water Quality NO
Infiltration Method HORTON
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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

	Volume hectare-m	Depth mm
Runoff Quantity Continuity	-----	-----
Total Precipitation	0.146	25.000
Evaporation Loss	0.000	0.000
Infiltration Loss	0.087	14.982
Surface Runoff	0.055	9.483
Final Storage	0.004	0.628
Continuity Error (%)	-0.374	

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity	-----	-----
Dry Weather Inflow	0.000	0.000

Wet Weather Inflow	0.055	0.554
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.055	0.554
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

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 CMS	Runoff Coeff
EX_N	25.00	0.00	0.00	14.98	9.47	0.02	9.48	0.42	0.30	0.379
EX_S	25.00	0.00	0.00	14.98	9.47	0.02	9.48	0.13	0.09	0.379

Analysis begun on: Wed Oct 5 21:27:16 2022
Analysis ended on: Wed Oct 5 21:27:16 2022

Total elapsed time: < 1 sec

2-yr, 3-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

```

*****
Element Count
*****
Number of rain gages ..... 7
Number of subcatchments ... 2
Number of nodes ..... 2
Number of links ..... 0
Number of pollutants ..... 0
Number of land uses ..... 0
    
```

 Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

 Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
EX_N	4.47	447.00	40.00	1.0000	3hr-2yr	SHEFFIELD_RD
EX_S	1.37	137.00	40.00	1.0000	3hr-2yr	HUMBER_PL

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HUMBER_PL	OUTFALL	62.48	0.00	0.0	
SHEFFIELD_RD	OUTFALL	64.00	0.00	0.0	

 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 ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Surcharge Method ..... EXTRAN
Starting Date ..... 12/11/2020 00:00:00
Ending Date ..... 12/21/2020 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
    
```

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		
Total Precipitation	0.186	31.880
Evaporation Loss	0.000	0.000
Infiltration Loss	0.091	15.601
Surface Runoff	0.092	15.782
Final Storage	0.004	0.628
Continuity Error (%)	-0.410	

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000

Wet Weather Inflow	0.092	0.922
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.092	0.922
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

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 CMS	Runoff Coeff
EX_N	31.88	0.00	0.00	15.60	12.25	3.53	15.78	0.71	0.48	0.495
EX_S	31.88	0.00	0.00	15.60	12.25	3.53	15.78	0.22	0.15	0.495

Analysis begun on: Wed Oct 5 21:27:34 2022
Analysis ended on: Wed Oct 5 21:27:34 2022

Total elapsed time: < 1 sec

2-yr, 6-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

Element Count

Number of rain gages 7
Number of subcatchments ... 2
Number of nodes 2
Number of links 0
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
EX_N	4.47	447.00	40.00	1.0000	6hr-2yr	SHEFFIELD_RD
EX_S	1.37	137.00	40.00	1.0000	6hr-2yr	HUMBER_PL

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HUMBER_PL	OUTFALL	62.48	0.00	0.0	
SHEFFIELD_RD	OUTFALL	64.00	0.00	0.0	

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 CMS
Process Models:
Rainfall/Runoff YES
RDII NO
Snowmelt NO
Groundwater NO
Flow Routing NO
Water Quality NO
Infiltration Method HORTON
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

Total Precipitation	0.215	36.865
Evaporation Loss	0.000	0.000
Infiltration Loss	0.094	16.058
Surface Runoff	0.119	20.301
Final Storage	0.004	0.628
Continuity Error (%)	-0.330	

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

```

*****
Dry Weather Inflow ..... 0.000 0.000
Wet Weather Inflow ..... 0.119 1.186
Groundwater Inflow ..... 0.000 0.000
RDII Inflow ..... 0.000 0.000
External Inflow ..... 0.000 0.000
External Outflow ..... 0.119 1.186
Flooding Loss ..... 0.000 0.000
Evaporation Loss ..... 0.000 0.000
Exfiltration Loss ..... 0.000 0.000
Initial Stored Volume .... 0.000 0.000
Final Stored Volume ..... 0.000 0.000
Continuity Error (%) ..... 0.000

```

```

*****
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 CMS	Runoff Coeff
EX_N	36.86	0.00	0.00	16.06	14.22	6.08	20.30	0.91	0.49	0.551
EX_S	36.86	0.00	0.00	16.06	14.22	6.08	20.30	0.28	0.15	0.551

```

Analysis begun on: Wed Oct 5 21:27:45 2022
Analysis ended on: Wed Oct 5 21:27:45 2022
Total elapsed time: < 1 sec

```

5-yr, 3-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

Element Count

Number of rain gages 7
Number of subcatchments ... 2
Number of nodes 2
Number of links 0
Number of pollutants 0
Number of land uses 0

Rainage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
EX_N	4.47	447.00	40.00	1.0000	3hr-5yr	SHEFFIELD_RD
EX_S	1.37	137.00	40.00	1.0000	3hr-5yr	HUMBER_PL

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HUMBER_PL	OUTFALL	62.48	0.00	0.0	
SHEFFIELD_RD	OUTFALL	64.00	0.00	0.0	

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing NO
 Water Quality NO
Infiltration Method HORTON
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		
Total Precipitation	0.248	42.540
Evaporation Loss	0.000	0.000
Infiltration Loss	0.092	15.728
Surface Runoff	0.154	26.404
Final Storage	0.004	0.628
Continuity Error (%)	-0.516	

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000

Wet Weather Inflow	0.154	1.542
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.154	1.542
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

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 CMS	Runoff Coeff
EX_N	42.54	0.00	0.00	15.73	16.54	9.86	26.40	1.18	0.69	0.621
EX_S	42.54	0.00	0.00	15.73	16.54	9.86	26.40	0.36	0.21	0.621

Analysis begun on: Wed Oct 5 21:28:01 2022
Analysis ended on: Wed Oct 5 21:28:01 2022

Total elapsed time: < 1 sec

5-yr, 6-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

Element Count

Number of rain gages 7
Number of subcatchments ... 2
Number of nodes 2
Number of links 0
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
EX_N	4.47	447.00	40.00	1.0000	6hr-5yr	SHEFFIELD_RD
EX_S	1.37	137.00	40.00	1.0000	6hr-5yr	HUMBER_PL

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HUMBER_PL	OUTFALL	62.48	0.00	0.0	
SHEFFIELD_RD	OUTFALL	64.00	0.00	0.0	

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing NO
 Water Quality NO
Infiltration Method HORTON
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		
Total Precipitation	0.286	49.044
Evaporation Loss	0.000	0.000
Infiltration Loss	0.094	16.153
Surface Runoff	0.190	32.489
Final Storage	0.004	0.628
Continuity Error (%)	-0.461	

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000

Wet Weather Inflow	0.190	1.897
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.190	1.897
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

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 CMS	Runoff Coeff
EX_N	49.04	0.00	0.00	16.15	19.12	13.37	32.49	1.45	0.73	0.662
EX_S	49.04	0.00	0.00	16.15	19.12	13.37	32.49	0.45	0.22	0.662

Analysis begun on: Wed Oct 5 21:28:15 2022
Analysis ended on: Wed Oct 5 21:28:16 2022

Total elapsed time: 00:00:01

100-yr, 3-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

Element Count

Number of rain gages 7
Number of subcatchments ... 2
Number of nodes 2
Number of links 0
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
EX_N	4.47	447.00	40.00	1.0000	3hr-100yr	SHEFFIELD_RD
EX_S	1.37	137.00	40.00	1.0000	3hr-100yr	HUMBER_PL

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HUMBER_PL	OUTFALL	62.48	0.00	0.0	
SHEFFIELD_RD	OUTFALL	64.00	0.00	0.0	

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing NO
 Water Quality NO
Infiltration Method HORTON
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		
Total Precipitation	0.419	71.677
Evaporation Loss	0.000	0.000
Infiltration Loss	0.093	15.893
Surface Runoff	0.325	55.588
Final Storage	0.004	0.628
Continuity Error (%)	-0.603	

	Volume hectare-m	Volume 10^6 ltr
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000

Wet Weather Inflow	0.325	3.246
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.325	3.246
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

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 CMS	Runoff Coeff
EX_N	71.68	0.00	0.00	15.89	28.25	27.33	55.59	2.48	1.22	0.776
EX_S	71.68	0.00	0.00	15.89	28.25	27.33	55.59	0.76	0.38	0.776

Analysis begun on: Wed Oct 5 21:28:29 2022
Analysis ended on: Wed Oct 5 21:28:29 2022

Total elapsed time: < 1 sec


```

*****
Dry Weather Inflow ..... 0.000 0.000
Wet Weather Inflow ..... 0.384 3.841
Groundwater Inflow ..... 0.000 0.000
RDII Inflow ..... 0.000 0.000
External Inflow ..... 0.000 0.000
External Outflow ..... 0.384 3.841
Flooding Loss ..... 0.000 0.000
Evaporation Loss ..... 0.000 0.000
Exfiltration Loss ..... 0.000 0.000
Initial Stored Volume .... 0.000 0.000
Final Stored Volume ..... 0.000 0.000
Continuity Error (%) ..... 0.000

```

```

*****
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 CMS	Runoff Coeff
EX_N	82.33	0.00	0.00	16.37	32.50	33.26	65.76	2.94	1.28	0.799
EX_S	82.32	0.00	0.00	16.37	32.50	33.26	65.76	0.90	0.39	0.799

```

Analysis begun on: Wed Oct 5 21:28:42 2022
Analysis ended on: Wed Oct 5 21:28:42 2022
Total elapsed time: < 1 sec

```

Appendix **J**

PCSWMM Input/Output Documentation – Proposed Conditions

Input

[TITLE]

;;Project Title/Notes

[OPTIONS]

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

START_DATE 12/11/2020
START_TIME 00:00:00
REPORT_START_DATE 12/11/2020
REPORT_START_TIME 00:00:00
END_DATE 12/21/2020
END_TIME 00:00:00
SWEEP_START 01/01
SWEEP_END 12/31
DRY_DAYS 0
REPORT_STEP 00:01:00
WET_STEP 00:01:00
DRY_STEP 00:01:00
ROUTING_STEP 1
RULE_STEP 00:00:00

INERTIAL_DAMPING PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP 0.75
LENGHTENING_STEP 0
MIN_SURFAREA 0
MAX_TRIALS 8
HEAD_TOLERANCE 0.0015
SYS_FLOW_TOL 5
LAT_FLOW_TOL 5
MINIMUM_STEP 0.5
THREADS 6

[EVAPORATION]

;;Data Source Parameters
;;-----
CONSTANT 0.0
DRY_ONLY NO

[RAINGAGES]

;;Name	Format	Interval	SCF	Source
25mm	INTENSITY	0:05	1.0	TIMESERIES 25mm
3hr-100yr	INTENSITY	0:10	1.0	TIMESERIES 3hr-100yr
3hr-2yr	INTENSITY	0:05	1.0	TIMESERIES 3hr-2yr
3hr-5yr	INTENSITY	0:05	1.0	TIMESERIES 3hr-5yr
6hr-100yr	INTENSITY	0:10	1.0	TIMESERIES 6hr-100yr
6hr-2yr	INTENSITY	0:05	1.0	TIMESERIES 6hr-2yr
6hr-5yr	INTENSITY	0:05	1.0	TIMESERIES 6hr-5yr

[SUBCATCHMENTS]

;;Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope	CurbLen	SnowPack
Area_1	25mm	CBMH_14	0.25	90	83.333	1	0	
Area_10	25mm	CB_23	0.08	90	26.667	1	0	
Area_101	25mm	MH_26	1.37	95	137	0.5	0	
Area_102	25mm	CBMH_11	1.13	95	113	0.5	0	
Area_11	25mm	CB_10	0.13	90	43.333	1	0	
Area_12	25mm	CBMH_9	0.16	90	53.333	1	0	
Area_13	25mm	CBMH_8	0.16	90	53.333	1	0	
Area_14	25mm	CBMH_7	0.17	90	56.667	1	0	
Area_15	25mm	CBMH_6	0.09	90	30	1	0	
Area_16	25mm	CB_5	0.15	90	50	1	0	
Area_17	25mm	CBMH_4	0.17	90	56.667	1	0	
Area_18	25mm	CBMH_3	0.17	90	56.667	1	0	
Area_19	25mm	CBMH_2	0.17	90	56.667	1	0	
Area_2	25mm	CBMH_15	0.16	90	53.333	1	0	
Area_20	25mm	J13	0.28	90	93.333	1	0	
Area_2001	25mm	OF2	0.07	25	7	0.5	0	
Area_2002	25mm	OF2	0.21	90	21	0.5	0	
Area_2003	25mm	OF1	0.16	90	16	1	0	
Area_2004	25mm	Humber_Pl	0.02	5	13.333	0.5	0	
Area_2005	25mm	Humber_Pl	0.04	5	26.667	0.5	0	
Area_21	25mm	CBMH_11	0.21	90	70	1	0	
Area_22	25mm	CBMH_12	0.32	90	106.667	1	0	
Area_23	25mm	CB_29	0.16	90	53.333	1	0	
Area_3	25mm	DCB_16	0.36	90	120	1	0	
Area_4	25mm	CBMH_18	0.28	90	93.333	1	0	
Area_5	25mm	CB_27	0.15	90	50	1	0	
Area_6	25mm	CB_28	0.15	90	50	1	0	
Area_7	25mm	CBMH_19	0.04	90	13.333	1	0	
Area_8	25mm	CBMH_21	0.12	90	40	1	0	
Area_9	25mm	CBMH_22	0.12	90	40	1	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
Area_1	0.013	0.2	1.57	4.67	100	OUTLET	
Area_10	0.013	0.2	1.57	4.67	100	OUTLET	
Area_101	0.013	0.2	1.57	4.67	100	OUTLET	
Area_102	0.013	0.2	1.57	4.67	100	OUTLET	
Area_11	0.013	0.2	1.57	4.67	100	OUTLET	
Area_12	0.013	0.2	1.57	4.67	100	OUTLET	
Area_13	0.013	0.2	1.57	4.67	100	OUTLET	
Area_14	0.013	0.2	1.57	4.67	100	OUTLET	
Area_15	0.013	0.2	1.57	4.67	100	OUTLET	
Area_16	0.013	0.2	1.57	4.67	100	OUTLET	
Area_17	0.013	0.2	1.57	4.67	100	OUTLET	
Area_18	0.013	0.2	1.57	4.67	100	OUTLET	
Area_19	0.013	0.2	1.57	4.67	100	OUTLET	
Area_2	0.013	0.2	1.57	4.67	100	OUTLET	
Area_20	0.013	0.2	1.57	4.67	100	OUTLET	
Area_2001	0.013	0.2	1.57	4.67	100	OUTLET	
Area_2002	0.013	0.2	1.57	4.67	100	OUTLET	
Area_2003	0.013	0.2	2	5	100	OUTLET	
Area_2004	0.013	0.2	1.57	4.67	100	OUTLET	
Area_2005	0.013	0.2	1.57	4.67	100	OUTLET	
Area_21	0.013	0.2	1.57	4.67	100	OUTLET	
Area_22	0.013	0.2	1.57	4.67	100	OUTLET	
Area_23	0.013	0.2	1.57	4.67	100	OUTLET	
Area_3	0.013	0.2	1.57	4.67	100	OUTLET	
Area_4	0.013	0.2	1.57	4.67	100	OUTLET	
Area_5	0.013	0.2	1.57	4.67	100	OUTLET	
Area_6	0.013	0.2	1.57	4.67	100	OUTLET	
Area_7	0.013	0.2	1.57	4.67	100	OUTLET	
Area_8	0.013	0.2	1.57	4.67	100	OUTLET	
Area_9	0.013	0.2	1.57	4.67	100	OUTLET	

[INFILTRATION]

;;Subcatchment	Param1	Param2	Param3	Param4	Param5
Area_1	75	0.5	4	7	0
Area_10	75	0.5	4	7	0
Area_101	75	0.5	4	7	0
Area_102	75	0.5	4	7	0
Area_11	75	0.5	4	7	0
Area_12	75	0.5	4	7	0
Area_13	75	0.5	4	7	0
Area_14	75	0.5	4	7	0
Area_15	75	0.5	4	7	0
Area_16	75	0.5	4	7	0
Area_17	75	0.5	4	7	0
Area_18	75	0.5	4	7	0
Area_19	75	0.5	4	7	0
Area_2	75	0.5	4	7	0
Area_20	75	0.5	4	7	0
Area_2001	75	0.5	4	7	0
Area_2002	75	0.5	4	7	0
Area_2003	75	0.5	4	7	0
Area_2004	75	0.5	4	7	0
Area_2005	75	0.5	4	7	0
Area_21	75	0.5	4	7	0
Area_22	75	0.5	4	7	0
Area_23	75	0.5	4	7	0
Area_3	75	0.5	4	7	0
Area_4	75	0.5	4	7	0
Area_5	75	0.5	4	7	0
Area_6	75	0.5	4	7	0
Area_7	75	0.5	4	7	0
Area_8	75	0.5	4	7	0
Area_9	75	0.5	4	7	0

[JUNCTIONS]

;;Name	Elevation	MaxDepth	InitDepth	SurDepth	Aponded
CB_10	65.329	1.411	0	0	10
CB_23	66.197	0.933	0	0	10
CB_27	65.485	1.345	0	0	10
CB_28	65.386	1.524	0	0	10
CB_29	64.113	2.427	0	0	0
CB_5	65.114	1.626	0	0	10
CBMH_11	63.583	2.157	0	0	10
CBMH_12	64.058	1.682	0	0	10
CBMH_14	64.106	2.214	0	0	10
CBMH_15	64.466	1.854	0	0	10
CBMH_18	64.05	2.54	0	0	0
CBMH_19	64.877	2.383	0	0	10
CBMH_2	64.057	2.943	0	0	10
CBMH_21	65.172	1.868	0	0	10
CBMH_22	65.532	1.508	0	0	10
CBMH_3	64.417	2.583	0	0	10
CBMH_4	64.777	2.223	0	0	10
CBMH_6	63.912	2.728	0	0	10
CBMH_7	64.272	2.728	0	0	10
CBMH_8	64.632	2.368	0	0	10
CBMH_9	64.992	2.008	0	0	10
DCB_16	64.798	1.522	0	0	10
J1	63.749	3.271	0	0	0
J13	63.537	3.103	0	0	10
J2	63.236	3.334	0	0	0

MH_20	64.989	2.301	0	0	0
MH_24	64.134	2.496	0	0	10
MH_25	64.415	2.625	0	0	0
MH_26	64.557	2.703	0	0	0
MH_27	63.889	2.021	0	0	0
MH_30	63.732	3.078	0	0	0
MH_44	63.512	3.508	0	0	0
MH_45	63.114	3.456	0	0	0
OGS_1	63.039	3.341	0	0	0
OGS_2	63.469	3.011	0	0	0

[OUTFALLS]

;;Name	Elevation	Type	Stage Data	Gated	Route To
Humber_P1	62.477	FREE		NO	
OF1	63.41	FREE		NO	
OF2	0	FREE		NO	

[STORAGE]

;;Name	Elev.	MaxDepth	InitDepth	Shape	Curve Name/Params	N/A	Fevap	Psi	Ksat	IMD
SU_N	63.749	3.041	0	TABULAR	STORAGE_N	0	0			
SU_S	63.236	3.334	0	TABULAR	STORAGE_S	0	0			

[CONDUITS]

;;Name	From Node	To Node	Length	Roughness	InOffset	OutOffset	InitFlow	MaxFlow
C1	SU_N	MH_44	2.5	0.009	64.6	64.575	0	0
C10	CB_28	MH_26	30.4	0.011	65.386	65.082	0	0
C11	CB_27	MH_26	32.8	0.011	65.485	65.157	0	0
C12	MH_26	MH_25	16.5	0.011	64.557	64.475	0	0
C13	MH_24	CBMH_18	4.8	0.011	64.134	64.11	0	0
C14	CB_23	CBMH_22	51.5	0.011	66.197	65.682	0	0
C15	CBMH_22	CBMH_21	60	0.011	65.532	65.232	0	0
C16	CBMH_21	MH_20	24.5	0.011	65.172	65.049	0	0
C17	MH_20	CBMH_19	10.4	0.011	64.989	64.937	0	0
C18	CBMH_19	MH_24	46.5	0.011	64.877	64.644	0	0
C19	CB_10	CBMH_9	52.5	0.011	65.329	65.067	0	0
C2	MH_44	OGS_2	11.6	0.011	63.512	63.454	0	0
C20	CBMH_9	CBMH_8	60	0.011	64.992	64.692	0	0
C21	CBMH_8	CBMH_7	60	0.011	64.632	64.332	0	0
C22	CBMH_7	CBMH_6	60	0.011	64.272	63.972	0	0
C23	CBMH_6	J13	29.9	0.011	63.912	63.762	0	0
C24	J13	SU_S	4	0.011	63.537	63.517	0	0
C25	CB_5	CBMH_4	52.5	0.011	65.114	64.852	0	0
C26	CBMH_4	CBMH_3	60	0.011	64.777	64.477	0	0
C27	CBMH_3	CBMH_2	60	0.011	64.417	64.117	0	0
C28	CBMH_2	MH_30	53.4	0.011	64.057	63.792	0	0
C29	CBMH_12	CBMH_11	50	0.011	64.058	63.773	0	0
C3	J1	MH_44	2.5	0.011	63.749	63.737	0	0
C30	MH_30	J13	9.3	0.011	63.732	63.687	0	0
C31	MH_27	CBMH_11	8.2	0.011	63.889	63.848	0	0
C32	CBMH_11	SU_S	13.2	0.011	63.568	63.517	0	0
C33	OGS_1	Humber_P1	4	0.011	63.039	62.48	0	0
C34	OGS_2	OF1	8.7	0.011	63.454	63.41	0	0
C35	MH_25	MH_24	44.2	0.011	64.415	64.194	0	0
C36	CBMH_18	SU_N	3.9	0.011	64.05	64.03	0	0
C37	CB_29	MH_27	32.9	0.011	64.113	63.949	0	0
C4	SU_S	MH_45	9.4	0.009	64.1	64.006	0	0
C5	J2	MH_45	9.4	0.011	63.236	63.189	0	0
C6	MH_45	OGS_1	3.1	0.011	63.114	63.099	0	0
C7	DCB_16	CBMH_15	54.4	0.011	64.798	64.526	0	0
C8	CBMH_15	CBMH_14	60	0.011	64.466	64.166	0	0
C9	CBMH_14	SU_N	15.2	0.011	64.106	64.03	0	0

[ORIFICES]

;;Name	From Node	To Node	Type	Offset	Qcoeff	Gated	CloseTime
OR1	SU_S	J2	SIDE	63.236	0.65	NO	0
OR2	SU_N	J1	SIDE	63.749	0.65	NO	0

[XSECTIONS]

;;Link	Shape	Geom1	Geom2	Geom3	Geom4	Barrels	Culvert
C1	CIRCULAR	0.2	0	0	0	1	
C10	CIRCULAR	0.45	0	0	0	1	
C11	CIRCULAR	0.45	0	0	0	1	
C12	CIRCULAR	0.525	0	0	0	1	
C13	CIRCULAR	0.6	0	0	0	1	
C14	CIRCULAR	0.375	0	0	0	1	
C15	CIRCULAR	0.45	0	0	0	1	
C16	CIRCULAR	0.45	0	0	0	1	
C17	CIRCULAR	0.45	0	0	0	1	
C18	CIRCULAR	0.45	0	0	0	1	
C19	CIRCULAR	0.45	0	0	0	1	
C2	CIRCULAR	0.375	0	0	0	1	
C20	CIRCULAR	0.525	0	0	0	1	
C21	CIRCULAR	0.525	0	0	0	1	
C22	CIRCULAR	0.525	0	0	0	1	
C23	CIRCULAR	0.525	0	0	0	1	
C24	CIRCULAR	0.75	0	0	0	1	
C25	CIRCULAR	0.525	0	0	0	1	
C26	CIRCULAR	0.6	0	0	0	1	
C27	CIRCULAR	0.6	0	0	0	1	

C28	CIRCULAR	0.6	0	0	0	1
C29	CIRCULAR	0.375	0	0	0	1
C3	CIRCULAR	0.3	0	0	0	1
C30	CIRCULAR	0.6	0	0	0	1
C31	CIRCULAR	0.375	0	0	0	1
C32	CIRCULAR	0.525	0	0	0	1
C33	CIRCULAR	0.375	0	0	0	1
C34	CIRCULAR	0.375	0	0	0	1
C35	CIRCULAR	0.6	0	0	0	1
C36	CIRCULAR	0.75	0	0	0	1
C37	CIRCULAR	0.375	0	0	0	1
C4	CIRCULAR	0.2	0	0	0	1
C5	CIRCULAR	0.3	0	0	0	1
C6	CIRCULAR	0.375	0	0	0	1
C7	CIRCULAR	0.525	0	0	0	1
C8	CIRCULAR	0.525	0	0	0	1
C9	CIRCULAR	0.6	0	0	0	1
OR1	CIRCULAR	0.075	0	0	0	
OR2	CIRCULAR	0.075	0	0	0	

[LOSSES]

::Link	Kentry	Kexit	Kavg	Flap Gate	Seepage
;;-----					

[CURVES]

::Name	Type	X-Value	Y-Value
;;-----			
ADS	Storage	0.025	530
ADS		0.051	530
ADS		0.076	530
ADS		0.102	530
ADS		0.127	530
ADS		0.152	530
ADS		0.178	530
ADS		0.203	530
ADS		0.229	530
ADS		0.254	590
ADS		0.279	638
ADS		0.305	678
ADS		0.33	711
ADS		0.356	739
ADS		0.381	764
ADS		0.406	785
ADS		0.432	803
ADS		0.457	819
ADS		0.483	833
ADS		0.508	846
ADS		0.533	857
ADS		0.559	866
ADS		0.584	875
ADS		0.61	883
ADS		0.635	889
ADS		0.66	895
ADS		0.686	901
ADS		0.711	905
ADS		0.737	910
ADS		0.762	913
ADS		0.787	916
ADS		0.813	919
ADS		0.838	921
ADS		0.864	922
ADS		0.889	924
ADS		0.914	925
ADS		0.94	925
ADS		0.965	925
ADS		0.991	925
ADS		1.016	925
ADS		1.041	924
ADS		1.067	923
ADS		1.092	921
ADS		1.118	919
ADS		1.143	917
ADS		1.168	914
ADS		1.194	911
ADS		1.219	908
ADS		1.245	903
ADS		1.27	898
ADS		1.295	892
ADS		1.321	886
ADS		1.346	880
ADS		1.372	874
ADS		1.397	868
ADS		1.422	862
ADS		1.448	856
ADS		1.473	850
ADS		1.499	845
ADS		1.524	840
ADS		1.549	834
ADS		1.575	830
ADS		1.6	825
ADS		1.626	820
ADS		1.651	816
ADS		1.676	811
STORAGE_N	Storage	0	0

STORAGE_N	0.025	600
STORAGE_N	0.051	588.2352941
STORAGE_N	0.076	592.2368421
STORAGE_N	0.102	588.3333333
STORAGE_N	0.127	590.6299213
STORAGE_N	0.152	592.1710526
STORAGE_N	0.178	589.9438202
STORAGE_N	0.203	591.2315271
STORAGE_N	0.229	589.6069869
STORAGE_N	0.254	658.6614173
STORAGE_N	0.279	714.8028674
STORAGE_N	0.305	758.852459
STORAGE_N	0.33	798.0909091
STORAGE_N	0.356	829.1573034
STORAGE_N	0.381	857.9527559
STORAGE_N	0.406	882.9064039
STORAGE_N	0.432	902.5925926
STORAGE_N	0.457	921.7724289
STORAGE_N	0.483	936.7080745
STORAGE_N	0.508	951.7322835
STORAGE_N	0.533	965.0469043
STORAGE_N	0.559	975.1341682
STORAGE_N	0.584	985.7363014
STORAGE_N	0.61	993.5409836
STORAGE_N	0.635	1002
STORAGE_N	0.66	1009.515152
STORAGE_N	0.686	1014.693878
STORAGE_N	0.711	1020.632911
STORAGE_N	0.737	1024.464043
STORAGE_N	0.762	1029.068241
STORAGE_N	0.787	1033.062262
STORAGE_N	0.813	1035.215252
STORAGE_N	0.838	1038.126492
STORAGE_N	0.864	1039.340278
STORAGE_N	0.889	1041.293588
STORAGE_N	0.914	1042.789934
STORAGE_N	0.94	1042.734043
STORAGE_N	0.965	1043.388601
STORAGE_N	0.991	1042.552977
STORAGE_N	1.016	1042.391732
STORAGE_N	1.041	1041.815562
STORAGE_N	1.067	1039.859419
STORAGE_N	1.092	1038.479853
STORAGE_N	1.118	1035.742397
STORAGE_N	1.143	1033.525809
STORAGE_N	1.168	1030.830479
STORAGE_N	1.194	1026.767169
STORAGE_N	1.219	1023.027071
STORAGE_N	1.245	1017.751004
STORAGE_N	1.27	1012.173228
STORAGE_N	1.295	1005.745174
STORAGE_N	1.321	998.4027252
STORAGE_N	1.346	991.7087667
STORAGE_N	1.372	984.0524781
STORAGE_N	1.397	977.1868289
STORAGE_N	1.422	970.5555556
STORAGE_N	1.448	963.4875691
STORAGE_N	1.473	957.3183978
STORAGE_N	1.499	950.7204803
STORAGE_N	1.524	944.9737533
STORAGE_N	1.549	939.4060684
STORAGE_N	1.575	933.4222222
STORAGE_N	1.6	928.2125
STORAGE_N	1.626	922.595326
STORAGE_N	1.651	917.7165354
STORAGE_N	1.676	912.977327

STORAGE_S	Storage	0	0
STORAGE_S		0.025	736
STORAGE_S		0.051	736
STORAGE_S		0.076	736
STORAGE_S		0.102	736
STORAGE_S		0.127	736
STORAGE_S		0.152	736
STORAGE_S		0.178	736
STORAGE_S		0.203	736
STORAGE_S		0.229	736
STORAGE_S		0.254	821
STORAGE_S		0.279	889
STORAGE_S		0.305	946
STORAGE_S		0.33	994
STORAGE_S		0.356	1034
STORAGE_S		0.381	1069
STORAGE_S		0.406	1098
STORAGE_S		0.432	1124
STORAGE_S		0.457	1147
STORAGE_S		0.483	1167
STORAGE_S		0.508	1185
STORAGE_S		0.533	1201
STORAGE_S		0.559	1215
STORAGE_S		0.584	1227
STORAGE_S		0.61	1238
STORAGE_S		0.635	1247
STORAGE_S		0.66	1256
STORAGE_S		0.686	1264

STORAGE_S	0.711	1270	
STORAGE_S	0.737	1276	
STORAGE_S	0.762	1281	
STORAGE_S	0.787	1285	
STORAGE_S	0.813	1289	
STORAGE_S	0.838	1292	
STORAGE_S	0.864	1294	
STORAGE_S	0.889	1296	
STORAGE_S	0.914	1298	
STORAGE_S	0.94	1298	
STORAGE_S	0.965	1299	
STORAGE_S	0.991	1298	
STORAGE_S	1.016	1298	
STORAGE_S	1.041	1296	
STORAGE_S	1.067	1295	
STORAGE_S	1.092	1293	
STORAGE_S	1.118	1290	
STORAGE_S	1.143	1287	
STORAGE_S	1.168	1283	
STORAGE_S	1.194	1278	
STORAGE_S	1.219	1273	
STORAGE_S	1.245	1267	
STORAGE_S	1.27	1260	
STORAGE_S	1.295	1252	
STORAGE_S	1.321	1243	
STORAGE_S	1.346	1234	
STORAGE_S	1.372	1226	
STORAGE_S	1.397	1217	
STORAGE_S	1.422	1208	
STORAGE_S	1.448	1200	
STORAGE_S	1.473	1192	
STORAGE_S	1.499	1184	
STORAGE_S	1.524	1177	
STORAGE_S	1.549	1169	
STORAGE_S	1.575	1162	
STORAGE_S	1.6	1156	
STORAGE_S	1.626	1149	
STORAGE_S	1.651	1143	
STORAGE_S	1.676	1137	
TEST	Storage	0	1193.31
TEST		1.676	1193.31

[TIMESERIES]

;;Name	Date	Time	Value
25mm		0:00	1.423
25mm		0:05	1.423
25mm		0:10	1.574
25mm		0:15	1.574
25mm		0:20	1.769
25mm		0:25	1.769
25mm		0:30	2.028
25mm		0:35	2.028
25mm		0:40	2.389
25mm		0:45	2.389
25mm		0:50	2.933
25mm		0:55	2.933
25mm		1:00	3.859
25mm		1:05	3.859
25mm		1:10	5.821
25mm		1:15	5.821
25mm		1:20	13.337
25mm		1:25	13.337
25mm		1:30	61.503
25mm		1:35	61.503
25mm		1:40	15.65
25mm		1:45	15.65
25mm		1:50	7.793
25mm		1:55	7.793
25mm		2:00	5.294
25mm		2:05	5.294
25mm		2:10	4.057
25mm		2:15	4.057
25mm		2:20	3.314
25mm		2:25	3.314
25mm		2:30	2.817
25mm		2:35	2.817
25mm		2:40	2.459
25mm		2:45	2.459
25mm		2:50	2.189
25mm		2:55	2.189
25mm		3:00	1.977
25mm		3:05	1.977
25mm		3:10	1.805
25mm		3:15	1.805
25mm		3:20	1.664
25mm		3:25	1.664
25mm		3:30	1.545
25mm		3:35	1.545
25mm		3:40	1.444
25mm		3:45	1.444
25mm		3:50	1.356
25mm		3:55	1.356
25mm		4:00	0

3hr-100yr	0:00	0
3hr-100yr	0:10	6.05
3hr-100yr	0:20	7.54
3hr-100yr	0:30	10.17
3hr-100yr	0:40	15.98
3hr-100yr	0:50	40.76
3hr-100yr	1:00	178.56
3hr-100yr	1:10	54.04
3hr-100yr	1:20	27.31
3hr-100yr	1:30	18.23
3hr-100yr	1:40	13.73
3hr-100yr	1:50	11.05
3hr-100yr	2:00	9.28
3hr-100yr	2:10	8.02
3hr-100yr	2:20	7.08
3hr-100yr	2:30	6.34
3hr-100yr	2:40	5.76
3hr-100yr	2:50	5.28
3hr-100yr	3:00	4.88

;Chicago design storm, a = 732.951, b = 6.199, c = 0.81, Duration = 180 minutes, r = 0.35, rain units = mm/hr.

3hr-2yr	0:00	2.393
3hr-2yr	0:05	2.588
3hr-2yr	0:10	2.823
3hr-2yr	0:15	3.109
3hr-2yr	0:20	3.466
3hr-2yr	0:25	3.927
3hr-2yr	0:30	4.543
3hr-2yr	0:35	5.41
3hr-2yr	0:40	6.721
3hr-2yr	0:45	8.935
3hr-2yr	0:50	13.427
3hr-2yr	0:55	26.893
3hr-2yr	1:00	103.571
3hr-2yr	1:05	49.651
3hr-2yr	1:10	27.587
3hr-2yr	1:15	17.967
3hr-2yr	1:20	13.238
3hr-2yr	1:25	10.466
3hr-2yr	1:30	8.658
3hr-2yr	1:35	7.391
3hr-2yr	1:40	6.455
3hr-2yr	1:45	5.737
3hr-2yr	1:50	5.169
3hr-2yr	1:55	4.707
3hr-2yr	2:00	4.326
3hr-2yr	2:05	4.005
3hr-2yr	2:10	3.731
3hr-2yr	2:15	3.494
3hr-2yr	2:20	3.288
3hr-2yr	2:25	3.107
3hr-2yr	2:30	2.945
3hr-2yr	2:35	2.801
3hr-2yr	2:40	2.672
3hr-2yr	2:45	2.555
3hr-2yr	2:50	2.449
3hr-2yr	2:55	2.351
3hr-2yr	3:00	0

;Chicago design storm, a = 998.071, b = 6.053, c = 0.814, Duration = 180 minutes, r = 0.35, rain units = mm/hr.

3hr-5yr	0:00	3.128
3hr-5yr	0:05	3.385
3hr-5yr	0:10	3.693
3hr-5yr	0:15	4.069
3hr-5yr	0:20	4.54
3hr-5yr	0:25	5.147
3hr-5yr	0:30	5.959
3hr-5yr	0:35	7.105
3hr-5yr	0:40	8.84
3hr-5yr	0:45	11.775
3hr-5yr	0:50	17.755
3hr-5yr	0:55	35.83
3hr-5yr	1:00	141.179
3hr-5yr	1:05	66.682
3hr-5yr	1:10	36.749
3hr-5yr	1:15	23.822
3hr-5yr	1:20	17.501
3hr-5yr	1:25	13.81
3hr-5yr	1:30	11.408
3hr-5yr	1:35	9.727
3hr-5yr	1:40	8.488
3hr-5yr	1:45	7.538
3hr-5yr	1:50	6.786
3hr-5yr	1:55	6.177
3hr-5yr	2:00	5.673
3hr-5yr	2:05	5.25
3hr-5yr	2:10	4.889
3hr-5yr	2:15	4.577
3hr-5yr	2:20	4.306
3hr-5yr	2:25	4.066
3hr-5yr	2:30	3.854
3hr-5yr	2:35	3.665
3hr-5yr	2:40	3.495
3hr-5yr	2:45	3.341

3hr-5yr	2:50	3.201
3hr-5yr	2:55	3.073
3hr-5yr	3:00	0
6hr-100yr	0:00	0
6hr-100yr	0:10	2.91
6hr-100yr	0:20	3.17
6hr-100yr	0:30	3.48
6hr-100yr	0:40	3.88
6hr-100yr	0:50	4.39
6hr-100yr	1:00	5.08
6hr-100yr	1:10	6.05
6hr-100yr	1:20	7.55
6hr-100yr	1:30	10.17
6hr-100yr	1:40	15.98
6hr-100yr	1:50	40.67
6hr-100yr	2:00	178.56
6hr-100yr	2:10	54.04
6hr-100yr	2:20	27.31
6hr-100yr	2:30	18.23
6hr-100yr	2:40	13.73
6hr-100yr	2:50	11.05
6hr-100yr	3:00	9.28
6hr-100yr	3:10	8.02
6hr-100yr	3:20	7.08
6hr-100yr	3:30	6.34
6hr-100yr	3:40	5.76
6hr-100yr	3:50	5.28
6hr-100yr	4:00	4.88
6hr-100yr	4:10	4.54
6hr-100yr	4:20	4.25
6hr-100yr	4:30	3.99
6hr-100yr	4:40	3.77
6hr-100yr	4:50	3.57
6hr-100yr	5:00	3.4
6hr-100yr	5:10	3.24
6hr-100yr	5:20	3.1
6hr-100yr	5:30	2.97
6hr-100yr	5:40	2.85
6hr-100yr	5:50	2.74
6hr-100yr	6:00	2.64

;Chicago design storm, a = 732.951, b = 6.199, c = 0.81, Duration = 360 minutes, r = 0.35, rain units = mm/hr.

6hr-2yr	0:00	1.274
6hr-2yr	0:05	1.32
6hr-2yr	0:10	1.37
6hr-2yr	0:15	1.425
6hr-2yr	0:20	1.485
6hr-2yr	0:25	1.55
6hr-2yr	0:30	1.623
6hr-2yr	0:35	1.703
6hr-2yr	0:40	1.793
6hr-2yr	0:45	1.894
6hr-2yr	0:50	2.008
6hr-2yr	0:55	2.139
6hr-2yr	1:00	2.29
6hr-2yr	1:05	2.467
6hr-2yr	1:10	2.677
6hr-2yr	1:15	2.93
6hr-2yr	1:20	3.242
6hr-2yr	1:25	3.636
6hr-2yr	1:30	4.15
6hr-2yr	1:35	4.851
6hr-2yr	1:40	5.864
6hr-2yr	1:45	7.456
6hr-2yr	1:50	10.31
6hr-2yr	1:55	16.817
6hr-2yr	2:00	41.518
6hr-2yr	2:05	103.571
6hr-2yr	2:10	39.807
6hr-2yr	2:15	22.769
6hr-2yr	2:20	15.728
6hr-2yr	2:25	11.97
6hr-2yr	2:30	9.658
6hr-2yr	2:35	8.101
6hr-2yr	2:40	6.985
6hr-2yr	2:45	6.147
6hr-2yr	2:50	5.495
6hr-2yr	2:55	4.973
6hr-2yr	3:00	4.546
6hr-2yr	3:05	4.191
6hr-2yr	3:10	3.89
6hr-2yr	3:15	3.632
6hr-2yr	3:20	3.409
6hr-2yr	3:25	3.213
6hr-2yr	3:30	3.04
6hr-2yr	3:35	2.886
6hr-2yr	3:40	2.748
6hr-2yr	3:45	2.624
6hr-2yr	3:50	2.511
6hr-2yr	3:55	2.409
6hr-2yr	4:00	2.315
6hr-2yr	4:05	2.229
6hr-2yr	4:10	2.149
6hr-2yr	4:15	2.076

6hr-2yr	4:20	2.008
6hr-2yr	4:25	1.944
6hr-2yr	4:30	1.885
6hr-2yr	4:35	1.83
6hr-2yr	4:40	1.778
6hr-2yr	4:45	1.729
6hr-2yr	4:50	1.684
6hr-2yr	4:55	1.64
6hr-2yr	5:00	1.599
6hr-2yr	5:05	1.561
6hr-2yr	5:10	1.524
6hr-2yr	5:15	1.489
6hr-2yr	5:20	1.456
6hr-2yr	5:25	1.425
6hr-2yr	5:30	1.395
6hr-2yr	5:35	1.366
6hr-2yr	5:40	1.339
6hr-2yr	5:45	1.312
6hr-2yr	5:50	1.287
6hr-2yr	5:55	1.263
6hr-2yr	6:00	0

;Chicago design storm, a = 998.071, b = 6.053, c = 0.814, Duration = 360 minutes, r = 0.35, rain units = mm/hr.

6hr-5yr	0:00	1.659
6hr-5yr	0:05	1.72
6hr-5yr	0:10	1.786
6hr-5yr	0:15	1.857
6hr-5yr	0:20	1.936
6hr-5yr	0:25	2.022
6hr-5yr	0:30	2.117
6hr-5yr	0:35	2.222
6hr-5yr	0:40	2.34
6hr-5yr	0:45	2.472
6hr-5yr	0:50	2.623
6hr-5yr	0:55	2.794
6hr-5yr	1:00	2.993
6hr-5yr	1:05	3.225
6hr-5yr	1:10	3.501
6hr-5yr	1:15	3.834
6hr-5yr	1:20	4.244
6hr-5yr	1:25	4.763
6hr-5yr	1:30	5.442
6hr-5yr	1:35	6.367
6hr-5yr	1:40	7.706
6hr-5yr	1:45	9.813
6hr-5yr	1:50	13.603
6hr-5yr	1:55	22.285
6hr-5yr	2:00	55.656
6hr-5yr	2:05	141.179
6hr-5yr	2:10	53.291
6hr-5yr	2:15	30.263
6hr-5yr	2:20	20.826
6hr-5yr	2:25	15.811
6hr-5yr	2:30	12.736
6hr-5yr	2:35	10.669
6hr-5yr	2:40	9.189
6hr-5yr	2:45	8.079
6hr-5yr	2:50	7.217
6hr-5yr	2:55	6.528
6hr-5yr	3:00	5.965
6hr-5yr	3:05	5.496
6hr-5yr	3:10	5.099
6hr-5yr	3:15	4.759
6hr-5yr	3:20	4.464
6hr-5yr	3:25	4.206
6hr-5yr	3:30	3.979
6hr-5yr	3:35	3.776
6hr-5yr	3:40	3.595
6hr-5yr	3:45	3.431
6hr-5yr	3:50	3.283
6hr-5yr	3:55	3.148
6hr-5yr	4:00	3.025
6hr-5yr	4:05	2.912
6hr-5yr	4:10	2.808
6hr-5yr	4:15	2.711
6hr-5yr	4:20	2.622
6hr-5yr	4:25	2.539
6hr-5yr	4:30	2.461
6hr-5yr	4:35	2.389
6hr-5yr	4:40	2.32
6hr-5yr	4:45	2.257
6hr-5yr	4:50	2.196
6hr-5yr	4:55	2.14
6hr-5yr	5:00	2.086
6hr-5yr	5:05	2.035
6hr-5yr	5:10	1.987
6hr-5yr	5:15	1.942
6hr-5yr	5:20	1.898
6hr-5yr	5:25	1.857
6hr-5yr	5:30	1.818
6hr-5yr	5:35	1.78
6hr-5yr	5:40	1.744
6hr-5yr	5:45	1.71
6hr-5yr	5:50	1.677
6hr-5yr	5:55	1.646

6hr-5yr 6:00 0

[REPORT]

;;Reporting Options
INPUT YES
CONTROLS NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]

DIMENSIONS	922046.74785	5041834.0492	922407.88115	5042274.6388
UNITS	Meters			

[COORDINATES]

;;Node	X-Coord	Y-Coord
CB_10	922267.44	5042167.037
CB_23	922183.138	5041946.243
CB_27	922174.44	5042163.651
CB_28	922183.823	5042138.927
CB_29	922311.039	5041911.888
CB_5	922241.227	5042156.669
CBMH_11	922268.343	5041907.04
CBMH_12	922226.064	5041886.711
CBMH_14	922119.051	5042161.391
CBMH_15	922187.216	5042194.27
CBMH_18	922101.491	5042122.208
CBMH_19	922112.299	5042084.028
CBMH_2	922320.148	5042000.64
CBMH_21	922131.832	5042046.581
CBMH_22	922160.736	5041992.512
CBMH_3	922294.476	5042054.025
CBMH_4	922264.811	5042107.553
CBMH_6	922368.578	5041956.48
CBMH_7	922344.579	5042017.069
CBMH_8	922319.775	5042064.766
CBMH_9	922291.331	5042119.713
DCB_16	922244.166	5042219.719
J1	922088.074	5042134.4
J13	922346.799	5041946.002
J2	922329.977	5041930.789
MH_20	922120.386	5042071.917
MH_24	922098.64	5042113.25
MH_25	922131.745	5042141.429
MH_26	922150.032	5042150.054
MH_27	922274.874	5041890.955
MH_30	922343.248	5041959.86
MH_44	922084.598	5042122.314
MH_45	922334.286	5041926.103
OGS_1	922335.039	5041923.577
OGS_2	922081.054	5042120.627
Humber_pl	922336.187	5041918.196
OF1	922072.924	5042114.432
OF2	922274.791	5042250.679
SU_N	922101.096	5042130.118
SU_S	922332.618	5041935.618

[VERTICES]

;;Link	X-Coord	Y-Coord
C1	922096.948	5042121.48
C4	922337.658	5041932.991

[POLYGONS]

;;Subcatchment	X-Coord	Y-Coord
Area_1	922156.684	5042195.99
Area_1	922169.821	5042170.099
Area_1	922115.018	5042141.948
Area_1	922097.108	5042135.258
Area_1	922095.563	5042134.473
Area_1	922091.602	5042142.138
Area_1	922078.404	5042141.433
Area_1	922072.844	5042153.373
Area_1	922156.684	5042195.99
Area_10	922182.687	5041970.194
Area_10	922202.152	5041931.834
Area_10	922189.98	5041925.657
Area_10	922187.058	5041928.291
Area_10	922181.001	5041928.076
Area_10	922164.529	5041960.981
Area_10	922182.687	5041970.194
Area_101	922274.182	5042060.554
Area_101	922164.013	5042006.979
Area_101	922118.261	5042097.159
Area_101	922156.344	5042116.483
Area_101	922161.602	5042120.253
Area_101	922173.064	5042124.967
Area_101	922228.053	5042151.46
Area_101	922238.998	5042129.891
Area_101	922274.182	5042060.554
Area_102	922274.182	5042060.554

Area_102	922293.417	5042022.648
Area_102	922318.903	5041972.423
Area_102	922292.345	5041958.947
Area_102	922264.29	5041944.711
Area_102	922197.507	5041910.823
Area_102	922189.979	5041925.657
Area_102	922202.152	5041931.834
Area_102	922164.013	5042006.979
Area_102	922274.182	5042060.554
Area_11	922264.237	5042142.698
Area_11	922240.449	5042189.576
Area_11	922262.695	5042201.089
Area_11	922272.999	5042180.783
Area_11	922274.904	5042166.229
Area_11	922280.04	5042166.668
Area_11	922287.842	5042154.676
Area_11	922264.237	5042142.698
Area_12	922291.446	5042089.077
Area_12	922264.237	5042142.698
Area_12	922287.841	5042154.676
Area_12	922315.053	5042101.05
Area_12	922291.446	5042089.077
Area_13	922318.655	5042035.455
Area_13	922291.446	5042089.077
Area_13	922315.049	5042101.059
Area_13	922342.258	5042047.437
Area_13	922318.655	5042035.455
Area_14	922345.865	5041981.834
Area_14	922318.655	5042035.455
Area_14	922342.258	5042047.437
Area_14	922369.397	5041993.769
Area_14	922345.865	5041981.834
Area_15	922365.904	5041952.636
Area_15	922359.463	5041955.035
Area_15	922357.167	5041959.56
Area_15	922345.865	5041981.834
Area_15	922369.472	5041993.807
Area_15	922371.927	5041988.763
Area_15	922378.739	5041976.704
Area_15	922378.755	5041956.1
Area_15	922369.637	5041951.745
Area_15	922367.394	5041953.143
Area_15	922365.821	5041952.667
Area_15	922365.904	5041952.636
Area_16	922264.237	5042142.698
Area_16	922238.998	5042129.891
Area_16	922228.221	5042151.129
Area_16	922229.721	5042154.923
Area_16	922221.355	5042159.491
Area_16	922215.755	5042170.747
Area_16	922217.934	5042178.151
Area_16	922240.449	5042189.576
Area_16	922264.237	5042142.698
Area_17	922291.446	5042089.077
Area_17	922266.207	5042076.27
Area_17	922238.998	5042129.891
Area_17	922264.237	5042142.698
Area_17	922291.446	5042089.077
Area_18	922318.654	5042035.454
Area_18	922293.417	5042022.648
Area_18	922266.207	5042076.27
Area_18	922291.446	5042089.077
Area_18	922318.654	5042035.454
Area_19	922345.865	5041981.834
Area_19	922323.529	5041970.5
Area_19	922318.903	5041972.423
Area_19	922293.417	5042022.648
Area_19	922318.655	5042035.455
Area_19	922345.865	5041981.834
Area_2	922209.215	5042222.737
Area_2	922215.404	5042210.581
Area_2	922211.118	5042202.902
Area_2	922210.778	5042201.725
Area_2	922210.247	5042181.824
Area_2	922200.465	5042185.649
Area_2	922169.821	5042170.099
Area_2	922156.651	5042196.064
Area_2	922209.215	5042222.737
Area_20	922295.881	5041959.172
Area_20	922292.345	5041958.947
Area_20	922318.903	5041972.423
Area_20	922323.528	5041970.499
Area_20	922345.32	5041981.557
Area_20	922345.865	5041981.834
Area_20	922355.492	5041963.045
Area_20	922357.167	5041959.56
Area_20	922359.463	5041955.035
Area_20	922365.859	5041952.653
Area_20	922368.907	5041946.111
Area_20	922371.707	5041938.283
Area_20	922325.369	5041919.024
Area_20	922320.146	5041915.508
Area_20	922295.881	5041959.172
Area_2001	922259.515	5042248.266
Area_2001	922073.048	5042152.971

Area_2001	922063.194	5042152.009
Area_2001	922264.858	5042254.388
Area_2001	922259.515	5042248.266
Area_2002	922379.025	5041976.492
Area_2002	922287.841	5042154.678
Area_2002	922297.66	5042167.96
Area_2002	922297.19	5042169.092
Area_2002	922291.55	5042182.669
Area_2002	922289.978	5042186.538
Area_2002	922259.517	5042248.262
Area_2002	922264.919	5042254.612
Area_2002	922379.025	5041976.492
Area_2003	922063.163	5042152.017
Area_2003	922073.048	5042152.971
Area_2003	922078.89	5042141.459
Area_2003	922091.7	5042141.95
Area_2003	922095.563	5042134.474
Area_2003	922095.417	5042131.52
Area_2003	922097.809	5042127.104
Area_2003	922097.503	5042125.683
Area_2003	922084.342	5042119.006
Area_2003	922109.135	5042069.705
Area_2003	922113.823	5042069.046
Area_2003	922116.98	5042062.787
Area_2003	922114.888	5042058.367
Area_2003	922145.979	5041996.588
Area_2003	922150.409	5041998.871
Area_2003	922151.992	5041996.657
Area_2003	922155.734	5041986.203
Area_2003	922153.387	5041982.171
Area_2003	922181.001	5041928.076
Area_2003	922187.058	5041928.291
Area_2003	922189.786	5041925.832
Area_2003	922197.337	5041910.438
Area_2003	922192.103	5041898.561
Area_2003	922063.163	5042152.017
Area_2004	922209.02	5041865.313
Area_2004	922235.292	5041858.36
Area_2004	922233.17	5041856.72
Area_2004	922230.811	5041855.444
Area_2004	922228.277	5041854.564
Area_2004	922225.635	5041854.104
Area_2004	922222.953	5041854.076
Area_2004	922220.302	5041854.481
Area_2004	922217.757	5041855.423
Area_2004	922215.4	5041856.768
Area_2004	922213.295	5041858.48
Area_2004	922211.498	5041860.514
Area_2004	922210.057	5041862.813
Area_2004	922209.011	5041865.318
Area_2004	922209.02	5041865.313
Area_2005	922371.594	5041938.235
Area_2005	922368.998	5041945.932
Area_2005	922365.962	5041952.377
Area_2005	922369.637	5041951.745
Area_2005	922378.755	5041956.1
Area_2005	922378.739	5041976.704
Area_2005	922391.466	5041946.493
Area_2005	922371.707	5041938.282
Area_2005	922371.594	5041938.235
Area_21	922237.628	5041931.182
Area_21	922264.427	5041944.78
Area_21	922274.121	5041925.898
Area_21	922277.379	5041923.323
Area_21	922284.651	5041920.109
Area_21	922298.899	5041916.291
Area_21	922301.752	5041903.119
Area_21	922264.403	5041877.966
Area_21	922237.628	5041931.182
Area_22	922192.103	5041898.562
Area_22	922197.507	5041910.823
Area_22	922237.628	5041931.182
Area_22	922262.14	5041882.443
Area_22	922264.403	5041877.966
Area_22	922235.292	5041858.36
Area_22	922209.013	5041865.315
Area_22	922192.103	5041898.562
Area_23	922292.345	5041958.947
Area_23	922295.881	5041959.172
Area_23	922320.146	5041915.507
Area_23	922301.752	5041903.119
Area_23	922298.899	5041916.291
Area_23	922284.651	5041920.109
Area_23	922277.379	5041923.323
Area_23	922274.121	5041925.898
Area_23	922264.411	5041944.772
Area_23	922292.345	5041958.947
Area_3	922280.091	5042166.581
Area_3	922274.904	5042166.229
Area_3	922273.008	5042180.81
Area_3	922262.695	5042201.089
Area_3	922217.934	5042178.15
Area_3	922210.247	5042181.824
Area_3	922211.001	5042202.867
Area_3	922215.404	5042210.581

Area_3	922209.221	5042222.74
Area_3	922232.117	5042234.358
Area_3	922259.517	5042248.262
Area_3	922291.901	5042181.949
Area_3	922297.215	5042169.271
Area_3	922297.618	5042167.941
Area_3	922287.842	5042154.676
Area_3	922280.091	5042166.581
Area_4	922143.181	5042156.27
Area_4	922161.483	5042120.204
Area_4	922156.344	5042116.484
Area_4	922118.26	5042097.159
Area_4	922114.257	5042092.55
Area_4	922109.378	5042089.904
Area_4	922101.037	5042085.662
Area_4	922084.076	5042119.088
Area_4	922089.477	5042121.836
Area_4	922097.449	5042125.976
Area_4	922097.726	5042126.825
Area_4	922095.579	5042131.056
Area_4	922095.563	5042134.473
Area_4	922115.018	5042141.948
Area_4	922143.181	5042156.27
Area_5	922152.032	5042138.87
Area_5	922143.185	5042156.239
Area_5	922200.513	5042185.631
Area_5	922210.247	5042181.824
Area_5	922217.934	5042178.15
Area_5	922215.802	5042170.903
Area_5	922152.032	5042138.87
Area_6	922215.755	5042170.747
Area_6	922221.427	5042159.476
Area_6	922229.627	5042155.107
Area_6	922228.053	5042151.46
Area_6	922227.484	5042152.582
Area_6	922173.058	5042124.965
Area_6	922161.483	5042120.204
Area_6	922151.987	5042138.959
Area_6	922215.755	5042170.747
Area_7	922128.26	5042077.453
Area_7	922122.858	5042074.827
Area_7	922118.32	5042072.395
Area_7	922113.587	5042069.511
Area_7	922108.959	5042069.833
Area_7	922101.037	5042085.662
Area_7	922114.159	5042092.581
Area_7	922118.26	5042097.159
Area_7	922128.26	5042077.453
Area_8	922118.345	5042072.41
Area_8	922128.26	5042077.453
Area_8	922155.476	5042023.817
Area_8	922137.141	5042014.511
Area_8	922114.851	5042058.188
Area_8	922115.066	5042058.458
Area_8	922117.071	5042062.608
Area_8	922113.617	5042069.414
Area_8	922118.345	5042072.41
Area_9	922137.14	5042014.511
Area_9	922155.476	5042023.817
Area_9	922182.686	5041970.194
Area_9	922164.343	5041960.893
Area_9	922153.575	5041982.125
Area_9	922155.734	5041986.203
Area_9	922151.992	5041996.657
Area_9	922150.409	5041998.871
Area_9	922146.183	5041996.693
Area_9	922137.32	5042014.602
Area_9	922137.14	5042014.511

[SYMBOLS]

;;Gage X-Coord Y-Coord
 ;;-----

25mm

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link C32
WARNING 03: negative offset ignored for Link C34

Element Count

Number of rain gages 7
Number of subcatchments ... 30
Number of nodes 40
Number of links 39
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Area_1	0.25	83.33	90.00	1.0000	25mm	CBMH_14
Area_10	0.08	26.67	90.00	1.0000	25mm	CB_23
Area_101	1.37	137.00	95.00	0.5000	25mm	MH_26
Area_102	1.13	113.00	95.00	0.5000	25mm	CBMH_11
Area_11	0.13	43.33	90.00	1.0000	25mm	CB_10
Area_12	0.16	53.33	90.00	1.0000	25mm	CBMH_9
Area_13	0.16	53.33	90.00	1.0000	25mm	CBMH_8
Area_14	0.17	56.67	90.00	1.0000	25mm	CBMH_7
Area_15	0.09	30.00	90.00	1.0000	25mm	CBMH_6
Area_16	0.15	50.00	90.00	1.0000	25mm	CB_5
Area_17	0.17	56.67	90.00	1.0000	25mm	CBMH_4
Area_18	0.17	56.67	90.00	1.0000	25mm	CBMH_3
Area_19	0.17	56.67	90.00	1.0000	25mm	CBMH_2
Area_2	0.16	53.33	90.00	1.0000	25mm	CBMH_15
Area_20	0.28	93.33	90.00	1.0000	25mm	J13
Area_2001	0.07	7.00	25.00	0.5000	25mm	OF2
Area_2002	0.21	21.00	90.00	0.5000	25mm	OF2
Area_2003	0.16	16.00	90.00	1.0000	25mm	OF1
Area_2004	0.02	13.33	5.00	0.5000	25mm	Humber_Pl
Area_2005	0.04	26.67	5.00	0.5000	25mm	Humber_Pl
Area_21	0.21	70.00	90.00	1.0000	25mm	CBMH_11
Area_22	0.32	106.67	90.00	1.0000	25mm	CBMH_12
Area_23	0.16	53.33	90.00	1.0000	25mm	CB_29
Area_3	0.36	120.00	90.00	1.0000	25mm	DCB_16
Area_4	0.28	93.33	90.00	1.0000	25mm	CBMH_18
Area_5	0.15	50.00	90.00	1.0000	25mm	CB_27
Area_6	0.15	50.00	90.00	1.0000	25mm	CB_28
Area_7	0.04	13.33	90.00	1.0000	25mm	CBMH_19
Area_8	0.12	40.00	90.00	1.0000	25mm	CBMH_21
Area_9	0.12	40.00	90.00	1.0000	25mm	CBMH_22

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
CB_10	JUNCTION	65.33	1.41	10.0	
CB_23	JUNCTION	66.20	0.93	10.0	
CB_27	JUNCTION	65.48	1.34	10.0	
CB_28	JUNCTION	65.39	1.52	10.0	
CB_29	JUNCTION	64.11	2.43	0.0	
CB_5	JUNCTION	65.11	1.63	10.0	
CBMH_11	JUNCTION	63.58	2.16	10.0	
CBMH_12	JUNCTION	64.06	1.68	10.0	
CBMH_14	JUNCTION	64.11	2.21	10.0	
CBMH_15	JUNCTION	64.47	1.85	10.0	
CBMH_18	JUNCTION	64.05	2.54	0.0	
CBMH_19	JUNCTION	64.88	2.38	10.0	
CBMH_2	JUNCTION	64.06	2.94	10.0	
CBMH_21	JUNCTION	65.17	1.87	10.0	
CBMH_22	JUNCTION	65.53	1.51	10.0	

CBMH_3	JUNCTION	64.42	2.58	10.0
CBMH_4	JUNCTION	64.78	2.22	10.0
CBMH_6	JUNCTION	63.91	2.73	10.0
CBMH_7	JUNCTION	64.27	2.73	10.0
CBMH_8	JUNCTION	64.63	2.37	10.0
CBMH_9	JUNCTION	64.99	2.01	10.0
DCB_16	JUNCTION	64.80	1.52	10.0
J1	JUNCTION	63.75	3.27	0.0
J13	JUNCTION	63.54	3.10	10.0
J2	JUNCTION	63.24	3.33	0.0
MH_20	JUNCTION	64.99	2.30	0.0
MH_24	JUNCTION	64.13	2.50	10.0
MH_25	JUNCTION	64.42	2.63	0.0
MH_26	JUNCTION	64.56	2.70	0.0
MH_27	JUNCTION	63.89	2.02	0.0
MH_30	JUNCTION	63.73	3.08	0.0
MH_44	JUNCTION	63.51	3.51	0.0
MH_45	JUNCTION	63.11	3.46	0.0
OGS_1	JUNCTION	63.04	3.34	0.0
OGS_2	JUNCTION	63.47	3.01	0.0
Humber_P1	OUTFALL	62.48	0.38	0.0
OF1	OUTFALL	63.41	0.38	0.0
OF2	OUTFALL	0.00	0.00	0.0
SU_N	STORAGE	63.75	3.04	0.0
SU_S	STORAGE	63.24	3.33	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	SU_N	MH_44	CONDUIT	2.5	1.0001	0.0090
C10	CB_28	MH_26	CONDUIT	30.4	1.0001	0.0110
C11	CB_27	MH_26	CONDUIT	32.8	1.0001	0.0110
C12	MH_26	MH_25	CONDUIT	16.5	0.4970	0.0110
C13	MH_24	CBMH_18	CONDUIT	4.8	0.5000	0.0110
C14	CB_23	CBMH_22	CONDUIT	51.5	1.0001	0.0110
C15	CBMH_22	CBMH_21	CONDUIT	60.0	0.5000	0.0110
C16	CBMH_21	MH_20	CONDUIT	24.5	0.5020	0.0110
C17	MH_20	CBMH_19	CONDUIT	10.4	0.5000	0.0110
C18	CBMH_19	MH_24	CONDUIT	46.5	0.5011	0.0110
C19	CB_10	CBMH_9	CONDUIT	52.5	0.4991	0.0110
C2	MH_44	OGS_2	CONDUIT	11.6	0.3707	0.0110
C20	CBMH_9	CBMH_8	CONDUIT	60.0	0.5000	0.0110
C21	CBMH_8	CBMH_7	CONDUIT	60.0	0.5000	0.0110
C22	CBMH_7	CBMH_6	CONDUIT	60.0	0.5000	0.0110
C23	CBMH_6	J13	CONDUIT	29.9	0.5017	0.0110
C24	J13	SU_S	CONDUIT	4.0	0.5000	0.0110
C25	CB_5	CBMH_4	CONDUIT	52.5	0.4991	0.0110
C26	CBMH_4	CBMH_3	CONDUIT	60.0	0.5000	0.0110
C27	CBMH_3	CBMH_2	CONDUIT	60.0	0.5000	0.0110
C28	CBMH_2	MH_30	CONDUIT	53.4	0.4963	0.0110
C29	CBMH_12	CBMH_11	CONDUIT	50.0	0.5700	0.0110
C3	J1	MH_44	CONDUIT	2.5	0.4800	0.0110
C30	MH_30	J13	CONDUIT	9.3	0.4839	0.0110
C31	MH_27	CBMH_11	CONDUIT	8.2	0.5000	0.0110
C32	CBMH_11	SU_S	CONDUIT	13.2	0.5000	0.0110
C33	OGS_1	Humber_P1	CONDUIT	4.0	14.1135	0.0110
C34	OGS_2	OF1	CONDUIT	8.7	0.6782	0.0110
C35	MH_25	MH_24	CONDUIT	44.2	0.5000	0.0110
C36	CBMH_18	SU_N	CONDUIT	3.9	0.5128	0.0110
C37	CB_29	MH_27	CONDUIT	32.9	0.4985	0.0110
C4	SU_S	MH_45	CONDUIT	9.4	1.0001	0.0090
C5	J2	MH_45	CONDUIT	9.4	0.5000	0.0110
C6	MH_45	OGS_1	CONDUIT	3.1	0.4839	0.0110
C7	DCB_16	CBMH_15	CONDUIT	54.4	0.5000	0.0110
C8	CBMH_15	CBMH_14	CONDUIT	60.0	0.5000	0.0110
C9	CBMH_14	SU_N	CONDUIT	15.2	0.5000	0.0110
OR1	SU_S	J2	ORIFICE			
OR2	SU_N	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C10	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C11	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C12	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C13	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21
C15	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C16	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C17	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C18	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C19	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.13
C20	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C21	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C22	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C23	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36

C24	CIRCULAR	0.75	0.44	0.19	0.75	1	0.93
C25	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C26	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C27	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C28	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C29	CIRCULAR	0.38	0.11	0.09	0.38	1	0.16
C3	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C30	CIRCULAR	0.60	0.28	0.15	0.60	1	0.50
C31	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C32	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C33	CIRCULAR	0.38	0.11	0.09	0.38	1	0.78
C34	CIRCULAR	0.38	0.11	0.09	0.38	1	0.17
C35	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C36	CIRCULAR	0.75	0.44	0.19	0.75	1	0.94
C37	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C4	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C5	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	0.14
C7	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C8	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C9	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
Infiltration Method HORTON
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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 1.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 6
Head Tolerance 0.001500 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

Total Precipitation	0.176	25.000
Evaporation Loss	0.000	0.000
Infiltration Loss	0.017	2.383
Surface Runoff	0.160	22.630
Final Storage	0.000	0.000
Continuity Error (%)	-0.049	

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

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.160	1.595
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.160	1.596
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 (%)	-0.034	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C2 (2)
 Link OR1 (1)
 Link OR2 (1)

 Routing Time Step Summary

Minimum Time Step : 0.74 sec
 Average Time Step : 1.00 sec
 Maximum Time Step : 1.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 2.00
 Percent Not Converging : 0.00
 Time Step Frequencies :
 1.000 - 0.871 sec : 99.97 %
 0.871 - 0.758 sec : 0.03 %
 0.758 - 0.660 sec : 0.00 %
 0.660 - 0.574 sec : 0.00 %
 0.574 - 0.500 sec : 0.00 %

 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 CMS	Runoff Coeff
Area_1	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.06	0.04	0.902
Area_10	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.02	0.01	0.902
Area_101	25.00	0.00	0.00	1.24	23.76	0.01	23.76	0.33	0.19	0.951
Area_102	25.00	0.00	0.00	1.24	23.76	0.01	23.76	0.27	0.16	0.951
Area_11	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.03	0.02	0.902
Area_12	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.04	0.02	0.902
Area_13	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.04	0.02	0.902
Area_14	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.04	0.03	0.902
Area_15	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.02	0.01	0.902
Area_16	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.03	0.02	0.902
Area_17	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.04	0.03	0.902
Area_18	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.04	0.03	0.902
Area_19	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.04	0.03	0.902
Area_2	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.04	0.02	0.902
Area_20	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.06	0.04	0.902
Area_2001	25.00	0.00	0.00	18.74	6.25	0.01	6.27	0.00	0.00	0.251
Area_2002	25.00	0.00	0.00	2.49	22.51	0.01	22.52	0.05	0.03	0.901
Area_2003	25.00	0.00	0.00	2.50	22.51	0.00	22.51	0.04	0.02	0.900
Area_2004	25.00	0.00	0.00	23.68	1.25	0.07	1.32	0.00	0.00	0.053
Area_2005	25.00	0.00	0.00	23.68	1.25	0.07	1.32	0.00	0.00	0.053
Area_21	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.05	0.03	0.902
Area_22	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.07	0.05	0.902
Area_23	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.04	0.02	0.902
Area_3	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.08	0.06	0.902
Area_4	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.06	0.04	0.902
Area_5	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.03	0.02	0.902
Area_6	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.03	0.02	0.902
Area_7	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.01	0.01	0.902
Area_8	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.03	0.02	0.902
Area_9	25.00	0.00	0.00	2.48	22.52	0.02	22.54	0.03	0.02	0.902

 Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB_10	JUNCTION	0.00	0.09	65.42	0 01:40	0.09
CB_23	JUNCTION	0.00	0.06	66.26	0 01:40	0.06
CB_27	JUNCTION	0.00	0.08	65.56	0 01:40	0.08
CB_28	JUNCTION	0.00	0.08	65.47	0 01:40	0.08
CB_29	JUNCTION	0.00	0.10	64.22	0 01:40	0.10
CB_5	JUNCTION	0.00	0.09	65.20	0 01:40	0.09
CBMH_11	JUNCTION	0.01	0.35	63.93	0 04:04	0.35
CBMH_12	JUNCTION	0.00	0.14	64.20	0 01:40	0.14
CBMH_14	JUNCTION	0.01	0.38	64.49	0 04:02	0.38
CBMH_15	JUNCTION	0.00	0.17	64.63	0 01:40	0.17
CBMH_18	JUNCTION	0.02	0.44	64.49	0 04:03	0.44
CBMH_19	JUNCTION	0.00	0.15	65.02	0 01:40	0.15
CBMH_2	JUNCTION	0.00	0.18	64.24	0 01:40	0.18
CBMH_21	JUNCTION	0.00	0.14	65.31	0 01:40	0.14
CBMH_22	JUNCTION	0.00	0.11	65.64	0 01:40	0.11
CBMH_3	JUNCTION	0.00	0.15	64.57	0 01:40	0.15
CBMH_4	JUNCTION	0.00	0.13	64.90	0 01:40	0.13
CBMH_6	JUNCTION	0.00	0.20	64.11	0 01:40	0.20
CBMH_7	JUNCTION	0.00	0.18	64.46	0 01:40	0.18
CBMH_8	JUNCTION	0.00	0.16	64.79	0 01:40	0.16
CBMH_9	JUNCTION	0.00	0.12	65.12	0 01:40	0.12
DCB_16	JUNCTION	0.00	0.14	64.94	0 01:40	0.14
J1	JUNCTION	0.01	0.07	63.82	0 04:01	0.07

J13	JUNCTION	0.02	0.40	63.94	0	04:04	0.40
J2	JUNCTION	0.01	0.07	63.31	0	04:05	0.07
MH_20	JUNCTION	0.00	0.14	65.13	0	01:40	0.14
MH_24	JUNCTION	0.01	0.35	64.49	0	04:03	0.35
MH_25	JUNCTION	0.00	0.29	64.70	0	01:40	0.28
MH_26	JUNCTION	0.00	0.31	64.87	0	01:40	0.31
MH_27	JUNCTION	0.00	0.10	63.99	0	01:40	0.10
MH_30	JUNCTION	0.01	0.20	63.94	0	04:03	0.20
MH_44	JUNCTION	0.01	0.07	63.58	0	04:02	0.07
MH_45	JUNCTION	0.01	0.07	63.18	0	04:05	0.07
OGS_1	JUNCTION	0.00	0.03	63.07	0	04:05	0.03
OGS_2	JUNCTION	0.01	0.06	63.53	0	04:02	0.06
Humber_P1	OUTFALL	0.00	0.00	62.48	0	00:00	0.00
OF1	OUTFALL	0.01	0.06	63.47	0	04:02	0.06
OF2	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU_N	STORAGE	0.05	0.74	64.49	0	04:01	0.74
SU_S	STORAGE	0.05	0.70	63.93	0	04:05	0.70

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB_10	JUNCTION	0.020	0.020	0 01:40	0.0293	0.0293	-0.009
CB_23	JUNCTION	0.012	0.012	0 01:40	0.018	0.018	-0.006
CB_27	JUNCTION	0.023	0.023	0 01:40	0.0338	0.0338	-0.003
CB_28	JUNCTION	0.023	0.023	0 01:40	0.0338	0.0338	-0.003
CB_29	JUNCTION	0.025	0.025	0 01:40	0.0361	0.0361	-0.005
CB_5	JUNCTION	0.023	0.023	0 01:40	0.0338	0.0338	-0.010
CBMH_11	JUNCTION	0.189	0.262	0 01:40	0.316	0.424	0.077
CBMH_12	JUNCTION	0.049	0.049	0 01:40	0.0721	0.0721	0.212
CBMH_14	JUNCTION	0.038	0.118	0 01:40	0.0563	0.179	-0.120
CBMH_15	JUNCTION	0.025	0.080	0 01:40	0.0361	0.117	0.514
CBMH_18	JUNCTION	0.043	0.330	0 01:40	0.0631	0.543	0.004
CBMH_19	JUNCTION	0.006	0.055	0 01:40	0.00902	0.0811	-0.006
CBMH_2	JUNCTION	0.026	0.101	0 01:40	0.0383	0.149	0.169
CBMH_21	JUNCTION	0.018	0.049	0 01:40	0.027	0.0721	-0.003
CBMH_22	JUNCTION	0.018	0.031	0 01:40	0.027	0.0451	-0.007
CBMH_3	JUNCTION	0.026	0.075	0 01:40	0.0383	0.11	-0.011
CBMH_4	JUNCTION	0.026	0.049	0 01:40	0.0383	0.0721	-0.008
CBMH_6	JUNCTION	0.014	0.108	0 01:40	0.0203	0.16	0.120
CBMH_7	JUNCTION	0.026	0.095	0 01:40	0.0383	0.14	-0.007
CBMH_8	JUNCTION	0.025	0.069	0 01:40	0.0361	0.101	-0.010
CBMH_9	JUNCTION	0.025	0.044	0 01:40	0.0361	0.0654	-0.007
DCB_16	JUNCTION	0.055	0.055	0 01:40	0.0811	0.0811	-0.010
J1	JUNCTION	0.000	0.010	0 04:01	0	0.711	-0.006
J13	JUNCTION	0.043	0.251	0 01:40	0.0631	0.378	-0.053
J2	JUNCTION	0.000	0.010	0 04:05	0	0.796	-0.006
MH_20	JUNCTION	0.000	0.049	0 01:40	0	0.0721	-0.001
MH_24	JUNCTION	0.000	0.290	0 01:40	0	0.476	-0.198
MH_25	JUNCTION	0.000	0.235	0 01:40	0	0.393	0.257
MH_26	JUNCTION	0.190	0.236	0 01:40	0.326	0.393	-0.000
MH_27	JUNCTION	0.000	0.024	0 01:40	0	0.0361	0.014
MH_30	JUNCTION	0.000	0.101	0 01:40	0	0.151	-0.116
MH_44	JUNCTION	0.000	0.010	0 04:01	0	0.711	0.007
MH_45	JUNCTION	0.000	0.010	0 04:05	0	0.796	0.001
OGS_1	JUNCTION	0.000	0.010	0 04:05	0	0.796	-0.001
OGS_2	JUNCTION	0.000	0.010	0 04:02	0	0.711	-0.007
Humber_P1	OUTFALL	0.001	0.010	0 04:00	0.000793	0.797	0.000
OF1	OUTFALL	0.023	0.030	0 01:40	0.036	0.747	0.000
OF2	OUTFALL	0.031	0.031	0 01:40	0.0517	0.0517	0.000
SU_N	STORAGE	0.000	0.448	0 01:40	0	0.719	-0.099
SU_S	STORAGE	0.000	0.513	0 01:40	0	0.799	-0.085

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Full Pcnt	Evap Loss Pcnt	Exfil Loss Pcnt	Maximum Volume 1000 m3	Max Full Pcnt	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU_N	0.032	1	0	0	0.587	23	0 04:01	0.012

SU_s 0.043 1 0 0 0.680 20 0 04:05 0.013

 Outfall Loading Summary

Outfall Node	Flow Freq Pent	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Humber_Pl	24.35	0.004	0.010	0.797
OF1	20.58	0.004	0.030	0.747
OF2	2.58	0.002	0.031	0.052
System	15.84	0.010	0.069	1.596

 Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C10	CONDUIT	0.023	0 01:40	1.21	0.07	0.18
C11	CONDUIT	0.023	0 01:40	1.21	0.07	0.18
C12	CONDUIT	0.235	0 01:40	1.77	0.66	0.59
C13	CONDUIT	0.290	0 01:40	1.87	0.56	0.61
C14	CONDUIT	0.012	0 01:40	1.03	0.06	0.16
C15	CONDUIT	0.031	0 01:40	1.03	0.13	0.24
C16	CONDUIT	0.049	0 01:40	1.18	0.20	0.31
C17	CONDUIT	0.049	0 01:40	1.18	0.21	0.31
C18	CONDUIT	0.055	0 01:40	1.22	0.23	0.33
C19	CONDUIT	0.020	0 01:40	0.91	0.08	0.20
C2	CONDUIT	0.010	0 04:02	0.78	0.08	0.18
C20	CONDUIT	0.044	0 01:40	1.13	0.12	0.24
C21	CONDUIT	0.069	0 01:40	1.28	0.19	0.30
C22	CONDUIT	0.094	0 01:40	1.40	0.26	0.35
C23	CONDUIT	0.108	0 01:40	1.46	0.30	0.38
C24	CONDUIT	0.251	0 01:40	1.79	0.27	0.54
C25	CONDUIT	0.023	0 01:40	0.93	0.06	0.17
C26	CONDUIT	0.049	0 01:40	1.15	0.10	0.21
C27	CONDUIT	0.075	0 01:40	1.30	0.15	0.26
C28	CONDUIT	0.101	0 01:40	1.41	0.20	0.30
C29	CONDUIT	0.049	0 01:40	1.26	0.31	0.38
C3	CONDUIT	0.010	0 04:01	0.78	0.13	0.24
C30	CONDUIT	0.101	0 01:40	1.39	0.20	0.38
C31	CONDUIT	0.024	0 01:40	0.99	0.17	0.28
C32	CONDUIT	0.262	0 01:40	1.82	0.73	0.73
C33	CONDUIT	0.010	0 04:05	2.44	0.01	0.08
C34	CONDUIT	0.010	0 04:02	0.85	0.06	0.17
C35	CONDUIT	0.235	0 01:40	1.78	0.46	0.48
C36	CONDUIT	0.330	0 01:40	1.94	0.35	0.60
C37	CONDUIT	0.024	0 01:40	0.99	0.17	0.28
C4	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C5	CONDUIT	0.010	0 04:05	0.78	0.12	0.24
C6	CONDUIT	0.010	0 04:05	0.75	0.07	0.18
C7	CONDUIT	0.055	0 01:40	1.21	0.15	0.26
C8	CONDUIT	0.079	0 01:40	1.34	0.22	0.33
C9	CONDUIT	0.118	0 01:40	1.48	0.23	0.70
OR1	ORIFICE	0.010	0 04:05			1.00
OR2	ORIFICE	0.010	0 04:01			1.00

 Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Crit	Inlet Ltd	Ctrl
C1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C15	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C18	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C19	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C2	1.00	0.00	0.10	0.00	0.79	0.12	0.00	0.00	0.79	0.00
C20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C21	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C22	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C23	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.03	0.00
C24	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.00	0.00

C25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C26	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C27	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C28	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.03	0.00
C29	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.04	0.00
C3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C30	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.01	0.00
C31	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.01	0.00
C32	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.01	0.00
C33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C34	1.00	0.00	0.00	0.00	0.77	0.23	0.00	0.00	0.04	0.00
C35	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.04	0.00
C36	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.00	0.00
C37	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	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
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C8	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.05	0.00
C9	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.01	0.00

 Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Wed Oct 5 20:17:15 2022
 Analysis ended on: Wed Oct 5 20:17:45 2022

Total elapsed time: 00:00:30

2-yr, 3-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

WARNING 03: negative offset ignored for Link C2
 WARNING 03: negative offset ignored for Link C32
 WARNING 03: negative offset ignored for Link C34

 Element Count

 Number of rain gages 7
 Number of subcatchments ... 30
 Number of nodes 40
 Number of links 39
 Number of pollutants 0
 Number of land uses 0

 Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

 Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Area_1	0.25	83.33	90.00	1.0000	3hr-2yr	CBMH_14
Area_10	0.08	26.67	90.00	1.0000	3hr-2yr	CB_23
Area_101	1.37	137.00	95.00	0.5000	3hr-2yr	MH_26
Area_102	1.13	113.00	95.00	0.5000	3hr-2yr	CBMH_11
Area_11	0.13	43.33	90.00	1.0000	3hr-2yr	CB_10
Area_12	0.16	53.33	90.00	1.0000	3hr-2yr	CBMH_9
Area_13	0.16	53.33	90.00	1.0000	3hr-2yr	CBMH_8
Area_14	0.17	56.67	90.00	1.0000	3hr-2yr	CBMH_7
Area_15	0.09	30.00	90.00	1.0000	3hr-2yr	CBMH_6
Area_16	0.15	50.00	90.00	1.0000	3hr-2yr	CB_5
Area_17	0.17	56.67	90.00	1.0000	3hr-2yr	CBMH_4
Area_18	0.17	56.67	90.00	1.0000	3hr-2yr	CBMH_3
Area_19	0.17	56.67	90.00	1.0000	3hr-2yr	CBMH_2
Area_2	0.16	53.33	90.00	1.0000	3hr-2yr	CBMH_15
Area_20	0.28	93.33	90.00	1.0000	3hr-2yr	J13
Area_2001	0.07	7.00	25.00	0.5000	3hr-2yr	OF2
Area_2002	0.21	21.00	90.00	0.5000	3hr-2yr	OF2
Area_2003	0.16	16.00	90.00	1.0000	3hr-2yr	OF1
Area_2004	0.02	13.33	5.00	0.5000	3hr-2yr	Humber_P1
Area_2005	0.04	26.67	5.00	0.5000	3hr-2yr	Humber_P1
Area_21	0.21	70.00	90.00	1.0000	3hr-2yr	CBMH_11
Area_22	0.32	106.67	90.00	1.0000	3hr-2yr	CBMH_12
Area_23	0.16	53.33	90.00	1.0000	3hr-2yr	CB_29
Area_3	0.36	120.00	90.00	1.0000	3hr-2yr	DCB_16
Area_4	0.28	93.33	90.00	1.0000	3hr-2yr	CBMH_18
Area_5	0.15	50.00	90.00	1.0000	3hr-2yr	CB_27
Area_6	0.15	50.00	90.00	1.0000	3hr-2yr	CB_28
Area_7	0.04	13.33	90.00	1.0000	3hr-2yr	CBMH_19
Area_8	0.12	40.00	90.00	1.0000	3hr-2yr	CBMH_21
Area_9	0.12	40.00	90.00	1.0000	3hr-2yr	CBMH_22

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
CB_10	JUNCTION	65.33	1.41	10.0	
CB_23	JUNCTION	66.20	0.93	10.0	
CB_27	JUNCTION	65.48	1.34	10.0	
CB_28	JUNCTION	65.39	1.52	10.0	
CB_29	JUNCTION	64.11	2.43	0.0	
CB_5	JUNCTION	65.11	1.63	10.0	
CBMH_11	JUNCTION	63.58	2.16	10.0	
CBMH_12	JUNCTION	64.06	1.68	10.0	
CBMH_14	JUNCTION	64.11	2.21	10.0	
CBMH_15	JUNCTION	64.47	1.85	10.0	
CBMH_18	JUNCTION	64.05	2.54	0.0	
CBMH_19	JUNCTION	64.88	2.38	10.0	
CBMH_2	JUNCTION	64.06	2.94	10.0	
CBMH_21	JUNCTION	65.17	1.87	10.0	
CBMH_22	JUNCTION	65.53	1.51	10.0	

CBMH_3	JUNCTION	64.42	2.58	10.0
CBMH_4	JUNCTION	64.78	2.22	10.0
CBMH_6	JUNCTION	63.91	2.73	10.0
CBMH_7	JUNCTION	64.27	2.73	10.0
CBMH_8	JUNCTION	64.63	2.37	10.0
CBMH_9	JUNCTION	64.99	2.01	10.0
DCB_16	JUNCTION	64.80	1.52	10.0
J1	JUNCTION	63.75	3.27	0.0
J13	JUNCTION	63.54	3.10	10.0
J2	JUNCTION	63.24	3.33	0.0
MH_20	JUNCTION	64.99	2.30	0.0
MH_24	JUNCTION	64.13	2.50	10.0
MH_25	JUNCTION	64.42	2.63	0.0
MH_26	JUNCTION	64.56	2.70	0.0
MH_27	JUNCTION	63.89	2.02	0.0
MH_30	JUNCTION	63.73	3.08	0.0
MH_44	JUNCTION	63.51	3.51	0.0
MH_45	JUNCTION	63.11	3.46	0.0
OGS_1	JUNCTION	63.04	3.34	0.0
OGS_2	JUNCTION	63.47	3.01	0.0
Humber_P1	OUTFALL	62.48	0.38	0.0
OF1	OUTFALL	63.41	0.38	0.0
OF2	OUTFALL	0.00	0.00	0.0
SU_N	STORAGE	63.75	3.04	0.0
SU_S	STORAGE	63.24	3.33	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	SU_N	MH_44	CONDUIT	2.5	1.0001	0.0090
C10	CB_28	MH_26	CONDUIT	30.4	1.0001	0.0110
C11	CB_27	MH_26	CONDUIT	32.8	1.0001	0.0110
C12	MH_26	MH_25	CONDUIT	16.5	0.4970	0.0110
C13	MH_24	CBMH_18	CONDUIT	4.8	0.5000	0.0110
C14	CB_23	CBMH_22	CONDUIT	51.5	1.0001	0.0110
C15	CBMH_22	CBMH_21	CONDUIT	60.0	0.5000	0.0110
C16	CBMH_21	MH_20	CONDUIT	24.5	0.5020	0.0110
C17	MH_20	CBMH_19	CONDUIT	10.4	0.5000	0.0110
C18	CBMH_19	MH_24	CONDUIT	46.5	0.5011	0.0110
C19	CB_10	CBMH_9	CONDUIT	52.5	0.4991	0.0110
C2	MH_44	OGS_2	CONDUIT	11.6	0.3707	0.0110
C20	CBMH_9	CBMH_8	CONDUIT	60.0	0.5000	0.0110
C21	CBMH_8	CBMH_7	CONDUIT	60.0	0.5000	0.0110
C22	CBMH_7	CBMH_6	CONDUIT	60.0	0.5000	0.0110
C23	CBMH_6	J13	CONDUIT	29.9	0.5017	0.0110
C24	J13	SU_S	CONDUIT	4.0	0.5000	0.0110
C25	CB_5	CBMH_4	CONDUIT	52.5	0.4991	0.0110
C26	CBMH_4	CBMH_3	CONDUIT	60.0	0.5000	0.0110
C27	CBMH_3	CBMH_2	CONDUIT	60.0	0.5000	0.0110
C28	CBMH_2	MH_30	CONDUIT	53.4	0.4963	0.0110
C29	CBMH_12	CBMH_11	CONDUIT	50.0	0.5700	0.0110
C3	J1	MH_44	CONDUIT	2.5	0.4800	0.0110
C30	MH_30	J13	CONDUIT	9.3	0.4839	0.0110
C31	MH_27	CBMH_11	CONDUIT	8.2	0.5000	0.0110
C32	CBMH_11	SU_S	CONDUIT	13.2	0.5000	0.0110
C33	OGS_1	Humber_P1	CONDUIT	4.0	14.1135	0.0110
C34	OGS_2	OF1	CONDUIT	8.7	0.6782	0.0110
C35	MH_25	MH_24	CONDUIT	44.2	0.5000	0.0110
C36	CBMH_18	SU_N	CONDUIT	3.9	0.5128	0.0110
C37	CB_29	MH_27	CONDUIT	32.9	0.4985	0.0110
C4	SU_S	MH_45	CONDUIT	9.4	1.0001	0.0090
C5	J2	MH_45	CONDUIT	9.4	0.5000	0.0110
C6	MH_45	OGS_1	CONDUIT	3.1	0.4839	0.0110
C7	DCB_16	CBMH_15	CONDUIT	54.4	0.5000	0.0110
C8	CBMH_15	CBMH_14	CONDUIT	60.0	0.5000	0.0110
C9	CBMH_14	SU_N	CONDUIT	15.2	0.5000	0.0110
OR1	SU_S	J2	ORIFICE			
OR2	SU_N	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C10	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C11	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C12	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C13	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21
C15	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C16	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C17	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C18	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C19	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.13
C20	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C21	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C22	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C23	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36

C24	CIRCULAR	0.75	0.44	0.19	0.75	1	0.93
C25	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C26	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C27	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C28	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C29	CIRCULAR	0.38	0.11	0.09	0.38	1	0.16
C3	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C30	CIRCULAR	0.60	0.28	0.15	0.60	1	0.50
C31	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C32	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C33	CIRCULAR	0.38	0.11	0.09	0.38	1	0.78
C34	CIRCULAR	0.38	0.11	0.09	0.38	1	0.17
C35	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C36	CIRCULAR	0.75	0.44	0.19	0.75	1	0.94
C37	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C4	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C5	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	0.14
C7	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C8	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C9	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
Infiltration Method HORTON
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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 1.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 6
Head Tolerance 0.001500 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

Total Precipitation	0.225	31.880
Evaporation Loss	0.000	0.000
Infiltration Loss	0.017	2.387
Surface Runoff	0.208	29.513
Final Storage	0.000	0.000
Continuity Error (%)	-0.066	

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

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.208	2.081
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.208	2.081
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 (%)	-0.037	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

Link C2 (3)
 Link OR1 (1)
 Link OR2 (1)

 Routing Time Step Summary

Minimum Time Step : 0.30 sec
 Average Time Step : 1.00 sec
 Maximum Time Step : 1.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 2.00
 Percent Not Converging : 0.00
 Time Step Frequencies :
 1.000 - 0.871 sec : 99.92 %
 0.871 - 0.758 sec : 0.08 %
 0.758 - 0.660 sec : 0.00 %
 0.660 - 0.574 sec : 0.00 %
 0.574 - 0.500 sec : 0.00 %

 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 CMS	Runoff Coeff
Area_1	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.07	0.06	0.924
Area_10	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.02	0.02	0.924
Area_101	31.88	0.00	0.00	1.24	30.30	0.35	30.65	0.42	0.26	0.961
Area_102	31.88	0.00	0.00	1.24	30.30	0.35	30.65	0.35	0.21	0.961
Area_11	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.04	0.03	0.924
Area_12	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.05	0.04	0.924
Area_13	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.05	0.04	0.924
Area_14	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.05	0.04	0.924
Area_15	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.03	0.02	0.924
Area_16	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.04	0.04	0.924
Area_17	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.05	0.04	0.924
Area_18	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.05	0.04	0.924
Area_19	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.05	0.04	0.924
Area_2	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.05	0.04	0.924
Area_20	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.08	0.07	0.924
Area_2001	31.88	0.00	0.00	19.96	7.98	3.95	11.93	0.01	0.00	0.374
Area_2002	31.88	0.00	0.00	2.50	28.70	0.68	29.39	0.06	0.04	0.922
Area_2003	31.88	0.00	0.00	2.52	28.71	0.66	29.37	0.05	0.03	0.921
Area_2004	31.88	0.00	0.00	23.95	1.60	6.34	7.94	0.00	0.00	0.249
Area_2005	31.88	0.00	0.00	23.95	1.60	6.34	7.94	0.00	0.00	0.249
Area_21	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.06	0.05	0.924
Area_22	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.09	0.08	0.924
Area_23	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.05	0.04	0.924
Area_3	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.11	0.09	0.924
Area_4	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.08	0.07	0.924
Area_5	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.04	0.04	0.924
Area_6	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.04	0.04	0.924
Area_7	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.01	0.01	0.924
Area_8	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.04	0.03	0.924
Area_9	31.88	0.00	0.00	2.46	28.72	0.73	29.45	0.04	0.03	0.924

 Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB_10	JUNCTION	0.00	0.11	65.44	0 01:05	0.11
CB_23	JUNCTION	0.00	0.08	66.28	0 01:05	0.08
CB_27	JUNCTION	0.00	0.10	65.59	0 01:05	0.10
CB_28	JUNCTION	0.00	0.10	65.49	0 01:05	0.10
CB_29	JUNCTION	0.00	0.13	64.25	0 01:05	0.13
CB_5	JUNCTION	0.00	0.11	65.23	0 01:05	0.11
CBMH_11	JUNCTION	0.03	0.53	64.12	0 03:08	0.53
CBMH_12	JUNCTION	0.00	0.19	64.25	0 01:05	0.19
CBMH_14	JUNCTION	0.02	0.56	64.67	0 02:58	0.56
CBMH_15	JUNCTION	0.00	0.22	64.68	0 01:05	0.22
CBMH_18	JUNCTION	0.03	0.61	64.66	0 02:59	0.61
CBMH_19	JUNCTION	0.00	0.19	65.07	0 01:05	0.19
CBMH_2	JUNCTION	0.00	0.23	64.29	0 01:05	0.23
CBMH_21	JUNCTION	0.00	0.18	65.35	0 01:05	0.18
CBMH_22	JUNCTION	0.00	0.14	65.67	0 01:05	0.14
CBMH_3	JUNCTION	0.00	0.20	64.61	0 01:05	0.20
CBMH_4	JUNCTION	0.00	0.16	64.94	0 01:05	0.16
CBMH_6	JUNCTION	0.01	0.25	64.17	0 01:05	0.25
CBMH_7	JUNCTION	0.00	0.24	64.51	0 01:05	0.24
CBMH_8	JUNCTION	0.00	0.20	64.83	0 01:05	0.20
CBMH_9	JUNCTION	0.00	0.16	65.15	0 01:05	0.16
DCB_16	JUNCTION	0.00	0.18	64.98	0 01:05	0.18
J1	JUNCTION	0.01	0.08	63.83	0 02:59	0.08

J13	JUNCTION	0.03	0.60	64.13	0	03:02	0.59
J2	JUNCTION	0.01	0.08	63.31	0	03:07	0.08
MH_20	JUNCTION	0.00	0.18	65.17	0	01:05	0.18
MH_24	JUNCTION	0.02	0.53	64.66	0	02:59	0.53
MH_25	JUNCTION	0.01	0.35	64.77	0	01:05	0.35
MH_26	JUNCTION	0.00	0.40	64.95	0	01:05	0.39
MH_27	JUNCTION	0.01	0.23	64.12	0	03:08	0.23
MH_30	JUNCTION	0.01	0.39	64.12	0	03:06	0.39
MH_44	JUNCTION	0.01	0.10	63.62	0	03:00	0.10
MH_45	JUNCTION	0.01	0.07	63.19	0	03:07	0.07
OGS_1	JUNCTION	0.00	0.03	63.07	0	03:08	0.03
OGS_2	JUNCTION	0.01	0.09	63.56	0	02:59	0.09
Humber_P1	OUTFALL	0.00	0.00	62.48	0	00:00	0.00
OF1	OUTFALL	0.01	0.09	63.50	0	03:00	0.09
OF2	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU_N	STORAGE	0.06	0.91	64.66	0	02:59	0.91
SU_S	STORAGE	0.07	0.88	64.12	0	03:07	0.88

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB_10	JUNCTION	0.033	0.033	0 01:05	0.0383	0.0383	-0.012
CB_23	JUNCTION	0.020	0.020	0 01:05	0.0236	0.0236	-0.007
CB_27	JUNCTION	0.038	0.038	0 01:05	0.0442	0.0442	-0.004
CB_28	JUNCTION	0.038	0.038	0 01:05	0.0442	0.0442	-0.004
CB_29	JUNCTION	0.040	0.040	0 01:05	0.0471	0.0471	0.120
CB_5	JUNCTION	0.038	0.038	0 01:05	0.0442	0.0442	-0.012
CBMH_11	JUNCTION	0.265	0.384	0 01:05	0.408	0.549	-0.020
CBMH_12	JUNCTION	0.080	0.080	0 01:05	0.0942	0.0942	0.854
CBMH_14	JUNCTION	0.063	0.190	0 01:05	0.0736	0.255	-0.264
CBMH_15	JUNCTION	0.040	0.129	0 01:05	0.0471	0.155	0.586
CBMH_18	JUNCTION	0.070	0.480	0 01:05	0.0824	0.697	-0.003
CBMH_19	JUNCTION	0.010	0.088	0 01:05	0.0118	0.106	-0.007
CBMH_2	JUNCTION	0.043	0.160	0 01:05	0.0501	0.194	0.319
CBMH_21	JUNCTION	0.030	0.079	0 01:05	0.0353	0.0942	-0.003
CBMH_22	JUNCTION	0.030	0.050	0 01:05	0.0353	0.0589	-0.010
CBMH_3	JUNCTION	0.043	0.120	0 01:05	0.0501	0.144	-0.012
CBMH_4	JUNCTION	0.043	0.080	0 01:05	0.0501	0.0942	-0.011
CBMH_6	JUNCTION	0.023	0.170	0 01:05	0.0265	0.21	0.058
CBMH_7	JUNCTION	0.043	0.150	0 01:05	0.0501	0.183	0.147
CBMH_8	JUNCTION	0.040	0.111	0 01:05	0.0471	0.133	-0.011
CBMH_9	JUNCTION	0.040	0.072	0 01:05	0.0471	0.0854	-0.010
DCB_16	JUNCTION	0.090	0.090	0 01:05	0.106	0.106	0.166
J1	JUNCTION	0.000	0.012	0 02:59	0	0.878	-0.005
J13	JUNCTION	0.070	0.394	0 01:05	0.0824	0.578	-0.037
J2	JUNCTION	0.000	0.011	0 03:07	0	1.03	-0.004
MH_20	JUNCTION	0.000	0.078	0 01:05	0	0.0942	-0.001
MH_24	JUNCTION	0.000	0.420	0 01:05	0	0.612	-0.310
MH_25	JUNCTION	0.000	0.332	0 01:05	0	0.508	0.360
MH_26	JUNCTION	0.257	0.331	0 01:05	0.42	0.508	0.047
MH_27	JUNCTION	0.000	0.040	0 01:05	0	0.0471	-0.032
MH_30	JUNCTION	0.000	0.160	0 01:05	0	0.21	-0.281
MH_44	JUNCTION	0.000	0.021	0 02:59	0	0.924	0.006
MH_45	JUNCTION	0.000	0.012	0 03:08	0	1.04	0.001
OGS_1	JUNCTION	0.000	0.012	0 03:08	0	1.04	-0.000
OGS_2	JUNCTION	0.000	0.021	0 02:59	0	0.924	-0.006
Humber_P1	OUTFALL	0.001	0.012	0 03:05	0.00476	1.04	0.000
OF1	OUTFALL	0.033	0.039	0 01:05	0.047	0.971	0.000
OF2	OUTFALL	0.043	0.043	0 01:05	0.0701	0.0701	0.000
SU_N	STORAGE	0.000	0.667	0 01:05	0	0.951	-0.092
SU_S	STORAGE	0.000	0.776	0 01:05	0	1.11	-0.107

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Full	Evap Loss	Exfil Loss	Maximum Volume 1000 m3	Max Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU_N	0.045	2	0	0	0.767	30	0 02:59	0.028

SU_s 0.065 2 0 0 0.914 26 0 03:07 0.061

 Outfall Loading Summary

Outfall Node	Flow Freq Pent	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Humber_Pl	26.62	0.005	0.012	1.040
OF1	22.05	0.005	0.039	0.971
OF2	2.60	0.003	0.043	0.070
System	17.09	0.013	0.090	2.081

 Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.010	0 02:59	1.18	0.20	0.31
C10	CONDUIT	0.037	0 01:05	1.40	0.11	0.23
C11	CONDUIT	0.037	0 01:05	1.40	0.11	0.23
C12	CONDUIT	0.332	0 01:05	1.92	0.93	0.75
C13	CONDUIT	0.419	0 01:05	2.02	0.82	0.90
C14	CONDUIT	0.020	0 01:05	1.19	0.10	0.21
C15	CONDUIT	0.049	0 01:05	1.18	0.21	0.31
C16	CONDUIT	0.078	0 01:05	1.35	0.33	0.39
C17	CONDUIT	0.079	0 01:05	1.35	0.33	0.40
C18	CONDUIT	0.088	0 01:05	1.39	0.37	0.42
C19	CONDUIT	0.032	0 01:05	1.05	0.13	0.25
C2	CONDUIT	0.021	0 02:59	0.94	0.17	0.26
C20	CONDUIT	0.071	0 01:05	1.30	0.20	0.30
C21	CONDUIT	0.109	0 01:05	1.46	0.30	0.38
C22	CONDUIT	0.150	0 01:05	1.59	0.42	0.45
C23	CONDUIT	0.171	0 01:05	1.64	0.47	0.55
C24	CONDUIT	0.394	0 01:05	2.02	0.42	0.80
C25	CONDUIT	0.037	0 01:05	1.07	0.10	0.22
C26	CONDUIT	0.078	0 01:05	1.32	0.15	0.26
C27	CONDUIT	0.119	0 01:05	1.48	0.23	0.33
C28	CONDUIT	0.160	0 01:05	1.60	0.31	0.38
C29	CONDUIT	0.080	0 01:05	1.33	0.51	0.57
C3	CONDUIT	0.012	0 02:59	0.80	0.15	0.26
C30	CONDUIT	0.160	0 01:05	1.58	0.32	0.69
C31	CONDUIT	0.040	0 01:05	1.09	0.27	0.66
C32	CONDUIT	0.382	0 01:05	2.05	1.06	1.00
C33	CONDUIT	0.012	0 03:08	2.58	0.02	0.09
C34	CONDUIT	0.021	0 03:00	1.05	0.12	0.24
C35	CONDUIT	0.332	0 01:05	1.93	0.65	0.59
C36	CONDUIT	0.480	0 01:05	2.14	0.51	0.83
C37	CONDUIT	0.040	0 01:05	1.13	0.27	0.36
C4	CONDUIT	0.001	0 03:08	0.54	0.01	0.08
C5	CONDUIT	0.011	0 03:07	0.81	0.14	0.25
C6	CONDUIT	0.012	0 03:08	0.79	0.08	0.20
C7	CONDUIT	0.089	0 01:05	1.38	0.25	0.34
C8	CONDUIT	0.128	0 01:05	1.53	0.36	0.66
C9	CONDUIT	0.189	0 01:05	1.68	0.37	0.97
OR1	ORIFICE	0.011	0 03:07			1.00
OR2	ORIFICE	0.012	0 02:59			1.00

 Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Crit	Inlet Ltd	Ctrl
C1	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C12	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.01	0.00
C13	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C15	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C18	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C19	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C2	1.00	0.00	0.11	0.00	0.76	0.13	0.00	0.00	0.79	0.00
C20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C21	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C22	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.03	0.00
C23	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.03	0.00
C24	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.01	0.00

C25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C26	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C27	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C28	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.05	0.00
C29	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.06	0.00
C3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C30	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.92	0.01	0.00
C31	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.01	0.00
C32	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.01	0.00
C33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C34	1.00	0.00	0.00	0.00	0.76	0.24	0.00	0.00	0.04	0.00
C35	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.03	0.00
C36	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.00	0.00
C37	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.03	0.00
C4	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.02	0.00
C8	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.04	0.00
C9	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.01	0.00

 Conduit Surcharge Summary

Conduit	Hours Full			Hours	
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Hours Capacity Limited
C32	0.83	0.83	4.15	0.02	0.01
C9	0.01	0.01	1.77	0.01	0.01

Analysis begun on: Wed Oct 5 20:35:01 2022
 Analysis ended on: Wed Oct 5 20:35:31 2022
 Total elapsed time: 00:00:30

2-yr, 6-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

WARNING 03: negative offset ignored for Link C2
 WARNING 03: negative offset ignored for Link C32
 WARNING 03: negative offset ignored for Link C34

 Element Count

Number of rain gages 7
 Number of subcatchments ... 30
 Number of nodes 40
 Number of links 39
 Number of pollutants 0
 Number of land uses 0

 Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

 Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Area_1	0.25	83.33	90.00	1.0000	6hr-2yr	CBMH_14
Area_10	0.08	26.67	90.00	1.0000	6hr-2yr	CB_23
Area_101	1.37	137.00	95.00	0.5000	6hr-2yr	MH_26
Area_102	1.13	113.00	95.00	0.5000	6hr-2yr	CBMH_11
Area_11	0.13	43.33	90.00	1.0000	6hr-2yr	CB_10
Area_12	0.16	53.33	90.00	1.0000	6hr-2yr	CBMH_9
Area_13	0.16	53.33	90.00	1.0000	6hr-2yr	CBMH_8
Area_14	0.17	56.67	90.00	1.0000	6hr-2yr	CBMH_7
Area_15	0.09	30.00	90.00	1.0000	6hr-2yr	CBMH_6
Area_16	0.15	50.00	90.00	1.0000	6hr-2yr	CB_5
Area_17	0.17	56.67	90.00	1.0000	6hr-2yr	CBMH_4
Area_18	0.17	56.67	90.00	1.0000	6hr-2yr	CBMH_3
Area_19	0.17	56.67	90.00	1.0000	6hr-2yr	CBMH_2
Area_2	0.16	53.33	90.00	1.0000	6hr-2yr	CBMH_15
Area_20	0.28	93.33	90.00	1.0000	6hr-2yr	J13
Area_2001	0.07	7.00	25.00	0.5000	6hr-2yr	OF2
Area_2002	0.21	21.00	90.00	0.5000	6hr-2yr	OF2
Area_2003	0.16	16.00	90.00	1.0000	6hr-2yr	OF1
Area_2004	0.02	13.33	5.00	0.5000	6hr-2yr	Humber_P1
Area_2005	0.04	26.67	5.00	0.5000	6hr-2yr	Humber_P1
Area_21	0.21	70.00	90.00	1.0000	6hr-2yr	CBMH_11
Area_22	0.32	106.67	90.00	1.0000	6hr-2yr	CBMH_12
Area_23	0.16	53.33	90.00	1.0000	6hr-2yr	CB_29
Area_3	0.36	120.00	90.00	1.0000	6hr-2yr	DCB_16
Area_4	0.28	93.33	90.00	1.0000	6hr-2yr	CBMH_18
Area_5	0.15	50.00	90.00	1.0000	6hr-2yr	CB_27
Area_6	0.15	50.00	90.00	1.0000	6hr-2yr	CB_28
Area_7	0.04	13.33	90.00	1.0000	6hr-2yr	CBMH_19
Area_8	0.12	40.00	90.00	1.0000	6hr-2yr	CBMH_21
Area_9	0.12	40.00	90.00	1.0000	6hr-2yr	CBMH_22

 Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
CB_10	JUNCTION	65.33	1.41	10.0	
CB_23	JUNCTION	66.20	0.93	10.0	
CB_27	JUNCTION	65.48	1.34	10.0	
CB_28	JUNCTION	65.39	1.52	10.0	
CB_29	JUNCTION	64.11	2.43	0.0	
CB_5	JUNCTION	65.11	1.63	10.0	
CBMH_11	JUNCTION	63.58	2.16	10.0	
CBMH_12	JUNCTION	64.06	1.68	10.0	
CBMH_14	JUNCTION	64.11	2.21	10.0	
CBMH_15	JUNCTION	64.47	1.85	10.0	
CBMH_18	JUNCTION	64.05	2.54	0.0	
CBMH_19	JUNCTION	64.88	2.38	10.0	
CBMH_2	JUNCTION	64.06	2.94	10.0	
CBMH_21	JUNCTION	65.17	1.87	10.0	
CBMH_22	JUNCTION	65.53	1.51	10.0	

CBMH_3	JUNCTION	64.42	2.58	10.0
CBMH_4	JUNCTION	64.78	2.22	10.0
CBMH_6	JUNCTION	63.91	2.73	10.0
CBMH_7	JUNCTION	64.27	2.73	10.0
CBMH_8	JUNCTION	64.63	2.37	10.0
CBMH_9	JUNCTION	64.99	2.01	10.0
DCB_16	JUNCTION	64.80	1.52	10.0
J1	JUNCTION	63.75	3.27	0.0
J13	JUNCTION	63.54	3.10	10.0
J2	JUNCTION	63.24	3.33	0.0
MH_20	JUNCTION	64.99	2.30	0.0
MH_24	JUNCTION	64.13	2.50	10.0
MH_25	JUNCTION	64.42	2.63	0.0
MH_26	JUNCTION	64.56	2.70	0.0
MH_27	JUNCTION	63.89	2.02	0.0
MH_30	JUNCTION	63.73	3.08	0.0
MH_44	JUNCTION	63.51	3.51	0.0
MH_45	JUNCTION	63.11	3.46	0.0
OGS_1	JUNCTION	63.04	3.34	0.0
OGS_2	JUNCTION	63.47	3.01	0.0
Humber_P1	OUTFALL	62.48	0.38	0.0
OF1	OUTFALL	63.41	0.38	0.0
OF2	OUTFALL	0.00	0.00	0.0
SU_N	STORAGE	63.75	3.04	0.0
SU_S	STORAGE	63.24	3.33	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	SU_N	MH_44	CONDUIT	2.5	1.0001	0.0090
C10	CB_28	MH_26	CONDUIT	30.4	1.0001	0.0110
C11	CB_27	MH_26	CONDUIT	32.8	1.0001	0.0110
C12	MH_26	MH_25	CONDUIT	16.5	0.4970	0.0110
C13	MH_24	CBMH_18	CONDUIT	4.8	0.5000	0.0110
C14	CB_23	CBMH_22	CONDUIT	51.5	1.0001	0.0110
C15	CBMH_22	CBMH_21	CONDUIT	60.0	0.5000	0.0110
C16	CBMH_21	MH_20	CONDUIT	24.5	0.5020	0.0110
C17	MH_20	CBMH_19	CONDUIT	10.4	0.5000	0.0110
C18	CBMH_19	MH_24	CONDUIT	46.5	0.5011	0.0110
C19	CB_10	CBMH_9	CONDUIT	52.5	0.4991	0.0110
C2	MH_44	OGS_2	CONDUIT	11.6	0.3707	0.0110
C20	CBMH_9	CBMH_8	CONDUIT	60.0	0.5000	0.0110
C21	CBMH_8	CBMH_7	CONDUIT	60.0	0.5000	0.0110
C22	CBMH_7	CBMH_6	CONDUIT	60.0	0.5000	0.0110
C23	CBMH_6	J13	CONDUIT	29.9	0.5017	0.0110
C24	J13	SU_S	CONDUIT	4.0	0.5000	0.0110
C25	CB_5	CBMH_4	CONDUIT	52.5	0.4991	0.0110
C26	CBMH_4	CBMH_3	CONDUIT	60.0	0.5000	0.0110
C27	CBMH_3	CBMH_2	CONDUIT	60.0	0.5000	0.0110
C28	CBMH_2	MH_30	CONDUIT	53.4	0.4963	0.0110
C29	CBMH_12	CBMH_11	CONDUIT	50.0	0.5700	0.0110
C3	J1	MH_44	CONDUIT	2.5	0.4800	0.0110
C30	MH_30	J13	CONDUIT	9.3	0.4839	0.0110
C31	MH_27	CBMH_11	CONDUIT	8.2	0.5000	0.0110
C32	CBMH_11	SU_S	CONDUIT	13.2	0.5000	0.0110
C33	OGS_1	Humber_P1	CONDUIT	4.0	14.1135	0.0110
C34	OGS_2	OF1	CONDUIT	8.7	0.6782	0.0110
C35	MH_25	MH_24	CONDUIT	44.2	0.5000	0.0110
C36	CBMH_18	SU_N	CONDUIT	3.9	0.5128	0.0110
C37	CB_29	MH_27	CONDUIT	32.9	0.4985	0.0110
C4	SU_S	MH_45	CONDUIT	9.4	1.0001	0.0090
C5	J2	MH_45	CONDUIT	9.4	0.5000	0.0110
C6	MH_45	OGS_1	CONDUIT	3.1	0.4839	0.0110
C7	DCB_16	CBMH_15	CONDUIT	54.4	0.5000	0.0110
C8	CBMH_15	CBMH_14	CONDUIT	60.0	0.5000	0.0110
C9	CBMH_14	SU_N	CONDUIT	15.2	0.5000	0.0110
OR1	SU_S	J2	ORIFICE			
OR2	SU_N	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C10	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C11	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C12	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C13	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21
C15	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C16	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C17	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C18	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C19	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.13
C20	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C21	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C22	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C23	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36

C24	CIRCULAR	0.75	0.44	0.19	0.75	1	0.93
C25	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C26	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C27	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C28	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C29	CIRCULAR	0.38	0.11	0.09	0.38	1	0.16
C3	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C30	CIRCULAR	0.60	0.28	0.15	0.60	1	0.50
C31	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C32	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C33	CIRCULAR	0.38	0.11	0.09	0.38	1	0.78
C34	CIRCULAR	0.38	0.11	0.09	0.38	1	0.17
C35	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C36	CIRCULAR	0.75	0.44	0.19	0.75	1	0.94
C37	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C4	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C5	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	0.14
C7	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C8	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C9	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
Infiltration Method HORTON
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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 1.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 6
Head Tolerance 0.001500 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

	-----	-----
Total Precipitation	0.260	36.865
Evaporation Loss	0.000	0.000
Infiltration Loss	0.017	2.475
Surface Runoff	0.243	34.409
Final Storage	0.000	0.000
Continuity Error (%)	-0.052	

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

	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.243	2.426
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.243	2.427
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 (%)	-0.032	

Time-Step Critical Elements

Link C33 (1.54%)

Highest Flow Instability Indexes

Link C2 (4)
 Link OR1 (1)
 Link OR2 (1)

 Routing Time Step Summary

Minimum Time Step : 0.15 sec
 Average Time Step : 1.00 sec
 Maximum Time Step : 1.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 2.00
 Percent Not Converging : 0.00
 Time Step Frequencies :
 1.000 - 0.871 sec : 99.94 %
 0.871 - 0.758 sec : 0.05 %
 0.758 - 0.660 sec : 0.01 %
 0.660 - 0.574 sec : 0.00 %
 0.574 - 0.500 sec : 0.00 %

 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 CMS	Runoff Coeff
Area_1	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.09	0.06	0.931
Area_10	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.03	0.02	0.931
Area_101	36.86	0.00	0.00	1.29	35.03	0.56	35.59	0.49	0.28	0.965
Area_102	36.86	0.00	0.00	1.29	35.03	0.56	35.59	0.40	0.23	0.965
Area_11	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.04	0.03	0.931
Area_12	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.05	0.04	0.931
Area_13	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.05	0.04	0.931
Area_14	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.06	0.04	0.931
Area_15	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.03	0.02	0.931
Area_16	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.05	0.04	0.931
Area_17	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.06	0.04	0.931
Area_18	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.06	0.04	0.931
Area_19	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.06	0.04	0.931
Area_2	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.05	0.04	0.931
Area_20	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.10	0.07	0.931
Area_2001	36.86	0.00	0.00	20.55	9.22	7.10	16.32	0.01	0.00	0.443
Area_2002	36.86	0.00	0.00	2.59	33.19	1.10	34.29	0.07	0.04	0.930
Area_2003	36.86	0.00	0.00	2.61	33.19	1.08	34.27	0.05	0.03	0.930
Area_2004	36.86	0.00	0.00	24.74	1.84	10.29	12.13	0.00	0.00	0.329
Area_2005	36.86	0.00	0.00	24.74	1.84	10.29	12.13	0.00	0.00	0.329
Area_21	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.07	0.05	0.931
Area_22	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.11	0.08	0.931
Area_23	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.05	0.04	0.931
Area_3	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.12	0.09	0.931
Area_4	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.10	0.07	0.931
Area_5	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.05	0.04	0.931
Area_6	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.05	0.04	0.931
Area_7	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.01	0.01	0.931
Area_8	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.04	0.03	0.931
Area_9	36.86	0.00	0.00	2.56	33.20	1.13	34.33	0.04	0.03	0.931

 Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB_10	JUNCTION	0.00	0.11	65.44	0 02:10	0.11
CB_23	JUNCTION	0.00	0.08	66.28	0 02:10	0.08
CB_27	JUNCTION	0.00	0.10	65.59	0 02:10	0.10
CB_28	JUNCTION	0.00	0.10	65.49	0 02:10	0.10
CB_29	JUNCTION	0.00	0.14	64.25	0 02:10	0.14
CB_5	JUNCTION	0.00	0.12	65.23	0 02:10	0.12
CBMH_11	JUNCTION	0.03	0.57	64.15	0 04:41	0.57
CBMH_12	JUNCTION	0.00	0.19	64.25	0 02:10	0.19
CBMH_14	JUNCTION	0.03	0.58	64.68	0 03:37	0.57
CBMH_15	JUNCTION	0.01	0.22	64.69	0 02:10	0.22
CBMH_18	JUNCTION	0.03	0.63	64.68	0 03:42	0.63
CBMH_19	JUNCTION	0.00	0.19	65.07	0 02:10	0.19
CBMH_2	JUNCTION	0.00	0.23	64.29	0 02:10	0.23
CBMH_21	JUNCTION	0.00	0.18	65.35	0 02:10	0.18
CBMH_22	JUNCTION	0.00	0.14	65.67	0 02:10	0.14
CBMH_3	JUNCTION	0.00	0.20	64.62	0 02:10	0.20
CBMH_4	JUNCTION	0.00	0.16	64.94	0 02:10	0.16
CBMH_6	JUNCTION	0.01	0.26	64.17	0 02:10	0.26
CBMH_7	JUNCTION	0.00	0.24	64.51	0 02:10	0.24
CBMH_8	JUNCTION	0.00	0.20	64.83	0 02:10	0.20
CBMH_9	JUNCTION	0.00	0.16	65.15	0 02:10	0.16
DCB_16	JUNCTION	0.00	0.18	64.98	0 02:10	0.18
J1	JUNCTION	0.01	0.08	63.83	0 03:39	0.08

J13	JUNCTION	0.04	0.62	64.16	0	04:18	0.62
J2	JUNCTION	0.01	0.08	63.31	0	04:41	0.08
MH_20	JUNCTION	0.00	0.18	65.17	0	02:10	0.18
MH_24	JUNCTION	0.03	0.55	64.68	0	03:42	0.54
MH_25	JUNCTION	0.01	0.37	64.79	0	02:10	0.37
MH_26	JUNCTION	0.00	0.41	64.97	0	02:10	0.41
MH_27	JUNCTION	0.01	0.26	64.15	0	04:41	0.26
MH_30	JUNCTION	0.02	0.42	64.15	0	04:39	0.42
MH_44	JUNCTION	0.01	0.12	63.63	0	03:39	0.12
MH_45	JUNCTION	0.01	0.09	63.20	0	04:41	0.09
OGS_1	JUNCTION	0.01	0.04	63.08	0	04:41	0.04
OGS_2	JUNCTION	0.01	0.10	63.57	0	03:39	0.10
Humber_P1	OUTFALL	0.00	0.00	62.48	0	00:00	0.00
OF1	OUTFALL	0.01	0.10	63.51	0	03:39	0.10
OF2	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU_N	STORAGE	0.07	0.93	64.68	0	03:39	0.93
SU_S	STORAGE	0.08	0.91	64.15	0	04:41	0.91

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB_10	JUNCTION	0.033	0.033	0 02:10	0.0446	0.0446	-0.008
CB_23	JUNCTION	0.021	0.021	0 02:10	0.0275	0.0275	-0.005
CB_27	JUNCTION	0.038	0.038	0 02:10	0.0515	0.0515	-0.003
CB_28	JUNCTION	0.038	0.038	0 02:10	0.0515	0.0515	-0.003
CB_29	JUNCTION	0.041	0.041	0 02:10	0.0549	0.0549	0.137
CB_5	JUNCTION	0.038	0.038	0 02:10	0.0515	0.0515	-0.009
CBMH_11	JUNCTION	0.283	0.405	0 02:10	0.474	0.638	-0.024
CBMH_12	JUNCTION	0.082	0.082	0 02:10	0.11	0.11	0.895
CBMH_14	JUNCTION	0.064	0.194	0 02:10	0.0858	0.28	-0.250
CBMH_15	JUNCTION	0.041	0.132	0 02:10	0.0549	0.179	0.547
CBMH_18	JUNCTION	0.072	0.505	0 02:10	0.0961	0.915	-0.006
CBMH_19	JUNCTION	0.010	0.090	0 02:10	0.0137	0.124	0.005
CBMH_2	JUNCTION	0.044	0.164	0 02:10	0.0584	0.226	0.273
CBMH_21	JUNCTION	0.031	0.080	0 02:10	0.0412	0.11	-0.002
CBMH_22	JUNCTION	0.031	0.051	0 02:10	0.0412	0.0687	-0.007
CBMH_3	JUNCTION	0.044	0.123	0 02:10	0.0584	0.168	0.068
CBMH_4	JUNCTION	0.044	0.081	0 02:10	0.0584	0.11	-0.007
CBMH_6	JUNCTION	0.023	0.174	0 02:10	0.0309	0.243	0.055
CBMH_7	JUNCTION	0.044	0.154	0 02:10	0.0584	0.213	0.159
CBMH_8	JUNCTION	0.041	0.113	0 02:10	0.0549	0.155	-0.008
CBMH_9	JUNCTION	0.041	0.074	0 02:10	0.0549	0.0996	-0.007
DCB_16	JUNCTION	0.092	0.092	0 02:10	0.124	0.124	0.183
J1	JUNCTION	0.000	0.012	0 03:39	0	0.953	-0.005
J13	JUNCTION	0.072	0.404	0 02:10	0.0961	0.664	-0.052
J2	JUNCTION	0.000	0.012	0 04:41	0	1.15	-0.004
MH_20	JUNCTION	0.000	0.080	0 02:10	0	0.11	-0.001
MH_24	JUNCTION	0.000	0.445	0 02:10	0	0.764	-0.276
MH_25	JUNCTION	0.000	0.354	0 02:10	0	0.591	0.349
MH_26	JUNCTION	0.278	0.354	0 02:10	0.488	0.591	0.049
MH_27	JUNCTION	0.000	0.041	0 02:10	0	0.0549	-0.048
MH_30	JUNCTION	0.000	0.163	0 02:10	0	0.242	-0.287
MH_44	JUNCTION	0.000	0.027	0 03:39	0	1.08	0.005
MH_45	JUNCTION	0.000	0.018	0 04:41	0	1.21	0.001
OGS_1	JUNCTION	0.000	0.018	0 04:41	0	1.21	-0.000
OGS_2	JUNCTION	0.000	0.027	0 03:39	0	1.08	-0.005
Humber_P1	OUTFALL	0.001	0.018	0 04:38	0.00728	1.21	0.000
OF1	OUTFALL	0.034	0.042	0 02:10	0.0548	1.13	0.000
OF2	OUTFALL	0.046	0.046	0 02:10	0.0834	0.0834	0.000
SU_N	STORAGE	0.000	0.697	0 02:10	0	1.14	-0.093
SU_S	STORAGE	0.000	0.807	0 02:10	0	1.29	-0.100

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Full	Evap Loss	Exfil Loss	Maximum Volume 1000 m3	Max Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU_N	0.052	2	0	0	0.783	30	0 03:39	0.034

SU_s 0.076 2 0 0 0.957 28 0 04:41 0.058

 Outfall Loading Summary

Outfall Node	Flow Freq Pent	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Humber_Pl	28.18	0.005	0.018	1.213
OF1	23.24	0.006	0.042	1.130
OF2	3.86	0.003	0.046	0.083
System	18.42	0.014	0.097	2.427

 Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.015	0 03:39	1.34	0.31	0.39
C10	CONDUIT	0.038	0 02:10	1.41	0.11	0.23
C11	CONDUIT	0.038	0 02:10	1.41	0.11	0.23
C12	CONDUIT	0.354	0 02:10	1.97	0.99	0.78
C13	CONDUIT	0.443	0 02:10	2.04	0.86	0.93
C14	CONDUIT	0.020	0 02:10	1.19	0.10	0.21
C15	CONDUIT	0.050	0 02:10	1.19	0.21	0.31
C16	CONDUIT	0.080	0 02:10	1.36	0.34	0.40
C17	CONDUIT	0.080	0 02:10	1.35	0.34	0.40
C18	CONDUIT	0.090	0 02:10	1.40	0.38	0.42
C19	CONDUIT	0.033	0 02:10	1.05	0.14	0.25
C2	CONDUIT	0.027	0 03:39	1.00	0.21	0.29
C20	CONDUIT	0.073	0 02:10	1.30	0.20	0.31
C21	CONDUIT	0.112	0 02:10	1.47	0.31	0.38
C22	CONDUIT	0.153	0 02:10	1.60	0.43	0.46
C23	CONDUIT	0.175	0 02:10	1.65	0.48	0.61
C24	CONDUIT	0.405	0 02:10	2.03	0.43	0.84
C25	CONDUIT	0.038	0 02:10	1.08	0.11	0.22
C26	CONDUIT	0.080	0 02:10	1.32	0.16	0.27
C27	CONDUIT	0.122	0 02:10	1.49	0.24	0.33
C28	CONDUIT	0.163	0 02:10	1.61	0.32	0.39
C29	CONDUIT	0.082	0 02:10	1.32	0.52	0.62
C3	CONDUIT	0.012	0 03:39	0.80	0.15	0.26
C30	CONDUIT	0.164	0 02:10	1.59	0.32	0.74
C31	CONDUIT	0.041	0 02:10	1.08	0.28	0.75
C32	CONDUIT	0.403	0 02:10	2.10	1.12	1.00
C33	CONDUIT	0.018	0 04:41	2.92	0.02	0.11
C34	CONDUIT	0.027	0 03:39	1.12	0.16	0.27
C35	CONDUIT	0.356	0 02:10	1.95	0.69	0.62
C36	CONDUIT	0.505	0 02:10	2.17	0.54	0.85
C37	CONDUIT	0.041	0 02:10	1.14	0.28	0.36
C4	CONDUIT	0.007	0 04:41	1.06	0.14	0.25
C5	CONDUIT	0.012	0 04:41	0.81	0.14	0.26
C6	CONDUIT	0.018	0 04:41	0.89	0.13	0.24
C7	CONDUIT	0.091	0 02:10	1.39	0.25	0.34
C8	CONDUIT	0.131	0 02:10	1.53	0.36	0.69
C9	CONDUIT	0.193	0 02:10	1.69	0.38	0.98
OR1	ORIFICE	0.012	0 04:41			1.00
OR2	ORIFICE	0.012	0 03:39			1.00

 Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Crit	Inlet Ltd	Ctrl
C1	1.00	0.98	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C12	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.01	0.00
C13	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C15	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C18	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C19	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C2	1.00	0.00	0.10	0.00	0.76	0.14	0.00	0.00	0.78	0.00
C20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C21	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C22	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.04	0.00
C23	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.03	0.00
C24	1.00	0.00	0.00	0.00	0.12	0.00	0.00	0.88	0.01	0.00

C25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C26	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C27	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.01	0.00
C28	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.05	0.00
C29	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.05	0.00
C3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C30	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.01	0.00
C31	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.01	0.00
C32	1.00	0.00	0.00	0.00	0.12	0.00	0.00	0.88	0.01	0.00
C33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C34	1.00	0.00	0.00	0.00	0.74	0.26	0.00	0.00	0.04	0.00
C35	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.03	0.00
C36	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.00	0.00
C37	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.03	0.00
C4	1.00	0.98	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.03	0.00
C8	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.04	0.00
C9	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.90	0.01	0.00

 Conduit Surcharge Summary

Conduit	Hours Full			Hours	
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Hours Capacity Limited
C29	0.01	0.01	1.00	0.01	0.01
C32	4.03	4.03	6.86	0.04	0.01
C9	0.01	0.01	3.57	0.01	0.01

Analysis begun on: Wed Oct 5 21:11:37 2022
 Analysis ended on: Wed Oct 5 21:12:08 2022
 Total elapsed time: 00:00:31

5-yr, 3-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link C32
WARNING 03: negative offset ignored for Link C34

Element Count

Number of rain gages 7
Number of subcatchments ... 30
Number of nodes 40
Number of links 39
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Area_1	0.25	83.33	90.00	1.0000	3hr-5yr	CBMH_14
Area_10	0.08	26.67	90.00	1.0000	3hr-5yr	CB_23
Area_101	1.37	137.00	95.00	0.5000	3hr-5yr	MH_26
Area_102	1.13	113.00	95.00	0.5000	3hr-5yr	CBMH_11
Area_11	0.13	43.33	90.00	1.0000	3hr-5yr	CB_10
Area_12	0.16	53.33	90.00	1.0000	3hr-5yr	CBMH_9
Area_13	0.16	53.33	90.00	1.0000	3hr-5yr	CBMH_8
Area_14	0.17	56.67	90.00	1.0000	3hr-5yr	CBMH_7
Area_15	0.09	30.00	90.00	1.0000	3hr-5yr	CBMH_6
Area_16	0.15	50.00	90.00	1.0000	3hr-5yr	CB_5
Area_17	0.17	56.67	90.00	1.0000	3hr-5yr	CBMH_4
Area_18	0.17	56.67	90.00	1.0000	3hr-5yr	CBMH_3
Area_19	0.17	56.67	90.00	1.0000	3hr-5yr	CBMH_2
Area_2	0.16	53.33	90.00	1.0000	3hr-5yr	CBMH_15
Area_20	0.28	93.33	90.00	1.0000	3hr-5yr	J13
Area_2001	0.07	7.00	25.00	0.5000	3hr-5yr	OF2
Area_2002	0.21	21.00	90.00	0.5000	3hr-5yr	OF2
Area_2003	0.16	16.00	90.00	1.0000	3hr-5yr	OF1
Area_2004	0.02	13.33	5.00	0.5000	3hr-5yr	Humber_P1
Area_2005	0.04	26.67	5.00	0.5000	3hr-5yr	Humber_P1
Area_21	0.21	70.00	90.00	1.0000	3hr-5yr	CBMH_11
Area_22	0.32	106.67	90.00	1.0000	3hr-5yr	CBMH_12
Area_23	0.16	53.33	90.00	1.0000	3hr-5yr	CB_29
Area_3	0.36	120.00	90.00	1.0000	3hr-5yr	DCB_16
Area_4	0.28	93.33	90.00	1.0000	3hr-5yr	CBMH_18
Area_5	0.15	50.00	90.00	1.0000	3hr-5yr	CB_27
Area_6	0.15	50.00	90.00	1.0000	3hr-5yr	CB_28
Area_7	0.04	13.33	90.00	1.0000	3hr-5yr	CBMH_19
Area_8	0.12	40.00	90.00	1.0000	3hr-5yr	CBMH_21
Area_9	0.12	40.00	90.00	1.0000	3hr-5yr	CBMH_22

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
CB_10	JUNCTION	65.33	1.41	10.0	
CB_23	JUNCTION	66.20	0.93	10.0	
CB_27	JUNCTION	65.48	1.34	10.0	
CB_28	JUNCTION	65.39	1.52	10.0	
CB_29	JUNCTION	64.11	2.43	0.0	
CB_5	JUNCTION	65.11	1.63	10.0	
CBMH_11	JUNCTION	63.58	2.16	10.0	
CBMH_12	JUNCTION	64.06	1.68	10.0	
CBMH_14	JUNCTION	64.11	2.21	10.0	
CBMH_15	JUNCTION	64.47	1.85	10.0	
CBMH_18	JUNCTION	64.05	2.54	0.0	
CBMH_19	JUNCTION	64.88	2.38	10.0	
CBMH_2	JUNCTION	64.06	2.94	10.0	
CBMH_21	JUNCTION	65.17	1.87	10.0	
CBMH_22	JUNCTION	65.53	1.51	10.0	

CBMH_3	JUNCTION	64.42	2.58	10.0
CBMH_4	JUNCTION	64.78	2.22	10.0
CBMH_6	JUNCTION	63.91	2.73	10.0
CBMH_7	JUNCTION	64.27	2.73	10.0
CBMH_8	JUNCTION	64.63	2.37	10.0
CBMH_9	JUNCTION	64.99	2.01	10.0
DCB_16	JUNCTION	64.80	1.52	10.0
J1	JUNCTION	63.75	3.27	0.0
J13	JUNCTION	63.54	3.10	10.0
J2	JUNCTION	63.24	3.33	0.0
MH_20	JUNCTION	64.99	2.30	0.0
MH_24	JUNCTION	64.13	2.50	10.0
MH_25	JUNCTION	64.42	2.63	0.0
MH_26	JUNCTION	64.56	2.70	0.0
MH_27	JUNCTION	63.89	2.02	0.0
MH_30	JUNCTION	63.73	3.08	0.0
MH_44	JUNCTION	63.51	3.51	0.0
MH_45	JUNCTION	63.11	3.46	0.0
OGS_1	JUNCTION	63.04	3.34	0.0
OGS_2	JUNCTION	63.47	3.01	0.0
Humber_P1	OUTFALL	62.48	0.38	0.0
OF1	OUTFALL	63.41	0.38	0.0
OF2	OUTFALL	0.00	0.00	0.0
SU_N	STORAGE	63.75	3.04	0.0
SU_S	STORAGE	63.24	3.33	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	SU_N	MH_44	CONDUIT	2.5	1.0001	0.0090
C10	CB_28	MH_26	CONDUIT	30.4	1.0001	0.0110
C11	CB_27	MH_26	CONDUIT	32.8	1.0001	0.0110
C12	MH_26	MH_25	CONDUIT	16.5	0.4970	0.0110
C13	MH_24	CBMH_18	CONDUIT	4.8	0.5000	0.0110
C14	CB_23	CBMH_22	CONDUIT	51.5	1.0001	0.0110
C15	CBMH_22	CBMH_21	CONDUIT	60.0	0.5000	0.0110
C16	CBMH_21	MH_20	CONDUIT	24.5	0.5020	0.0110
C17	MH_20	CBMH_19	CONDUIT	10.4	0.5000	0.0110
C18	CBMH_19	MH_24	CONDUIT	46.5	0.5011	0.0110
C19	CB_10	CBMH_9	CONDUIT	52.5	0.4991	0.0110
C2	MH_44	OGS_2	CONDUIT	11.6	0.3707	0.0110
C20	CBMH_9	CBMH_8	CONDUIT	60.0	0.5000	0.0110
C21	CBMH_8	CBMH_7	CONDUIT	60.0	0.5000	0.0110
C22	CBMH_7	CBMH_6	CONDUIT	60.0	0.5000	0.0110
C23	CBMH_6	J13	CONDUIT	29.9	0.5017	0.0110
C24	J13	SU_S	CONDUIT	4.0	0.5000	0.0110
C25	CB_5	CBMH_4	CONDUIT	52.5	0.4991	0.0110
C26	CBMH_4	CBMH_3	CONDUIT	60.0	0.5000	0.0110
C27	CBMH_3	CBMH_2	CONDUIT	60.0	0.5000	0.0110
C28	CBMH_2	MH_30	CONDUIT	53.4	0.4963	0.0110
C29	CBMH_12	CBMH_11	CONDUIT	50.0	0.5700	0.0110
C3	J1	MH_44	CONDUIT	2.5	0.4800	0.0110
C30	MH_30	J13	CONDUIT	9.3	0.4839	0.0110
C31	MH_27	CBMH_11	CONDUIT	8.2	0.5000	0.0110
C32	CBMH_11	SU_S	CONDUIT	13.2	0.5000	0.0110
C33	OGS_1	Humber_P1	CONDUIT	4.0	14.1135	0.0110
C34	OGS_2	OF1	CONDUIT	8.7	0.6782	0.0110
C35	MH_25	MH_24	CONDUIT	44.2	0.5000	0.0110
C36	CBMH_18	SU_N	CONDUIT	3.9	0.5128	0.0110
C37	CB_29	MH_27	CONDUIT	32.9	0.4985	0.0110
C4	SU_S	MH_45	CONDUIT	9.4	1.0001	0.0090
C5	J2	MH_45	CONDUIT	9.4	0.5000	0.0110
C6	MH_45	OGS_1	CONDUIT	3.1	0.4839	0.0110
C7	DCB_16	CBMH_15	CONDUIT	54.4	0.5000	0.0110
C8	CBMH_15	CBMH_14	CONDUIT	60.0	0.5000	0.0110
C9	CBMH_14	SU_N	CONDUIT	15.2	0.5000	0.0110
OR1	SU_S	J2	ORIFICE			
OR2	SU_N	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C10	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C11	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C12	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C13	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21
C15	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C16	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C17	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C18	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C19	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.13
C20	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C21	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C22	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C23	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36

C24	CIRCULAR	0.75	0.44	0.19	0.75	1	0.93
C25	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C26	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C27	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C28	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C29	CIRCULAR	0.38	0.11	0.09	0.38	1	0.16
C3	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C30	CIRCULAR	0.60	0.28	0.15	0.60	1	0.50
C31	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C32	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C33	CIRCULAR	0.38	0.11	0.09	0.38	1	0.78
C34	CIRCULAR	0.38	0.11	0.09	0.38	1	0.17
C35	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C36	CIRCULAR	0.75	0.44	0.19	0.75	1	0.94
C37	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C4	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C5	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	0.14
C7	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C8	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C9	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
Infiltration Method HORTON
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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 1.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 6
Head Tolerance 0.001500 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

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Total Precipitation	0.300	42.540
Evaporation Loss	0.000	0.000
Infiltration Loss	0.017	2.395
Surface Runoff	0.283	40.179
Final Storage	0.000	0.000
Continuity Error (%)	-0.080	

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

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Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.283	2.832
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.283	2.834
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 (%)	-0.061	

Time-Step Critical Elements

Link C33 (1.37%)

Highest Flow Instability Indexes

Link C2 (4)
 Link OR1 (1)
 Link OR2 (1)

 Routing Time Step Summary

Minimum Time Step : 0.44 sec
 Average Time Step : 0.99 sec
 Maximum Time Step : 1.00 sec
 Percent in Steady State : -0.00
 Average Iterations per Step : 2.00
 Percent Not Converging : 0.00
 Time Step Frequencies :
 1.000 - 0.871 sec : 98.11 %
 0.871 - 0.758 sec : 0.37 %
 0.758 - 0.660 sec : 0.50 %
 0.660 - 0.574 sec : 0.57 %
 0.574 - 0.500 sec : 0.46 %

 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 CMS	Runoff Coeff
Area_1	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.10	0.09	0.943
Area_10	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.03	0.03	0.943
Area_101	42.54	0.00	0.00	1.24	40.43	0.89	41.32	0.57	0.38	0.971
Area_102	42.54	0.00	0.00	1.24	40.43	0.89	41.32	0.47	0.31	0.971
Area_11	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.05	0.05	0.943
Area_12	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.06	0.06	0.943
Area_13	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.06	0.06	0.943
Area_14	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.07	0.06	0.943
Area_15	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.04	0.03	0.943
Area_16	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.06	0.05	0.943
Area_17	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.07	0.06	0.943
Area_18	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.07	0.06	0.943
Area_19	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.07	0.06	0.943
Area_2	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.06	0.06	0.943
Area_20	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.11	0.10	0.943
Area_2001	42.54	0.00	0.00	20.24	10.64	11.67	22.31	0.02	0.01	0.524
Area_2002	42.54	0.00	0.00	2.51	38.30	1.74	40.05	0.08	0.06	0.941
Area_2003	42.54	0.00	0.00	2.53	38.31	1.73	40.03	0.06	0.05	0.941
Area_2004	42.54	0.00	0.00	24.03	2.13	16.39	18.52	0.00	0.00	0.435
Area_2005	42.54	0.00	0.00	24.03	2.13	16.39	18.52	0.01	0.00	0.435
Area_21	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.08	0.08	0.943
Area_22	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.13	0.12	0.943
Area_23	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.06	0.06	0.943
Area_3	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.14	0.13	0.943
Area_4	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.11	0.10	0.943
Area_5	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.06	0.05	0.943
Area_6	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.06	0.05	0.943
Area_7	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.02	0.01	0.943
Area_8	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.05	0.04	0.943
Area_9	42.54	0.00	0.00	2.47	38.33	1.79	40.12	0.05	0.04	0.943

 Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB_10	JUNCTION	0.00	0.13	65.46	0 01:05	0.13
CB_23	JUNCTION	0.00	0.09	66.29	0 01:05	0.09
CB_27	JUNCTION	0.00	0.12	65.61	0 01:05	0.12
CB_28	JUNCTION	0.00	0.12	65.51	0 01:05	0.12
CB_29	JUNCTION	0.00	0.16	64.28	0 01:04	0.16
CB_5	JUNCTION	0.00	0.14	65.25	0 01:05	0.14
CBMH_11	JUNCTION	0.04	0.66	64.25	0 02:10	0.66
CBMH_12	JUNCTION	0.00	0.24	64.30	0 01:05	0.24
CBMH_14	JUNCTION	0.03	0.68	64.79	0 01:56	0.68
CBMH_15	JUNCTION	0.01	0.32	64.79	0 01:53	0.32
CBMH_18	JUNCTION	0.04	0.74	64.79	0 01:55	0.74
CBMH_19	JUNCTION	0.00	0.23	65.11	0 01:05	0.23
CBMH_2	JUNCTION	0.00	0.28	64.34	0 01:05	0.28
CBMH_21	JUNCTION	0.00	0.22	65.39	0 01:05	0.22
CBMH_22	JUNCTION	0.00	0.17	65.70	0 01:05	0.17
CBMH_3	JUNCTION	0.00	0.24	64.66	0 01:05	0.24
CBMH_4	JUNCTION	0.00	0.19	64.97	0 01:05	0.19
CBMH_6	JUNCTION	0.01	0.34	64.25	0 02:09	0.33
CBMH_7	JUNCTION	0.00	0.29	64.57	0 01:05	0.29
CBMH_8	JUNCTION	0.00	0.24	64.88	0 01:05	0.24
CBMH_9	JUNCTION	0.00	0.19	65.18	0 01:05	0.19
DCB_16	JUNCTION	0.00	0.22	65.02	0 01:05	0.22
J1	JUNCTION	0.01	0.08	63.83	0 01:55	0.08

J13	JUNCTION	0.04	0.77	64.31	0	02:14	0.75
J2	JUNCTION	0.01	0.08	63.32	0	02:10	0.08
MH_20	JUNCTION	0.00	0.22	65.21	0	01:05	0.22
MH_24	JUNCTION	0.03	0.65	64.79	0	01:55	0.65
MH_25	JUNCTION	0.01	0.47	64.88	0	01:05	0.46
MH_26	JUNCTION	0.01	0.55	65.10	0	01:05	0.55
MH_27	JUNCTION	0.01	0.36	64.25	0	02:10	0.36
MH_30	JUNCTION	0.02	0.52	64.25	0	02:11	0.52
MH_44	JUNCTION	0.01	0.19	63.70	0	01:55	0.19
MH_45	JUNCTION	0.01	0.16	63.27	0	02:10	0.16
OGS_1	JUNCTION	0.01	0.07	63.11	0	02:10	0.07
OGS_2	JUNCTION	0.01	0.16	63.63	0	01:55	0.16
Humber_P1	OUTFALL	0.00	0.00	62.48	0	00:00	0.00
OF1	OUTFALL	0.01	0.16	63.57	0	01:55	0.16
OF2	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU_N	STORAGE	0.07	1.04	64.79	0	01:55	1.04
SU_S	STORAGE	0.09	1.01	64.25	0	02:10	1.01

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB_10	JUNCTION	0.047	0.047	0 01:05	0.0521	0.0521	-0.013
CB_23	JUNCTION	0.029	0.029	0 01:05	0.0321	0.0321	-0.008
CB_27	JUNCTION	0.054	0.054	0 01:05	0.0602	0.0602	-0.005
CB_28	JUNCTION	0.054	0.054	0 01:05	0.0602	0.0602	-0.005
CB_29	JUNCTION	0.058	0.058	0 01:05	0.0642	0.0642	0.550
CB_5	JUNCTION	0.054	0.054	0 01:05	0.0602	0.0602	-0.014
CBMH_11	JUNCTION	0.389	0.556	0 01:05	0.551	0.743	-0.003
CBMH_12	JUNCTION	0.115	0.115	0 01:05	0.128	0.128	0.786
CBMH_14	JUNCTION	0.090	0.271	0 01:05	0.1	0.307	-0.410
CBMH_15	JUNCTION	0.058	0.185	0 01:05	0.0642	0.208	0.631
CBMH_18	JUNCTION	0.101	0.700	0 01:05	0.112	0.943	-0.006
CBMH_19	JUNCTION	0.014	0.126	0 01:05	0.016	0.144	0.268
CBMH_2	JUNCTION	0.061	0.230	0 01:05	0.0682	0.266	0.330
CBMH_21	JUNCTION	0.043	0.113	0 01:05	0.0481	0.128	-0.003
CBMH_22	JUNCTION	0.043	0.071	0 01:05	0.0481	0.0802	-0.011
CBMH_3	JUNCTION	0.061	0.172	0 01:05	0.0682	0.197	0.230
CBMH_4	JUNCTION	0.061	0.114	0 01:05	0.0682	0.128	-0.012
CBMH_6	JUNCTION	0.032	0.244	0 01:05	0.0361	0.284	-0.010
CBMH_7	JUNCTION	0.061	0.216	0 01:05	0.0682	0.249	0.346
CBMH_8	JUNCTION	0.058	0.158	0 01:05	0.0642	0.181	-0.010
CBMH_9	JUNCTION	0.058	0.103	0 01:05	0.0642	0.116	-0.011
DCB_16	JUNCTION	0.129	0.129	0 01:05	0.144	0.144	0.380
J1	JUNCTION	0.000	0.012	0 01:55	0	0.911	-0.005
J13	JUNCTION	0.101	0.565	0 01:05	0.112	0.791	-0.108
J2	JUNCTION	0.000	0.012	0 02:10	0	1.11	-0.004
MH_20	JUNCTION	0.000	0.112	0 01:05	0	0.128	-0.001
MH_24	JUNCTION	0.000	0.610	0 01:05	0	0.828	-0.376
MH_25	JUNCTION	0.000	0.490	0 01:05	0	0.686	0.292
MH_26	JUNCTION	0.380	0.487	0 01:05	0.566	0.686	0.091
MH_27	JUNCTION	0.000	0.058	0 01:05	0	0.0639	-0.391
MH_30	JUNCTION	0.000	0.229	0 01:05	0	0.29	-0.451
MH_44	JUNCTION	0.000	0.064	0 01:55	0	1.25	0.010
MH_45	JUNCTION	0.000	0.054	0 02:10	0	1.41	0.000
OGS_1	JUNCTION	0.000	0.054	0 02:10	0	1.41	-0.000
OGS_2	JUNCTION	0.000	0.065	0 01:55	0	1.25	-0.007
Humber_P1	OUTFALL	0.004	0.055	0 02:10	0.0111	1.42	0.000
OF1	OUTFALL	0.047	0.067	0 01:54	0.064	1.32	0.000
OF2	OUTFALL	0.063	0.063	0 01:05	0.0997	0.0997	0.000
SU_N	STORAGE	0.000	0.968	0 01:05	0	1.25	-0.110
SU_S	STORAGE	0.000	1.119	0 01:05	0	1.51	-0.111

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CBMH_11	JUNCTION	1.32	0.024	1.493
CBMH_14	JUNCTION	1.85	0.080	1.534
J13	JUNCTION	0.01	0.023	2.330

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU_N	0.054	2	0	0	0.896	35	0 01:55	0.064
SU_S	0.080	2	0	0	1.082	31	0 02:10	0.136

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Humber_Pl	27.80	0.007	0.055	1.417
OF1	22.80	0.008	0.067	1.317
OF2	3.48	0.005	0.063	0.100
System	18.03	0.020	0.129	2.834

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.052	0 01:55	1.72	1.09	0.93
C10	CONDUIT	0.054	0 01:05	1.55	0.16	0.27
C11	CONDUIT	0.054	0 01:05	1.55	0.16	0.27
C12	CONDUIT	0.490	0 01:05	2.32	1.37	0.94
C13	CONDUIT	0.611	0 01:05	2.38	1.19	1.00
C14	CONDUIT	0.028	0 01:05	1.32	0.14	0.25
C15	CONDUIT	0.070	0 01:05	1.31	0.29	0.37
C16	CONDUIT	0.112	0 01:05	1.48	0.47	0.48
C17	CONDUIT	0.112	0 01:05	1.48	0.47	0.48
C18	CONDUIT	0.125	0 01:05	1.52	0.53	0.52
C19	CONDUIT	0.046	0 01:05	1.16	0.19	0.30
C2	CONDUIT	0.065	0 01:55	1.31	0.52	0.46
C20	CONDUIT	0.102	0 01:05	1.43	0.28	0.36
C21	CONDUIT	0.157	0 01:05	1.61	0.44	0.46
C22	CONDUIT	0.214	0 01:05	1.74	0.60	0.56
C23	CONDUIT	0.244	0 01:05	1.79	0.68	0.82
C24	CONDUIT	0.565	0 01:05	2.21	0.61	0.99
C25	CONDUIT	0.053	0 01:05	1.19	0.15	0.26
C26	CONDUIT	0.112	0 01:05	1.46	0.22	0.32
C27	CONDUIT	0.171	0 01:05	1.64	0.33	0.40
C28	CONDUIT	0.229	0 01:05	1.76	0.45	0.54
C29	CONDUIT	0.114	0 01:05	1.30	0.73	0.82
C3	CONDUIT	0.012	0 01:55	0.82	0.16	0.27
C30	CONDUIT	0.229	0 01:05	1.74	0.45	0.93
C31	CONDUIT	0.064	0 01:05	1.08	0.43	0.98
C32	CONDUIT	0.555	0 01:05	2.60	1.54	1.00
C33	CONDUIT	0.054	0 02:10	4.04	0.07	0.18
C34	CONDUIT	0.064	0 01:55	1.43	0.38	0.42
C35	CONDUIT	0.485	0 01:05	2.10	0.95	0.80
C36	CONDUIT	0.700	0 01:05	2.34	0.74	0.99
C37	CONDUIT	0.058	0 01:05	1.21	0.39	0.58
C4	CONDUIT	0.042	0 02:10	1.70	0.88	0.73
C5	CONDUIT	0.012	0 02:10	0.82	0.15	0.27
C6	CONDUIT	0.054	0 02:10	1.21	0.38	0.42
C7	CONDUIT	0.128	0 01:05	1.53	0.36	0.41
C8	CONDUIT	0.183	0 01:05	1.68	0.51	0.81
C9	CONDUIT	0.271	0 01:05	1.84	0.53	1.00
OR1	ORIFICE	0.012	0 02:10			1.00
OR2	ORIFICE	0.012	0 01:55			1.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.98	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C12	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.01	0.00
C13	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C15	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

C18	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.01	0.00
C19	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C2	1.00	0.00	0.10	0.00	0.76	0.14	0.00	0.00	0.78	0.00
C20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C21	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C22	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.04	0.00
C23	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.03	0.00
C24	1.00	0.00	0.00	0.00	0.12	0.00	0.00	0.88	0.01	0.00
C25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C26	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C27	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.01	0.00
C28	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.04	0.00
C29	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.05	0.00
C3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C30	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.01	0.00
C31	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.02	0.00
C32	1.00	0.00	0.00	0.00	0.12	0.00	0.00	0.88	0.01	0.00
C33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C34	1.00	0.00	0.00	0.00	0.75	0.25	0.00	0.00	0.04	0.00
C35	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.03	0.00
C36	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.00	0.00
C37	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.03	0.00
C4	1.00	0.98	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.01	0.00	0.99	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.03	0.00
C8	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.04	0.00
C9	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.90	0.01	0.00

 Conduit Surcharge Summary

Conduit	Hours Full			Hours	
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Hours Capacity Limited
C1	0.01	0.01	0.01	0.73	0.01
C12	0.01	0.01	0.01	0.10	0.01
C13	1.44	1.44	1.80	0.05	0.01
C23	0.01	0.01	0.01	0.01	0.01
C24	0.01	0.01	0.01	0.01	0.01
C29	0.01	0.01	2.84	0.01	0.01
C30	0.01	0.01	0.01	0.01	0.01
C31	0.01	0.01	1.32	0.01	0.01
C32	4.08	4.11	6.43	0.14	0.01
C36	0.01	0.01	0.44	0.01	0.01
C8	0.01	0.01	2.04	0.01	0.01
C9	1.85	1.85	3.14	0.01	0.01

Analysis begun on: Wed Oct 5 21:15:03 2022
 Analysis ended on: Wed Oct 5 21:15:33 2022

Total elapsed time: 00:00:30

5-yr, 6-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link C32
WARNING 03: negative offset ignored for Link C34

Element Count

Number of rain gages 7
Number of subcatchments ... 30
Number of nodes 40
Number of links 39
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Area_1	0.25	83.33	90.00	1.0000	6hr-5yr	CBMH_14
Area_10	0.08	26.67	90.00	1.0000	6hr-5yr	CB_23
Area_101	1.37	137.00	95.00	0.5000	6hr-5yr	MH_26
Area_102	1.13	113.00	95.00	0.5000	6hr-5yr	CBMH_11
Area_11	0.13	43.33	90.00	1.0000	6hr-5yr	CB_10
Area_12	0.16	53.33	90.00	1.0000	6hr-5yr	CBMH_9
Area_13	0.16	53.33	90.00	1.0000	6hr-5yr	CBMH_8
Area_14	0.17	56.67	90.00	1.0000	6hr-5yr	CBMH_7
Area_15	0.09	30.00	90.00	1.0000	6hr-5yr	CBMH_6
Area_16	0.15	50.00	90.00	1.0000	6hr-5yr	CB_5
Area_17	0.17	56.67	90.00	1.0000	6hr-5yr	CBMH_4
Area_18	0.17	56.67	90.00	1.0000	6hr-5yr	CBMH_3
Area_19	0.17	56.67	90.00	1.0000	6hr-5yr	CBMH_2
Area_2	0.16	53.33	90.00	1.0000	6hr-5yr	CBMH_15
Area_20	0.28	93.33	90.00	1.0000	6hr-5yr	J13
Area_2001	0.07	7.00	25.00	0.5000	6hr-5yr	OF2
Area_2002	0.21	21.00	90.00	0.5000	6hr-5yr	OF2
Area_2003	0.16	16.00	90.00	1.0000	6hr-5yr	OF1
Area_2004	0.02	13.33	5.00	0.5000	6hr-5yr	Humber_Pl
Area_2005	0.04	26.67	5.00	0.5000	6hr-5yr	Humber_Pl
Area_21	0.21	70.00	90.00	1.0000	6hr-5yr	CBMH_11
Area_22	0.32	106.67	90.00	1.0000	6hr-5yr	CBMH_12
Area_23	0.16	53.33	90.00	1.0000	6hr-5yr	CB_29
Area_3	0.36	120.00	90.00	1.0000	6hr-5yr	DCB_16
Area_4	0.28	93.33	90.00	1.0000	6hr-5yr	CBMH_18
Area_5	0.15	50.00	90.00	1.0000	6hr-5yr	CB_27
Area_6	0.15	50.00	90.00	1.0000	6hr-5yr	CB_28
Area_7	0.04	13.33	90.00	1.0000	6hr-5yr	CBMH_19
Area_8	0.12	40.00	90.00	1.0000	6hr-5yr	CBMH_21
Area_9	0.12	40.00	90.00	1.0000	6hr-5yr	CBMH_22

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
CB_10	JUNCTION	65.33	1.41	10.0	
CB_23	JUNCTION	66.20	0.93	10.0	
CB_27	JUNCTION	65.48	1.34	10.0	
CB_28	JUNCTION	65.39	1.52	10.0	
CB_29	JUNCTION	64.11	2.43	0.0	
CB_5	JUNCTION	65.11	1.63	10.0	
CBMH_11	JUNCTION	63.58	2.16	10.0	
CBMH_12	JUNCTION	64.06	1.68	10.0	
CBMH_14	JUNCTION	64.11	2.21	10.0	
CBMH_15	JUNCTION	64.47	1.85	10.0	
CBMH_18	JUNCTION	64.05	2.54	0.0	
CBMH_19	JUNCTION	64.88	2.38	10.0	
CBMH_2	JUNCTION	64.06	2.94	10.0	
CBMH_21	JUNCTION	65.17	1.87	10.0	
CBMH_22	JUNCTION	65.53	1.51	10.0	

CBMH_3	JUNCTION	64.42	2.58	10.0
CBMH_4	JUNCTION	64.78	2.22	10.0
CBMH_6	JUNCTION	63.91	2.73	10.0
CBMH_7	JUNCTION	64.27	2.73	10.0
CBMH_8	JUNCTION	64.63	2.37	10.0
CBMH_9	JUNCTION	64.99	2.01	10.0
DCB_16	JUNCTION	64.80	1.52	10.0
J1	JUNCTION	63.75	3.27	0.0
J13	JUNCTION	63.54	3.10	10.0
J2	JUNCTION	63.24	3.33	0.0
MH_20	JUNCTION	64.99	2.30	0.0
MH_24	JUNCTION	64.13	2.50	10.0
MH_25	JUNCTION	64.42	2.63	0.0
MH_26	JUNCTION	64.56	2.70	0.0
MH_27	JUNCTION	63.89	2.02	0.0
MH_30	JUNCTION	63.73	3.08	0.0
MH_44	JUNCTION	63.51	3.51	0.0
MH_45	JUNCTION	63.11	3.46	0.0
OGS_1	JUNCTION	63.04	3.34	0.0
OGS_2	JUNCTION	63.47	3.01	0.0
Humber_P1	OUTFALL	62.48	0.38	0.0
OF1	OUTFALL	63.41	0.38	0.0
OF2	OUTFALL	0.00	0.00	0.0
SU_N	STORAGE	63.75	3.04	0.0
SU_S	STORAGE	63.24	3.33	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	SU_N	MH_44	CONDUIT	2.5	1.0001	0.0090
C10	CB_28	MH_26	CONDUIT	30.4	1.0001	0.0110
C11	CB_27	MH_26	CONDUIT	32.8	1.0001	0.0110
C12	MH_26	MH_25	CONDUIT	16.5	0.4970	0.0110
C13	MH_24	CBMH_18	CONDUIT	4.8	0.5000	0.0110
C14	CB_23	CBMH_22	CONDUIT	51.5	1.0001	0.0110
C15	CBMH_22	CBMH_21	CONDUIT	60.0	0.5000	0.0110
C16	CBMH_21	MH_20	CONDUIT	24.5	0.5020	0.0110
C17	MH_20	CBMH_19	CONDUIT	10.4	0.5000	0.0110
C18	CBMH_19	MH_24	CONDUIT	46.5	0.5011	0.0110
C19	CB_10	CBMH_9	CONDUIT	52.5	0.4991	0.0110
C2	MH_44	OGS_2	CONDUIT	11.6	0.3707	0.0110
C20	CBMH_9	CBMH_8	CONDUIT	60.0	0.5000	0.0110
C21	CBMH_8	CBMH_7	CONDUIT	60.0	0.5000	0.0110
C22	CBMH_7	CBMH_6	CONDUIT	60.0	0.5000	0.0110
C23	CBMH_6	J13	CONDUIT	29.9	0.5017	0.0110
C24	J13	SU_S	CONDUIT	4.0	0.5000	0.0110
C25	CB_5	CBMH_4	CONDUIT	52.5	0.4991	0.0110
C26	CBMH_4	CBMH_3	CONDUIT	60.0	0.5000	0.0110
C27	CBMH_3	CBMH_2	CONDUIT	60.0	0.5000	0.0110
C28	CBMH_2	MH_30	CONDUIT	53.4	0.4963	0.0110
C29	CBMH_12	CBMH_11	CONDUIT	50.0	0.5700	0.0110
C3	J1	MH_44	CONDUIT	2.5	0.4800	0.0110
C30	MH_30	J13	CONDUIT	9.3	0.4839	0.0110
C31	MH_27	CBMH_11	CONDUIT	8.2	0.5000	0.0110
C32	CBMH_11	SU_S	CONDUIT	13.2	0.5000	0.0110
C33	OGS_1	Humber_P1	CONDUIT	4.0	14.1135	0.0110
C34	OGS_2	OF1	CONDUIT	8.7	0.6782	0.0110
C35	MH_25	MH_24	CONDUIT	44.2	0.5000	0.0110
C36	CBMH_18	SU_N	CONDUIT	3.9	0.5128	0.0110
C37	CB_29	MH_27	CONDUIT	32.9	0.4985	0.0110
C4	SU_S	MH_45	CONDUIT	9.4	1.0001	0.0090
C5	J2	MH_45	CONDUIT	9.4	0.5000	0.0110
C6	MH_45	OGS_1	CONDUIT	3.1	0.4839	0.0110
C7	DCB_16	CBMH_15	CONDUIT	54.4	0.5000	0.0110
C8	CBMH_15	CBMH_14	CONDUIT	60.0	0.5000	0.0110
C9	CBMH_14	SU_N	CONDUIT	15.2	0.5000	0.0110
OR1	SU_S	J2	ORIFICE			
OR2	SU_N	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C10	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C11	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C12	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C13	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21
C15	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C16	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C17	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C18	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C19	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.13
C20	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C21	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C22	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C23	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36

C24	CIRCULAR	0.75	0.44	0.19	0.75	1	0.93
C25	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C26	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C27	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C28	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C29	CIRCULAR	0.38	0.11	0.09	0.38	1	0.16
C3	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C30	CIRCULAR	0.60	0.28	0.15	0.60	1	0.50
C31	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C32	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C33	CIRCULAR	0.38	0.11	0.09	0.38	1	0.78
C34	CIRCULAR	0.38	0.11	0.09	0.38	1	0.17
C35	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C36	CIRCULAR	0.75	0.44	0.19	0.75	1	0.94
C37	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C4	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C5	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	0.14
C7	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C8	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C9	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
Infiltration Method HORTON
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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 1.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 6
Head Tolerance 0.001500 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

Total Precipitation	0.346	49.044
Evaporation Loss	0.000	0.000
Infiltration Loss	0.018	2.482
Surface Runoff	0.328	46.593
Final Storage	0.000	0.000
Continuity Error (%)	-0.065	

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

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.328	3.285
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.329	3.286
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 (%)	-0.045	

Time-Step Critical Elements

Link C33 (2.13%)

Highest Flow Instability Indexes

Link C2 (5)
 Link OR1 (1)

 Routing Time Step Summary

Minimum Time Step : 0.43 sec
 Average Time Step : 0.99 sec
 Maximum Time Step : 1.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 2.00
 Percent Not Converging : 0.00
 Time Step Frequencies :
 1.000 - 0.871 sec : 97.27 %
 0.871 - 0.758 sec : 0.63 %
 0.758 - 0.660 sec : 0.72 %
 0.660 - 0.574 sec : 0.63 %
 0.574 - 0.500 sec : 0.75 %

 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 CMS	Runoff Coeff
Area_1	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.12	0.09	0.949
Area_10	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.04	0.03	0.949
Area_101	49.04	0.00	0.00	1.29	46.61	1.17	47.77	0.65	0.41	0.974
Area_102	49.04	0.00	0.00	1.29	46.61	1.17	47.77	0.54	0.34	0.974
Area_11	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.06	0.05	0.949
Area_12	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.07	0.06	0.949
Area_13	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.07	0.06	0.949
Area_14	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.08	0.06	0.949
Area_15	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.04	0.03	0.949
Area_16	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.07	0.06	0.949
Area_17	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.08	0.06	0.949
Area_18	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.08	0.06	0.949
Area_19	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.08	0.06	0.949
Area_2	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.07	0.06	0.949
Area_20	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.13	0.10	0.949
Area_2001	49.04	0.00	0.00	20.73	12.27	16.06	28.33	0.02	0.01	0.578
Area_2002	49.04	0.00	0.00	2.60	44.16	2.31	46.46	0.10	0.06	0.947
Area_2003	49.04	0.00	0.00	2.62	44.16	2.29	46.45	0.07	0.05	0.947
Area_2004	49.04	0.00	0.00	24.83	2.45	21.78	24.23	0.00	0.00	0.494
Area_2005	49.04	0.00	0.00	24.83	2.45	21.78	24.23	0.01	0.00	0.494
Area_21	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.10	0.08	0.949
Area_22	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.15	0.12	0.949
Area_23	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.07	0.06	0.949
Area_3	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.17	0.13	0.949
Area_4	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.13	0.10	0.949
Area_5	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.07	0.06	0.949
Area_6	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.07	0.06	0.949
Area_7	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.02	0.01	0.949
Area_8	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.06	0.04	0.949
Area_9	49.04	0.00	0.00	2.56	44.17	2.35	46.52	0.06	0.04	0.949

 Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB_10	JUNCTION	0.00	0.14	65.47	0 02:10	0.14
CB_23	JUNCTION	0.00	0.10	66.29	0 02:10	0.10
CB_27	JUNCTION	0.00	0.12	65.61	0 02:10	0.12
CB_28	JUNCTION	0.00	0.12	65.51	0 02:10	0.12
CB_29	JUNCTION	0.00	0.17	64.28	0 02:10	0.17
CB_5	JUNCTION	0.00	0.14	65.25	0 02:10	0.14
CBMH_11	JUNCTION	0.04	0.70	64.28	0 02:57	0.69
CBMH_12	JUNCTION	0.01	0.25	64.31	0 02:10	0.25
CBMH_14	JUNCTION	0.04	0.71	64.81	0 02:53	0.71
CBMH_15	JUNCTION	0.01	0.35	64.81	0 02:50	0.35
CBMH_18	JUNCTION	0.04	0.76	64.81	0 02:52	0.76
CBMH_19	JUNCTION	0.00	0.24	65.11	0 02:10	0.24
CBMH_2	JUNCTION	0.01	0.29	64.35	0 02:10	0.29
CBMH_21	JUNCTION	0.00	0.22	65.39	0 02:10	0.22
CBMH_22	JUNCTION	0.00	0.17	65.70	0 02:10	0.17
CBMH_3	JUNCTION	0.00	0.24	64.66	0 02:10	0.24
CBMH_4	JUNCTION	0.00	0.19	64.97	0 02:10	0.19
CBMH_6	JUNCTION	0.01	0.36	64.27	0 03:08	0.36
CBMH_7	JUNCTION	0.00	0.30	64.57	0 02:10	0.30
CBMH_8	JUNCTION	0.00	0.25	64.88	0 02:10	0.25
CBMH_9	JUNCTION	0.00	0.20	65.19	0 02:10	0.20
DCB_16	JUNCTION	0.00	0.22	65.02	0 02:10	0.22
J1	JUNCTION	0.01	0.08	63.83	0 02:52	0.08
J13	JUNCTION	0.05	0.78	64.31	0 02:57	0.75

J2	JUNCTION	0.01	0.08	63.32	0	03:08	0.08
MH_20	JUNCTION	0.00	0.22	65.21	0	02:10	0.22
MH_24	JUNCTION	0.03	0.68	64.81	0	02:52	0.68
MH_25	JUNCTION	0.01	0.49	64.90	0	02:10	0.48
MH_26	JUNCTION	0.01	0.57	65.13	0	02:10	0.57
MH_27	JUNCTION	0.01	0.38	64.27	0	03:04	0.38
MH_30	JUNCTION	0.03	0.54	64.28	0	03:06	0.54
MH_44	JUNCTION	0.01	0.20	63.71	0	02:54	0.20
MH_45	JUNCTION	0.01	0.17	63.28	0	03:02	0.17
OGS_1	JUNCTION	0.01	0.07	63.11	0	03:08	0.07
OGS_2	JUNCTION	0.01	0.17	63.64	0	02:55	0.17
Humber_P1	OUTFALL	0.00	0.00	62.48	0	00:00	0.00
OF1	OUTFALL	0.01	0.17	63.58	0	02:53	0.17
OF2	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU_N	STORAGE	0.08	1.06	64.81	0	02:52	1.06
SU_S	STORAGE	0.10	1.04	64.27	0	03:08	1.04

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB_10	JUNCTION	0.048	0.048	0 02:10	0.0605	0.0605	-0.010
CB_23	JUNCTION	0.030	0.030	0 02:10	0.0372	0.0372	-0.006
CB_27	JUNCTION	0.056	0.056	0 02:10	0.0698	0.0698	-0.004
CB_28	JUNCTION	0.056	0.056	0 02:10	0.0698	0.0698	-0.004
CB_29	JUNCTION	0.059	0.059	0 02:10	0.0744	0.0744	0.570
CB_5	JUNCTION	0.056	0.056	0 02:10	0.0698	0.0698	-0.010
CBMH_11	JUNCTION	0.415	0.587	0 02:10	0.637	0.86	0.024
CBMH_12	JUNCTION	0.119	0.119	0 02:10	0.149	0.149	0.588
CBMH_14	JUNCTION	0.093	0.281	0 02:10	0.116	0.355	-0.502
CBMH_15	JUNCTION	0.059	0.191	0 02:10	0.0744	0.241	0.899
CBMH_18	JUNCTION	0.104	0.741	0 02:10	0.13	1.09	-0.003
CBMH_19	JUNCTION	0.015	0.130	0 02:10	0.0186	0.167	0.246
CBMH_2	JUNCTION	0.063	0.238	0 02:10	0.0791	0.307	0.310
CBMH_21	JUNCTION	0.044	0.117	0 02:10	0.0558	0.149	-0.002
CBMH_22	JUNCTION	0.044	0.074	0 02:10	0.0558	0.093	-0.008
CBMH_3	JUNCTION	0.063	0.179	0 02:10	0.0791	0.228	0.268
CBMH_4	JUNCTION	0.063	0.118	0 02:10	0.0791	0.149	-0.009
CBMH_6	JUNCTION	0.033	0.253	0 02:10	0.0419	0.329	-0.031
CBMH_7	JUNCTION	0.063	0.224	0 02:10	0.0791	0.288	0.369
CBMH_8	JUNCTION	0.059	0.164	0 02:10	0.0744	0.209	-0.007
CBMH_9	JUNCTION	0.059	0.107	0 02:10	0.0744	0.135	-0.008
DCB_16	JUNCTION	0.133	0.133	0 02:10	0.167	0.167	0.399
J1	JUNCTION	0.000	0.013	0 02:52	0	0.978	-0.004
J13	JUNCTION	0.104	0.588	0 02:10	0.13	0.854	-0.156
J2	JUNCTION	0.000	0.012	0 03:08	0	1.18	-0.004
MH_20	JUNCTION	0.000	0.116	0 02:10	0	0.149	-0.001
MH_24	JUNCTION	0.000	0.648	0 02:10	0	0.958	-0.364
MH_25	JUNCTION	0.000	0.520	0 02:10	0	0.793	0.309
MH_26	JUNCTION	0.409	0.520	0 02:10	0.654	0.794	0.091
MH_27	JUNCTION	0.000	0.059	0 02:10	0	0.074	-0.452
MH_30	JUNCTION	0.000	0.237	0 02:10	0	0.321	-0.447
MH_44	JUNCTION	0.000	0.074	0 02:51	0	1.45	0.009
MH_45	JUNCTION	0.000	0.060	0 03:01	0	1.63	0.001
OGS_1	JUNCTION	0.000	0.060	0 03:08	0	1.63	-0.000
OGS_2	JUNCTION	0.000	0.076	0 02:50	0	1.45	-0.010
Humber_P1	OUTFALL	0.005	0.061	0 02:51	0.0145	1.64	0.000
OF1	OUTFALL	0.050	0.079	0 02:44	0.0743	1.52	0.000
OF2	OUTFALL	0.068	0.068	0 02:10	0.117	0.117	0.000
SU_N	STORAGE	0.000	1.017	0 02:10	0	1.45	-0.108
SU_S	STORAGE	0.000	1.173	0 02:10	0	1.7	-0.102

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CBMH_11	JUNCTION	1.78	0.061	1.456
CBMH_14	JUNCTION	2.17	0.107	1.507
CBMH_18	JUNCTION	0.56	0.013	1.777
J13	JUNCTION	0.04	0.026	2.327

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU_N	0.061	2	0	0	0.925	36	0 02:52	0.074
SU_S	0.089	3	0	0	1.115	32	0 03:08	0.094

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Humber_Pl	28.97	0.008	0.061	1.644
OF1	23.99	0.009	0.079	1.525
OF2	4.75	0.004	0.068	0.117
System	19.24	0.022	0.147	3.286

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.061	0 02:44	1.95	1.29	1.00
C10	CONDUIT	0.055	0 02:10	1.57	0.16	0.27
C11	CONDUIT	0.055	0 02:10	1.57	0.16	0.27
C12	CONDUIT	0.520	0 02:10	2.45	1.45	0.95
C13	CONDUIT	0.648	0 02:10	2.48	1.26	1.00
C14	CONDUIT	0.029	0 02:10	1.33	0.14	0.25
C15	CONDUIT	0.073	0 02:10	1.32	0.30	0.38
C16	CONDUIT	0.116	0 02:10	1.50	0.49	0.49
C17	CONDUIT	0.116	0 02:10	1.49	0.49	0.49
C18	CONDUIT	0.130	0 02:10	1.54	0.54	0.53
C19	CONDUIT	0.047	0 02:10	1.17	0.20	0.30
C2	CONDUIT	0.076	0 02:50	1.38	0.60	0.50
C20	CONDUIT	0.105	0 02:10	1.45	0.29	0.37
C21	CONDUIT	0.162	0 02:10	1.63	0.45	0.47
C22	CONDUIT	0.222	0 02:10	1.76	0.62	0.57
C23	CONDUIT	0.254	0 02:10	1.81	0.70	0.84
C24	CONDUIT	0.588	0 02:10	2.23	0.63	1.00
C25	CONDUIT	0.055	0 02:10	1.20	0.15	0.26
C26	CONDUIT	0.116	0 02:10	1.47	0.23	0.32
C27	CONDUIT	0.177	0 02:10	1.65	0.35	0.41
C28	CONDUIT	0.237	0 02:10	1.78	0.46	0.58
C29	CONDUIT	0.116	0 02:10	1.27	0.74	0.83
C3	CONDUIT	0.013	0 02:52	0.82	0.16	0.27
C30	CONDUIT	0.238	0 02:10	1.76	0.47	0.95
C31	CONDUIT	0.067	0 02:10	1.03	0.45	1.00
C32	CONDUIT	0.586	0 02:10	2.74	1.63	1.00
C33	CONDUIT	0.060	0 03:08	4.17	0.08	0.19
C34	CONDUIT	0.074	0 02:53	1.49	0.43	0.46
C35	CONDUIT	0.518	0 02:10	2.16	1.01	0.83
C36	CONDUIT	0.741	0 02:10	2.36	0.79	1.00
C37	CONDUIT	0.059	0 02:10	1.21	0.40	0.64
C4	CONDUIT	0.048	0 02:58	1.72	1.00	0.88
C5	CONDUIT	0.012	0 03:07	0.82	0.15	0.29
C6	CONDUIT	0.060	0 03:08	1.24	0.42	0.45
C7	CONDUIT	0.132	0 02:10	1.54	0.37	0.42
C8	CONDUIT	0.189	0 02:10	1.69	0.53	0.83
C9	CONDUIT	0.278	0 02:10	1.84	0.54	1.00
OR1	ORIFICE	0.012	0 03:08			1.00
OR2	ORIFICE	0.013	0 02:52			1.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.97	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C12	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.01	0.00
C13	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C15	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C17	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

C18	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.01	0.00
C19	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C2	1.00	0.00	0.10	0.00	0.75	0.15	0.00	0.00	0.78	0.00
C20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C21	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C22	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.04	0.00
C23	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.03	0.00
C24	1.00	0.00	0.00	0.00	0.12	0.00	0.00	0.87	0.01	0.00
C25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C26	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C27	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.02	0.00
C28	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.04	0.00
C29	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.05	0.00
C3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C30	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.01	0.00
C31	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.02	0.00
C32	1.00	0.00	0.00	0.00	0.13	0.00	0.00	0.87	0.01	0.00
C33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C34	1.00	0.00	0.00	0.00	0.74	0.26	0.00	0.00	0.05	0.00
C35	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.03	0.00
C36	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.89	0.00	0.00
C37	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.03	0.00
C4	1.00	0.97	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.03	0.00
C8	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.04	0.00
C9	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.89	0.01	0.00

 Conduit Surcharge Summary

Conduit	Hours Full			Hours	
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Hours Capacity Limited
C1	0.13	0.56	0.13	1.12	0.13
C12	0.01	0.03	0.01	0.09	0.01
C13	1.67	1.67	2.09	0.06	0.01
C23	0.01	0.01	0.04	0.01	0.01
C24	0.04	0.04	0.49	0.01	0.01
C29	0.01	0.01	4.24	0.01	0.01
C30	0.01	0.01	0.04	0.01	0.01
C31	0.65	0.65	1.78	0.01	0.01
C32	5.48	5.53	7.81	0.11	0.01
C35	0.01	0.01	0.69	0.01	0.01
C36	0.56	0.56	0.95	0.01	0.01
C4	0.01	0.01	0.01	0.45	0.01
C8	0.01	0.01	2.53	0.01	0.01
C9	2.17	2.17	4.46	0.01	0.01

Analysis begun on: Wed Oct 5 21:16:09 2022
 Analysis ended on: Wed Oct 5 21:16:39 2022

Total elapsed time: 00:00:30

100-yr, 3-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link C32
WARNING 03: negative offset ignored for Link C34

Element Count

Number of rain gages 7
Number of subcatchments ... 30
Number of nodes 40
Number of links 39
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Area_1	0.25	83.33	90.00	1.0000	3hr-100yr	CBMH_14
Area_10	0.08	26.67	90.00	1.0000	3hr-100yr	CB_23
Area_101	1.37	137.00	95.00	0.5000	3hr-100yr	MH_26
Area_102	1.13	113.00	95.00	0.5000	3hr-100yr	CBMH_11
Area_11	0.13	43.33	90.00	1.0000	3hr-100yr	CB_10
Area_12	0.16	53.33	90.00	1.0000	3hr-100yr	CBMH_9
Area_13	0.16	53.33	90.00	1.0000	3hr-100yr	CBMH_8
Area_14	0.17	56.67	90.00	1.0000	3hr-100yr	CBMH_7
Area_15	0.09	30.00	90.00	1.0000	3hr-100yr	CBMH_6
Area_16	0.15	50.00	90.00	1.0000	3hr-100yr	CB_5
Area_17	0.17	56.67	90.00	1.0000	3hr-100yr	CBMH_4
Area_18	0.17	56.67	90.00	1.0000	3hr-100yr	CBMH_3
Area_19	0.17	56.67	90.00	1.0000	3hr-100yr	CBMH_2
Area_2	0.16	53.33	90.00	1.0000	3hr-100yr	CBMH_15
Area_20	0.28	93.33	90.00	1.0000	3hr-100yr	J13
Area_2001	0.07	7.00	25.00	0.5000	3hr-100yr	OF2
Area_2002	0.21	21.00	90.00	0.5000	3hr-100yr	OF2
Area_2003	0.16	16.00	90.00	1.0000	3hr-100yr	OF1
Area_2004	0.02	13.33	5.00	0.5000	3hr-100yr	Humber_P1
Area_2005	0.04	26.67	5.00	0.5000	3hr-100yr	Humber_P1
Area_21	0.21	70.00	90.00	1.0000	3hr-100yr	CBMH_11
Area_22	0.32	106.67	90.00	1.0000	3hr-100yr	CBMH_12
Area_23	0.16	53.33	90.00	1.0000	3hr-100yr	CB_29
Area_3	0.36	120.00	90.00	1.0000	3hr-100yr	DCB_16
Area_4	0.28	93.33	90.00	1.0000	3hr-100yr	CBMH_18
Area_5	0.15	50.00	90.00	1.0000	3hr-100yr	CB_27
Area_6	0.15	50.00	90.00	1.0000	3hr-100yr	CB_28
Area_7	0.04	13.33	90.00	1.0000	3hr-100yr	CBMH_19
Area_8	0.12	40.00	90.00	1.0000	3hr-100yr	CBMH_21
Area_9	0.12	40.00	90.00	1.0000	3hr-100yr	CBMH_22

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
CB_10	JUNCTION	65.33	1.41	10.0	
CB_23	JUNCTION	66.20	0.93	10.0	
CB_27	JUNCTION	65.48	1.34	10.0	
CB_28	JUNCTION	65.39	1.52	10.0	
CB_29	JUNCTION	64.11	2.43	0.0	
CB_5	JUNCTION	65.11	1.63	10.0	
CBMH_11	JUNCTION	63.58	2.16	10.0	
CBMH_12	JUNCTION	64.06	1.68	10.0	
CBMH_14	JUNCTION	64.11	2.21	10.0	
CBMH_15	JUNCTION	64.47	1.85	10.0	
CBMH_18	JUNCTION	64.05	2.54	0.0	
CBMH_19	JUNCTION	64.88	2.38	10.0	
CBMH_2	JUNCTION	64.06	2.94	10.0	
CBMH_21	JUNCTION	65.17	1.87	10.0	
CBMH_22	JUNCTION	65.53	1.51	10.0	

CBMH_3	JUNCTION	64.42	2.58	10.0
CBMH_4	JUNCTION	64.78	2.22	10.0
CBMH_6	JUNCTION	63.91	2.73	10.0
CBMH_7	JUNCTION	64.27	2.73	10.0
CBMH_8	JUNCTION	64.63	2.37	10.0
CBMH_9	JUNCTION	64.99	2.01	10.0
DCB_16	JUNCTION	64.80	1.52	10.0
J1	JUNCTION	63.75	3.27	0.0
J13	JUNCTION	63.54	3.10	10.0
J2	JUNCTION	63.24	3.33	0.0
MH_20	JUNCTION	64.99	2.30	0.0
MH_24	JUNCTION	64.13	2.50	10.0
MH_25	JUNCTION	64.42	2.63	0.0
MH_26	JUNCTION	64.56	2.70	0.0
MH_27	JUNCTION	63.89	2.02	0.0
MH_30	JUNCTION	63.73	3.08	0.0
MH_44	JUNCTION	63.51	3.51	0.0
MH_45	JUNCTION	63.11	3.46	0.0
OGS_1	JUNCTION	63.04	3.34	0.0
OGS_2	JUNCTION	63.47	3.01	0.0
Humber_P1	OUTFALL	62.48	0.38	0.0
OF1	OUTFALL	63.41	0.38	0.0
OF2	OUTFALL	0.00	0.00	0.0
SU_N	STORAGE	63.75	3.04	0.0
SU_S	STORAGE	63.24	3.33	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	SU_N	MH_44	CONDUIT	2.5	1.0001	0.0090
C10	CB_28	MH_26	CONDUIT	30.4	1.0001	0.0110
C11	CB_27	MH_26	CONDUIT	32.8	1.0001	0.0110
C12	MH_26	MH_25	CONDUIT	16.5	0.4970	0.0110
C13	MH_24	CBMH_18	CONDUIT	4.8	0.5000	0.0110
C14	CB_23	CBMH_22	CONDUIT	51.5	1.0001	0.0110
C15	CBMH_22	CBMH_21	CONDUIT	60.0	0.5000	0.0110
C16	CBMH_21	MH_20	CONDUIT	24.5	0.5020	0.0110
C17	MH_20	CBMH_19	CONDUIT	10.4	0.5000	0.0110
C18	CBMH_19	MH_24	CONDUIT	46.5	0.5011	0.0110
C19	CB_10	CBMH_9	CONDUIT	52.5	0.4991	0.0110
C2	MH_44	OGS_2	CONDUIT	11.6	0.3707	0.0110
C20	CBMH_9	CBMH_8	CONDUIT	60.0	0.5000	0.0110
C21	CBMH_8	CBMH_7	CONDUIT	60.0	0.5000	0.0110
C22	CBMH_7	CBMH_6	CONDUIT	60.0	0.5000	0.0110
C23	CBMH_6	J13	CONDUIT	29.9	0.5017	0.0110
C24	J13	SU_S	CONDUIT	4.0	0.5000	0.0110
C25	CB_5	CBMH_4	CONDUIT	52.5	0.4991	0.0110
C26	CBMH_4	CBMH_3	CONDUIT	60.0	0.5000	0.0110
C27	CBMH_3	CBMH_2	CONDUIT	60.0	0.5000	0.0110
C28	CBMH_2	MH_30	CONDUIT	53.4	0.4963	0.0110
C29	CBMH_12	CBMH_11	CONDUIT	50.0	0.5700	0.0110
C3	J1	MH_44	CONDUIT	2.5	0.4800	0.0110
C30	MH_30	J13	CONDUIT	9.3	0.4839	0.0110
C31	MH_27	CBMH_11	CONDUIT	8.2	0.5000	0.0110
C32	CBMH_11	SU_S	CONDUIT	13.2	0.5000	0.0110
C33	OGS_1	Humber_P1	CONDUIT	4.0	14.1135	0.0110
C34	OGS_2	OF1	CONDUIT	8.7	0.6782	0.0110
C35	MH_25	MH_24	CONDUIT	44.2	0.5000	0.0110
C36	CBMH_18	SU_N	CONDUIT	3.9	0.5128	0.0110
C37	CB_29	MH_27	CONDUIT	32.9	0.4985	0.0110
C4	SU_S	MH_45	CONDUIT	9.4	1.0001	0.0090
C5	J2	MH_45	CONDUIT	9.4	0.5000	0.0110
C6	MH_45	OGS_1	CONDUIT	3.1	0.4839	0.0110
C7	DCB_16	CBMH_15	CONDUIT	54.4	0.5000	0.0110
C8	CBMH_15	CBMH_14	CONDUIT	60.0	0.5000	0.0110
C9	CBMH_14	SU_N	CONDUIT	15.2	0.5000	0.0110
OR1	SU_S	J2	ORIFICE			
OR2	SU_N	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C10	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C11	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C12	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C13	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21
C15	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C16	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C17	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C18	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C19	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.13
C20	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C21	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C22	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C23	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36

C24	CIRCULAR	0.75	0.44	0.19	0.75	1	0.93
C25	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C26	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C27	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C28	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C29	CIRCULAR	0.38	0.11	0.09	0.38	1	0.16
C3	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C30	CIRCULAR	0.60	0.28	0.15	0.60	1	0.50
C31	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C32	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C33	CIRCULAR	0.38	0.11	0.09	0.38	1	0.78
C34	CIRCULAR	0.38	0.11	0.09	0.38	1	0.17
C35	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C36	CIRCULAR	0.75	0.44	0.19	0.75	1	0.94
C37	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C4	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C5	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	0.14
C7	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C8	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C9	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51

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 CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed NO
 Water Quality NO
Infiltration Method HORTON
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 12/11/2020 00:00:00
Ending Date 12/21/2020 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 1.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 6
Head Tolerance 0.001500 m

	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm

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Total Precipitation	0.505	71.677
Evaporation Loss	0.000	0.000
Infiltration Loss	0.017	2.413
Surface Runoff	0.489	69.322
Final Storage	0.000	0.000
Continuity Error (%)	-0.082	

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

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Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.489	4.886
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.489	4.888
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 (%)	-0.037	

Time-Step Critical Elements

Link C33 (3.80%)

Highest Flow Instability Indexes

Link C2 (4)
 Link OR1 (1)
 Link OR2 (1)

 Routing Time Step Summary

Minimum Time Step : 0.50 sec
 Average Time Step : 0.98 sec
 Maximum Time Step : 1.00 sec
 Percent in Steady State : 0.00
 Average Iterations per Step : 2.00
 Percent Not Converging : 0.01
 Time Step Frequencies :
 1.000 - 0.871 sec : 96.49 %
 0.871 - 0.758 sec : 0.30 %
 0.758 - 0.660 sec : 0.28 %
 0.660 - 0.574 sec : 0.66 %
 0.574 - 0.500 sec : 2.28 %

 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 CMS	Runoff Coeff
Area_1	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.17	0.12	0.966
Area_10	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.06	0.04	0.966
Area_101	71.68	0.00	0.00	1.25	68.12	2.34	70.46	0.97	0.65	0.983
Area_102	71.68	0.00	0.00	1.25	68.12	2.34	70.46	0.80	0.53	0.983
Area_11	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.09	0.06	0.966
Area_12	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.11	0.08	0.966
Area_13	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.11	0.08	0.966
Area_14	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.12	0.08	0.966
Area_15	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.06	0.04	0.966
Area_16	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.10	0.07	0.966
Area_17	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.12	0.08	0.966
Area_18	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.12	0.08	0.966
Area_19	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.12	0.08	0.966
Area_2	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.11	0.08	0.966
Area_20	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.19	0.14	0.966
Area_2001	71.68	0.00	0.00	20.52	17.93	33.25	51.18	0.04	0.01	0.714
Area_2002	71.68	0.00	0.00	2.53	64.54	4.64	69.18	0.15	0.10	0.965
Area_2003	71.68	0.00	0.00	2.55	64.54	4.62	69.17	0.11	0.08	0.965
Area_2004	71.68	0.00	0.00	24.23	3.59	43.89	47.48	0.01	0.01	0.662
Area_2005	71.68	0.00	0.00	24.23	3.59	43.89	47.48	0.02	0.01	0.662
Area_21	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.15	0.10	0.966
Area_22	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.22	0.16	0.966
Area_23	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.11	0.08	0.966
Area_3	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.25	0.18	0.966
Area_4	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.19	0.14	0.966
Area_5	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.10	0.07	0.966
Area_6	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.10	0.07	0.966
Area_7	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.03	0.02	0.966
Area_8	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.08	0.06	0.966
Area_9	71.68	0.00	0.00	2.48	64.57	4.70	69.27	0.08	0.06	0.966

 Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB_10	JUNCTION	0.00	0.16	65.49	0 01:10	0.16
CB_23	JUNCTION	0.00	0.11	66.31	0 01:10	0.11
CB_27	JUNCTION	0.00	0.31	65.80	0 01:10	0.30
CB_28	JUNCTION	0.00	0.39	65.78	0 01:10	0.37
CB_29	JUNCTION	0.01	0.86	64.98	0 01:08	0.60
CB_5	JUNCTION	0.00	0.16	65.28	0 01:10	0.16
CBMH_11	JUNCTION	0.06	1.13	64.71	0 01:52	1.13
CBMH_12	JUNCTION	0.02	1.51	65.57	0 01:03	0.84
CBMH_14	JUNCTION	0.04	1.08	65.19	0 01:32	1.08
CBMH_15	JUNCTION	0.01	1.34	65.81	0 01:16	0.72
CBMH_18	JUNCTION	0.05	1.14	65.19	0 01:32	1.14
CBMH_19	JUNCTION	0.00	0.32	65.19	0 01:33	0.32
CBMH_2	JUNCTION	0.02	0.66	64.72	0 01:53	0.66
CBMH_21	JUNCTION	0.00	0.27	65.44	0 01:10	0.27
CBMH_22	JUNCTION	0.00	0.20	65.73	0 01:10	0.20
CBMH_3	JUNCTION	0.00	0.30	64.71	0 01:53	0.30
CBMH_4	JUNCTION	0.00	0.23	65.00	0 01:10	0.23
CBMH_6	JUNCTION	0.02	0.80	64.71	0 01:52	0.80
CBMH_7	JUNCTION	0.01	0.44	64.71	0 01:50	0.44
CBMH_8	JUNCTION	0.00	0.30	64.93	0 01:10	0.30
CBMH_9	JUNCTION	0.00	0.23	65.22	0 01:10	0.23
DCB_16	JUNCTION	0.00	0.39	65.19	0 01:32	0.39
J1	JUNCTION	0.01	0.18	63.93	0 01:32	0.18

J13	JUNCTION	0.06	1.17	64.71	0	01:52	1.17
J2	JUNCTION	0.01	0.14	63.37	0	01:53	0.14
MH_20	JUNCTION	0.00	0.27	65.26	0	01:10	0.27
MH_24	JUNCTION	0.04	1.06	65.19	0	01:31	1.06
MH_25	JUNCTION	0.02	0.99	65.40	0	01:10	0.98
MH_26	JUNCTION	0.01	1.23	65.78	0	01:10	1.22
MH_27	JUNCTION	0.03	0.82	64.71	0	01:52	0.82
MH_30	JUNCTION	0.04	0.98	64.71	0	01:52	0.98
MH_44	JUNCTION	0.02	0.42	63.93	0	01:32	0.42
MH_45	JUNCTION	0.02	0.26	63.37	0	01:53	0.26
OGS_1	JUNCTION	0.01	0.10	63.14	0	01:53	0.10
OGS_2	JUNCTION	0.01	0.35	63.82	0	01:32	0.35
Humber_P1	OUTFALL	0.00	0.00	62.48	0	00:00	0.00
OF1	OUTFALL	0.01	0.33	63.74	0	01:32	0.33
OF2	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU_N	STORAGE	0.09	1.44	65.19	0	01:32	1.44
SU_S	STORAGE	0.11	1.47	64.71	0	01:53	1.47

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB_10	JUNCTION	0.064	0.064	0 01:10	0.09	0.09	-0.012
CB_23	JUNCTION	0.039	0.039	0 01:10	0.0554	0.0554	-0.007
CB_27	JUNCTION	0.074	0.074	0 01:10	0.104	0.104	0.357
CB_28	JUNCTION	0.074	0.074	0 01:10	0.104	0.104	0.478
CB_29	JUNCTION	0.079	0.079	0 01:10	0.111	0.111	0.583
CB_5	JUNCTION	0.074	0.074	0 01:10	0.104	0.104	-0.013
CBMH_11	JUNCTION	0.636	0.872	0 01:10	0.942	1.27	0.040
CBMH_12	JUNCTION	0.157	0.157	0 01:10	0.222	0.222	0.322
CBMH_14	JUNCTION	0.123	0.378	0 01:07	0.173	0.53	-0.516
CBMH_15	JUNCTION	0.079	0.258	0 01:09	0.111	0.358	0.361
CBMH_18	JUNCTION	0.138	1.071	0 01:10	0.194	1.62	0.006
CBMH_19	JUNCTION	0.020	0.177	0 01:10	0.0277	0.249	0.857
CBMH_2	JUNCTION	0.084	0.323	0 01:10	0.118	0.458	0.370
CBMH_21	JUNCTION	0.059	0.157	0 01:10	0.0831	0.222	0.067
CBMH_22	JUNCTION	0.059	0.098	0 01:10	0.0831	0.139	0.041
CBMH_3	JUNCTION	0.084	0.241	0 01:10	0.118	0.338	0.207
CBMH_4	JUNCTION	0.084	0.157	0 01:10	0.118	0.222	0.640
CBMH_6	JUNCTION	0.044	0.348	0 01:10	0.0623	0.487	-0.394
CBMH_7	JUNCTION	0.084	0.304	0 01:10	0.118	0.427	0.625
CBMH_8	JUNCTION	0.079	0.221	0 01:10	0.111	0.311	0.562
CBMH_9	JUNCTION	0.079	0.142	0 01:10	0.111	0.201	0.228
DCB_16	JUNCTION	0.177	0.177	0 01:10	0.249	0.249	0.955
J1	JUNCTION	0.000	0.014	0 01:32	0	0.951	-0.005
J13	JUNCTION	0.138	0.802	0 01:08	0.194	1.14	-0.232
J2	JUNCTION	0.000	0.015	0 01:53	0	1.21	-0.004
MH_20	JUNCTION	0.000	0.157	0 01:10	0	0.221	-0.019
MH_24	JUNCTION	0.000	0.940	0 01:10	0	1.42	-0.507
MH_25	JUNCTION	0.000	0.764	0 01:10	0	1.17	0.262
MH_26	JUNCTION	0.646	0.771	0 01:08	0.965	1.17	0.074
MH_27	JUNCTION	0.000	0.080	0 01:08	0	0.11	-0.540
MH_30	JUNCTION	0.000	0.323	0 01:10	0	0.459	-0.800
MH_44	JUNCTION	0.000	0.207	0 01:32	0	2.15	0.012
MH_45	JUNCTION	0.000	0.124	0 01:53	0	2.42	0.000
OGS_1	JUNCTION	0.000	0.124	0 01:53	0	2.42	-0.000
OGS_2	JUNCTION	0.000	0.207	0 01:32	0	2.15	-0.011
Humber_P1	OUTFALL	0.017	0.127	0 01:50	0.0285	2.45	0.000
OF1	OUTFALL	0.076	0.219	0 01:30	0.111	2.26	0.000
OF2	OUTFALL	0.110	0.110	0 01:10	0.181	0.181	0.000
SU_N	STORAGE	0.000	1.442	0 01:08	0	2.15	-0.100
SU_S	STORAGE	0.000	1.654	0 01:08	0	2.42	-0.085

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CB_29	JUNCTION	2.31	0.490	1.562
CBMH_11	JUNCTION	3.90	0.488	1.029
CBMH_12	JUNCTION	2.66	1.140	0.167
CBMH_14	JUNCTION	2.80	0.483	1.131
CBMH_15	JUNCTION	0.87	0.755	0.514
CBMH_18	JUNCTION	2.17	0.389	1.401
CBMH_2	JUNCTION	0.01	0.002	2.281
CBMH_6	JUNCTION	2.15	0.213	1.930
J13	JUNCTION	3.32	0.422	1.931
MH_24	JUNCTION	0.70	0.097	1.439
MH_25	JUNCTION	1.20	0.389	1.636
MH_26	JUNCTION	0.04	0.176	1.477
MH_27	JUNCTION	3.20	0.387	1.199
MH_30	JUNCTION	2.69	0.319	2.099

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU_N	0.067	3	0	0	1.304	50	0 01:32	0.207
SU_S	0.107	3	0	0	1.664	48	0 01:53	0.124

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Humber_P1	29.10	0.014	0.127	2.446
OF1	23.64	0.018	0.219	2.261
OF2	4.45	0.008	0.110	0.181
System	19.06	0.040	0.370	4.888

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.193	0 01:32	6.13	4.07	1.00
C10	CONDUIT	0.079	0 01:11	1.65	0.24	0.94
C11	CONDUIT	0.087	0 01:10	1.66	0.26	0.85
C12	CONDUIT	0.764	0 01:10	3.53	2.13	1.00
C13	CONDUIT	0.935	0 01:10	3.31	1.82	1.00
C14	CONDUIT	0.039	0 01:10	1.45	0.19	0.29
C15	CONDUIT	0.098	0 01:10	1.40	0.41	0.45
C16	CONDUIT	0.157	0 01:10	1.61	0.66	0.59
C17	CONDUIT	0.157	0 01:10	1.60	0.66	0.59
C18	CONDUIT	0.177	0 01:10	1.65	0.74	0.85
C19	CONDUIT	0.064	0 01:10	1.28	0.27	0.35
C2	CONDUIT	0.207	0 01:32	1.90	1.64	0.96
C20	CONDUIT	0.142	0 01:10	1.52	0.40	0.45
C21	CONDUIT	0.221	0 01:10	1.70	0.61	0.58
C22	CONDUIT	0.304	0 01:10	1.86	0.85	0.92
C23	CONDUIT	0.347	0 01:09	1.95	0.96	1.00
C24	CONDUIT	0.800	0 01:07	2.37	0.86	1.00
C25	CONDUIT	0.074	0 01:10	1.31	0.21	0.31
C26	CONDUIT	0.157	0 01:10	1.59	0.31	0.38
C27	CONDUIT	0.240	0 01:10	1.78	0.47	0.74
C28	CONDUIT	0.323	0 01:10	1.91	0.63	1.00
C29	CONDUIT	0.157	0 01:10	1.42	1.00	1.00
C3	CONDUIT	0.014	0 01:33	0.84	0.18	0.63
C30	CONDUIT	0.320	0 01:08	1.73	0.63	1.00
C31	CONDUIT	0.080	0 01:08	0.97	0.55	1.00
C32	CONDUIT	0.872	0 01:10	4.03	2.42	1.00
C33	CONDUIT	0.124	0 01:53	5.15	0.16	0.27
C34	CONDUIT	0.207	0 01:32	1.97	1.21	0.90
C35	CONDUIT	0.764	0 01:10	2.70	1.49	1.00
C36	CONDUIT	1.071	0 01:10	2.67	1.14	1.00
C37	CONDUIT	0.080	0 01:08	1.20	0.55	1.00
C4	CONDUIT	0.110	0 01:53	3.49	2.31	1.00
C5	CONDUIT	0.015	0 01:53	0.82	0.18	0.54
C6	CONDUIT	0.124	0 01:53	1.52	0.86	0.69
C7	CONDUIT	0.179	0 01:09	1.62	0.50	0.88
C8	CONDUIT	0.256	0 01:07	1.77	0.71	1.00
C9	CONDUIT	0.376	0 01:08	1.95	0.73	1.00
OR1	ORIFICE	0.015	0 01:53			1.00
OR2	ORIFICE	0.014	0 01:32			1.00

Flow Classification Summary

Adjusted /Actual	Fraction of Time in Flow Class							
	Up	Down	Sub	Sup	Up	Down	Norm	Inlet

Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.97	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C12	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.01	0.00
C13	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C15	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C17	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C18	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.01	0.00
C19	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C2	1.00	0.00	0.09	0.00	0.77	0.14	0.00	0.00	0.78	0.00
C20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C21	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.01	0.00
C22	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.03	0.00
C23	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.03	0.00
C24	1.00	0.00	0.00	0.00	0.13	0.00	0.00	0.87	0.01	0.00
C25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C26	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.01	0.00
C27	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.01	0.00
C28	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.04	0.00
C29	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.05	0.00
C3	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C30	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.01	0.00
C31	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.02	0.00
C32	1.00	0.00	0.00	0.00	0.13	0.00	0.00	0.87	0.01	0.00
C33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C34	1.00	0.00	0.00	0.00	0.75	0.25	0.00	0.00	0.04	0.00
C35	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.03	0.00
C36	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.89	0.00	0.00
C37	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.03	0.00
C4	1.00	0.96	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.02	0.00
C8	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.04	0.00
C9	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.89	0.01	0.00

Conduit Surcharge Summary

Conduit	Hours Full		Hours		Hours Capacity Limited
	Both Ends	Upstream	Above Normal Flow	Full	
C1	2.08	2.16	2.08	2.35	2.08
C10	0.01	0.01	0.07	0.01	0.01
C11	0.01	0.01	0.04	0.01	0.01
C12	0.98	1.01	1.25	0.22	0.18
C13	2.58	2.64	2.76	0.18	0.07
C18	0.01	0.01	0.70	0.01	0.01
C2	0.01	0.69	0.01	1.46	0.01
C22	0.01	0.01	2.15	0.01	0.01
C23	2.46	2.46	3.32	0.01	0.01
C24	3.32	3.32	3.45	0.01	0.01
C27	0.01	0.01	0.01	0.01	0.01
C28	0.99	0.99	2.69	0.01	0.01
C29	2.66	2.66	4.96	0.03	0.03
C30	3.04	3.04	3.32	0.01	0.01
C31	3.58	3.58	3.90	0.01	0.01
C32	6.08	6.11	8.35	0.23	0.18
C34	0.01	0.01	0.01	0.88	0.01
C35	1.13	1.20	2.22	0.15	0.06
C36	2.17	2.17	2.28	0.09	0.01
C37	2.31	2.31	3.20	0.01	0.01
C4	2.89	3.23	2.89	3.45	2.89
C7	0.01	0.01	0.87	0.01	0.01
C8	1.13	1.13	2.95	0.01	0.01
C9	2.80	2.80	3.93	0.01	0.01

Analysis begun on: Wed Oct 5 21:19:30 2022
Analysis ended on: Wed Oct 5 21:20:01 2022
Total elapsed time: 00:00:31

100-yr, 6-hour

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link C32
WARNING 03: negative offset ignored for Link C34

Element Count

Number of rain gages 7
Number of subcatchments ... 30
Number of nodes 40
Number of links 39
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
25mm	25mm	INTENSITY	5 min.
3hr-100yr	3hr-100yr	INTENSITY	10 min.
3hr-2yr	3hr-2yr	INTENSITY	5 min.
3hr-5yr	3hr-5yr	INTENSITY	5 min.
6hr-100yr	6hr-100yr	INTENSITY	10 min.
6hr-2yr	6hr-2yr	INTENSITY	5 min.
6hr-5yr	6hr-5yr	INTENSITY	5 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Area_1	0.25	83.33	90.00	1.0000	6hr-100yr	CBMH_14
Area_10	0.08	26.67	90.00	1.0000	6hr-100yr	CB_23
Area_101	1.37	137.00	95.00	0.5000	6hr-100yr	MH_26
Area_102	1.13	113.00	95.00	0.5000	6hr-100yr	CBMH_11
Area_11	0.13	43.33	90.00	1.0000	6hr-100yr	CB_10
Area_12	0.16	53.33	90.00	1.0000	6hr-100yr	CBMH_9
Area_13	0.16	53.33	90.00	1.0000	6hr-100yr	CBMH_8
Area_14	0.17	56.67	90.00	1.0000	6hr-100yr	CBMH_7
Area_15	0.09	30.00	90.00	1.0000	6hr-100yr	CBMH_6
Area_16	0.15	50.00	90.00	1.0000	6hr-100yr	CB_5
Area_17	0.17	56.67	90.00	1.0000	6hr-100yr	CBMH_4
Area_18	0.17	56.67	90.00	1.0000	6hr-100yr	CBMH_3
Area_19	0.17	56.67	90.00	1.0000	6hr-100yr	CBMH_2
Area_2	0.16	53.33	90.00	1.0000	6hr-100yr	CBMH_15
Area_20	0.28	93.33	90.00	1.0000	6hr-100yr	J13
Area_2001	0.07	7.00	25.00	0.5000	6hr-100yr	OF2
Area_2002	0.21	21.00	90.00	0.5000	6hr-100yr	OF2
Area_2003	0.16	16.00	90.00	1.0000	6hr-100yr	OF1
Area_2004	0.02	13.33	5.00	0.5000	6hr-100yr	Humber_P1
Area_2005	0.04	26.67	5.00	0.5000	6hr-100yr	Humber_P1
Area_21	0.21	70.00	90.00	1.0000	6hr-100yr	CBMH_11
Area_22	0.32	106.67	90.00	1.0000	6hr-100yr	CBMH_12
Area_23	0.16	53.33	90.00	1.0000	6hr-100yr	CB_29
Area_3	0.36	120.00	90.00	1.0000	6hr-100yr	DCB_16
Area_4	0.28	93.33	90.00	1.0000	6hr-100yr	CBMH_18
Area_5	0.15	50.00	90.00	1.0000	6hr-100yr	CB_27
Area_6	0.15	50.00	90.00	1.0000	6hr-100yr	CB_28
Area_7	0.04	13.33	90.00	1.0000	6hr-100yr	CBMH_19
Area_8	0.12	40.00	90.00	1.0000	6hr-100yr	CBMH_21
Area_9	0.12	40.00	90.00	1.0000	6hr-100yr	CBMH_22

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
CB_10	JUNCTION	65.33	1.41	10.0	
CB_23	JUNCTION	66.20	0.93	10.0	
CB_27	JUNCTION	65.48	1.34	10.0	
CB_28	JUNCTION	65.39	1.52	10.0	
CB_29	JUNCTION	64.11	2.43	0.0	
CB_5	JUNCTION	65.11	1.63	10.0	
CBMH_11	JUNCTION	63.58	2.16	10.0	
CBMH_12	JUNCTION	64.06	1.68	10.0	
CBMH_14	JUNCTION	64.11	2.21	10.0	
CBMH_15	JUNCTION	64.47	1.85	10.0	
CBMH_18	JUNCTION	64.05	2.54	0.0	
CBMH_19	JUNCTION	64.88	2.38	10.0	
CBMH_2	JUNCTION	64.06	2.94	10.0	
CBMH_21	JUNCTION	65.17	1.87	10.0	
CBMH_22	JUNCTION	65.53	1.51	10.0	
CBMH_3	JUNCTION	64.42	2.58	10.0	

CBMH_4	JUNCTION	64.78	2.22	10.0
CBMH_6	JUNCTION	63.91	2.73	10.0
CBMH_7	JUNCTION	64.27	2.73	10.0
CBMH_8	JUNCTION	64.63	2.37	10.0
CBMH_9	JUNCTION	64.99	2.01	10.0
DCB_16	JUNCTION	64.80	1.52	10.0
J1	JUNCTION	63.75	3.27	0.0
J13	JUNCTION	63.54	3.10	10.0
J2	JUNCTION	63.24	3.33	0.0
MH_20	JUNCTION	64.99	2.30	0.0
MH_24	JUNCTION	64.13	2.50	10.0
MH_25	JUNCTION	64.42	2.63	0.0
MH_26	JUNCTION	64.56	2.70	0.0
MH_27	JUNCTION	63.89	2.02	0.0
MH_30	JUNCTION	63.73	3.08	0.0
MH_44	JUNCTION	63.51	3.51	0.0
MH_45	JUNCTION	63.11	3.46	0.0
OGS_1	JUNCTION	63.04	3.34	0.0
OGS_2	JUNCTION	63.47	3.01	0.0
Humber_P1	OUTFALL	62.48	0.38	0.0
OF1	OUTFALL	63.41	0.38	0.0
OF2	OUTFALL	0.00	0.00	0.0
SU_N	STORAGE	63.75	3.04	0.0
SU_S	STORAGE	63.24	3.33	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	SU_N	MH_44	CONDUIT	2.5	1.0001	0.0090
C10	CB_28	MH_26	CONDUIT	30.4	1.0001	0.0110
C11	CB_27	MH_26	CONDUIT	32.8	1.0001	0.0110
C12	MH_26	MH_25	CONDUIT	16.5	0.4970	0.0110
C13	MH_24	CBMH_18	CONDUIT	4.8	0.5000	0.0110
C14	CB_23	CBMH_22	CONDUIT	51.5	1.0001	0.0110
C15	CBMH_22	CBMH_21	CONDUIT	60.0	0.5000	0.0110
C16	CBMH_21	MH_20	CONDUIT	24.5	0.5020	0.0110
C17	MH_20	CBMH_19	CONDUIT	10.4	0.5000	0.0110
C18	CBMH_19	MH_24	CONDUIT	46.5	0.5011	0.0110
C19	CB_10	CBMH_9	CONDUIT	52.5	0.4991	0.0110
C2	MH_44	OGS_2	CONDUIT	11.6	0.3707	0.0110
C20	CBMH_9	CBMH_8	CONDUIT	60.0	0.5000	0.0110
C21	CBMH_8	CBMH_7	CONDUIT	60.0	0.5000	0.0110
C22	CBMH_7	CBMH_6	CONDUIT	60.0	0.5000	0.0110
C23	CBMH_6	J13	CONDUIT	29.9	0.5017	0.0110
C24	J13	SU_S	CONDUIT	4.0	0.5000	0.0110
C25	CB_5	CBMH_4	CONDUIT	52.5	0.4991	0.0110
C26	CBMH_4	CBMH_3	CONDUIT	60.0	0.5000	0.0110
C27	CBMH_3	CBMH_2	CONDUIT	60.0	0.5000	0.0110
C28	CBMH_2	MH_30	CONDUIT	53.4	0.4963	0.0110
C29	CBMH_12	CBMH_11	CONDUIT	50.0	0.5700	0.0110
C3	J1	MH_44	CONDUIT	2.5	0.4800	0.0110
C30	MH_30	J13	CONDUIT	9.3	0.4839	0.0110
C31	MH_27	CBMH_11	CONDUIT	8.2	0.5000	0.0110
C32	CBMH_11	SU_S	CONDUIT	13.2	0.5000	0.0110
C33	OGS_1	Humber_P1	CONDUIT	4.0	14.1135	0.0110
C34	OGS_2	OF1	CONDUIT	8.7	0.6782	0.0110
C35	MH_25	MH_24	CONDUIT	44.2	0.5000	0.0110
C36	CBMH_18	SU_N	CONDUIT	3.9	0.5128	0.0110
C37	CB_29	MH_27	CONDUIT	32.9	0.4985	0.0110
C4	SU_S	MH_45	CONDUIT	9.4	1.0001	0.0090
C5	J2	MH_45	CONDUIT	9.4	0.5000	0.0110
C6	MH_45	OGS_1	CONDUIT	3.1	0.4839	0.0110
C7	DCB_16	CBMH_15	CONDUIT	54.4	0.5000	0.0110
C8	CBMH_15	CBMH_14	CONDUIT	60.0	0.5000	0.0110
C9	CBMH_14	SU_N	CONDUIT	15.2	0.5000	0.0110
OR1	SU_S	J2	ORIFICE			
OR2	SU_N	J1	ORIFICE			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C10	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C11	CIRCULAR	0.45	0.16	0.11	0.45	1	0.34
C12	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C13	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21
C15	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C16	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C17	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C18	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C19	CIRCULAR	0.45	0.16	0.11	0.45	1	0.24
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.13
C20	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C21	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C22	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C23	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C24	CIRCULAR	0.75	0.44	0.19	0.75	1	0.93

C25	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C26	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C27	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C28	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C29	CIRCULAR	0.38	0.11	0.09	0.38	1	0.16
C3	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C30	CIRCULAR	0.60	0.28	0.15	0.60	1	0.50
C31	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C32	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C33	CIRCULAR	0.38	0.11	0.09	0.38	1	0.78
C34	CIRCULAR	0.38	0.11	0.09	0.38	1	0.17
C35	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51
C36	CIRCULAR	0.75	0.44	0.19	0.75	1	0.94
C37	CIRCULAR	0.38	0.11	0.09	0.38	1	0.15
C4	CIRCULAR	0.20	0.03	0.05	0.20	1	0.05
C5	CIRCULAR	0.30	0.07	0.07	0.30	1	0.08
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	0.14
C7	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C8	CIRCULAR	0.53	0.22	0.13	0.53	1	0.36
C9	CIRCULAR	0.60	0.28	0.15	0.60	1	0.51

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 CMS

Process Models:

Rainfall/Runoff YES

RDII NO

Snowmelt NO

Groundwater NO

Flow Routing YES

Ponding Allowed NO

Water Quality NO

Infiltration Method HORTON

Flow Routing Method DYNWAVE

Surcharge Method EXTRAN

Starting Date 12/11/2020 00:00:00

Ending Date 12/21/2020 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 1.00 sec

Variable Time Step YES

Maximum Trials 8

Number of Threads 6

Head Tolerance 0.001500 m

	Volume hectare-m	Depth mm
Runoff Quantity Continuity		

Total Precipitation	0.580	82.325
Evaporation Loss	0.000	0.000
Infiltration Loss	0.018	2.506
Surface Runoff	0.563	79.876
Final Storage	0.000	0.000
Continuity Error (%)	-0.069	

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

Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.563	5.630
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.563	5.633
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 (%)	-0.048	

Time-Step Critical Elements

Link C33 (4.38%)

Highest Flow Instability Indexes

Link C2 (5)

Link OR2 (1)
 Link OR1 (1)

 Routing Time Step Summary

Minimum Time Step : 0.50 sec
 Average Time Step : 0.98 sec
 Maximum Time Step : 1.00 sec
 Percent in Steady State : -0.00
 Average Iterations per Step : 2.00
 Percent Not Converging : 0.01
 Time Step Frequencies :
 1.000 - 0.871 sec : 95.79 %
 0.871 - 0.758 sec : 0.30 %
 0.758 - 0.660 sec : 0.29 %
 0.660 - 0.574 sec : 0.83 %
 0.574 - 0.500 sec : 2.79 %

 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 CMS	Runoff Coeff
Area_1	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.20	0.12	0.970
Area_10	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.06	0.04	0.970
Area_101	82.32	0.00	0.00	1.30	78.24	2.82	81.06	1.11	0.65	0.985
Area_102	82.32	0.00	0.00	1.30	78.24	2.82	81.06	0.92	0.53	0.985
Area_11	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.10	0.06	0.970
Area_12	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.13	0.08	0.970
Area_13	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.13	0.08	0.970
Area_14	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.14	0.08	0.970
Area_15	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.07	0.04	0.970
Area_16	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.12	0.07	0.970
Area_17	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.14	0.08	0.970
Area_18	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.14	0.08	0.970
Area_19	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.14	0.08	0.970
Area_2	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.13	0.08	0.970
Area_20	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.22	0.14	0.970
Area_2001	82.33	0.00	0.00	21.03	20.60	40.72	61.31	0.04	0.01	0.745
Area_2002	82.33	0.00	0.00	2.63	74.12	5.61	79.73	0.17	0.10	0.969
Area_2003	82.32	0.00	0.00	2.65	74.13	5.59	79.72	0.13	0.08	0.968
Area_2004	82.32	0.00	0.00	25.10	4.12	53.14	57.25	0.01	0.01	0.695
Area_2005	82.32	0.00	0.00	25.10	4.12	53.14	57.25	0.02	0.01	0.695
Area_21	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.17	0.10	0.970
Area_22	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.26	0.16	0.970
Area_23	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.13	0.08	0.970
Area_3	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.29	0.18	0.970
Area_4	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.22	0.14	0.970
Area_5	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.12	0.07	0.970
Area_6	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.12	0.07	0.970
Area_7	82.32	0.00	0.00	2.58	74.16	5.66	79.82	0.03	0.02	0.970
Area_8	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.10	0.06	0.970
Area_9	82.33	0.00	0.00	2.58	74.16	5.66	79.82	0.10	0.06	0.970

 Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB_10	JUNCTION	0.00	0.16	65.49	0 02:10	0.16
CB_23	JUNCTION	0.00	0.11	66.31	0 02:10	0.11
CB_27	JUNCTION	0.00	0.48	65.96	0 02:10	0.45
CB_28	JUNCTION	0.00	1.39	66.77	0 02:09	0.54
CB_29	JUNCTION	0.02	0.93	65.04	0 02:07	0.67
CB_5	JUNCTION	0.00	0.16	65.28	0 02:10	0.16
CBMH_11	JUNCTION	0.06	1.20	64.78	0 02:50	1.20
CBMH_12	JUNCTION	0.02	1.45	65.50	0 02:03	0.93
CBMH_14	JUNCTION	0.05	1.15	65.26	0 02:32	1.15
CBMH_15	JUNCTION	0.02	1.57	66.04	0 02:13	0.80
CBMH_18	JUNCTION	0.05	1.21	65.26	0 02:31	1.21
CBMH_19	JUNCTION	0.00	0.39	65.26	0 02:30	0.39
CBMH_2	JUNCTION	0.02	0.73	64.78	0 02:50	0.72
CBMH_21	JUNCTION	0.00	0.27	65.44	0 02:10	0.27
CBMH_22	JUNCTION	0.00	0.20	65.73	0 02:10	0.20
CBMH_3	JUNCTION	0.01	0.37	64.78	0 02:50	0.36
CBMH_4	JUNCTION	0.00	0.23	65.01	0 02:10	0.23
CBMH_6	JUNCTION	0.03	0.87	64.78	0 02:50	0.87
CBMH_7	JUNCTION	0.01	0.51	64.78	0 02:50	0.51
CBMH_8	JUNCTION	0.00	0.30	64.93	0 02:10	0.30
CBMH_9	JUNCTION	0.00	0.23	65.22	0 02:10	0.23
DCB_16	JUNCTION	0.01	0.47	65.27	0 02:29	0.47
J1	JUNCTION	0.01	0.24	63.99	0 02:31	0.24
J13	JUNCTION	0.07	1.24	64.78	0 02:51	1.24

J2	JUNCTION	0.02	0.15	63.38	0	02:51	0.15
MH_20	JUNCTION	0.00	0.27	65.26	0	02:30	0.27
MH_24	JUNCTION	0.04	1.13	65.26	0	02:31	1.13
MH_25	JUNCTION	0.02	1.26	65.67	0	02:09	1.10
MH_26	JUNCTION	0.01	1.59	66.15	0	02:09	1.35
MH_27	JUNCTION	0.03	0.89	64.78	0	02:50	0.89
MH_30	JUNCTION	0.04	1.05	64.78	0	02:50	1.05
MH_44	JUNCTION	0.02	0.47	63.99	0	02:31	0.47
MH_45	JUNCTION	0.02	0.27	63.38	0	02:51	0.27
OGS_1	JUNCTION	0.01	0.10	63.14	0	02:51	0.10
OGS_2	JUNCTION	0.02	0.38	63.85	0	02:31	0.38
Humber_P1	OUTFALL	0.00	0.00	62.48	0	00:00	0.00
OF1	OUTFALL	0.01	0.34	63.75	0	02:31	0.34
OF2	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU_N	STORAGE	0.10	1.51	65.26	0	02:31	1.51
SU_S	STORAGE	0.12	1.54	64.78	0	02:51	1.54

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB_10	JUNCTION	0.064	0.064	0 02:10	0.104	0.104	-0.010
CB_23	JUNCTION	0.039	0.039	0 02:10	0.0638	0.0638	-0.006
CB_27	JUNCTION	0.074	0.074	0 02:10	0.12	0.12	0.440
CB_28	JUNCTION	0.074	0.074	0 02:10	0.12	0.12	0.379
CB_29	JUNCTION	0.079	0.079	0 02:10	0.128	0.128	0.499
CB_5	JUNCTION	0.074	0.074	0 02:10	0.12	0.12	-0.011
CBMH_11	JUNCTION	0.637	0.874	0 02:10	1.08	1.47	0.034
CBMH_12	JUNCTION	0.158	0.158	0 02:10	0.255	0.255	0.284
CBMH_14	JUNCTION	0.123	0.377	0 02:06	0.2	0.612	-0.406
CBMH_15	JUNCTION	0.079	0.258	0 02:08	0.128	0.413	-0.081
CBMH_18	JUNCTION	0.138	1.080	0 02:10	0.223	1.86	0.005
CBMH_19	JUNCTION	0.020	0.177	0 02:10	0.0319	0.287	0.775
CBMH_2	JUNCTION	0.084	0.325	0 02:10	0.136	0.523	0.118
CBMH_21	JUNCTION	0.059	0.158	0 02:10	0.0958	0.255	0.120
CBMH_22	JUNCTION	0.059	0.099	0 02:10	0.0958	0.16	0.027
CBMH_3	JUNCTION	0.084	0.241	0 02:10	0.136	0.39	0.533
CBMH_4	JUNCTION	0.084	0.158	0 02:10	0.136	0.255	0.562
CBMH_6	JUNCTION	0.044	0.349	0 02:10	0.0718	0.562	-0.377
CBMH_7	JUNCTION	0.084	0.305	0 02:10	0.136	0.493	0.562
CBMH_8	JUNCTION	0.079	0.222	0 02:10	0.128	0.358	0.432
CBMH_9	JUNCTION	0.079	0.143	0 02:10	0.128	0.231	0.306
DCB_16	JUNCTION	0.177	0.177	0 02:10	0.287	0.287	0.838
J1	JUNCTION	0.000	0.014	0 02:23	0	1.02	-0.004
J13	JUNCTION	0.138	0.801	0 02:07	0.223	1.31	-0.203
J2	JUNCTION	0.000	0.015	0 02:51	0	1.28	-0.003
MH_20	JUNCTION	0.000	0.158	0 02:10	0	0.255	-0.069
MH_24	JUNCTION	0.000	0.963	0 02:10	0	1.63	-0.450
MH_25	JUNCTION	0.000	0.787	0 02:10	0	1.35	0.228
MH_26	JUNCTION	0.647	0.787	0 02:10	1.11	1.35	0.049
MH_27	JUNCTION	0.000	0.080	0 02:07	0	0.127	-0.483
MH_30	JUNCTION	0.000	0.327	0 02:09	0	0.523	-0.712
MH_44	JUNCTION	0.000	0.223	0 02:31	0	2.48	0.011
MH_45	JUNCTION	0.000	0.132	0 02:51	0	2.78	0.000
OGS_1	JUNCTION	0.000	0.132	0 02:51	0	2.78	-0.000
OGS_2	JUNCTION	0.000	0.223	0 02:31	0	2.48	-0.009
Humber_P1	OUTFALL	0.019	0.135	0 02:44	0.0344	2.82	0.000
OF1	OUTFALL	0.077	0.236	0 02:30	0.128	2.6	0.000
OF2	OUTFALL	0.111	0.111	0 02:10	0.21	0.21	0.000
SU_N	STORAGE	0.000	1.428	0 02:10	0	2.48	-0.069
SU_S	STORAGE	0.000	1.642	0 02:09	0	2.78	-0.074

Node Surcharge Summary

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CB_27	JUNCTION	0.01	0.027	0.868
CB_28	JUNCTION	0.02	0.938	0.136
CB_29	JUNCTION	2.73	0.554	1.498
CBMH_11	JUNCTION	4.80	0.560	0.957
CBMH_12	JUNCTION	3.15	1.070	0.237
CBMH_14	JUNCTION	3.66	0.553	1.061
CBMH_15	JUNCTION	1.04	0.987	0.282
CBMH_18	JUNCTION	2.32	0.459	1.331
CBMH_2	JUNCTION	1.01	0.065	2.218
CBMH_6	JUNCTION	2.56	0.285	1.858
J13	JUNCTION	4.22	0.493	1.860
MH_24	JUNCTION	0.90	0.167	1.369
MH_25	JUNCTION	1.31	0.660	1.365
MH_26	JUNCTION	0.05	0.545	1.108
MH_27	JUNCTION	4.00	0.459	1.127

MH_30 JUNCTION 3.32 0.389 2.029
 OGS_2 JUNCTION 0.31 0.007 2.629

 Node Flooding Summary

No nodes were flooded.

 Storage Volume Summary

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU_N	0.075	3	0	0	1.371	53	0 02:31	0.223
SU_S	0.118	3	0	0	1.748	51	0 02:51	0.132

 Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Humber_Pl	30.07	0.017	0.135	2.818
OF1	24.82	0.020	0.236	2.605
OF2	5.74	0.007	0.111	0.210
System	20.21	0.043	0.402	5.633

 Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.208	0 02:31	6.63	4.40	1.00
C10	CONDUIT	0.078	0 02:09	1.66	0.23	1.00
C11	CONDUIT	0.091	0 02:10	1.67	0.27	1.00
C12	CONDUIT	0.787	0 02:10	3.63	2.20	1.00
C13	CONDUIT	0.947	0 02:10	3.35	1.85	1.00
C14	CONDUIT	0.039	0 02:10	1.45	0.19	0.30
C15	CONDUIT	0.099	0 02:10	1.40	0.41	0.45
C16	CONDUIT	0.158	0 02:10	1.61	0.66	0.59
C17	CONDUIT	0.158	0 02:10	1.60	0.66	0.67
C18	CONDUIT	0.177	0 02:09	1.64	0.74	0.93
C19	CONDUIT	0.064	0 02:10	1.28	0.27	0.35
C2	CONDUIT	0.223	0 02:31	2.02	1.76	1.00
C20	CONDUIT	0.143	0 02:10	1.52	0.40	0.45
C21	CONDUIT	0.221	0 02:10	1.70	0.62	0.59
C22	CONDUIT	0.305	0 02:10	1.86	0.85	0.99
C23	CONDUIT	0.347	0 02:07	1.95	0.96	1.00
C24	CONDUIT	0.797	0 02:07	2.36	0.86	1.00
C25	CONDUIT	0.074	0 02:10	1.31	0.21	0.31
C26	CONDUIT	0.158	0 02:10	1.59	0.31	0.38
C27	CONDUIT	0.241	0 02:10	1.78	0.47	0.80
C28	CONDUIT	0.327	0 02:09	1.91	0.64	1.00
C29	CONDUIT	0.158	0 02:10	1.43	1.01	1.00
C3	CONDUIT	0.015	0 02:43	0.84	0.19	0.81
C30	CONDUIT	0.319	0 02:07	1.73	0.63	1.00
C31	CONDUIT	0.080	0 02:07	0.97	0.55	1.00
C32	CONDUIT	0.874	0 02:10	4.04	2.43	1.00
C33	CONDUIT	0.132	0 02:51	5.24	0.17	0.28
C34	CONDUIT	0.223	0 02:31	2.06	1.30	0.95
C35	CONDUIT	0.787	0 02:10	2.78	1.53	1.00
C36	CONDUIT	1.079	0 02:10	2.63	1.15	1.00
C37	CONDUIT	0.080	0 02:07	1.20	0.55	1.00
C4	CONDUIT	0.117	0 02:51	3.73	2.47	1.00
C5	CONDUIT	0.015	0 02:52	0.82	0.19	0.57
C6	CONDUIT	0.132	0 02:51	1.56	0.92	0.72
C7	CONDUIT	0.180	0 02:08	1.62	0.50	0.95
C8	CONDUIT	0.255	0 02:06	1.73	0.71	1.00
C9	CONDUIT	0.366	0 02:07	1.89	0.71	1.00
OR1	ORIFICE	0.015	0 02:51			1.00
OR2	ORIFICE	0.014	0 02:23			1.00

 Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl	
C1	1.00	0.96	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C12	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.01	0.00
C13	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.89	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C15	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C17	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C18	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.01	0.00
C19	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C2	1.00	0.00	0.09	0.00	0.76	0.15	0.00	0.00	0.77	0.00
C20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C21	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.97	0.01	0.00
C22	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.03	0.00
C23	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.03	0.00
C24	1.00	0.00	0.00	0.00	0.14	0.00	0.00	0.86	0.01	0.00
C25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C26	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.01	0.00
C27	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.95	0.02	0.00
C28	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.04	0.00
C29	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.05	0.00
C3	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C30	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.89	0.01	0.00
C31	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.91	0.02	0.00
C32	1.00	0.00	0.00	0.00	0.14	0.00	0.00	0.86	0.01	0.00
C33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C34	1.00	0.00	0.00	0.00	0.74	0.26	0.00	0.00	0.05	0.00
C35	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.03	0.00
C36	1.00	0.00	0.00	0.00	0.12	0.00	0.00	0.88	0.00	0.00
C37	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.03	0.00
C4	1.00	0.95	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.96	0.00	0.00
C6	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C7	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.03	0.00
C8	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.04	0.00
C9	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.88	0.01	0.00

Conduit Surcharge Summary

Conduit	----- Hours Full -----			Hours Above Full Normal Flow	Hours Capacity Limited
	Both Ends	Upstream	Dnstream		
C1	2.19	2.32	2.19	2.65	2.19
C10	0.02	0.02	0.08	0.01	0.01
C11	0.01	0.01	0.05	0.01	0.01
C12	1.11	1.14	1.36	0.23	0.18
C13	3.13	3.17	3.56	0.18	0.09
C18	0.01	0.01	0.90	0.01	0.01
C2	0.30	0.89	0.30	1.57	0.30
C22	0.01	0.01	2.56	0.01	0.01
C23	3.01	3.01	4.22	0.01	0.01
C24	4.22	4.22	4.36	0.01	0.01
C27	0.01	0.01	1.01	0.01	0.01
C28	1.48	1.48	3.32	0.01	0.01
C29	3.15	3.15	5.89	0.05	0.05
C30	3.84	3.84	4.22	0.01	0.01
C31	4.48	4.48	4.80	0.01	0.01
C32	7.02	7.05	9.30	0.23	0.19
C34	0.01	0.30	0.01	1.05	0.01
C35	1.25	1.31	2.40	0.15	0.07
C36	2.32	2.32	2.53	0.10	0.03
C37	2.73	2.73	4.00	0.01	0.01
C4	3.60	4.12	3.60	4.36	3.60
C7	0.01	0.01	1.04	0.01	0.01
C8	1.29	1.29	4.08	0.01	0.01
C9	3.65	3.65	5.22	0.01	0.01

Analysis begun on: Wed Oct 5 21:20:59 2022
Analysis ended on: Wed Oct 5 21:21:30 2022
Total elapsed time: 00:00:31

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