CHEO INTEGRATED TREATMENT CENTRE

SERVICING AND STORMWATER MANAGEMENT REPORT| April 1, 2025

WALTERFEDY

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APPENDICES

1.0 INTRODUCTION

WalterFedy was retained by EllisDon to provide civil consulting engineering services in support of the construction of the Children's Hospital of Eastern Ontario's (CHEO) new Integrated Treatment Centre at 401 Smyth Road, in the City of Ottawa.

The proposed development plan is to construct a new state-of-the-art treatment center where CHEO will be able to improve access to services that were previously scattered throughout the Champlain region. The development will provide care and support services for developmental, rehabilitation, behavioural, autism, mental health, communication disorders, and community services in one building. The building will contain a variety of focused areas including medical staff workplaces, clinical areas, and school/pre-school areas to best provide an integrated transmural care model and act as the interface between primary and secondary care.

The new building will replace an existing surface parking lot located southeast of the existing CHEO building and north of the intersection between Ring Road and Smyth Road. A small parking lot is to be provided at the southeast corner of the building, connected to an accessway provided on the western face of the building. A loading entrance ramp will also be provided along the southern end of the building. The balance of the site will remain largely unchanged and will comprise of landscaped areas and pedestrian walkways.

The purpose of this report is to identify how the Site will be serviced for water, sanitary, and storm and to demonstrate compliance with municipal and provincial standards for site servicing and stormwater management.

1.1 Site Location and Background

The overall CHEO campus occupies approximately 13.9 hectares of land on the southwest corner of the Ottawa Health Science Centre (OHSC) campus. The site for the proposed Integrated Treatment Centre is located in the southwest corner of the CHEO campus and encompasses an area of approximately 2.06 hectares.

The site is bounded by the existing CHEO campus buildings to the north and east and Ring Road to the west and south.

In general, the site slopes from east to west, ranging in elevations from 79.14m at the northwest corner of the site to an elevation of 82.37m along the eastern edge of the site.

1.2 Reference Reports and Drawings

In preparation of this report, the following background information was referenced:

1. 1Door4Care: CHEO Integrated Treatment Centre Preliminary Development Feasibility Review, Fotenn Planning + Design, prepared for Infrastructure Ontario, October 2022
2. Subsurface Utility Engineering Services Report, Annis O'Sullivan Vollebekk Ltd., prepared for Infrastructure Ontairo, February 2020
3. 1Door4Care: CHEO Integrated Treatment Centre Preliminary Functional Servicing Study, Stantec Consulting Ltd., prepared for Infrastructure Ontario, October 2022
4. 1Door4Care: CHEO Integrated Treatment Centre – Climate Risk Assessment, Stantec Consulting Ltd., prepared for Infrastructure Ontario, December 2022

5. Phase One Environmental Site Assessment, GHD Ltd., prepared for Infrastructure Ontario, June 2020
6. Phase Two Environmental Site Assessment, GHD Ltd., prepared for Infrastructure Ontario, June 2020
7. 1Door4Care: CHEO Integrated Treatment Centre – Geotechnical Investigation Report, GHD Ltd., prepared for Infrastructure Ontario, October 2022
8. Preliminary Geotechnical Design Recommendations, 1Door4Care, CHEO Integrated Treatment Centre, Thurber Engineering Ltd., prepared for EllisDon, December 2022
9. 1Door 4Care: CHEO Integrated Treatment Centre – Hydrogeological Assessment, GHD Ltd., prepared for Infrastructure Ontario, October 2022
10. Ottawa Health Sciences Centre Site Services Assessment, J.L. Richards & Associates Ltd., prepared for the Ottawa Health Sciences Centre, January 2011
11. Ottawa Health Sciences Centre Storm and Sanitary Sewer Capacity Assessment, Morrison Hershfield, prepared for the University of Ottawa, May 2017
12. CHEO 1Door4Care Functional Program Space Allocations, CHEO Resource Planning Group, April 2020
13. Ottawa Health Sciences Centre Stormwater Master Plan, Morrison Hershfield, prepared for the Children's Hospital of Eastern Ontario (CHEO) & Ottawa Children's Treatment Centre (OCTC), July 2019
14. CHEO 1Door4Care Building, Groundwater Management Report, Geofirma Engineering, prepared for CHEO Complex, 401 & 407 Smyth Road, Ottawa, Ontario, August 2024

The following guidance documents were also referenced in preparation of this report:

1. City of Ottawa: Sewer Design Guidelines, The City of Ottawa, October 2012
2. Ottawa Design Guidelines - Water Distribution, The City of Ottawa, July 2010
3. City of Ottawa Technical Bulletin ISTB-2018-02, March 2018
4. Stormwater Management Planning and Design Manual, Ministry of the Environment, Conservation and Parks (MECP), March 2003.
5. Design Guidelines for Sewage Works, Ministry of the Environment, Conservation and Parks, March 2019.
6. Design Guidelines for Drinking Water Systems, Ministry of the Environment, Conservation and Parks, May 2019.

2.0 EXISTING CONDITIONS

2.1 Topography, Land Use and Drainage

Existing topographical and legal boundary information for this site was obtained from a survey by Annis, O'Sullivan, Vollebekk Ltd., dated February 2020. The Site occupies approximately 2.06 ha of land located in the southwestern corner of the overall Ottawa Health Services Centre (OHSC) campus.

The topography on site ranges from an elevation of 79.14m at the northwest corner of the site to an elevation of 82.37m along the eastern edge of the site. Based on the topographic survey, various catchbasin structures are located on site, connected to an existing storm sewer traversing the site. The majority of the catchbasins are located within the existing asphalt parking lot in the southern part of the site.

No existing stormwater controls appear to exist on site. The drainage from the site is ultimately conveyed through a series of storm sewers towards the northwest corner of the OHSC campus where the campus' internal storm system connects to the City of Ottawa's storm sewers. The City of Ottawa's storm sewers ultimately drains to the Rideau River.

2.2 Existing Servicing

Two watermains are in close proximity to the Site. A 200mm diameter watermain exists along Ring Road, running along the western boundary of the Site. A 300mm diameter watermain exists within the access road running along the eastern boundary of the site. The existing CHEO building located east of the site is connected to the 300mm-diameter watermain.

An existing 535mm-diameter storm sewer exists along the eastern boundary of the site, underneath of the access road to the main CHEO building. A 375mm-diameter storm sewer exists within Ring Road along the western boundary of the Site. Both storm sewer lines connect to a larger storm sewer line, ultimately leading to a series of 1350mm-diameter storm sewers located in the northwestern corner of the OHSC campus that connect to the City of Ottawa's storm sewer system which ultimately outlets to the Rideau River.

A 300mm-diameter sanitary sewer exists along the access road to the east of the Site. This sewer runs north along the access road and connects to a 381mm-diameter sanitary sewer running towards the northwest corner of the OHSC campus. The system eventually connects to the Rideau River Collector Sewer west of Riverside Drive.

2.3 Other Existing Utilities

Based on the Report for Subsurface Utility Engineering Services created by Annis O'Sullivan Vollebekk Ltd., it is understood that hydro Ottawa and private service electric power, Bell, Rogers, and Telus telecommunications, Enbridge natural gas mains, as well as municipal and private water, sanitary, and storm sewers are readily available within the adjacent rights-of-way and access roads. It is noted that an existing unknown utility easement is shown to bisect the site from northeast to southwest. The status of the utility easement is currently unknown and should be examined further during detailed design.

2.4 Geotechnical Investigation

GHD Ltd. was retained by Infrastructure Ontario to complete a preliminary geotechnical investigation for the proposed development. Supplemental commentary was provided by Thurber Engineering as part of the project team. These reports are provided under a separate cover. The following summarizes the findings of the geotechnical investigation as they relate to proposed grading, servicing, and stormwater management:

- A preliminary investigation was completed in December 2019. During the preliminary investigation a total of 14 boreholes were advanced on site to assess the geotechnical conditions, ten of which also included installation of groundwater monitoring wells

- A supplementary geotechnical investigation was completed in July 2022. A total of 10 boreholes were advanced on site to assess the geotechnical conditions, four of which also included installation of groundwater monitoring wells.

- Topsoil was encountered in six boreholes. The thickness of the topsoil layer ranged from approximately 50mm to 100mm in thickness. Asphalt ranging in thickness between 50mm to 75mm was encountered in the remaining boreholes on site.

- All boreholes noted a layer of fill, extending a depth of 0.4 to 3.2m below grade. In general, the fill material consisted of a heterogeneous mixture of gravelly sand/silty sand/sandy silt or sand and gravel. Organic material such as rootlets and wood pieces as well as asphalt fragments were found within the fill layer.

- Native soil with a varying composition from silty sand/ gravelly sand/ sand and silt/ sandy gravel/ clayey silt was encountered in all boreholes and extended to depths of 1.2 to 3.5m below grade.

- Bedrock was encountered in all boreholes (with the exception of BH14, MW18, BH19, and BH22) at a depth of 1.9 to 3.8m below grade. The bedrock was noted to be shale bedrock and was visually identified as the Georgian Bay Formation. A review of bedrock geology maps of the Ottawa area was conducted for the subsequent Thurber Engineering memorandum, where it was found that the site is located at the border of Carlsbad and Billings Shale formations, not the Georgian Bay Formation referenced in the original GHD report. It was noted that this formation generally consists of dark grey weak to moderately strong shale.

- Adjeleian Allen Rubeli Ltd. created a report in 1998 detailing "swelling shale" conditions that were encountered at the Children's Treatment Centre in the OHSC campus. The report indicated that the swelling shale phenomenon has caused heaving by a factor of 2 to 3mm per year with no evidence to suggest that the swelling will cease in the future.

2.5 Hydrogeological Investigation

GHD Ltd. was retained by Infrastructure Ontario to complete a preliminary hydrogeological investigation for the proposed development. The report is provided under a separate cover. The following summarizes the findings of the hydrogeological investigation as they relate to site servicing and stormwater management:

- The native glaciolacustrine deposit underlying the fill material found on site forms an aquitard layer. Based on hydraulic testing, the horizontal hydraulic conductivity for the aquitard ranged from 1.02×10^{-2} cm/sec to 9.81×10^{-6} cm/s.

- The weathered shale bedrock underlying the site also forms an aquitard. Based on hydraulic testing, the horizontal hydraulic conductivity of the bedrock ranged from 2.22×10^{-3} cm/s to 1.66×10^{-4} cm/s. It was noted that the higher hydraulic conductivity of the bedrock may represent local marginal aquifer conditions within the weathered bedrock.

- Four Guelph Parameter infiltration tests were conducted on the shallow unsaturated soil on Site. Testing indicated that the shallow silt with sand overburden has a medium to high infiltration rate of 34 to 171 mm/hr.

- Groundwater levels measured in the shallow monitoring wells screened across the overburden bedrock contact ranged from 1.31 to 5.16m below grade. The water table elevation was found to range from approximately 77.07 to 79.58m above mean sea level.

2.6 Source Water Protection

According to the Province of Ontario's Source Protection Information Atlas, the Site is not part of any water quality or quantity source water protection areas. As such, the Rideau Valley Source Protection Plan is not applicable to this development. Table I provides the source protection details for the Site.

Table I: Source Protection Details

SOURCE PROTECTION AREA	RIDEAU VALLEY
Water Quality	
Wellhead Protection Area	No
Wellhead Protection Area E (GUDI):	No
Intake Protection Zone:	No
Issue Contributing Area:	No
Significant Groundwater Recharge Area:	No
Highly Vulnerable Aquifer:	No
Event Based Area:	No
Water Quantity	
Wellhead Protection Area Q1:	No
Wellhead Protection Area Q2:	No
Intake Protection Zone Q:	No

3.0 GROUND WATER CONTROL

3.1 Short Term Discharge (During Construction)

The proposed development of the new Integrated Treatment Centre includes the construction of an underground tunnel segment spanning between the proposed building and the existing CHEO campus, as well as one level of the building which will be located partially below the existing ground surface of the Site. According to the Hydrogeological Assessment conducted by GHD, a worst-case dewatering rate of 257.97 m^3/day but typical dewatering rate of 85.99 m^3/day was established based on a 3x safety factor. The predicted groundwater takings for construction excavation purposes are above the Ministry of the Environment Conservation and Parks (MECP) Environmental Activity and Sector Registry (EASR) limit of 50,000 L/day. Based on this, an EASR for groundwater takings for excavation purposes will be required.

It is noted that the short-term dewatering rate is subject to change, and may potentially be lower, depending on the shoring methodology that is selected. Watertight shoring systems may limit the ingress of water, and dewatering could be completed over a longer timeframe, should the construction timelines permit it, resulting in an overall lower discharge rate. The conservative flow rate is used for the purposes of this functional assessment.

The geotechnical assessment for the dewatering impact to existing structures and sewers around the site will result in negligible increase of effective stress and is not anticipated to be of concern.

3.2 Long-Term Discharge (Subdrainage System)

Based on the Groundwater Management Report prepared by Geofirma Engineering (August 2024), three hypothetical groundwater discharge scenarios were considered upon building construction. Each of these systems would discharge to the storm sewer system, as per their report. The first scenario is that the groundwater elevation will not fluctuate and consistently remain at 79.6 mASL (highest recorded elevation by GHD). This would result in 3,400 L/day of discharge. The second scenario was an increase by 0.5m to a maximum

elevation of 80.1 mASL, with an estimated discharge of 14,400 L/day. The final scenario was an increase by 1m, with a maximum elevation of 80.6 mASL, and resulting 37,400 L/day of discharge required. Scenario 1 has been considered for design.

A building subdrainage system is proposed through a 9m grid of 100mm diameter perforated pipes, with a 150mm diameter header draining the system via gravity to the proposed storm sewer network. This subdrain system is designed with an invert of 79.60 around the perimeter of the building where the groundwater contours are highest, and leaves the building at an invert of 78.60 at the south side of the building west of the main entrance where the groundwater contours are lowest. It is anticipated that this subdrain system will rarely be used, except for in major storm events where the groundwater level rises locally.

3.3 Quality and Discharge

As part of the hydrogeologic investigation, samples of groundwater were collected and analyzed for compliance with the City of Ottawa Sewer Use By-Law (2003-5134). The analysis notes that exceedances of Nonyl phenol and TKN parameters with respect to the sanitary sewer system. When compared to storm sewer use parameters, exceedances for TSS (1.9x), Nonyl phenol (4x), Manganese (17x) and Chloroform (2.9x) are noted.

Give the subdrain system will only potentially be activated during storm events, the concentrations of the above parameters will become heavily diluted once mixed with stormwater from the remainder of the system. Under scenario one, approximately 3,4000 L/day (0.04 L/s) of groundwater flows will initially mix with up to 174.56 L/s of stormwater (100-year storm event). The groundwater flow represents approximately 0.02% of the overall flows discharging to the Ring Road major system, and 0.01% of the overall flows discharging from the overall area analyzed (based on a combined 100-year flow rate of 374.56 L/s [storm sewer system + Ring Road major system]).

The dilution represented above will result in the above concentrations falling within the acceptable ranges per the City of Ottawa Sewer Use By-Law. An inspection manhole is located immediately downstream of the subdrainage system for testing purposes. Existing Manhole 46 can be used to test dilution with the Ring Road Major system, and Existing Manhole 32 can be used to test dilution with the overall study area.

Some strategies to reduce/limit TSS entering the system will be detailed in Section 7.5. TSS removal will also reduce Nonyl phenol and Chloroform.

A backflow preventor is proposed for the discharge sewer from the subdrainage system.

4.0 PROPOSED CONDITIONS

The Development is to consist of a six-storey integrated care facility. The proposed Integrated Treatment Centre building will incorporate educational services, medical staff workplaces, clinical areas, therapeutic areas, and community learning areas under one roof.

5.0 SANITARY SERVICING

5.1 Design Criteria

The City of Ottawa relies on their *Ottawa Sewer Design Guidelines* for design of wastewater and stormwater infrastructure, and *Technical Bulletin ISTB-2018-01* for revisions to these standards. The following requirements are noted for the development:

- A Manning's Roughness Coefficient of 0.013 for all PVC pipes and all new sanitary sewer systems
- A minimum velocity of 0.6 m/s and maximum velocity of 3.0 m/s is permitted within the pipe
- An average wastewater flow rate for medical centers of 275 L/capita/day for medical staff
- An average wastewater flow rate for medical centers of 25 L/capita/day for patients
- An institutional peaking factor of 1.5
- A total inflow/infiltration allowance of 0.33 L/s/effective gross ha

The proposed development is expected to discharge domestic sanitary sewage to the private sanitary sewer system on site.

5.2 Total Sanitary Demand

The City of Ottawa's *Ottawa Sewer Design Guidelines* provides daily sewage flow values for a number of different land uses. The guidelines provides a per-hectare flow rate of 28,000 L/gross hectare/day for institutional areas. The guidelines also provide an institutional peaking factor of 1.5. These values were utilized in order to calculate the expected wastewater demand from the site. A summary of the calculation is provided in Table II below.

Table II: Sanitary Flow Calculation

Average Daily Wastewater Flow (Institutional)	28,000	*L/ha/d*
Site Area	2.17	*ha*
Peaking Factor	1.5	
Peak Domestic Wastewater Flow	**1.06**	**L/s**
Site Area	2.17	ha
Infiltration Allowance (0.33 L/s/ha)	0.72	L/s
Total Sanitary Drainage	**1.77**	**L/s**

It should be noted that the proposed lengths of sanitary sewer that will connect the proposed integrated treatment centre to the existing sanitary sewer system are servicing lines. As such, the anticipated maximum drainage rate that the pipe lengths are expected to convey can be calculated using the OBC fixture unit method, as per Section 8.0 of the Ontario Building Code (OBC). The maximum probable drainage rate was calculated using Table 7.4.10.5 of the OBC, a summary of the calculation completed is provided in Table III below. Detailed calculations are provided within Appendix B.

Table III: OBC Sanitary Flow Calculation

Total Number of Fixture Units (as per Mechanical plans)	1180	
Maximum Drainage Rate for the Proposed Fixture Unit Count (as per Table 7.4.10.5)	189.84	*Gal/min*
Total Sanitary Drainage	**14.38**	**L/s**

After comparing the results of the two sanitary flow calculation methods shown above, it was decided that the OBC sanitary flow rate was used for the design of the proposed servicing pipes. This value was chosen to be used within the servicing design because it yielded the largest flow rate, and is also more accurate to the daily anticipated flow rate through the proposed pipe lengths due to the fact that it considers the typical use case scenarios of the fixture units that will be installed in the proposed building.

As discussed above, the total sanitary discharge expected from the site is 14.38 L/s. The design of the sewers for this project was completed using the Chézy-Manning formula with a roughness coefficient of 0.013 in accordance with City of Ottawa Guidelines. Table IV below illustrates the minimum design considerations for the service connection to the private sanitary sewer on Ring Road to ensure compliance with MECP requirements and provide self cleansing velocities within the pipe.

Table IV: Sanitary Service Design

Diameter of Service	250	*mm*
Minimum Slope of Service	0.53	*%*
Full Flow Capacity	43.29	*L/s*
Full Flow Velocity	0.88	*m/s*

A minimum 250mm-diameter service at 0.53% is proposed to convey flows to the Ring Road system. All sanitary sewers will be constructed at a minimum depth of 1.8m below ground surface to prevent freezing. Insulation will be provided for sewers that cannot be placed at this minimum depth to prevent freezing. A sanitary sewer design sheet can be found in Appendix B. It is understood that the proposed sewer lengths will not be flowing at their full flow capacities, as such partially full pipe flow calculations were completed to ensure that the self-cleaning velocity of 0.6 m/s was able to be achieved under the anticipated sanitary flow conditions for the proposed building. Partially full flow calculations are presented in Appendix B to illustrate compliance.

5.3 Wastewater Collection and Discharge

Downstream from the site, wastewater is collected in the 300mm-diameter private sanitary sewer located in the access road along the eastern boundary of the site. The 2011 Site Servicing Assessment conducted by J.L. Richards indicated that the existing wastewater discharge entering this sewer segment from CHEO is approximately 4.24 L/s. Table SS3 of the report provided in Appendix B illustrates that the full flow capacity of this sewer segment is 88.05 L/s. The combined wastewater inflow from the existing CHEO campus and proposed Integrated Treatment Centre is 5.92 L/s. Therefore, it is anticipated that the 250mm-diameter sanitary sewer will be sufficient to convey the sewage to the existing sanitary sewer system on Ring Road. A sanitary sewer design sheet has been provided in Appendix B to demonstrate that the proposed sanitary sewer lengths have adequate capacity for the development.

A capacity assessment of the existing system was completed in 2011 by J.L. Richards. The subsequent report notes that the sanitary sewers within the north-west corner of the OHSC campus had a capacity of over 215 L/s at the outlet of the OHSC campus sewer system, and 325 L/s downstream of the National Defence Medical Centre. No capacity constraints were noted in the downstream system at the time of the report.

6.0 WATER DISTRIBUTION DESIGN

A 200mm-diameter watermain exists along Ring Road at the western limits of the Site, and a 300mm-diameter watermain exists along the access road at the eastern limits of the Site.

6.1 Design Criteria

The City of Ottawa's *Ottawa Design Guidelines – Water Distribution* defer to MECP requirements for water distribution. In accordance with MECP guidelines, the water distribution system shall be capable of delivering the water demands at a minimum residual pressure of 275 kPa (40 psi) in a non-fire scenario and at a minimum residual pressure of 140 kPa (20 psi) in the event of a fire. Under standard conditions, the MECP guidelines

recommend an operating pressure in the range of 350 kPa (50 psi) to 480 kPa (70 psi), with pressure at any point in the system not exceeding 700 kPa (100 psi).

To comply with CAN/CSA standards for health-care facilities, the proposed building will be provided with a redundant water supply for domestic water and fire protection.

6.2 Domestic Water Demand (City of Ottawa Per-Capita Sewage Generation)

The domestic water demand for the plant is calculated using the same methodology as outlined within the Preliminary Functional Servicing Study conducted by Stantec (dated October 25, 2022). Staffing and visitor/patient numbers utilized within the calculations were derived from the Functional Program Space Allocations report. Maximum day and peak hourly demands were determined by multiplying the average day demand and maximum day demand calculated by their associated peaking factors – as determined by the *Ottawa Design Guidelines – Water Distribution* (July 2010). A summary of the domestic water demand calculations is provided in Table V.

Table V: Summary of Domestic Water Demand Calculations

Average Daily Domestic Water Demand (Staff)	275	*L/c/d*
Number of Staff Anticipated	522	
Maximum Day Peaking Factor	1.50	
Peak Hour Factor	1.80	
Maximum Day Domestic Water Demand (Staff)	**2.49**	**L/s**
Peak Hour Domestic Water Demand (Staff)	**4.49**	**L/s**
Average Daily Domestic Water Demand (Patients)	25	L/c/d
Number of Patients Anticipated	251	
Maximum Day Peaking Factor	1.50	
Peak Hour Factor	1.80	
Maximum Day Domestic Water Demand (Patients)	**0.12**	**L/s**
Peak Hour Domestic Water Demand (Patients)	**0.20**	**L/s**
Total Maximum Day Domestic Water Demand	**2.61**	**L/s**
Total Peak Hour Domestic Water Demand	**4.68**	**L/s**

6.3 Fire Water Demand

Water demand for fire protection was calculated in accordance with the Fire Underwriter's Survey *Water Supply for Public Fire Protection* (FUS 2020).

It is understood that from a building code perspective, the proposed building will be classified as consisting of non-combustible construction.

6.3.1 FUS 2020 Methodology

The required fire flow (RFF) is calculated based on a coefficient of construction (C) and the effective floor area (A)

$$RFF = 220C\sqrt{A}$$

The following sections outline reasoning used to determine the values of the above coefficients, as well as the adjustments made to the required fire flow for the proposed development.

(1) Coefficient of Construction

The FUS 2020 classification uses different definitions for the type of construction, corresponding to a type of construction coefficient used in the calculations. FUS 2020 has the following definitions that are considered applicable to the development:

- Fire-Resistive Construction (Type I) (C=0.6): A building is considered to be of Fire-resistive construction (Type I) when all structural elements, walls, arches, floors, and roof are constructed with a minimum 2-hour fire resistance rating, and all materials used in the construction of the structural elements, walls, arches, floors, and roofs are constructed with non-combustible materials.

- Non-combustible Construction (Type II) (C=0.8): A building is considered to be of Non-combustible construction (Type II) when all structural elements, walls, arches, floors, and roofs are constructed with a minimum 1-hour fire resistance rating and are constructed with non-combustible materials.

Based on the Preliminary Code Review, the facility does not classify as a Fire-Resistive Construction (C=0.6), as all structural members do not have a 2-hour fire resistance rating ("Roofs that do not support an occupancy do not require fire-resistance ratings"). As such, a Coefficient of Construction, C=0.8, is proposed for the development under FUS 2020.

(2) Effective Floor Area

The vertical openings and exterior vertical communications of the building are noted to have a fire resistance rating of at least one hour. This combined with the Construction Coefficient of the building being below 1.0 gives that the area to be used in the FUS calculations shall consider the largest floor area plus 25% of each of the two immediately adjoining floors. For this building, an overall Effective Floor Area of 7,098 m^2 was utilized in the calculations.

Based on the above, an RFF of 15,000 LPM (250 L/s) is noted for this building.

(3) Occupancy Charge

The RFF calculated within the above section can be modified depending on the various occupancy classes defined within FUS 2020. Occupancy charges area assigned based on the fire hazard level associated with the contents that will be stored within the proposed development. The main categories defined under FUS 2020 area as follows:

- Non-combustible Contents (-25%): includes merchandise or materials (including stock, furniture, and equipment) which in permissible quantities does not themselves constitute an active fuel for the spread of fire.

- Limited Combustible Contents (-15%): includes merchandise or materials of a low combustibility, with limited concentration of combustible materials.

- Combustible Contents (0%): Includes merchandise or materials of moderate combustibility

- Free Burning Contents (+15%): Includes merchandise or materials which burn freely, constituting an active fuel

- **Rapid Burning Contents (+25%):** Includes merchandise or materials which either burn with great intensity, spontaneously ignite and are difficult to extinguish, or give off flammable or explosive vapours at ordinary temperature.

The proposed development falls into the major occupancy category of "care and treatment occupancies" from the National Building Code of Canada (NBC). This major occupancy category has a suggested occupancy charge of non-combustible to limited combustible contents according to FUS 2020. To calculate the most conservative RFF, it was decided that a limited combustible content occupancy charge of -15% would be applied.

(4) Automatic Sprinkler Protection

The required RFF can be further reduced depending on the adequacy of the automatic sprinkler system provided. Table VI identifies the available credits that can be applied depending on the design of the automatic sprinkler system.

Table VI: Sprinkler Credits (FUS 2020)

Automatic Sprinkler System Design	Credit
Automatic sprinkler protection designed and installed in accordance with NFPA 13	30%
Water supply is standard for both the system and Fire Department hose lines	10%
Fully supervised system	10%

Given the design of the sprinkler system for the proposed building, all three of the above listed credits were applied to the system, resulting in an RFF reduction of 50%.

(5) Exposure Charge Adjustment

The RFF of the development can be increased depending on the distance between exposed risks (i.e. structures, stored materials, forests, etc.) and the proposed development. The exposure charges applied to the building depends on the separation distance between the building, the length-height factor of the exposing building face, and the exposed risk. Table VII summarizes the exposed risks identified, their measured separation differences, and the exposure adjustment charge applied.

Table VII: Summary of Exposure Charges Applied

EXPOSED RISK IDENTIFIED	SEPARATION DISTANCE MEASURED	EXPOSURE CHARGE APPLIED
Existing Max Keeping Wing	27m	3%
Existing CHEO Main Building	>30m	0%
Existing Residential Area South of Site	28m	3%
Total Exposure Charge Applied		**6%**

(6) Total Required Fire Flow

A summary of the calculated RFF and subsequent modifications made using the FUS 2020 methodology is provided in Table VIII.

Table VIII: Summary of Required Fire Flow Calculations

Calculated Required Fire Flow	15,000 L/min
Occupancy Charge Applied	-15%
Adjusted Required Fire Flow	12,750 L/min
Automated Sprinkler Protection Credit Applied	-50%
Adjusted Required Fire Flow	6,375 L/min
Exposure Charges Applied	+6%
Adjusted Required Fire Flow	7,000 L/min
Total Required Fire Flow	**117 L/s**

6.4 Municipal System Capacity and Service Design

Hydrant flow testing was conducted by Clean Water Works on the Ottawa Health Science Centre Campus throughout April and May 2021. The report prepared by Clean Water Works is provided within Appendix B. One hydrant tested during this inspection was noted to be within close proximity to the Site (Hydrant PH328-20). The results of the flow tests noted that a static pressure of 60 PSI was available at the Site, and a residual pressure of 50 PSI was measured at a flow of 1090 GPM. An N185 graph of the results is included within Appendix B. Extrapolating the results of the flow test, it is noted that the rated capacity of the system at 20 PSI is in the order of 2305 GPM or approximately 145 L/s. The required maximum day demand plus fire flow of 119.61 L/s is available at approximately 30 PSI.

In addition to the above, headloss calculations were completed based on transmission losses, elevation losses, and minor losses to confirm adequate pressures are available at the building FFE. Beginning with transmission losses and using the Hazen-Williams Equation, utilizing a diameter of 200mm, roughness coefficient, C, of 150 for PVC pipe, and a length of 18.4 m - a total major head loss of 0.943 m (1.34 PSI) is noted for the 119.61 L/s combination maximum day demand and fire flow.

From the connection to existing at an invert of 81.91 m to the building connection at an invert of 81.70 m, a loss of 0.50m (0.71 PSI) is noted.

Finally, from the connection point to the building FFE, there are several minor losses noted beginning with branch flow from the tee at the main (k=1.0) and open water valve (k=0.15). Utilizing a velocity of 3.88 m/s (based on a diameter of 200 mm and combination of maximum day demand and fire flow of 119.61 L/s), a pressure drop of 1.26 PSI is noted from minor losses.

In total, a pressure drop of 2.30 PSI is anticipated. Therefore, the 119.61 L/s is available at the building FFE at approximately 27.7 PSI, demonstrating adequate pressure is available to service the building.

Finally, several municipal hydrants are located within 75 m of the proposed buildings. As per the City of Ottawa's technical bulletin ISTB-2018-02, Hydrants with a class of AA contribute a fire flow of 5,700 L/min. Given the calculated required fire flow of approximately 7,000 L/min, two AA class hydrants will be required to be provided within 75 m of the building in order to provide the required fire flow. As illustrated on Drawing C1201, 3 hydrants are provided within 75 m of the building – therefore meeting the required fire flow as per ISTB-2018-02.

7.0 STORM SERVICING AND STORMWATER MANAGEMENT

7.1 Design Criteria

Morrison Hershfield completed a Stormwater Master Plan for the OHSC campus in July, 2019. The conclusions and recommendations of the Stormwater Master Plan governs all stormwater management measures on Site. The following is the design criteria based on the most stringent requirements from the MECP in addition to the conclusions and recommendations of the Stormwater Master Plan:

- Quantity Control: Provide attenuation such that peak flows for proposed conditions are equal to or less than the peak flow recorded for the pre-development 2-year design storm event. The attenuation is to be provided for the 2-year through 100-year design events. The 3-hour City of Ottawa design storm events will be used for this assessment for all event to the 100-year. Peak flow shall be determined using a C value of 0.5 in accordance with the City of Ottawa Sewer Design Guidelines.

- Quality Control: Quality Control is provided by the oil grit separator installed at the northwester corner of the entire OHSC campus. No further water quality control measures are anticipated to be needed for the proposed development.

- Water Balance: Review significance of existing groundwater systems and develop recommendations for groundwater recharge and water balance to the extent technically, physically and economically practicable.

7.2 Existing Stormwater Management Controls

The evaluation of the existing storm sewer conditions conducted as part of the Master Plan prepared by Morrison Hershfield found several problems with the stormwater management system in the OHSC campus. Existing conditions modelling of the system indicated that, under the 5-year and 100-year storm events, peak flow directed to the receiving Alta Vista Hospital Link (AVHL) sewer exceeded the 10-year flow of 3,920 L/s that the sewer was designed for. In addition to the peak flow exceedance noted above, it was also found that 20% of storm sewers within the campus exceeded their theoretical full flow capacity under the 2-year storm event. This number increases to 37% under the 5-year storm event and 60% under the 100-year storm event. The modelling conducted also indicated that elevated hydraulic grade line elevations exist in the minor system during intense storm events.

To remedy these noted issues, three recommendations were provided. These recommendations included implementing backflow preventers on all building drainage connections to the minor system, installing inlet control devices on highlighted catchbasin structures, and instating strict stormwater quantity control criteria on all future development within the OHSC campus. The phasing and priority of the above recommendations were suggested to be completed in the order that they were presented above.

The subject site itself does not appear to have any existing controls. The 2019 *Stormwater Masterplan* by Morrison Hershfield recommends that all future developments across the OHSC campus control post-development peak flows (up to and including the 100-year storm event) to the pre-existing 2-year storm event using stormwater retention measures. In addition, peak flows under pre-existing conditions are stipulated to be determined using a runoff coefficient of 0.5 in accordance with the City of Ottawa Sewer Design Guidelines.

7.3 Existing Conditions

Under existing conditions, runoff from the Site is directed towards two outlets. A portion of the Site (approximately 1.694 ha) directs runoff towards Ring Road in the form of overland flow, while the remaining 1.889 ha directs runoff towards the storm sewer system. It should be noted that several external catchment areas were noted to contribute runoff to the outlets. An existing catchment area plan and flow schematic of the pre-development conditions has been provided within Appendix A of this report. A summary of the pre-development catchment parameters is provided within Table IX and
Table X, with a more detailed calculation being provided in Table 2 of Appendix C.

Table IX: Summary of Pre-Development Catchment Parameters Contributing to the Ring Road Major System

CATCHMENT ID	DESCRIPTION	AREA (HA)
EXT-1	Section of ring road on the southern limits of the Site	0.256
EXT-2	Portion of existing external asphalt parking lot that directs runoff onto entrance driveway to CHEO entrance	0.146
100	The northern most portion of the existing external asphalt parking lot	0.105
103B	Southwestern portion of existing asphalt parking lot west of the main entrance to CHEO	0.618
104	Existing gravel overflow parking west of the main entrance to CHEO	0.351

Table X: Summary of Pre-Development Catchment Parameters Contributing to the Storm Sewer System

CATCHMENT ID	DESCRIPTION	AREA (HA)
EXT-3	External catchment capturing flows from external asphalt parking lot	0.962
101	Existing landscaped area south of the existing CHEO main entrance	0.102
102	Southeast portion of existing driveway connecting Ring Road to the main entrance of CHEO	0.349
103A	Existing asphalt parking lot west of the main entrance to CHEO	0.287
105	Landscaped area located north of the main entrance of the existing CHEO building	0.189

As per the Stormwater Master Plan created by Morrison Hershfield, the allowable release rate from the Site is set as the pre-development peak flow rate under the 2-year design storm event using a runoff coefficient of 0.50. This allowable release rate was determined using the rational method. The rainfall intensity used within the ration al method calculation was determined using the intensity-duration-frequency (IDF) curve parameters for the 2-year storm event alongside a time of concentration of 10 minutes. The parameters utilized within the rational method calculation as well as the allowable release rates calculated are summarized in Table XI and
Table XII, with a detailed breakdown of the calculation provided within Table 2 in Appendix C

Table XI: Allowable Release Rate to Ring Road Major System

Area of Catchment (A)	1.694	ha
Runoff Coefficient (C)	0.50	-
IDF Curve Parameters from City of Ottawa Sewer Design Guidelines		
a	732.951	-
b	6.199	min
c	0.810	-
Time of Concentration (t_c)	10	min
Rainfall intensity (i)	76.805	mm/hr
2-Year Pre-Development Peak Flow Rate (North Hospital)	**180.85**	**L/s**

Table XII: Allowable Release Rate to Storm Sewer System

Area of Catchment (A)	1.889	ha
Runoff Coefficient (C)	0.50	-
IDF Curve Parameters from City of Ottawa Sewer Design Guidelines		
A	732.951	-
B	6.199	min
C	0.810	-
Time of Concentration (t_c)	10	min
Rainfall intensity (i)	76.805	mm/hr
2-Year Pre-Development Peak Flow Rate (Ring Road)	**201.67**	**L/s**

7.4 Proposed Conditions

Under proposed conditions the overall percent imperviousness for the Site was calculated to be approximately 75%. A catchment area plan of proposed conditions as well as a flow schematic of proposed conditions have been included within Appendix A of this report. A summary of post-development catchment parameters has been provided in Table XIII.

Table XIII: Proposed Catchment Parameters

CATCHMENT ID	DESCRIPTION	AREA (HA)
EXT-1	Section of ring road on the southern limits of the Site	0.28
EXT-2	Section of ring road on the western limits of the Site	0.28
EXT-3	Existing asphalt parking lot - directs runoff to Site	0.96
222	Landscaped area south of existing CHEO main entrance	0.11
223	Portion of existing external asphalt parking lot that directs runoff onto entrance driveway to CHEO entrance	0.11
224A	Northern portion of proposed Integrate Treatment Centre Building - attenuated by green roof system	0.14
224B	Central portion of proposed Integrate Treatment Centre Building - attenuated by control flow roof drains	0.22
224C	Southern portion of proposed Integrate Treatment Centre Building - attenuated by green roof system	0.12
225A	Northern portion of the driveway between proposed Integrated Treatment Centre building and existing CHEO entrance	0.17
225B	Southern Portion of the driveway between proposed Integrated Treatment Centre building and existing CHEO entrance	0.29
226	South intersection between Site driveway and Ring Road	0.10
227	Proposed parking lot in front of the Integrated Treatment Centre building	0.43
228	Proposed landscaped area on northern limits of the Site	0.21
229	Existing landscaped area in front of CHEO Max Keeping Wing	0.15

Modelling of post-development conditions was completed in PCSWMM. A table summarizing the peak flow rates generated during all modelled storm events within each of the above catchment areas has been provided within Table 5 of Appendix D. A storm sewer design sheet can be found in Appendix C.

As noted in Section 3.2, a proposed subdrainage system will any and all convey groundwater discharge to the nearby storm sewer system on Site. In order to account for the proposed groundwater discharge from this system a base flow of approximately 0.04 L/s was added to the node representing the connection to the weeping tile system.

Additionally, as noted within the *CHEO 1Door4Care Parking Garage Servicing and Stormwater Management Report* completed by WalterFedy (revised December 1, 2023), post-development peak flow rates directed towards Ring Road from the parking garage side exceeded the allowable release rates under the 50-year and 100-year storm events. These overages were added to first ring road node within this stormwater management model in order to better reflect post-development conditions. The peak flow rates, and base flow rates utilized within the modelling are illustrated in Table XIV.

Table XIV: Peak Flow Rates from Parking Garage Site to be Attenuated by Integrated Treatment Centre Measures

DESIGN STORM EVENT	ALLOWABLE RELEASE RATE (L/S)	POST-DEVELOPMENT PEAK FLOW RATE (L/S)	FLOW RATE ADDED TO MODEL (L/S)
50-Year	22.74	25.34	2.60
100-Year	22.74	29.02	6.28

The proposed development, and adding in the 50 and 100 year flows coming down Ring Road from the Parking Garage, will increase the peak outflow of the Site, therefore necessitating peak flow reduction measures. The following sections outline the stormwater management practices that are proposed to be implemented in order to attenuate flows to the noted allowable release rates.

It should be noted that no attenuation measures have been proposed within catchments 228, 225b, and 226 due to the steep grades within these areas – these catchments will mainly produce uncontrolled flow directed to Ring Road. In order to provide sufficient attenuation measures such that outflow from the Site meets the quantity control requirements, the proposed detention storage, surface ponding, flow control roof drains, and green roof measures have been designed as to limit the flow exiting these measures as much as possible. A flow schematic of proposed conditions has been provided within Appendix A for reference.

7.4.1 Surface Ponding

Surface ponding is proposed to occur on the parking area located southwest of the proposed Integrated Treatment Centre (catchment 227). As per the *1Door4Care: CHEO Integrated Treatment Centre – Climate Risk Assessment Report* completed by Stantec in 2022, surface ponding was restricted to storm events larger than the 5-year storm event. This was accomplished utilizing a 75 mm diameter orifice plate installed downstream of CBMH38. This orifice plate was sized such that flows from the 5-year design storm event would be able to pass through without interference while flows generated from the 10- through 100-year design storm events were restricted such that ponding could occur.

Ponding was restricted to a maximum depth of 0.30 m with a maximum allowable ponded volume of 141 m^3. Peak inflow/outflow rates and maximum storage volumes recorded for the surface ponding storage node within all modelled storm events are listed within Table 6 in Appendix C.

7.4.2 Control Flow Roof Drains

In order to attenuate flows stemming from the proposed Integrated Treatment Centre, twelve control flow roof drains are proposed to be installed on the rooftop of the proposed building. Control flow roof drains were modelled as Zurn Z-105 Control-Flo drains with a drainage function of 0.38 L/s per 25 mm of head. Rooftop ponding was restricted to a total area of approximately 1547 m^2 with a maximum depth of 0.150 m. Peak inflow/outflow rates and maximum storage volumes recorded for the roof ponding storage node within all modelled storm events are listed within Table 6 in Appendix C. A summary of the roof drain characteristics utilized within all modelled storm scenarios is similarly located in Appendix C.

7.4.3 Green Roof

It is proposed that approximately 665 m^2 of roof area on the Integrated Treatment Centre be converted into green roof space. The green roof system is comprised of Sopranature Toundra Box complete with a retention board base layer. Together, the system is capable of retaining 67.2 mm of rainwater – rainwater in excess of this amount is sent to conventional roof drains and is directed to the storm sewer outlet for the building. Product specifications for the Toundra Box are provided in Appendix C.

7.4.4 Detention Gallery

In order to further attenuate flows directed towards the existing storm sewer system, an underground detention gallery comprised of 84 ADS SC-310 StormTech chambers. This detention gallery provides 84.20m^3 of storage and will receive flows from the southern parking area on Site (catchment 227). Additionally, this gallery is expected to receive a portion of the overland flows generated from roof catchment 224C, any runoff generated from catchment 224C that exceeds the capacity of the proposed green roof system that services the catchment will spill to grade onto catchment 227. Flow from the gallery is controlled using a 75 mm diameter orifice plate located at DCBMH38. The small diameter of the proposed orifice plate acts to constrict flow leaving the gallery, thereby requiring the usage of the provided storage volume. Peak inflow/outflow rates and maximum storage volumes recorded for the detention gallery node within all modelled storm events are listed within Table 6 in Appendix C.

The peak flow rates recorded under post-development conditions after the implementation of the above noted stormwater management measures is summarized within Table XV and Table XVI.

Table XV: Comparison of Pre- and Post-Development Peak Flow Rates to the Storm Sewer System

DESIGN STORM EVENT	PRE-DEVELOPMENT PEAK FLOW RATE (L/S)	ALLOWABLE RELEASE RATE (L/S)	POST-DEVELOPMENT PEAK FLOW RATE (L/S)
2-Year	201.67	201.67	71.46
5-Year	273.58	201.67	101.29
10-Year	320.71	201.67	123.68
25-Year	379.92	201.67	153.88
50-Year	423.98	201.67	178.38
100-Year	468.84	201.67	200.92

Table XVI: Comparison of Pre- and Post-Development Peak Flow Rates to Ring Road Major System

DESIGN STORM EVENT	PRE-DEVELOPMENT PEAK FLOW RATE (L/S)	ALLOWABLE RELEASE RATE (L/S)	POST-DEVELOPMENT PEAK FLOW RATE (L/S)
2-Year	180.85	180.85	62.56
5-Year	245.34	180.85	90.17
10-Year	287.60	180.85	109.07
25-Year	340.70	180.85	134.53
50-Year	380.21	180.85	154.11
100-Year	420.45	180.85	174.56

As seen in the tables above, the proposed stormwater management measures are capable of successfully reducing the post-development peak flow rates to the allowable release rate.

7.5 Quality Control

It is understood that the existing private storm sewer network already has quality control measures in place at the downstream end of the system. To supplement the downstream measures, drainage from the site is directed towards a detention gallery equipped with an isolator row. The LID measure will reduce maintenance needs and provide additional TSS removal for runoff from the site to act as an upstream quality control prior to the existing downstream quality control measures.

As noted in Sections 3.2 and 3.3, the hydrogeological investigations on Site revealed concentrations of TSS, Nonyl phenol, Manganese, and Chloroform that exceeded the allowable concentrations listed within the City of Ottawa Sewer Use By-Law (2003-5134). It should be noted that the expected flow rates from the building's subdrainage system are negligibly small when compared to the expected peak flow rates that will be conveyed through the storm sewer system (between 70.47 and 200.01 L/s depending on the storm event in question). This flow will also only enter the system during major storm events when the groundwater level rises high enough to enter the system. Therefore, it is expected that the mixing between the contaminated groundwater discharge and cleaner discharge being conveyed through the storm sewer system will result in concentrations of the above-noted contaminants falling within the allowable limits at the outfall of the storm sewer system.

Several measures have been taken to limit TSS levels discharging from the site. This includes ensuring the entire subdrainage system has pipes wrapped with filter socks to limit TSS entering the system. The storm sewer system also includes sumps in all manholes. Finally, an oil-grit separator is located at the outfall of the CHEO system to provide treatment to this heavily diluted flow.

7.6 Water Balance

The increase in imperviousness will locally alter water balance as compared to existing conditions. The exact impact will have to be evaluated based on the other stormwater design decisions.

8.0 CONSTRUCTION EROSION AND SEDIMENT CONTROL

Prior to start of any construction, all erosion and sediment control measures will be installed and inspected by the Consultant. The measures will also be periodically inspected and upgraded/altered as site conditions change. Periodic inspections will consist of visual observation of the effectiveness of the control measures and sediment migration offsite. Construction inspections will be conducted biweekly and within 24 hours of any rainfall event of 25mm or greater, until such a time that paving works are complete and vegetation has established itself to a

density equivalent to 70% of the background native vegetation density. Records of all inspections will be maintained and made available to the RVCA, City of Ottawa and the MECP upon request.

Any sediment tracked onto the roadway during the course of construction will be cleaned by the Contractor. To minimize the amount of mud tracked onto the roadway, a mud-mat will be installed at all construction exits and the contractor will be required to ensure that vehicles leave through the exit. The mudmat will be periodically inspected and cleaned as required to ensure it is functioning as intended.

Each inlet structure to remain, and new inlet structures to be installed will require a heavy-duty silt sac to be installed. Filter fabric will be wrapped around the lids of all manholes to prevent intrusion of sediment into the storm sewer network. The inserts will be cleaned once they reach one-third their sediment accumulation capacity or as per the manufacturer's recommendations.

All erosion and sediment control measures will be removed at the end of construction.

9.0 CONCLUSIONS

Based on the servicing design presented in this report, the following conclusions are presented:

- The Site is not located within a Source Protection Area, and the Rideau Valley Source Protection Policies will not apply to the site.
- The subdrain system under the floor of the proposed building may discharge groundwater during larger storm events due to fluctuations in groundwater elevations. Quality control of the groundwater will be achieved through dilution of the peak flows with the storm sewer system as well as TSS removal through the filter sock around the perforated pipes of the subdrain system, the sumps in the storm manholes and the oil grit interceptors in the overall CHEO campus.
- Sanitary discharge from the site will be conveyed to the OHSC campus' private sanitary sewer system through the existing 300mm-diameter sewer to the east of the site.
- No capacity concerns exist in downstream sanitary infrastructure.
- Water servicing will be provided from the 300mm diameter watermain running underneath the access road east of the Site.
- Based on hydrant flow testing completed for the greater campus, adequate flow and pressures are expected to be available to service the anticipated domestic and fire demand for the proposed development. Hydrant coverage is provided by the existing hydrant on Ring Road, as well as two relocated hydrants on the internal road.
- Stormwater quantity control requirements will be met through the implementation of a combination of an underground storage gallery, surface ponding measures, on line orifice control and flow control roof drains.
- No additional stormwater quality control measures are required for the Site.

- Erosion and Sediment Control measures will ensure protection of the adjacent natural features. Measures will be put in place prior to any construction activity and maintained until construction is completed and ground surfaces have been stabilized.

All of which is respectfully submitted,

WALTERFEDY

Shelley Forwell, P.Eng.
Design Engineer, Civil Engineering
Partner

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Circe Mahoney
Water Resources EIT, Civil Engineering

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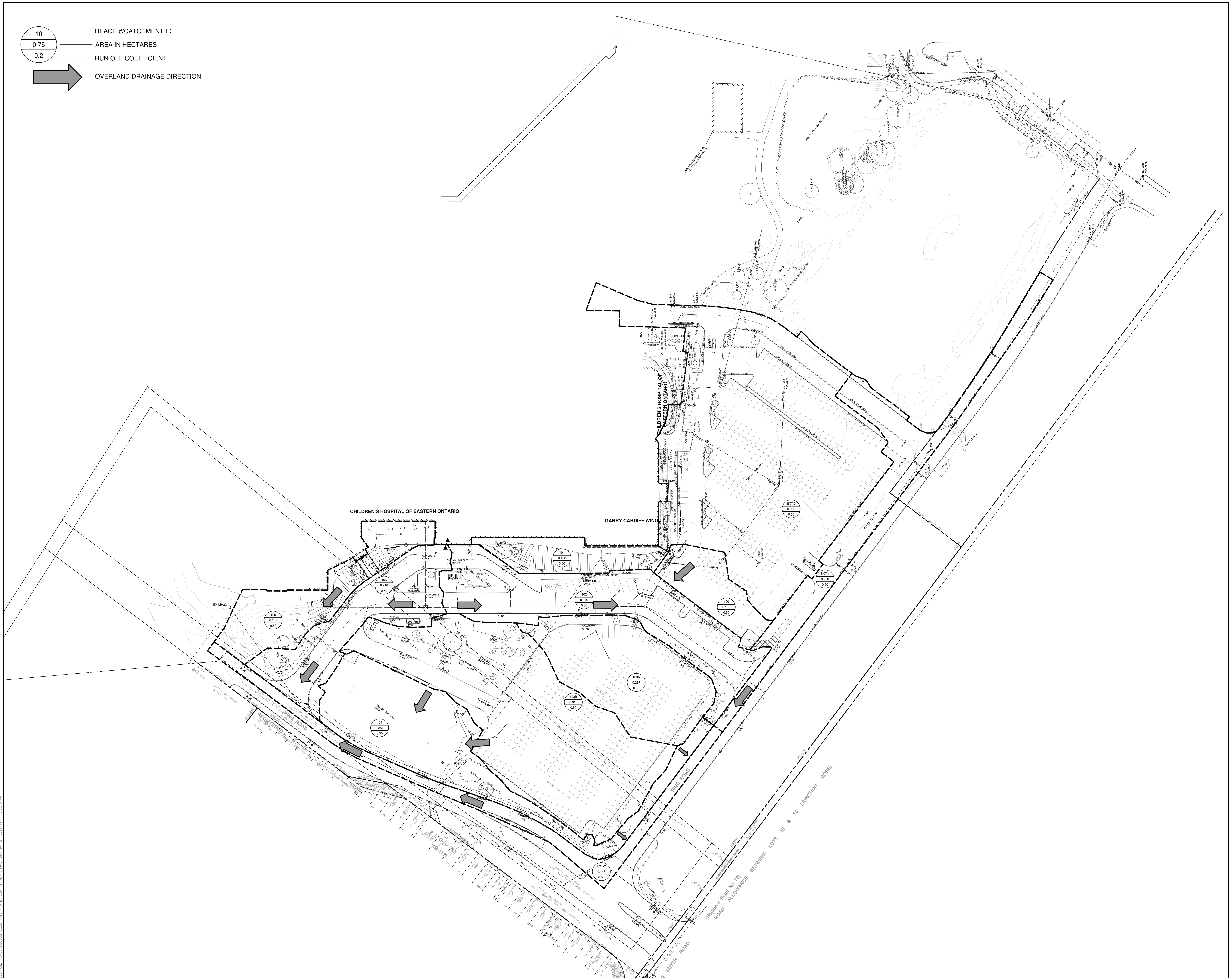
APPENDIX A

Catchment Area and Flow Schematic Figures



CHEO
1Door4Care

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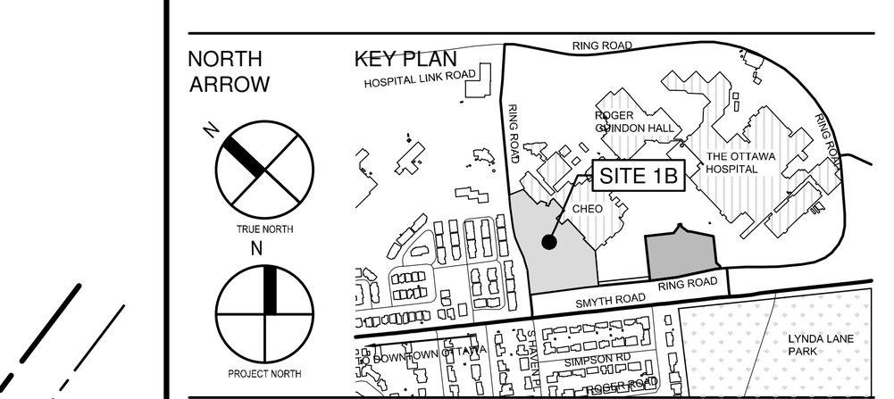
NORTH ARROW

KEY PLAN



GENERAL NOTES

1. THIS SET OF PLANS SHALL NOT BE USED FOR CONSTRUCTION UNTIL STAMPED BY THE DESIGN ENGINEER AND APPROVED BY THE LOCAL MUNICIPALITY.
2. NO CHANGES ARE TO BE MADE WITHOUT THE APPROVAL OF THE DESIGN ENGINEER.
3. THIS PLAN NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF WALTERFEDY.
4. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM AND THOSE NOT LOCATED PRIOR TO CONSTRUCTION.
5. ANY AREA DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ITS ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CONSULTANT AND AUTHORITY HAVING JURISDICTION. THE CONTRACTOR IS RESPONSIBLE FOR RESTORING ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY TO MUNICIPAL STANDARDS.
6. ALL HEALTH AND SAFETY RELATED SIGNAGE MUST BE POSTED AT THE SITE AS REQUIRED BY APPLICABLE LAW AND BEST MANAGEMENT PRACTICES.
7. AT THE END OF CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE CONSULTANT WITH A DIGITAL FILE OF AS-CONSTRUCTED DRAWINGS. THE DRAWINGS MUST REFLECT THE CONSTRUCTED STATE OF THE WORK. SUBMISSION OF UNALTERED DESIGN DRAWINGS AND CONTRACT CHANGES WILL NOT BE ACCEPTED.

#	DATE:	REVISION:

REVISIONS

CLIENT

CHEO INTEGRATED TREATMENT CENTRE

401 SMYTH RD. OTTAWA, ON K1H8L1

TITLE

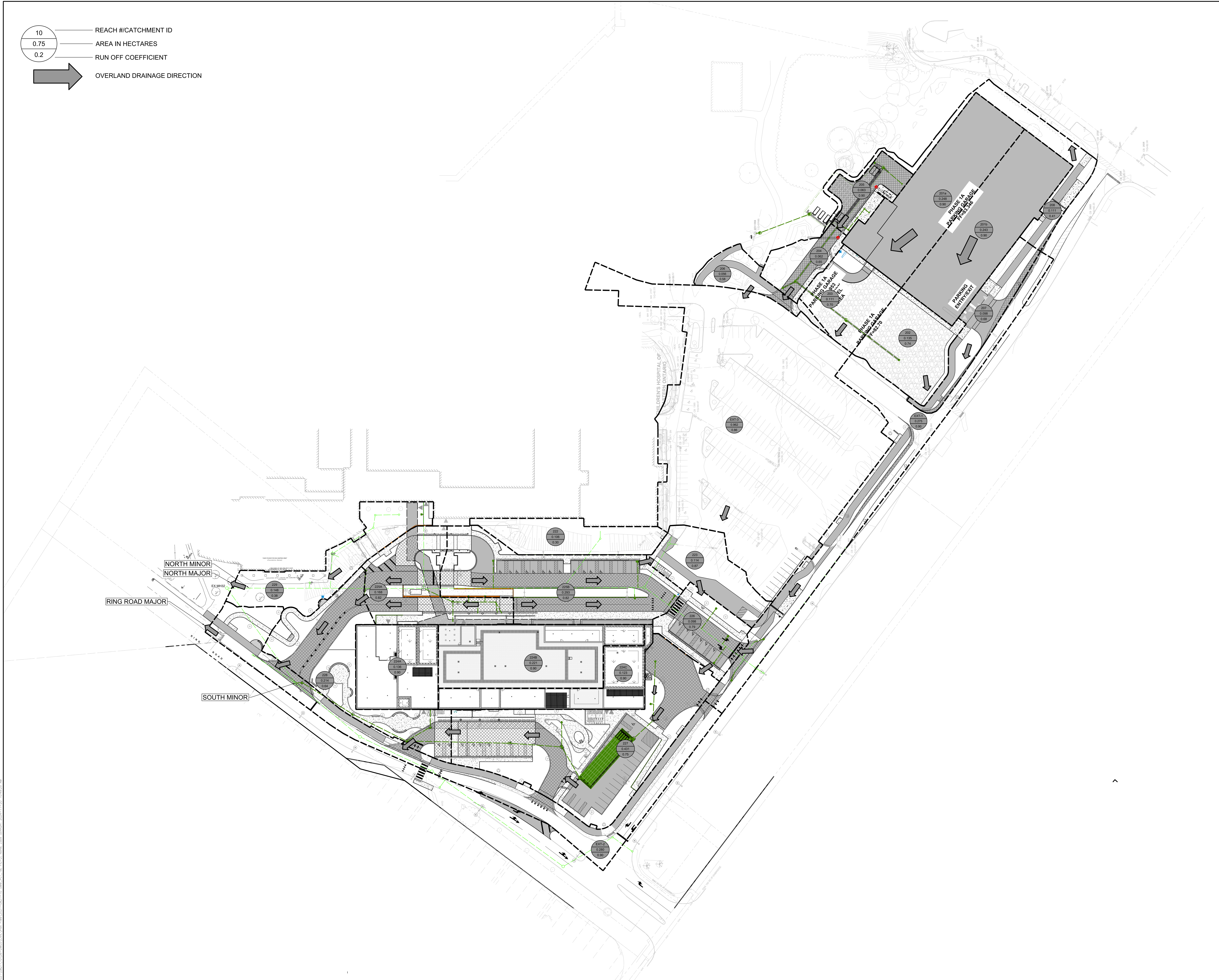
EXISTING STORM CATCHMENT AREA PLAN

SCALE: 1:500
DRAWN BY: DL, ZS
REVIEWED BY: SF
JOB NUMBER: 2021-0821-13
PLOT DATE: 2024.11.14

DRAWING NUMBER:

FIG-1

PLAN #: 18912
DEVELOPMENT #: D07-12-22-0170



CHEO

Infrastructure Ontario

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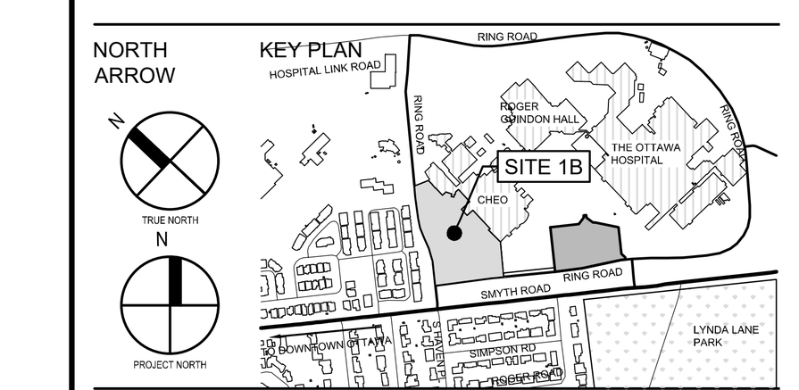
NORTH ARROW

KEY PLAN



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#	DATE:	REVISION:
12	24/11/27	ISSUED FOR 100% CD SUBMISSION
10	24/09/20	ISSUED FOR CSI–001 SITE CURB AT TUNNEL
9	24/08/23	ISSUED FOR BUILDING PERMIT
8	24/08/23	ISSUED FOR SITE PLAN CONTROL
7	24/08/07	ISSUED FOR 50% CD SUBMISSION
6	24/06/03	ISSUED FOR 100% DD SUBMISSION R2
5	24/05/10	ISSUED FOR FOUNDATION PERMIT
4	24/04/19	ISSUED FOR 100% DD SUBMISSION
3	24/01/24	RE–ISSUED FOR BUILDING PERMIT (TUNNEL)
2	23/12/20	ISSUED FOR BUILDING PERMIT (TUNNEL)
1	23/12/15	RE–ISSUED FOR 50% DD SUBMISSION
0	23/12/15	ISSUED FOR 50% DD SUBMISSION

REVISIONS

CLIENT

CHEO INTEGRATED TREATMENT CENTRE

401 SMYTH RD. OTTAWA, ON K1H8L1

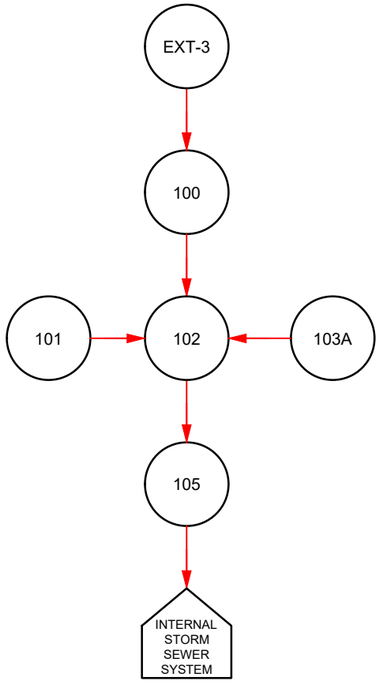
TITLE

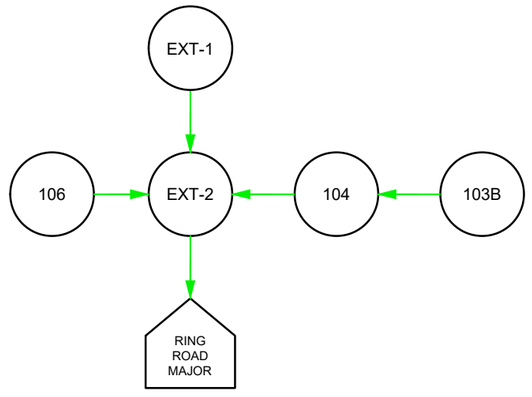
STORM CATCHMENT AREA PLAN

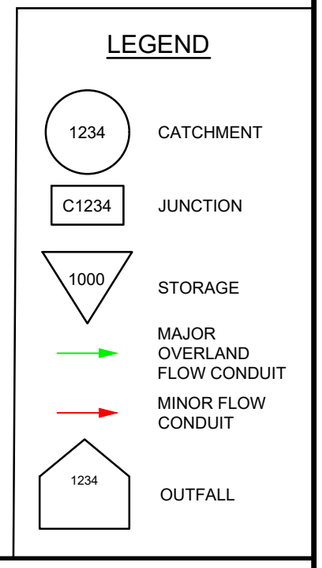
SCALE: 1:500
DRAWN BY: DL, TK, ZS
REVIEWED BY: SF
JOB NUMBER: 2021-0821-13
PLOT DATE: 2024.11.20

DRAWING NUMBER:

FIG-2







PROJECT:

CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

TITLE:

EXISTING CONDITIONS: PCSWMM MODEL SCHEMATIC

WALTERFEDY

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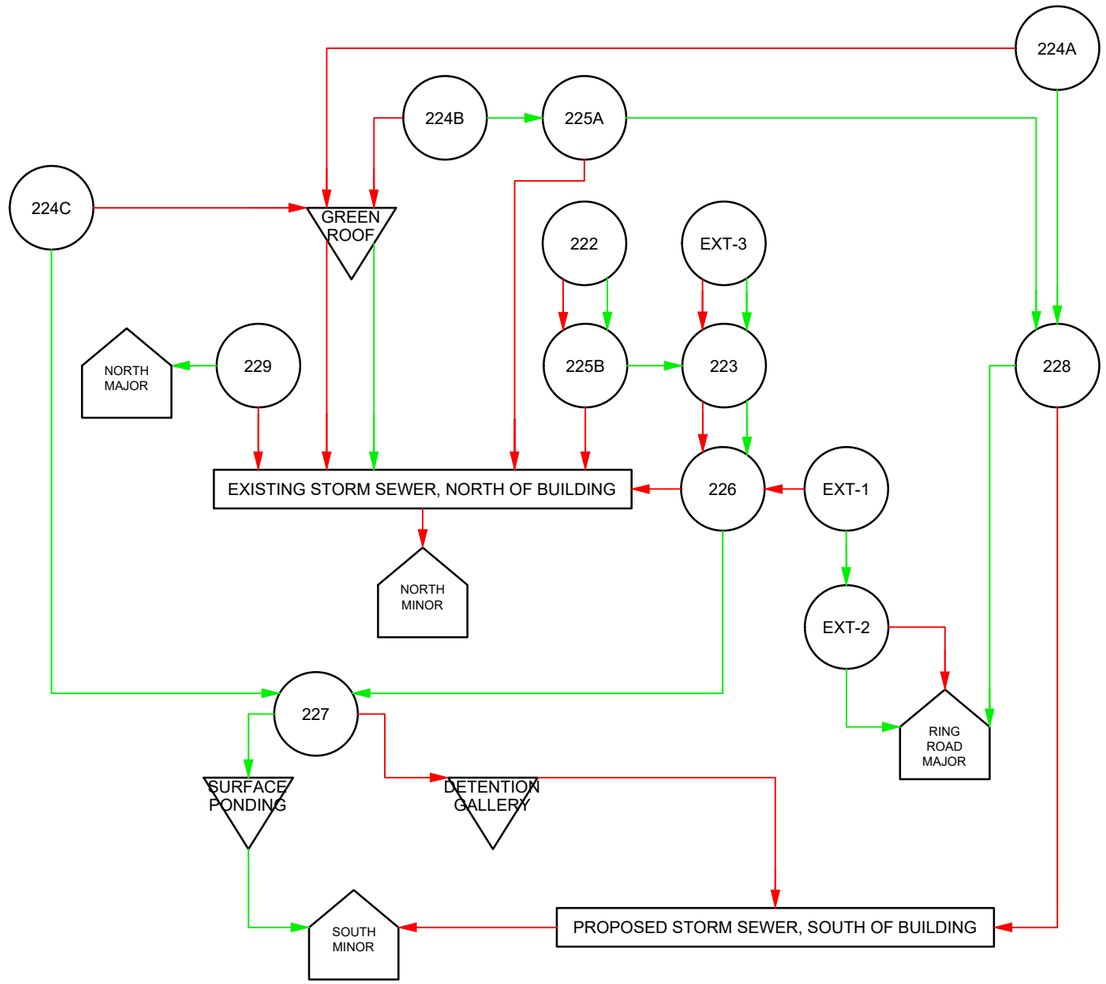
SCALE:	N/A	DATE:	2024-11-14
DRAWN BY:	ZS	PROJECT NO.:	2021-0821-13
CHECKED BY:	SF	FILE:	2021-0821-13_FLOW_SCHEM

SHEET NO.:

FIG-3



LEGEND

- 1234 — CATCHMENT
- C1234 — JUNCTION
- 1000 — STORAGE
- MAJOR OVERLAND FLOW CONDUIT
- MINOR FLOW CONDUIT
- 1234 — OUTFALL

PROJECT:

CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

TITLE:

PROPOSED CONDITIONS: PCSWMM MODEL SCHEMATIC

WALTERFEDY
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675 Queen Street South, Suite 111, Kitchener, Ontario N2M 1A1
T: 519.576.2150 F: 519.576.5499 walterfedy.com

SCALE:	N/A	DATE:	2024-11-14
DRAWN BY:	ZS	PROJECT NO.:	2021-0821-13
CHECKED BY:	SF	FILE:	2021-0821-13_FLOW_SCHEM
SHEET NO.:			

FIG-4

APPENDIX B

Servicing Details

WASTEWATER GENERATION

MECP Design Criteria

WALTERFEDY

Project	CHEO 1Door4Care
Project #	2021-0821-13
Designer	CM
Address	401 Smyth Road, Ottawa, Ontario
Description	Anticipated Wastewater Flows Generated

Building Description	Site Area[1] (ha)	Average Daily Wastewater Flow (L/gross Ha/day)[2]	Average Wastewater Generated (L/day)	Peaking Factor[3]	Infiltration Allowance[2] (L/s/ha)	Peak Domestic Wastewater Flow (L/s)
Proposed 1Door4Care Facility	2.17	28000	60,810	1.50		1.06
Infiltration Allowance	2.17				0.33	0.72
Total						**1.77**

Notes:

1. Site Area based on Civil Drawings
2. Per Capita Demands and Infiltration Allowance taken from City of Ottawa's Ottawa Sewer Design Guidelines
3. Peaking Factor taken from City of Ottawa's Sewer Design Guidelines for institutional developments

Hydraulic Load (Fixuture Unit Calculation) for Wastewater Demand per OBC

Total Number of Fixutre Units[1] 1180.00

Interpolation of Anticipated Maximum Drainage Rate:	
Maximum Drainage Rate for a total FU count of 1000 (as per Table 7.4.10.5)	174.00 gal/min
Maximum Drainage Rate for a total FU count of 2000 (as per Table 7.4.10.5)	262.00 gal/min
Maximum Drainage Rate for proposed FU count (as per Table 7.4.10.5)	**189.84 gal/min**
Maximum Drainage Rate	**14.38 L/s**

Notes:
[1] Refer to mechanical plans for more details

Use the total Fixture Unit count and the table below to calculate the flow

Table 7.4.10.5.
Maximum Probable Drainage Rate, gal/min
Forming Part of Sentence 7.4.10.5.(2)

Item	Column 1	Column 2	Column 3	Column 4
	Fixture Units in Service	*Fixture Units*	*Fixture Units*	*Fixture Units*
		Col. 1	Col. 1 × 10	Col. 1 × 100
1.	100	53	174	900
2.	90	51	164	835
3.	80	49	153	750
4.	70	47	140	680
5.	60	44	128	600
6.	50	41	115	520
7.	40	38	102	435
8.	30	33	88	350
9.	20	27	72	262
10.	10	21	53	174

SANITARY SEWER DESIGN CALCULATIONS

Project:	CHEO Integrated Treatment Centre
Project No:	2021-0821-13
Date:	2025-02-21
Designed By:	ZS
Checked By:	SF

Design Data

Min. Velocity	0.6	m/s
Max. Velocity	3.0	m/s
Manning's 'n'	0.013	
Infiltration	0.330	L/s/ha

Residential

Peaking Factor	Harmon	
Avg. Daily Flow	350	L/c/day

Institutional

Peaking Factor	1.5	
Avg. Daily Flow	28000	L/Gross Ha/day

Description	Pipe Data From	To	Length (m)	Residential Area (ha)	Units	Density (ppu)	Population (people)	Cumulative Area (ha)	Population (people)	Peak Factor	Institutional Area (ha)	Total Area (ha)	Infiltration Area (ha)	Total Area (ha)	Flow (L/s)	Total Flow (L/s)	Design Data Diameter (mm)	Slope (%)	Q_{FULL} (L/s)	V_{FULL} (m/s)	Q/Q_{FULL}
Proposed Integrated Treatment Centre	SAN CON. 1	MH13A	16.3		0	0.00	**0**	0.00	0	**3.60**	2.17	2.17	2.17	2.17	**1.77**	**1.77**	250	0.53	**43.29**	**0.88**	**0.04**
	MH13A	EX.MH13A	15.3		0	0.00	**0**	0.00	0	**0.00**		2.17	0.00	2.17	**1.77**	**1.77**	300	0.50	**68.38**	**0.97**	**0.03**
															Per OBC:	**14.38**	250	0.53	**43.29**	**0.88**	**0.33**
																14.38	300	0.50	**68.38**	**0.97**	**0.21**

ANGLE	FLOW DEPTH	AREA	WETTED PERIMETER	HYDRAULIC RADIUS	DISCHARGE	VELOCITY
Theta (θ)	d/D	A/A_{FULL}	P/P_{FULL}	R/R_{FULL}	Q/Q_{FULL}	V/V_{FULL}
0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.100	0.001	0.000	0.016	0.002	0.000	0.014
0.200	0.002	0.000	0.032	0.007	0.000	0.035
0.300	0.006	0.001	0.048	0.015	0.000	0.061
0.400	0.010	0.002	0.064	0.026	0.000	0.089
0.500	0.016	0.003	0.080	0.041	0.000	0.119
0.600	0.022	0.006	0.095	0.059	0.001	0.151
0.700	0.030	0.009	0.111	0.080	0.002	0.185
0.800	0.039	0.013	0.127	0.103	0.003	0.220
0.900	0.050	0.019	0.143	0.130	0.005	0.256
1.000	0.061	0.025	0.159	0.159	0.007	0.293
1.100	0.074	0.033	0.175	0.190	0.011	0.330
1.200	0.087	0.043	0.191	0.223	0.016	0.368
1.300	0.102	0.054	0.207	0.259	0.022	0.406
1.400	0.118	0.066	0.223	0.296	0.029	0.444
1.500	0.134	0.080	0.239	0.335	0.039	0.482
1.600	0.152	0.096	0.255	0.375	0.050	0.520
1.700	0.170	0.113	0.271	0.417	0.063	0.558
1.800	0.189	0.131	0.286	0.459	0.078	0.595
1.900	0.209	0.152	0.302	0.502	0.096	0.632
2.000	0.230	0.174	0.318	0.545	0.116	0.667
2.100	0.251	0.197	0.334	0.589	0.138	0.703
2.200	0.273	0.221	0.350	0.633	0.163	0.737
2.300	0.296	0.247	0.366	0.676	0.190	0.770
2.400	0.319	0.274	0.382	0.719	0.220	0.802
2.500	0.342	0.303	0.398	0.761	0.252	0.833
2.600	0.366	0.332	0.414	0.802	0.286	0.863
2.700	0.390	0.362	0.430	0.842	0.322	0.891
2.800	0.415	0.392	0.446	0.880	0.360	0.919
2.900	0.440	0.423	0.462	0.918	0.400	0.944
3.000	0.465	0.455	0.477	0.953	0.441	0.968
3.100	0.490	0.487	0.493	0.987	0.482	0.991
3.142	0.500	0.500	0.500	1.000	0.500	1.000
3.200	0.515	0.519	0.509	1.018	0.525	1.012
3.300	0.540	0.550	0.525	1.048	0.568	1.032
3.400	0.564	0.582	0.541	1.075	0.611	1.049
3.500	0.589	0.613	0.557	1.100	0.653	1.066
3.600	0.614	0.643	0.573	1.123	0.695	1.080
3.700	0.638	0.673	0.589	1.143	0.736	1.093
3.800	0.662	0.702	0.605	1.161	0.776	1.105
3.900	0.685	0.730	0.621	1.176	0.814	1.114
4.000	0.708	0.757	0.637	1.189	0.850	1.122
4.100	0.731	0.783	0.653	1.200	0.884	1.129
4.200	0.752	0.807	0.668	1.208	0.915	1.134
4.300	0.774	0.830	0.684	1.213	0.944	1.137
4.400	0.794	0.852	0.700	1.216	0.970	1.139
4.500	0.814	0.872	0.716	1.217	0.994	1.140
4.600	0.833	0.890	0.732	1.216	1.014	1.139
4.700	0.851	0.907	0.748	1.213	1.032	1.137
4.800	0.869	0.922	0.764	1.208	1.046	1.134
4.900	0.885	0.936	0.780	1.201	1.058	1.130
5.000	0.901	0.948	0.796	1.192	1.066	1.124
5.100	0.915	0.959	0.812	1.182	1.072	1.118
5.200	0.928	0.968	0.828	1.170	1.075	1.110
5.300	0.941	0.976	0.844	1.157	1.076	1.102
5.400	0.952	0.982	0.859	1.143	1.074	1.093
5.500	0.962	0.988	0.875	1.128	1.070	1.084
5.600	0.971	0.992	0.891	1.113	1.065	1.074
5.700	0.979	0.995	0.907	1.097	1.058	1.063
5.800	0.985	0.997	0.923	1.080	1.050	1.053
5.900	0.991	0.999	0.939	1.063	1.040	1.042
6.000	0.995	0.999	0.955	1.047	1.030	1.031
6.100	0.998	1.000	0.971	1.030	1.020	1.020
6.200	1.000	1.000	0.987	1.013	1.009	1.009
6.283	1.000	1.000	1.000	1.000	1.000	1.000

Flow Depth

$$\frac{d}{D} = \frac{1 - \cos\left(\frac{\theta}{2}\right)}{2}$$

Area

$$A = \frac{D^2}{8}(\theta - sin\theta)$$

Wetted Perimeter

$$P = \frac{D}{2}\theta$$

Hydraulic Radius

$$R = \frac{D}{4}\left(1 - \frac{sin\theta}{\theta}\right)$$

A/A_{FULL}

$$\frac{\theta - sin\theta}{2\pi}$$

P/P_{FULL}

$$\frac{\theta}{2\pi}$$

R/R_{FULL}

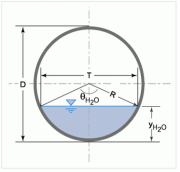
$$\frac{A \times P}{A_{FULL} \times P_{FULL}}$$

Q/Q_{FULL}

$$\frac{A}{A_{FULL}} \times \left(\frac{R}{R_{FULL}}\right)^{\frac{2}{3}}$$

V/V_{FULL}

$$\frac{Q}{Q_{FULL}} \times \frac{A_{FULL}}{A}$$



Determine the Anticipated Velocity at the Maximum Expected Flow (Q) 300mm dia pipe @ 0.50%

Parameter	Value	Units	Notes
Q_{FULL}	68.38	L/s	Flow when pipe is flowing full
Q	14.38	L/s	Flow anticipated to be directed to the pipe from OBC calculations
Q/Q_{FULL}	0.210		
V/V_{FULL}	0.790		As determined by interpolating the table on the left
V_{FULL}	0.97	m/s	Velocity when pipe is flowing full
V	**0.764**	**m/s**	Velocity anticipated at the flow rate (Q) listed above

REQUIRED DOMESTIC WATER DEMAND

MECP Design Criteria

WALTERFEDY

Project	CHEO Integrated Treatment Centre
Project #	2021-0821-13
Designer	CM
Address	401 Smyth Road, Ottawa, Ontario
Description	Domestic Flows - Proposed Condtions

Building Description	Gross Floor Area[1] (m^2)	Population[2]	Per Capita Demand (L/capita/day)[3]	Average Water Demand (L/day)	Maximum Day Peaking Factor[4]	Peak Hour Factor[4]	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)	Water Service Size (mm)	Water Service Velocity[3] (m/s)
Proposed 1Door4Care Facility - Staff	21,718	522	275	143,550	1.50	1.80	2.5	4.49	200	0.14
Proposed 1Door4Care Facility - Patients	21,718	251	25	6,275	1.50	1.80	0.1	0.20	200	0.01
Total							**2.60**	**4.68**	**150**	**0.26**
Fire Flow								117	200	3.72

Notes:

1. GFA based on architectural design
2. Anticipated staff and patient population taken from "1DOOR4CARE: CHEO INTEGRATED TREATMENT CENTRE - PRELIMINARY FUNCTIONAL SERVICING STUDY (1DOOR4CARE), prepared by Stantec October 25, 2022"
3. Per Capita Demands taken from City of Ottawa's Ottawa Sewer Design Guidelines, Appendix 4-A.
4. Maximum Day and Peak Hour Peaking Factors Determined using City of Ottawa Water Distribution Guidelines

REQUIRED FIRE FLOW

Water Supply for Public Fire Protection (FUS 2020)

WALTERFEDY

Project	CHEO Integrated Treatment Centre
Project #	2021-0821-13
Designer	CM
Address	401 Smyth Road, Ottawa, Ontario
Description	Fire Flows - 1Door4Care Building

$$F = 220 \times C \times \sqrt{A}$$

F = Required fire flow (LPM)
C = Coefficient related to type of construction
A = Total floor area (including all storeys but excluding any basement levels at least 50% below grade)

Type of Construction	Non-Combustible Construction	**C =**	0.8
Description	**Unprotected Metal Structural Components, Masonry or Metal Walls. All Structural Members are Constructed with Minimum 1 Hour Fire Rating**		

Floor Area	21718	m^2
# Storeys	6	
Fire Resistant Building?	NO	

Vertical Openings and Exterior Vertical Communications protected with minimum one (1) hr rating? YES

Area	7098	m^2
Description	Area of Largest Floor + 25% of each of the floor areas directly adjoining it	
Required Fire Flow	15000	L/min

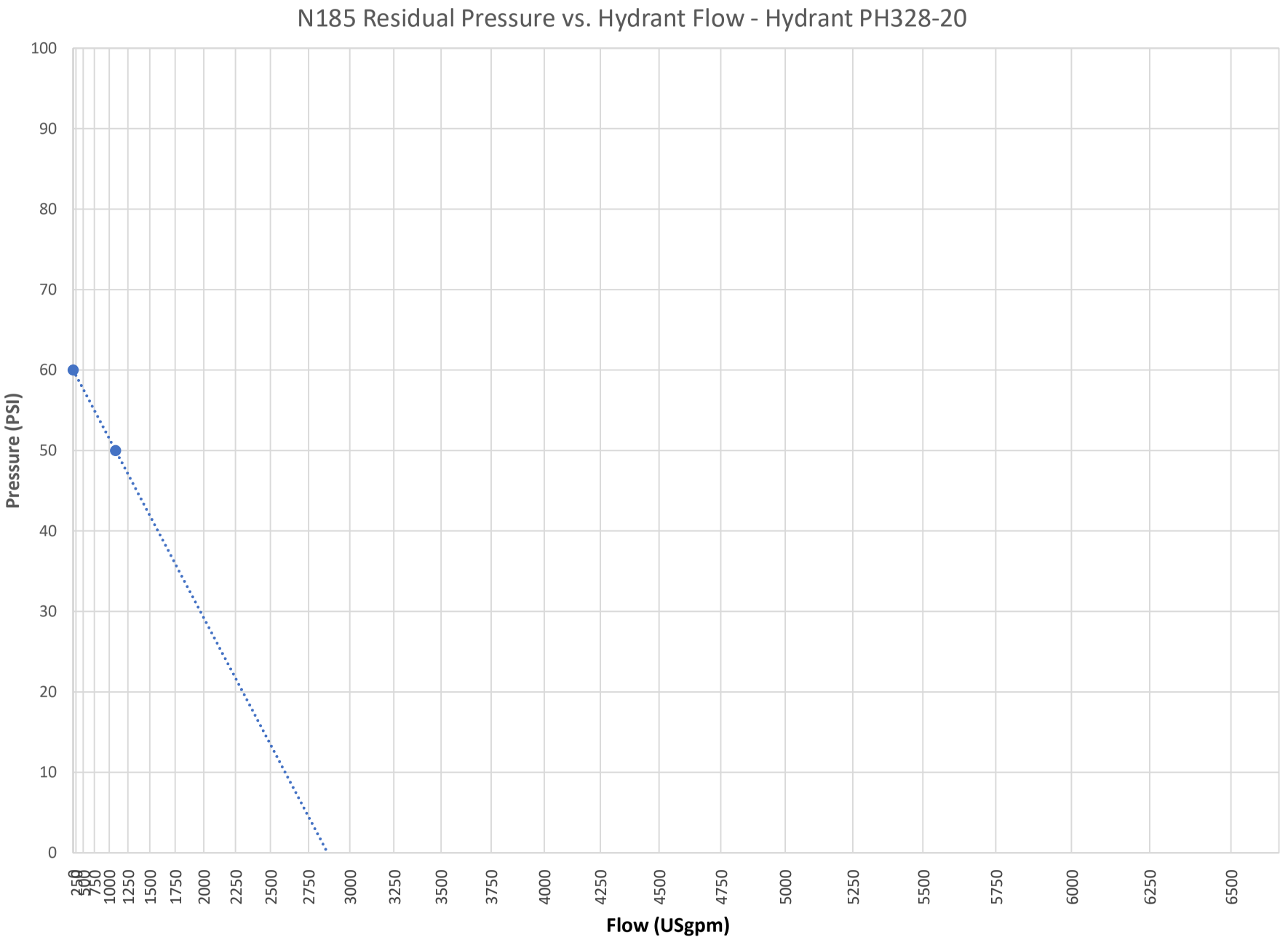
Occupancy Charge	Limited-Combustible Contents			
Fire Flow Reduction	-15%	**OR**	-2250	L/min
Required Fire Flow	12750	L/min		

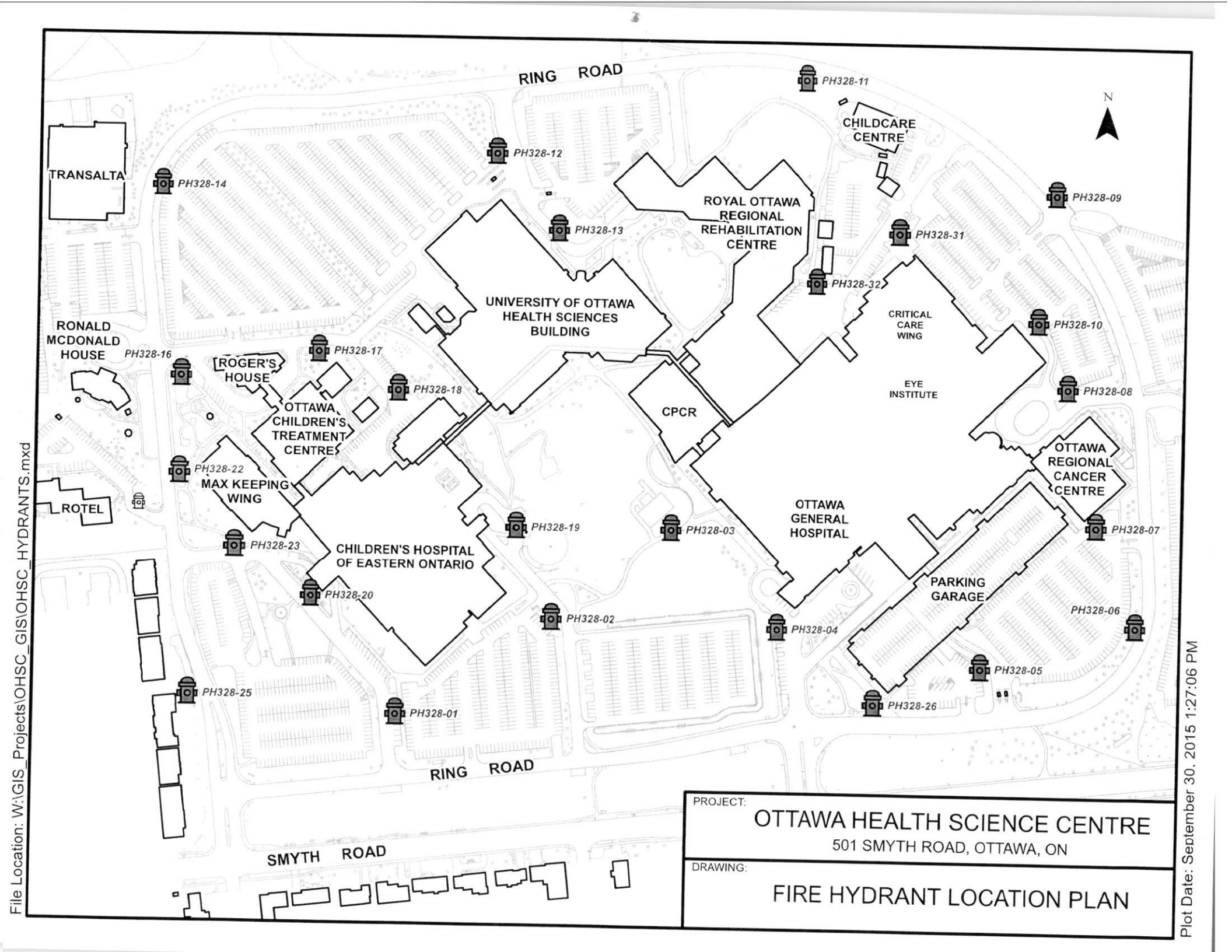
Automated Sprinker Protection	YES		
Designed to NFPA 13 Standard	YES	-30%	
Standard Water Supply to Sprinklers and Standpipes	YES	-10%	
Fully Supervised System	YES	-10%	
Fire Flow Adjustment		-6375	L/min

Exposure 1 (North)	**Distance**	27	m	**Length-Height Factor**	>100	**Charge**	3%
Description	Existing Max Keeping Wing						
Exposure 2 (East)	**Distance**	>30	m	**Length-Height Factor**	N/A	**Charge**	0%
Description	Existing CHEO Main Building						
Exposure 3 (West)	**Distance**	N/A	m	**Length-Height Factor**	N/A	**Charge**	0%
Description	N/A						
Exposure 4 (South)	**Distance**	23	m	**Length-Height Factor**	>100	**Charge**	3%
Description	Existing Residential Buildings						

Total Exposure Charge	6%	
Fire Flow Adjustment	765	L/min

Total Required Fire Flow	7000	L/min
Total Required Fire Flow	1849	U.S. GPM
Total Required Fire Flow	117	L/s


N185 Residual Pressure vs. Hydrant Flow - Hydrant PH328-20
Pressure (PSI)
100
90
80
70
60
50
40
30
20
10
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
2750
3000
3250
3500
3750
4000
4250
4500
4750
5000
5250
5500
5750
6000
6250
6500
Flow (USgpm)



PROJECT:

OTTAWA HEALTH SCIENCE CENTRE

501 SMYTH ROAD, OTTAWA, ON

DRAWING:

FIRE HYDRANT LOCATION PLAN

File Location: W:\GIS_Projects\OHSC_GIS\OHSC_HYDRANTS.mxd

Plot Date: September 30, 2015 1:27:06 PM

Compliance Report

CLEAN WATER WORKS

Fire Hydrant #: PH328- 01

Date: April/May 2021
Work Order #: 101791
Client: The Ottawa Hospital
Contact: David Eastman
Contact Phone: 613-295-8562
Customer PO #:
Site Name: General Campus
Site Address: 501 Smyth
Inspected by: Andries van Rozen
Inspection #:

Hydrant Make and Model: ((See Master List))
Year Manufactured: ((See Master List))
Hydrant Location: ((See Map))
Surface Condition: ((See Master List))
Seat Valve Size: ((See Master List))
Flange Elevation: ((See Master List))
Hydrant Colour - Body: Red
- Bonnet: Blue
Valve Location: ((See Master List))
Surface Condition: ((See Master List))

Flow Test Results:

Pitot Reading (PSI): 48
Pitot Reading (GPM): 1160
Static Pressure (PSI): 60
Residual Pressure (PSI): 50

Flow @ 20 PSI (GPM): 2452

Visual inspection:

	Yes / No
Hydrant Accessible	☑ ☐
Caps Present	☑ ☐
Caps Easily Removed	☑ ☐
Barrel Draining	☑ ☐
Water Level	Drained
Painting Required	☐ ☑

Hydrant is in Compliance with Ontario Fire Code

YES ☑ **NO** ☐

CLEAN WATER WORKS

FH ID #: PFH328-01

Date: 28 / 04 / 21 dd/mm/yy

W.O. #: 101791

Fire Hydrant Inspection Report

Customer	TOH	Contact	
Site Name	General Campus	Phone #	
Site Address	501 Smyth	P.O. #	
Inspected By	AVR	Make / Model	
Inspection #	1 2 3 4 (5) 6 7 SP	Year of Man.	
Barrel Ext.		Hose Nozzles	
Flange Elev.		Hydrant Colour	Body: / Top:

Isolation Valve	Yes	No
VP068		
Visible	✓	
Operates properly	✓	
Cap in place	✓	
Valve open	✓	
Barrel	**Yes**	**No**
Self draining	✓	
Water level: Dry		
Plugged		✓
Ground Flange	**Yes**	**No**
Solid	✓	
Buried		✓
Damaged		✓
Caps and Gaskets	**Yes**	**No**
Missing		✓
Replaced		✓
Lubricated	✓	

Nozzles and Threads	Yes	No
Loose		✓
Damaged	✓	
Leaking		✓
Repaired		✓
Proper nozzle orientation	✓	
Pumper nozzle	✓	
Hydrant	**Yes**	**No**
Colour coded	✓	
Painting required		✓
Lubricate upper stem	✓	
Operation satisfactory	✓	
Restoration required	✓	
Hydrant marker in place	✓	

Hydro Static Testing	Yes	No
Prior to opening – underground leak	✓	
Fully open – above ground leak		✓
Fully open – underground leak	✓	
Fully closed – underground leak	✓	

Flow Testing	
Pitot reading (PSI)	48
Pitot reading (GPM)	1160
Static Pressure (PSI)	60
Volume of water used (GPM x total flow min.)	
Residual pressure (PSI)	50
Flow @ 20 PSI	2452

Comments: Slight damage to both hose nozzles.

Possible underground leak upstream from main valve disc.

-> Re & Re (approx 6ft to top of valve)

Compliance Report

CLEAN WATER WORKS

Fire Hydrant #: PH328- 02

Date: April/May 2021
Work Order #: 101791
Client: The Ottawa Hospital
Contact: David Eastman
Contact Phone: 613-295-8562
Customer PO #:
Site Name: General Campus
Site Address: 501 Smyth
Inspected by: Andries van Rozen
Inspection #:

Hydrant Make and Model: ((See Master List))
Year Manufactured: ((See Master List))
Hydrant Location: ((See Map))
Surface Condition: ((See Master List))
Seat Valve Size: ((See Master List))
Flange Elevation: ((See Master List))
Hydrant Colour - Body: Red
- Bonnet: Blue
Valve Location: ((See Master List))
Surface Condition: ((See Master List))

Flow Test Results:

Pitot Reading (PSI): 50
Pitot Reading (GPM): 1190
Static Pressure (PSI): 64
Residual Pressure (PSI): 54

Flow @ 20 PSI (GPM): 2649

Visual inspection:

	Yes / No
Hydrant Accessible	☑ ☐
Caps Present	☑ ☐
Caps Easily Removed	☑ ☐
Barrel Draining	☑ ☐
Water Level	Drained
Painting Required	☐ ☑

Hydrant is in Compliance with Ontario Fire Code

YES ☑ **NO** ☐

CLEAN WATER WORKS

FH ID #: PH328 - 02

Date: 27 / 04 / 21 dd/mm/yy

W.O. #: 101791

Fire Hydrant Inspection Report

Customer	TOH	Contact		
Site Name	General campus	Phone #		
Site Address	501 Smyth	P.O. #		
Inspected By	AvR	Make / Model		
Inspection #	1 2 3 4 (5) 6 7 SP	Year of Man.		
Barrel Ext.		Hose Nozzles		
Flange Elev.		Hydrant Colour	Body:	Top:

Isolation Valve	Yes	No
VP 067 Visible	✓	
Operates properly	✓	
Cap in place	✓	
Valve open	✓	
Barrel	**Yes**	**No**
Self draining	✓	
Water level ____ Dry		
Plugged		✓
Ground Flange	**Yes**	**No**
Solid	✓	
Buried		✓
Damaged		✓
Caps and Gaskets	**Yes**	**No**
Missing		✓
Replaced		✓
Lubricated	✓	

Nozzles and Threads	Yes	No
Loose		✓
Damaged		✓
Leaking		✓
Repaired		✓
Proper nozzle orientation	✓	
Pumper nozzle	✓	
Hydrant	**Yes**	**No**
Colour coded	✓	
Painting required		✓
Lubricate upper stem	✓	
Operation satisfactory	✓	
Restoration required	✓	
Hydrant marker in place	✓	

Hydro Static Testing	Yes	No
Prior to opening – underground leak		✓
Fully open – above ground leak	✓	
Fully open – underground leak		
Fully closed – underground leak		✓

Flow Testing	
Pitot reading (PSI)	50
Pitot reading (GPM)	1190
Static Pressure (PSI)	64
Volume of water used (GPM x total flow min.)	
Residual pressure (PSI)	54
Flow @ 20 PSI	2649

Comments: Leaking from bonnet ⇒ Top Seals

Possible internal damage ⇒ Conversion

Compliance Report

CLEAN WATER WORKS

Fire Hydrant #: PH328- 03

Date: April/May 2021
Work Order #: 101791
Client: The Ottawa Hospital
Contact: David Eastman
Contact Phone: 613-295-8562
Customer PO #:
Site Name: General Campus
Site Address: 501 Smyth
Inspected by: Andries van Rozen
Inspection #:

Hydrant Make and Model: ((See Master List))
Year Manufactured: ((See Master List))
Hydrant Location: ((See Map))
Surface Condition: ((See Master List))
Seat Valve Size: ((See Master List))
Flange Elevation: ((See Master List))
Hydrant Colour - Body: Red
- Bonnet: Blue
Valve Location: ((See Master List))
Surface Condition: ((See Master List))

Flow Test Results:

Pitot Reading (PSI): 44
Pitot Reading (GPM): 1110
Static Pressure (PSI): 60
Residual Pressure (PSI): 50

Flow @ 20 PSI (GPM): 2347

Visual inspection:

	Yes / No
Hydrant Accessible	☑ ☐
Caps Present	☑ ☐
Caps Easily Removed	☑ ☐
Barrel Draining	☑ ☐
Water Level	Drained
Painting Required	☐ ☑

Hydrant is in Compliance with Ontario Fire Code

YES ☑ **NO** ☐

CLEAN WATER WORKS

FH ID #: PH 328-03

Date: 27 / 04 / 21 dd/mm/yy

W.O. #: 101791

Fire Hydrant Inspection Report

Customer	TOH		Contact		
Site Name	General Campus		Phone #		
Site Address	501 Smyth		P.O. #		
Inspected By	AvR		Make / Model		
Inspection #	1 2 3 4 5 6 7 SP		Year of Man.		
Barrel Ext.			Hose Nozzles		
Flange Elev.			Hydrant Colour	Body:	Top:

Isolation Valve	Yes	No
VP 065 Visible	✓	
Operates properly	✓	
Cap in place	✓	
Valve open		

Barrel	Yes	No
Self draining	✓	
Water level: Dry		
Plugged		✓

Ground Flange	Yes	No
Solid	✓	
Buried		✓
Damaged		✓

Caps and Gaskets	Yes	No
Missing		✓
Replaced		✓
Lubricated	✓	

Nozzles and Threads	Yes	No
Loose		✓
Damaged		✓
Leaking		✓
Repaired		✓
Proper nozzle orientation	✓	
Pumper nozzle	✓	

Hydrant	Yes	No
Colour coded	✓	
Painting required		✓
Lubricate upper stem	✓	
Operation satisfactory	✓	
Restoration required		✓
Hydrant marker in place	✓	

Hydro Static Testing	Yes	No
Prior to opening – underground leak		✓
Fully open – above ground leak		✓
Fully open – underground leak		✓
Fully closed – underground leak		✓

Flow Testing	
Pitot reading (PSI)	44
Pitot reading (GPM)	1110
Static Pressure (PSI)	60
Volume of water used (GPM x total flow min.)	50
Residual pressure (PSI)	
Flow @ 20 PSI	2347

Comments:

Compliance Report

CLEAN WATER WORKS

Fire Hydrant #: PH328- 04

Date: April/May 2021
Work Order #: 101791
Client: The Ottawa Hospital
Contact: David Eastman
Contact Phone: 613-295-8562
Customer PO #:
Site Name: General Campus
Site Address: 501 Smyth
Inspected by: Andries van Rozen
Inspection #:

Hydrant Make and Model: ((See Master List))
Year Manufactured: ((See Master List))
Hydrant Location: ((See Map))
Surface Condition: ((See Master List))
Seat Valve Size: ((See Master List))
Flange Elevation: ((See Master List))
Hydrant Colour - Body: Red
- Bonnet: Blue
Valve Location: ((See Master List))
Surface Condition: ((See Master List))

Flow Test Results:

Pitot Reading (PSI): 40
Pitot Reading (GPM): 1060
Static Pressure (PSI): 62
Residual Pressure (PSI): 52

Flow @ 20 PSI (GPM): 2300

Visual inspection:

	Yes / No
Hydrant Accessible	☑ ☐
Caps Present	☑ ☐
Caps Easily Removed	☑ ☐
Barrel Draining	☑ ☐
Water Level	Drained
Painting Required	☐ ☑

Hydrant is in Compliance with Ontario Fire Code

YES ☑ **NO** ☐

CLEAN WATER WORKS

FH ID #: PH328-04

Date: 27/04/21 dd/mm/yy

W.O. #: 101791

Fire Hydrant Inspection Report

Customer	TCH	Contact		
Site Name	General Campus	Phone #		
Site Address	501 Smyth	P.O. #		
Inspected By	AvR	Make / Model		
Inspection #	1 2 3 4 (5) 6 7 SP	Year of Man.		
Barrel Ext.		Hose Nozzles		
Flange Elev.		Hydrant Colour	Body:	Top:

Isolation Valve	Yes	No
VP 063 Visible	✓	
Operates properly	✓	
Cap in place	✓	
Valve open	✓	
Barrel	**Yes**	**No**
Self drainage	✓	
Water level / Dry		
Plugged		✓
Ground Flange	**Yes**	**No**
Solid	✓	
Buried		✓
Damaged		-
Caps and Gaskets	**Yes**	**No**
Missing		✓
Replaced		✓
Lubricated	✓	

Nozzles and Threads	Yes	No
Loose		✓
Damaged		✓
Leaking		✓
Repaired		✓
Proper nozzle orientation	✓	
Pumper nozzle	✓	
Hydrant	**Yes**	**No**
Colour coded	✓	
Painting required		✓
Lubricate upper stem	✓	
Operation satisfactory	✓	
Restoration required		✓
Hydrant marker in place	✓	

Hydro Static Testing	Yes	No
Prior to opening – underground leak		✓
Fully open – above ground leak		✓
Fully open – underground leak		✓
Fully closed – underground leak		✓

Flow Testing	
Pitot reading (PSI)	40
Pitot reading (GPM)	1060
Static Pressure (PSI)	82
Volume of water used (GPM x total flow min.)	
Residual pressure (PSI)	52
Flow @ 20 PSI	2300

Comments:

Compliance Report

CLEAN WATER WORKS

Fire Hydrant #: PH328- 20

Date: April/May 2021
Work Order #: 101791
Client: The Ottawa Hospital
Contact: David Eastman
Contact Phone: 613-295-8562
Customer PO #:
Site Name: General Campus
Site Address: 501 Smyth
Inspected by: Andries van Rozen
Inspection #:

Hydrant Make and Model: ((See Master List))
Year Manufactured: ((See Master List))
Hydrant Location: ((See Map))
Surface Condition: ((See Master List))
Seat Valve Size: ((See Master List))
Flange Elevation: ((See Master List))
Hydrant Colour - Body: Red
- Bonnet: Blue
Valve Location: ((See Master List))
Surface Condition: ((See Master List))

Flow Test Results:

Pitot Reading (PSI): 42
Pitot Reading (GPM): 1090
Static Pressure (PSI): 60
Residual Pressure (PSI): 50

Flow @ 20 PSI (GPM): 2304

Visual inspection:

	Yes / No
Hydrant Accessible	☑ ☐
Caps Present	☑ ☐
Caps Easily Removed	☑ ☐
Barrel Draining	☑ ☐
Water Level	Drained
Painting Required	☐ ☑

Hydrant is in Compliance with Ontario Fire Code

YES ☑ **NO** ☐

CLEAN WATER WORKS

FH ID #: PH 323-20

Date: 28/04/21 dd/mm/yy

W.O. #: 101791

Fire Hydrant Inspection Report

Customer	TOH	Contact		
Site Name	General Campus	Phone #		
Site Address	501 Smyth	P.O. #		
Inspected By	AvR	Make / Model		
Inspection #	1 2 3 4 (5) 6 7 SP	Year of Man.		
Barrel Ext.		Hose Nozzles		
Flange Elev.		Hydrant Colour	Body:	Top:

Isolation Valve	Yes	No
Visible	✓	
Operates properly		
Cap in place	✓	
Valve open		

Barrel	Yes	No
Self draining	✓	
Water level / Dry		
Plugged		✓

Ground Flange	Yes	No
Solid	✓	
Buried		✓
Damaged		✓

Caps and Gaskets	Yes	No
Missing		✓
Replaced		✓
Lubricated	✓	

Nozzles and Threads	Yes	No
Loose		✓
Damaged	✓	
Leaking		✓
Repaired		✓
Proper nozzle orientation	✓	
Pumper nozzle	✓	

Hydrant	Yes	No
Colour coded	✓	
Painting required		✓
Lubricate upper stem	✓	
Operation satisfactory	✓	
Restoration required	✓	
Hydrant marker in place	✓	

Hydro Static Testing	Yes	No
Prior to opening – underground leak		✓
Fully open – above ground leak	✓	
Fully open – underground leak		✓
Fully closed – underground leak		✓

Flow Testing	
Pitot reading (PSI)	42
Pitot reading (GPM)	1090
Static Pressure (PSI)	60
Volume of water used (GPM x total flow min.)	
Residual pressure (PSI)	50
Flow @ 20 PSI	2304

Comments: Damage to hose nozzle thread.
Cracked bearing housing.
Leaking from operating nut.

↳ Conversion

Compliance Report

CLEAN WATER WORKS

Fire Hydrant #: PH328- 23

Date: April/May 2021
Work Order #: 101791
Client: The Ottawa Hospital
Contact: David Eastman
Contact Phone: 613-295-8562
Customer PO #:
Site Name: General Campus
Site Address: 501 Smyth
Inspected by: Andries van Rozen
Inspection #:

Hydrant Make and Model: ((See Master List))
Year Manufactured: ((See Master List))
Hydrant Location: ((See Map))
Surface Condition: ((See Master List))
Seat Valve Size: ((See Master List))
Flange Elevation: ((See Master List))
Hydrant Colour - Body: Red
- Bonnet: Blue
Valve Location: ((See Master List))
Surface Condition: ((See Master List))

Flow Test Results:

Pitot Reading (PSI): 42
Pitot Reading (GPM): 1090
Static Pressure (PSI): 60
Residual Pressure (PSI): 50

Flow @ 20 PSI (GPM): 2304

Visual inspection:

	Yes / No
Hydrant Accessible	☑ ☐
Caps Present	☑ ☐
Caps Easily Removed	☑ ☐
Barrel Draining	☑ ☐
Water Level	Drained
Painting Required	☐ ☑

Hydrant is in Compliance with Ontario Fire Code

YES ☑ **NO** ☐

CLEAN WATER WORKS

FH ID #: PH 32823

Date: 28 / 04 / 21 dd/mm/yy

W.O. #: 101791

Fire Hydrant Inspection Report

Customer	TCH	Contact	
Site Name	General Campus	Phone #	
Site Address	501 Smyth	P.O. #	
Inspected By	AVR	Make / Model	
Inspection #	1 2 3 4 (5) 6 7 SP	Year of Man.	
Barrel Ext.		Hose Nozzles	
Flange Elev.		Hydrant Colour	Body: Top:

Isolation Valve	Yes	No
No iso valve — Visible	N	
Operates properly		A
Cap in place		
Valve open		

Barrel	Yes	No
Self draining	✓	
Water level ____ Dry		
Plugged		

Ground Flange	Yes	No
Solid	✓	
Buried		✓
Damaged		✓

Caps and Gaskets	Yes	No
Missing		✓
Replaced		✓
Lubricated	✓	

Nozzles and Threads	Yes	No
Loose		
Damaged		
Leaking		
Repaired		
Proper nozzle orientation		
Pumper nozzle		

Hydrant	Yes	No
Colour coded		
Painting required		
Lubricate upper stem		
Operation satisfactory		
Restoration required		
Hydrant marker in place		

Hydro Static Testing	Yes	No
Prior to opening – underground leak		✓
Fully open – above ground leak	✓	
Fully open – underground leak		✓
Fully closed – underground leak		✓

Flow Testing	
Pitot reading (PSI)	42
Pitot reading (GPM)	1090
Static Pressure (PSI)	60
Volume of water used (GPM x total flow min.)	
Residual pressure (PSI)	50
Flow @ 20 PSI	2304

Comments: Draining very slow.
Already checked parts in December
↳ Excavate
Leaking from bonnet.
Had new seals in December
↳ Internals worn out.
Getting tough to operate again.

8pt to disc
8 ½" bury?

⇒ Re & Re + iso valve

Compliance Report

CLEAN WATER WORKS

Fire Hydrant #: PH328- 25

Date: April/May 2021
Work Order #: 101791
Client: The Ottawa Hospital
Contact: David Eastman
Contact Phone: 613-295-8562
Customer PO #:
Site Name: General Campus
Site Address: 501 Smyth
Inspected by: Andries van Rozen
Inspection #:

Hydrant Make and Model: ((See Master List))
Year Manufactured: ((See Master List))
Hydrant Location: ((See Map))
Surface Condition: ((See Master List))
Seat Valve Size: ((See Master List))
Flange Elevation: ((See Master List))
Hydrant Colour - Body: Red
- Bonnet: Blue
Valve Location: ((See Master List))
Surface Condition: ((See Master List))

Flow Test Results:

Pitot Reading (PSI): 48
Pitot Reading (GPM): 1160
Static Pressure (PSI): 62
Residual Pressure (PSI): 52

Flow @ 20 PSI (GPM): 2517

Visual inspection:

	Yes / No
Hydrant Accessible	☑ ☐
Caps Present	☑ ☐
Caps Easily Removed	☑ ☐
Barrel Draining	☑ ☐
Water Level	Drained
Painting Required	☐ ☑

Hydrant is in Compliance with Ontario Fire Code

YES ☑ **NO** ☐

CLEAN WATER WORKS

FH ID #: PH328-25

Date: 28 / 04 / 21 dd/mm/yy

W.O. #: 101791

Fire Hydrant Inspection Report

Customer	TOH		Contact		
Site Name	General Campus		Phone #		
Site Address	501 Smyth		P.O. #		
Inspected By	AR		Make / Model		
Inspection #	1 2 3 4 (5) 6 7 SP		Year of Man.		
Barrel Ext.			Hose Nozzles		
Flange Elev.			Hydrant Colour	Body:	Top:

Isolation Valve	Yes	No
VP 093 Visible	✓	
Operates properly	✓	
Cap in place	✓	
Valve open	✓	

Barrel	Yes	No
Self draining	✓	
Water level ____ Dry		
Plugged		✓

Ground Flange	Yes	No
Solid	✓	
Buried		✓
Damaged		✓

Caps and Gaskets	Yes	No
Missing		✓
Replaced		✓
Lubricated	✓	

Nozzles and Threads	Yes	No
Loose		✓
Damaged		✓
Leaking		✓
Repaired		✓
Proper nozzle orientation	✓	
Pumper nozzle	✓	

Hydrant	Yes	No
Colour coded	✓	
Painting required		✓
Lubricate upper stem		✓
Operation satisfactory	✓	
Restoration required	✓	
Hydrant marker in place	✓	

Hydro Static Testing	Yes	No
Prior to opening – underground leak		✓
Fully open – above ground leak	✓	
Fully open – underground leak		✓
Fully closed – underground leak		✓

Flow Testing	
Pitot reading (PSI)	48
Pitot reading (GPM)	1160
Static Pressure (PSI)	62
Volume of water used (GPM x total flow min.)	
Residual pressure (PSI)	52
Flow @ 20 PSI	2517

Comments: Leaking from bonnet.
Cracked bearing housing
↳ Hydralube conversion

Compliance Report

CLEAN WATER WORKS

Fire Hydrant #: PH328- 26

Date: April/May 2021
Work Order #: 101791
Client: The Ottawa Hospital
Contact: David Eastman
Contact Phone: 613-295-8562
Customer PO #:
Site Name: General Campus
Site Address: 501 Smyth
Inspected by: Andries van Rozen
Inspection #:

Hydrant Make and Model: ((See Master List))
Year Manufactured: ((See Master List))
Hydrant Location: ((See Map))
Surface Condition: ((See Master List))
Seat Valve Size: ((See Master List))
Flange Elevation: ((See Master List))
Hydrant Colour - Body: Red
- Bonnet: Blue
Valve Location: ((See Master List))
Surface Condition: ((See Master List))

Flow Test Results:

Pitot Reading (PSI):	40
Pitot Reading (GPM):	1060
Static Pressure (PSI):	62
Residual Pressure (PSI):	52
Flow @ 20 PSI (GPM):	2300

Visual inspection:

	Yes / No
Hydrant Accessible	☑ ☐
Caps Present	☑ ☐
Caps Easily Removed	☑ ☐
Barrel Draining	☑ ☐
Water Level	Drained
Painting Required	☐ ☑

Hydrant is in Compliance with Ontario Fire Code

YES ☑ **NO** ☐

CLEAN WATER WORKS

FH ID #: FH 328-26

Date: 03 / 05 / 21 dd/mm/yy

W.O. #: 101791

Fire Hydrant Inspection Report

Customer	TOH	Contact	
Site Name	General Campus	Phone #	
Site Address	301 Smyth	P.O. #	
Inspected By	AvR	Make / Model	
Inspection #	1 2 3 4 (5) 6 7 SP	Year of Man.	
Barrel Ext.		Hose Nozzles	
Flange Elev.		Hydrant Colour	Body: / Top:

Isolation Valve	Yes	No
VP 053 Visible		✓
Operates properly		
Cap in place		
Valve open		

Barrel	Yes	No
Self draining	✓	
Water level / Dry		
Plugged		✓

Ground Flange	Yes	No
Solid	✓	
Buried		✓
Damaged		✓

Caps and Gaskets	Yes	No
Missing		✓
Replaced		✓
Lubricated	✓	

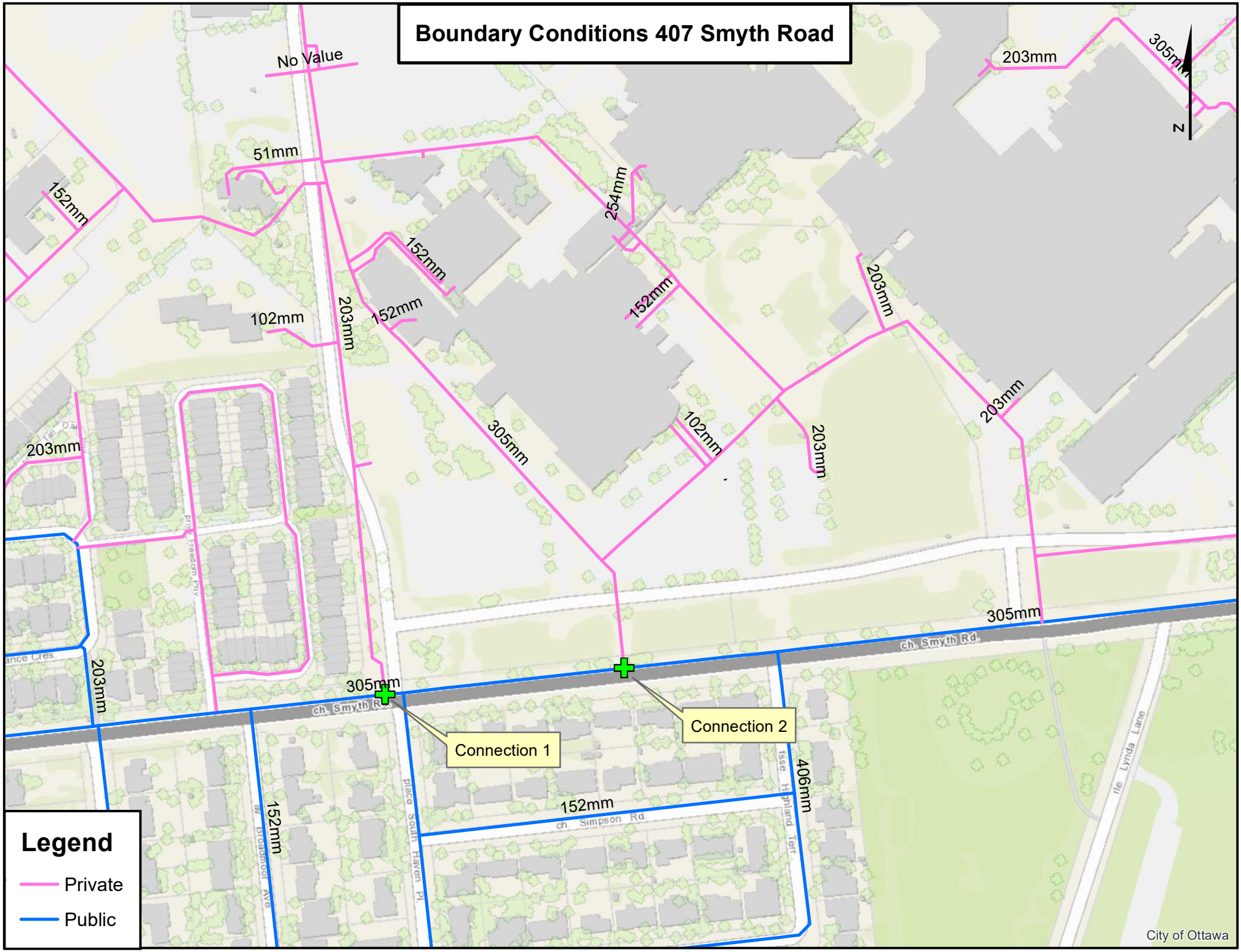
Nozzles and Threads	Yes	No
Loose		✓
Damaged		✓
Leaking		✓
Repaired		✓
Proper nozzle orientation		✓
Pumper nozzle	✓	

Hydrant	Yes	No
Colour coded	✓	
Painting required		✓
Lubricate upper stem	✓	
Operation satisfactory	✓	
Restoration required		✓
Hydrant marker in place	✓	

Hydro Static Testing	Yes	No
Prior to opening – underground leak		✓
Fully open – above ground leak		✓
Fully open – underground leak		✓
Fully closed – underground leak		✓

Flow Testing	
Pitot reading (PSI)	40
Pitot reading (GPM)	1060
Static Pressure (PSI)	62
Volume of water used (GPM x total flow min.)	
Residual pressure (PSI)	52
Flow @ 20 PSI	2300

Comments: Valve not visible, able to isolate with zone valves. This will turn off 3 or 4 hydrants together. No buildings affected.
Hydrant is accessible by Ontario Fire Code standards, however, we do recommend rotating the hydrant to facilitate quicker/easier hook ups during an emergency situation.


Boundary Conditions 407 Smyth Road
No Value
51mm
152mm
102mm
203mm
152mm
254mm
152mm
203mm
305mm
102mm
203mm
203mm
203mm
305mm
203mm
305mm
Connection 1
Connection 2
406mm
152mm
152mm
Legend
Private
Public
N
City of Ottawa

Outlook

RE: CHEO ITC - Water Boundary Condition Request

From Bramah, Bruce <bruce.bramah@ottawa.ca>
Date Tue 12/17/2024 7:27 AM
To Michael Mundee <mmundee@ellisdon.com>
Cc Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca <ed-41236@gatethree.ca>

Good morning,

Yes, we will process the BC request. Typically results will be received within 2-3 weeks.
Thanks
--
Bruce Bramah, P.Eng
Project Manager
Planning, Development, and Building Services Department | Direction générale des services de la planification, de l'aménagement et du bâtiment
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Michael Mundee <mmundee@ellisdon.com>
Sent: December 17, 2024 6:04 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca
Subject: Re: CHEO ITC - Water Boundary Condition Request

Good morning, Bruce

Just wanted to confirm that you've received everything you for this.

Cheers,
Michael Mundee | EllisDon Corp.
Senior Project Manager
613-315-6854

From: Michael Mundee <mmundee@ellisdon.com>
Sent: Friday, December 13, 2024 11:00:50 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca <ed-41236@gatethree.ca>
Subject: Re: CHEO ITC - Water Boundary Condition Request

Hi Bruce,

Please updated information below:

Location of Service – north side of building, connecting to CHEO campus system - refer to Site Servicing drawing

Total Fire flow per FUS – 117 L/s - Non combustible construction, occupancy charge (-15%), auto sprinkler credit (-50%), exposure (+6%)

Average Day – 1.73L/s

Max Day – 2.61 L/s

Peak hour daily demand - **4.70L/s**

Cheers,

Michael Mundee | EllisDon Corp.

Senior Project Manager

C: 613-315-6854

E: mmundee@ellisdon.com

From: Bramah, Bruce <bruce.bramah@ottawa.ca>
Sent: Thursday, December 12, 2024 11:33 AM
To: Michael Mundee <mmundee@ellisdon.com>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca <ed-41236@gatethree.ca>
Subject: RE: CHEO ITC - Water Boundary Condition Request

Hi Michael,

As per the Technical Bulletin ISD-2010-02 and Ottawa Water Design Guideline 4.2.8, Table 2: The peaking factor for Max Day is 1.5 x Avg Day, Max Hour is 1.8 x Max Day.

Your Max Hour demand is currently showing 1.8 x Avg Day which does not meet our guidelines. Please revise your Max Hour accordingly and resubmit.
Thanks,
--
Bruce Bramah, P.Eng
Project Manager
Planning, Development, and Building Services Department | Direction générale des services de la planification, de l'aménagement et du bâtiment
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Michael Mundee <mmundee@ellisdon.com>
Sent: December 12, 2024 10:11 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca
Subject: Re: CHEO ITC - Water Boundary Condition Request

Bruce,

Location of Service – north side of building, connecting to CHEO campus system - refer to Site Servicing drawing

Total Fire flow per FUS – 117 L/s - Non combustible construction, occupancy charge (-15%), auto sprinkler credit (-50%), exposure (+6%)

Average Day – 1.73L/s

Max Day – 2.61 L/s

Peak hour daily demand 3.13L/s

Cheers,

Michael Mundee | EllisDon Corp.

Senior Project Manager

C: 613-315-6854

E: mmundee@ellisdon.com

From: Bramah, Bruce <bruce.bramah@ottawa.ca>
Sent: Thursday, December 12, 2024 7:58 AM
To: Michael Mundee <mmundee@ellisdon.com>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca <ed-41236@gatethree.ca>
Subject: RE: CHEO ITC - Water Boundary Condition Request

Good morning Michael,

Boundary condition request shall provide the following information as per the pre-consultation notes:

Water boundary condition requests must include the location of the service(s) and the expected loads required by the proposed developments. Please provide all the following information:

- Location of service(s)
- Type of development and the amount of fire flow required (as per FUS, 2020).
- Average daily demand: ___ l/s.

- Maximum daily demand: ___l/s.
- Maximum hourly daily demand: ___ l/s.

Fire protection (Fire demand, Hydrant Locations)

Please provide a rough Geo-Ottawa image showing with the existing connection locations to the public watermain and the required fire flow as per FUS 2020. Please also provide the calculations table as they differ from the domestic water demand table within the first submission and the Ottawa Water Design Guidelines.
Thanks,

--
Bruce Bramah, P.Eng
Project Manager
Planning, Development, and Building Services Department | Direction générale des services de la planification, de l'aménagement et du bâtiment
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Michael Mundee <mmundee@ellisdon.com>
Sent: December 12, 2024 6:45 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca
Subject: CHEO ITC - Water Boundary Condition Request

Hi Bruce,

Thanks for your call this morning and clarifying the comment regarding the boundary conditions.
Here is the requested information:

Average Day – 1.73L/s

Max Day – 2.61 L/s

Peak hour daily demand 3.13L/s

Cheers,

Michael Mundee | EllisDon Corp.

Senior Project Manager

C: 613-315-6854

E: mmundee@ellisdon.com

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Outlook

RE: CHEO ITC - Water Boundary Condition Request

From Bramah, Bruce <bruce.bramah@ottawa.ca>
Date Fri 12/20/2024 11:47 AM
To Michael Mundee <mmundee@ellisdon.com>
Cc Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca <ed-41236@gatethree.ca>

1 attachment (1 MB)
407 Smyth Road December 2024.pdf;

Hi Michael,

Quick turn around on this one, please see below:
The following are boundary conditions, HGL, for hydraulic analysis at 407 Smyth Road (zone 2W2C) assumed to be connected via two connections at the 305 mm watermain on Smyth Road (see attached PDF for location).

Both Connections:
Min HGL: 123.5 m
Max HGL: 131.1 m
Max Day + FF (117.0 L/s): 122.4 m (Connection 1), 123.5 m (Connection 2)

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,
--
Bruce Bramah, P.Eng
Project Manager
Planning, Development, and Building Services Department | Direction générale des services de la planification, de l'aménagement et du bâtiment
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Michael Mundee <mmundee@ellisdon.com>
Sent: December 13, 2024 11:01 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>

Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca
Subject: Re: CHEO ITC - Water Boundary Condition Request

Hi Bruce,

Please updated information below:

Location of Service – north side of building, connecting to CHEO campus system - refer to Site Servicing drawing

Total Fire flow per FUS – 117 L/s - Non combustible construction, occupancy charge (-15%), auto sprinkler credit (-50%), exposure (+6%)

Average Day – 1.73L/s

Max Day – 2.61 L/s

Peak hour daily demand - **4.70L/s**

Cheers,

Michael Mundee | EllisDon Corp.

Senior Project Manager

C: 613-315-6854

E: mmundee@ellisdon.com

From: Bramah, Bruce <bruce.bramah@ottawa.ca>
Sent: Thursday, December 12, 2024 11:33 AM
To: Michael Mundee <mmundee@ellisdon.com>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca <ed-41236@gatethree.ca>
Subject: RE: CHEO ITC - Water Boundary Condition Request

Hi Michael,

As per the Technical Bulletin ISD-2010-02 and Ottawa Water Design Guideline 4.2.8, Table 2: The peaking factor for Max Day is 1.5 x Avg Day, Max Hour is 1.8 x Max Day.

Your Max Hour demand is currently showing 1.8 x Avg Day which does not meet our guidelines. Please revise your Max Hour accordingly and resubmit.
Thanks,
--
Bruce Bramah, P.Eng
Project Manager
Planning, Development, and Building Services Department | Direction générale des services de la planification, de l'aménagement et du bâtiment
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Michael Mundee <mmundee@ellisdon.com>
Sent: December 12, 2024 10:11 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca
Subject: Re: CHEO ITC - Water Boundary Condition Request

Bruce,

Location of Service – north side of building, connecting to CHEO campus system - refer to Site Servicing drawing

Total Fire flow per FUS – 117 L/s - Non combustible construction, occupancy charge (-15%), auto sprinkler credit (-50%), exposure (+6%)

Average Day – 1.73L/s

Max Day – 2.61 L/s

Peak hour daily demand 3.13L/s

Cheers,

Michael Mundee | EllisDon Corp.

Senior Project Manager

C: 613-315-6854

E: mmundee@ellisdon.com

From: Bramah, Bruce <bruce.bramah@ottawa.ca>
Sent: Thursday, December 12, 2024 7:58 AM
To: Michael Mundee <mmundee@ellisdon.com>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca <ed-41236@gatethree.ca>
Subject: RE: CHEO ITC - Water Boundary Condition Request

Good morning Michael,

Boundary condition request shall provide the following information as per the pre-consultation notes:

Water boundary condition requests must include the location of the service(s) and the expected loads required by the proposed developments. Please provide all the following information:

- Location of service(s)
- Type of development and the amount of fire flow required (as per FUS, 2020).
- Average daily demand: ___ l/s.
- Maximum daily demand: ___l/s.
- Maximum hourly daily demand: ___ l/s.

Fire protection (Fire demand, Hydrant Locations)

Please provide a rough Geo-Ottawa image showing with the existing connection locations to the public watermain and the required fire flow as per FUS 2020. Please also provide the calculations table as they differ from the domestic water demand table within the first submission and the Ottawa Water Design Guidelines.
Thanks,

--
Bruce Bramah, P.Eng
Project Manager
Planning, Development, and Building Services Department | Direction générale des services de la planification, de l'aménagement et du bâtiment
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Michael Mundee <mmundee@ellisdon.com>
Sent: December 12, 2024 6:45 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Cc: Faris Eltayeb <feltayeb@ellisdon.com>; ed-41236@gatethree.ca
Subject: CHEO ITC - Water Boundary Condition Request

Hi Bruce,

Thanks for your call this morning and clarifying the comment regarding the boundary conditions.
Here is the requested information:

Average Day – 1.73L/s

Max Day – 2.61 L/s

Peak hour daily demand 3.13L/s

Cheers,

Michael Mundee | EllisDon Corp.

Senior Project Manager

C: 613-315-6854

E: mmundee@ellisdon.com

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APPENDIX C

Stormwater Management Details

TABLE 1
DESIGN STORM PARAMETERS

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

Design Storm	IDF Storm Parameters			Time of Peak	Storm Duration	Max. Rainfall Intensity	Max. Rainfall Depth
	a	b	c	r	D (h)	(mm/hr)	(mm)
2-year	732.951	6.199	0.810	0.3	3	76.8	31.9
5-year	998.071	6.053	0.814	0.3	3	104.2	42.5
10-year	1174.184	6.014	0.816	0.3	3	122.1	49.5
25-year	1402.884	6.018	0.819	0.3	3	144.7	58.3
50-year	1569.580	6.014	0.820	0.3	3	161.5	64.8
100-year	1735.688	6.014	0.820	0.3	3	178.6	71.7

Notes:
(1) IDF curve parameters taken from City of Ottawa Sewer Design Guidelines (October 2012)

TABLE 2
PRE-DEVELOPMENT CATCHMENT AREA PARAMETERS AND ALLOWABLE RELEASE RATES

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

Subcatchment	Comment	Area (ha)	Runoff Coefficient[1]
Existing Conditions Catchment Area Parameters			
To Ring Road Major System			
EXT-1	Section of ring road on the southern limits of the Site	0.256	0.5
EXT-2	Portion of existing external asphalt parking lot that directs runoff onto entrance driveway to CHEO entrance	0.146	0.5
100	The northern most portion of the existing external asphalt parking lot	0.105	0.5
103B	Southwestern portion of existing asphalt parking lot west of the main entrance to CHEO	0.618	0.5
104	Existing gravel overflow parking west of the main entrance to CHEO	0.351	0.5
106	Northwest portion of the existing driveway connecting Ring Road to the main entrance of CHEO	0.218	0.5
Total to Ring Road		**1.694**	**0.5**
To Storm Sewer System			
EXT-3	External catchment capturing flows from external asphalt parking lot	0.962	0.5
101	Existing landscaped area south of the existing CHEO main entrance	0.102	0.5
102	Southeast portion of existing driveway connecting Ring Road to the main entrance of CHEO	0.349	0.5
103A	Existing asphalt parking lot west of the main entrance to CHEO	0.287	0.5
105	Landscaped area located north of the main entrance of the existing CHEO building	0.189	0.5
Total to Storm Sewer System		**1.889**	**0.5**

Allowable Release Rate Calculations, Rational Method Formula: Q = 2.78*C*i*A				
Outlet ID	**Total Contributing Area (ha)**	**Runoff Coefficient[1]**	**2-year Design Storm Intensity (mm/hr)[2]**	**Allowable Peak Flow Rate (L/s)**
Ring Road Major System	1.694	0.5	76.81	180.85
Storm Sewer System	1.889	0.5	76.81	201.67

Notes:

(1) Runoff Coefficient of 0.5 has been applied as per the recommendations listed within the *"Ottawa Health Sciences Centre Stormwater Master Plan"* prepared by Morrison Hershfield (July 2019)

(2) The allowable release rates have been set equal to the outflow from a pre-development, 2-year storm event with a runoff coefficient of 0.5 as per the Stormwater Master Plan created by Morrison Hershfield.

TABLE 3
PROPOSED CATCHMENT PARAMETERS

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

							Mannings Roughness		Horton Infiltration[1]			Depression Storage				
Subcatchment	Comment	Area (ha)	Percent Impervious[2] (%)	Width (m)	Flow Length (m)	Slope (%)	Impervious	Pervious	Max. Infiltration Rate (mm/hr)	Min. Infiltration Rate (mm/hr)	Decay Constant (1/hr)	Impervious (mm)	Pervious (mm)	Percent Zero Impervious (%)	Subarea Routing	Percent Routed (%)
Proposed Conditions																
Internal Catchments																
222	Landscaped area south of existing CHEO main entrance	0.11	30	53	20	0.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
223	Portion of existing external asphalt parking lot that directs runoff onto entrance driveway to CHEO entrance	0.11	87	40	28	0.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
224A	Northern portion of proposed Integrate Treatment Centre Building - attenuated by green roof system	0.14	90	37	37	0.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
224B	Central portion of proposed Integrate Treatment Centre Building - attenuated by control flow roof drains	0.22	90	79	28	0.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
224C	Southern portion of proposed Integrate Treatment Centre Building - attenuated by green roof system	0.12	90	44	28	0.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
225A	Northern portion of the driveway between proposed Integrated Treatment Centre building and existing CHEO entrance	0.17	82	34	49	2.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
225B	Southern Portion of the driveway between proposed Integrated Treatment Centre building and existing CHEO entrance	0.29	82	28	106	2.1	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
226	South intersection between Site driveway and Ring Road	0.10	79	27	37	3.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
227	Proposed parking lot in front of the Integrated Treatment Centre bu	0.43	75	57	76	2.0	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
228	Proposed landscaped area on northern limits of the Site	0.21	25	21	100	6.9	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
229	Existing landscaped area in front of CHEO Max Keeping Wing	0.15	38	15	101	4.9	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
External Catchments																
EXT-1	Section of ring road on the southern limits of the Site	0.28	90	15	183	0.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
EXT-2	Section of ring road on the western limits of the Site	0.28	90	187	15	0.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
EXT-3	Existing asphalt parking lot - directs runoff to Site	0.96	86	61	158	0.5	0.013	0.240	76.20	13.20	4.14	1.57	4.67	25	OUTLET	100
Total (site)		**2.05**	71													
Total (included external)		**3.57**	78													

Notes:
(1) Horton InfiltrationMethod Parameters taken from *Ottawa Design Guidelines - Sewer* , October 2012

TABLE 4
PEAK RUNOFF VOLUMES

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

Subcatchment	Design Storms					
	2-year (m^3)	5-year (m^3)	10-year (m^3)	25-year (m^3)	50-year (m^3)	100-year (m^3)
Proposed Conditions						
222	5	7	8	9	11	12
223	131	182	215	257	289	322
224A	19	26	31	37	41	46
224B	30	41	49	58	65	73
224C	11	15	18	22	24	29
225A	21	29	34	41	46	52
225B	41	56	65	78	88	99
226	133	188	225	271	306	343
227	58	79	93	112	128	145
228	8	11	13	16	18	21
229	9	12	14	16	18	20
EXT-1	37	50	59	70	78	87
EXT-2	39	53	62	74	84	93
EXT-3	123	168	197	234	262	292

TABLE 5
PEAK RUNOFF FLOW RATES

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

Subcatchment	Design Storms					
	Chicago 2-Year (L/s)	**Chicago** 5-Year (L/s)	**Chicago** 10-Year (L/s)	**Chicago** 25-Year (L/s)	**Chicago** 50-Year (L/s)	**Chicago** 100-Year (L/s)
Proposed Conditions						
222	6.51	8.98	10.65	13.03	14.93	16.98
223	34.34	54.68	72.67	97.51	117.46	138.96
224A	17.58	26.34	32.26	40.07	46.07	52.29
224B	27.63	41.39	50.70	62.97	72.39	82.17
224C	12.09	17.56	21.22	26.07	29.77	33.59
225A	27.22	37.94	45.14	54.97	62.56	70.44
225B	38.47	56.31	68.27	84.08	96.21	108.82
226	36.36	60.96	80.82	107.90	129.50	152.72
227	68.82	93.87	111.49	137.62	158.15	179.47
228	11.08	15.22	18.04	22.11	25.41	28.97
229	6.34	9.78	12.14	15.28	17.70	20.25
EXT-1	9.85	16.08	20.84	27.37	32.60	38.24
EXT-2	44.59	63.87	76.75	93.86	106.92	120.37
EXT-3	37.95	62.95	81.23	106.17	126.07	147.43

TABLE 6
GALLERY PERFORMANCE SUMMARY

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

PCSWMM Model Element	Design Storm	Peak Inflow (L/s)	Peak Outflow to Storm Sewer Network (L/s)	Max. Storage Volume (m^3)	Max. Ponding Elevation (m)
Detention Gallery					
	2-year	60.13	29.36	27	77.86
	5-year	86.16	32.40	40	77.94
	10-year	96.07	34.07	49	78.00
	25-year	106.89	30.04	63	78.11
	50-year	116.54	27.89	74	78.23
	100-year	134.43	36.25	83	78.33

PCSWMM Model Element	Design Storm	Peak Inflow (L/s)	Peak Outflow to Storm Sewer Network (L/s)	Max. Storage Volume (m^3)	Max. Ponding Elevation (m)
Surface Ponding					
	2-year	68.82	68.82	0	79.60
	5-year	93.87	93.87	0	79.60
	10-year	111.49	84.24	8	79.73
	25-year	137.62	100.39	11	79.74
	50-year	158.15	112.38	13	79.75
	100-year	179.47	121.20	16	79.75

PCSWMM Model Element	Design Storm	Peak Inflow (L/s)	Peak Outflow to Storm Sewer Network (L/s)	Max. Storage Volume (m^3)	Max. Ponding Depth (m)
Roof Storage					
	2-year	27.63	15.50	19	0.01
	5-year	41.39	20.67	26	0.02
	10-year	50.70	25.84	31	0.02
	25-year	62.97	31.01	37	0.02
	50-year	72.39	36.18	41	0.03
	100-year	82.17	38.76	46	0.03

TABLE 7
OUTLET COMPARISONS

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

Design Storm Event	To Storm Sewer System		
	Existing (L/s)	Allowable [1] (L/s)	Proposed (L/s)
2-year	201.67	201.67	71.46
5-year	273.58	201.67	101.29
10-year	320.71	201.67	123.68
25-year	379.92	201.67	153.88
50-year	423.98	201.67	178.38
100-year	468.84	201.67	200.92

Design Storm Event	To Ring Road Major System		
	Existing (L/s)	Allowable [1] (L/s)	Proposed (L/s)
2-year	180.85	180.85	62.56
5-year	245.34	180.85	90.17
10-year	287.60	180.85	109.07
25-year	340.70	180.85	134.53
50-year	380.21	180.85	154.11
100-year	420.45	180.85	174.56

Notes:

(1) The allowable release rate has been set equal to the outflow from a pre-development, 2-year storm event with a runoff coefficient of 0.5 as per the *Stormwater Master Plan* created by Morrison Hershfield.

STORMWATER MANAGEMENT CALCULATIONS
FLOW CONTROL ROOF DRAIN DESIGN - CATCHMENT 224B

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

Roof Drain Characteristics		
Drainage function (Zurn Z-105 Control-Flo Drain)	0.38	L/s/25 mm of head
Max ponding depth	150	mm

Building Roof Requirement		
Roof area serviced by flow control roof drains	2210	m^2
Number of Roof Drains	**12**	

Stage-Storage-Discharge Curve		
head (m)	Discharge (L/s)	Storage (m^3)
0.000	0.00	0.0
0.025	4.56	38.7
0.050	9.12	77.4
0.075	13.68	116.0
0.100	18.24	154.7
0.125	22.80	193.4
0.150	27.36	232.1

*Note: Roof Storage = Area x Head x 0.7

STORMWATER MANAGEMENT CALCULATIONS
ORIFICE DESIGN CALCULATION

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
CHEO INTEGRATED TREATMENT CENTRE
OTTAWA, ONTARIO

Parameters for Orifice Plate - CBMH40		
$Q = C_d A\sqrt{2gh}$		
Discharge Coefficient (C_d)	0.62	-
Diameter of Orifice	0.075	m
Area of Orifice	0.004	m^2
Acceleration due to Gravity (g)	9.81	m/s
Max. Water Level in CBMH40 - 5 Yr	77.94	m
Centreline Elevation of Orifice Plate	77.37	m
Hydraulic Head (h)	0.572	m
Calculated Max. Flow out of Orifice (Q)	**9.18**	**L/s**
Modelled Max. Flow out of Orifice	**8.87**	**L/s**
Difference	**0.31**	**L/s**

SOPRANATURE
SOPRARETENTIO BOARD

TECHNICAL DATA SHEET 230328SCANE (supersedes -)

VEGETATIVE SOLUTION COMPLEMENTARY PRODUCT

APPLICATIONS

ROOFS

PLAZA-DECKS

DESCRIPTION

SOPRARETENTIO BOARD is a drainage board with water retention properties made from 100% recycled polyester. SOPRARETENTIO BOARD is used in flat or slope green roofing systems to retain a certain amount of water and channel excess to the water outlets. It can also be used on any roofs or plaza-decks that needs water management or be used as a protection board over the waterproofing membranes.

INSTALLATION

Install all the SOPRARETENTIO BOARD side by side directly on the surface making sure to leave no gaps between the boards.

FOR COMPLETE INFORMATION ON PRODUCT INSTALLATION, PLEASE CONSULT YOUR SOPREMA REPRESENTATIVE.

PACKAGING

Specifications	SOPRARETENTIO BOARD
Dimensions	1 m x 1.2 m (3.3 x 4 ft)
Coverage per roll	1.2 m^2 (13.2 ft^2)
Thickness	30 mm (1.18 in)

PROPERTIES

Properties	Standards	SOPRARETENTIO BOARD
Material	-	100% Recycled Polyester
Colour	-	Dark Grey
Compressive Strength *10% deformation*	ASTM D 1621	2.9 kPa (0.42 psi)
Dry Weight	ASTM E 2397	3.0 kg/m^2 (0.6 lb/ft^2)
Fully Saturated Water retention	ASTM E 2397	21.6 L/m^2
Puncture Resistance	ASTM D 4833	220 N (49.5 lbf)
Flow Rate *at 20 kPa*	ASTM D 4716 Hydraulic gradient of 1.0	0,21 L/s/m (0.017 gal US/min/ft)

(All values are nominal)

TDS-SOPRARETENTIO-BOARD.indd

SYSTÈME QUALITÉ ISO 9001 QUALITY SYSTEM

SYSTÈME ENVIRONNEMENT ISO 14001 ENVIRONMENT SYSTEM

SOPREMA®

SOPRANATURE
TOUNDRA BOX

TECHNICAL DATA SHEET 210721SCANE (supersedes 210129SCANE)

VEGETATIVE SOLUTION

APPLICATIONS

ROOFS

PLAZA-DECKS

DESCRIPTION

SOPRANATURE's TOUNDRA BOX is a patented pre-vegetated system. It is composed of a box made of 100% recycled polypropylene and recyclable removable side boards, containing a filter cloth and a growing medium in which a mix of sedum species is cultivated. The mix of sedums can be adapted according to the hardiness zone and climatic conditions.

The TOUNDRA BOX system can be installed on SOPRANATURE green roofs, garden terraces, and plaza decks.

INSTALLATION

The TOUNDRA BOX boxes are installed with their side boards (removable upper part). The side boards must be removed up to the second-to-last installed row only, as the last row supports the substrate. The side boards can be recycled.

The installation of the TOUNDRA BOX system must be immediately followed by saturation watering.

FOR FURTHER DETAILS ON PRODUCT INSTALLATION AS WELL AS RECOMMENDATIONS ON RUSTICITY ZONES AND CLIMATE ZONES, PLEASE CONSULT A SOPREMA REPRESENTATIVE.

PACKAGING

Specifications		TOUNDRA BOX
Box material		100%-recycled polypropylene
Filter cloth material		Non-woven polypropylene
Box dimensions		300 mm × 600 mm (11.8 in × 23.6 in)
Total height	Upon delivery	195 mm (7.7 in)
	After removing the side boards	100 mm (3.9 in)
Coverage of vegetation at installation		≥ 90%

(All values are nominal)

PROPERTIES

Properties	Standards	TOUNDRA BOX
Density	ASTM E2399	106.0 to 124.2 kg/m² (21.7 to 25.5 lb/ft²)
Water retention capacity	ASTM E2397	45.6 L/m² (1.1 Gallon/ft²)
Wind flow resistance	CSA A123.24	200 [133] Km/h (124 [83] mph)*

*Values between backets include safety factor.
(All values are nominal)

STORAGE AND HANDLING

The storage time of a pallet of stacked TOUNDRA BOX boxes should not exceed 48 hours. In the case of long-term storage, contact our SOPRANATURE Department to determine the precautions to consider. Store the TOUNDRA BOX out of direct sunlight in a ventilated place.

SOPREMA®

SYSTÈME QUALITÉ ISO 9001 QUALITY SYSTEM

SYSTÈME ENVIRONNEMENT ISO 14001 ENVIRONMENT SYSTEM

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	HAIDER NASRULLAH 647-850-9417 HAIDER.NASRULLAH@ADSPIPE.COM
ADS SALES REP:	BRAD DUNLOP 613-893-7336 BRAD.DUNLOP@ADSPIPE.COM
PROJECT NO:	S352402
ONTARIO SITE COORDINATOR:	RYAN RUBENSTEIN 519-710-3687 RYAN.RUBENSTEIN@ADSPIPE.COM

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR WEBSITE

1 DOOR 4 CARE AT CHEO ELLIS DON

OTTAWA, ON

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.
10. MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE. DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
11. ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE; AASHTO M43 #3, 357, 4, 467, 5, 56, OR 57.
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

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

CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT

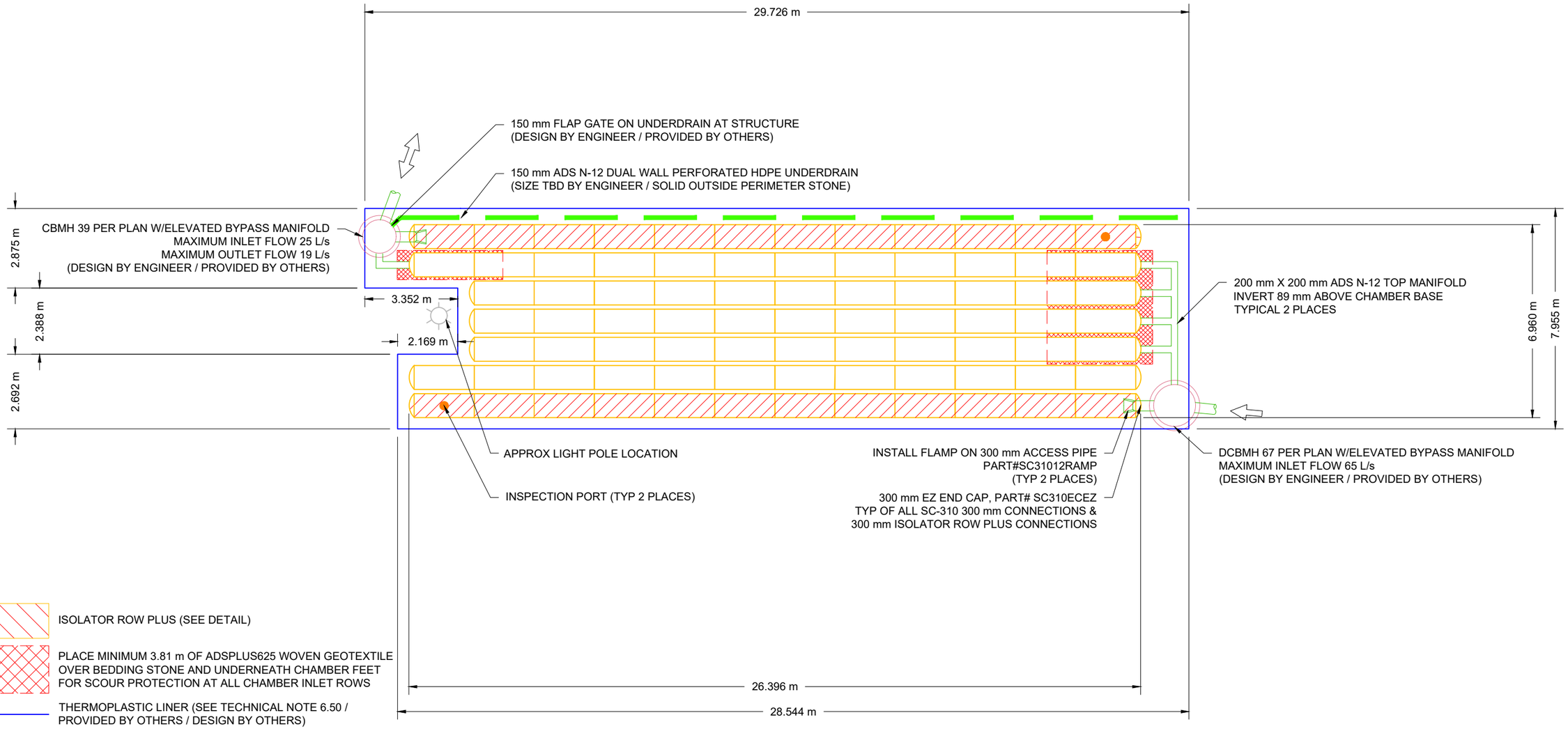
81	STORMTECH SC-310 CHAMBERS
14	STORMTECH SC-310 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	% STONE VOID
84.3	**INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED)**
225.2	SYSTEM AREA (m²)
79.7	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS

80.617	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
78.789	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
78.636	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
78.636	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
78.636	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
78.331	TOP OF STONE
78.179	TOP OF SC-310 CHAMBER
77.862	200 mm TOP MANIFOLD/CONNECTION INVERT
77.796	300 mm ISOLATOR ROW PLUS CONNECTION INVERT
77.773	BOTTOM OF SC-310 CHAMBER
77.621	UNDERDRAIN INVERT
77.621	BOTTOM OF STONE

NOTES

- THE STORMTECH SYSTEM DEPICTED DOES NOT CONTAIN PROPER WATER QUALITY MEASURES. ABSENCE OF WATER QUALITY MEASURES CAN RESULT IN UNTREATED STORMWATER. ADS RECOMMENDS THE USE OF ISOLATOR ROW PLUS AND AN UPSTREAM HIGH FLOW BYPASS ON ALL STORMTECH SYSTEMS TO PROPERLY DIRECT THE FIRST FLUSH.



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 3.81 m OF ADSPLUS625 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

THERMOPLASTIC LINER (SEE TECHNICAL NOTE 6.50 / PROVIDED BY OTHERS / DESIGN BY OTHERS)

1 DOOR 4 CARE AT CHEO
ELLIS DON
OTTAWA, ON

DATE: 5/18/23 | DRAWN: RCT
PROJECT #: S352402 | CHECKED: RCT

DATE	DRWN	CHKD	DESCRIPTION
3/6/25	RCT	RCT	NEW PLANS FOR OVERLAY
12/09/24	RCT	RCT	REVISED PER NEW PLANS

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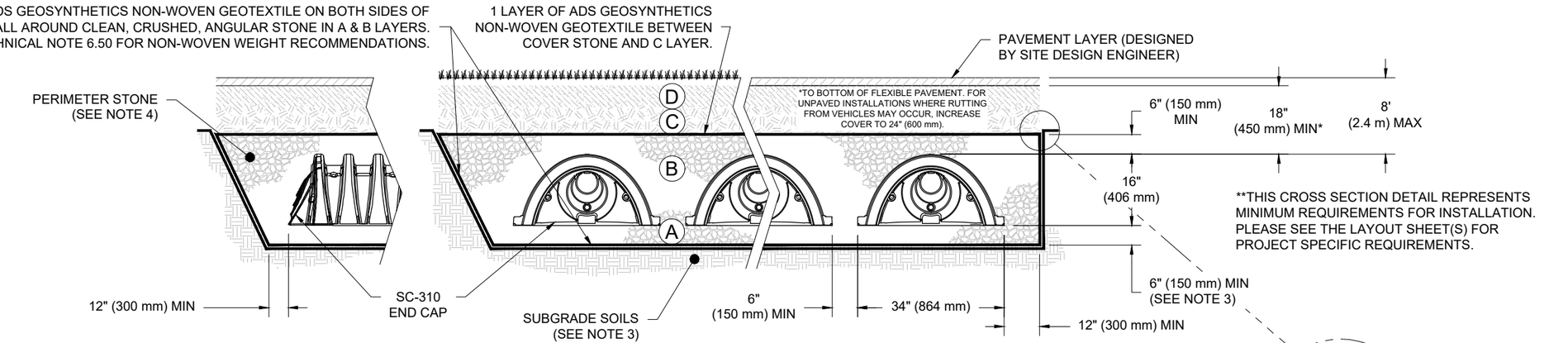
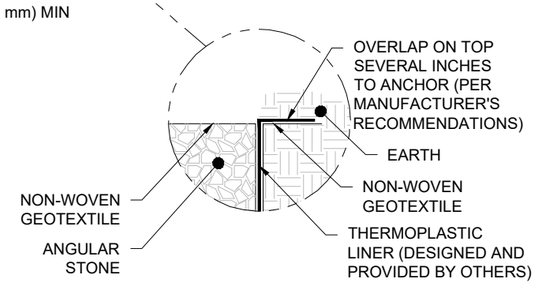
SCALE = 1 : 150

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	3.25	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".





THERMOPLASTIC LINER DETAIL

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1 DOOR 4 CARE AT CHEO
ELLIS DON
OTTAWA, ON

DATE: 5/18/23 | DRAWN: RCT
PROJECT #: S352402 | CHECKED: RCT

DATE	DRWN	CHKD	DESCRIPTION
3/6/25	RCT	RCT	NEW PLANS FOR OVERLAY
12/09/24	RCT	RCT	REVISED PER NEW PLANS

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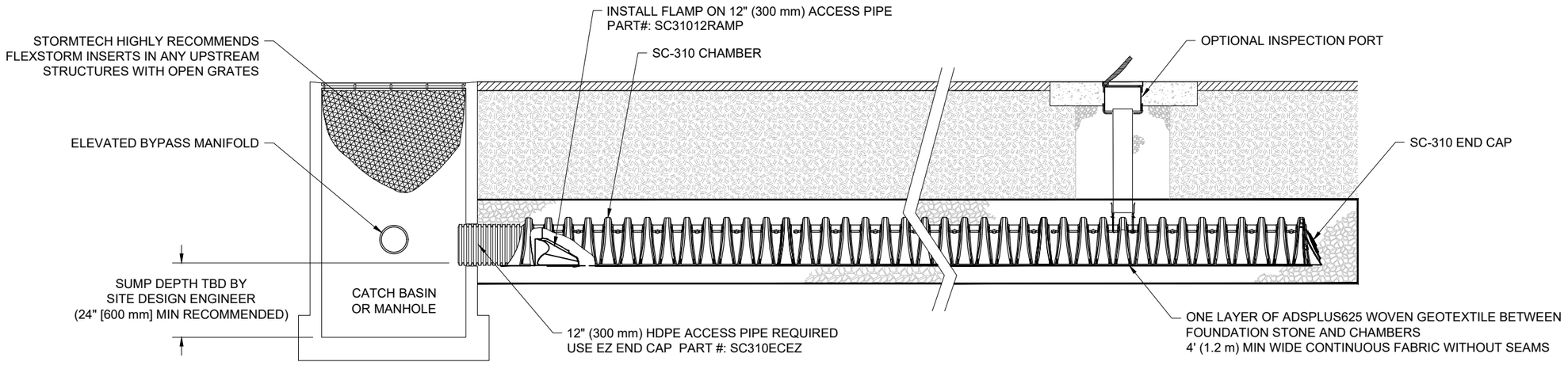


SC-310 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

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

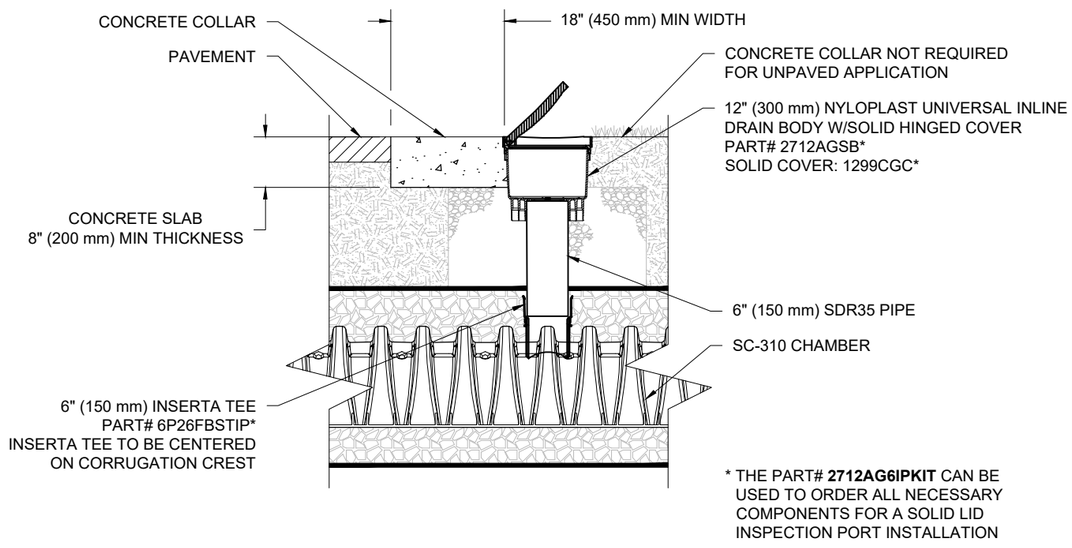
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

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

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

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



SC-310 6" (150 mm) INSPECTION PORT DETAIL
NTS

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UNDERDRAIN DETAIL

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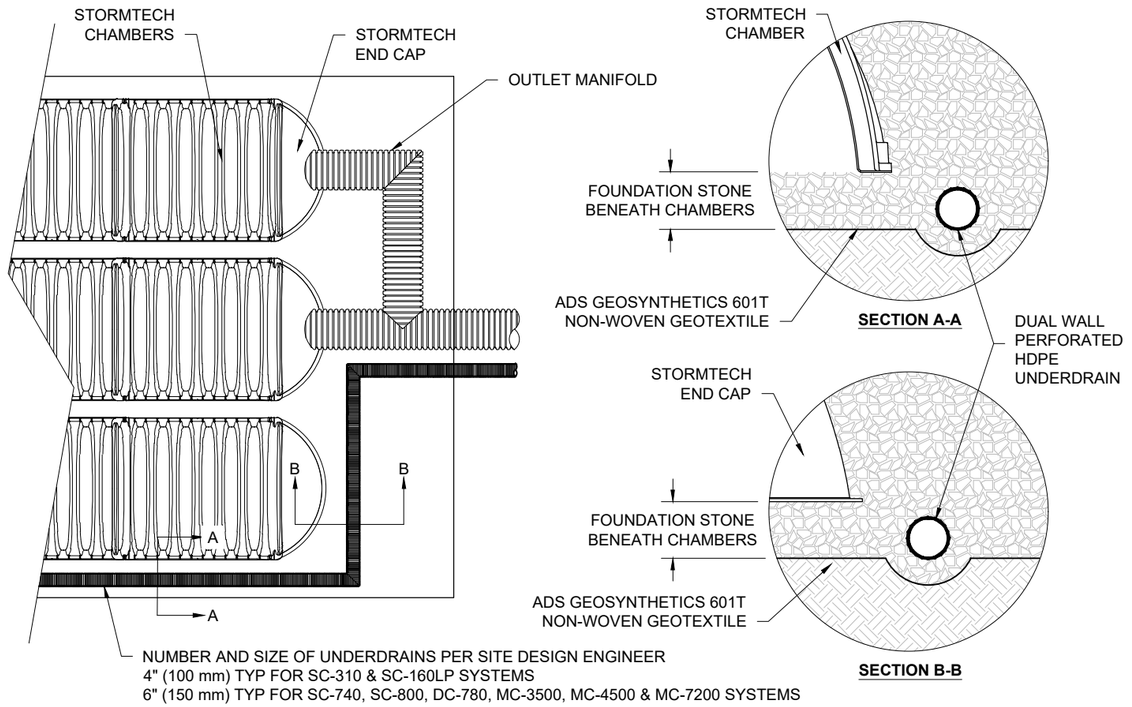
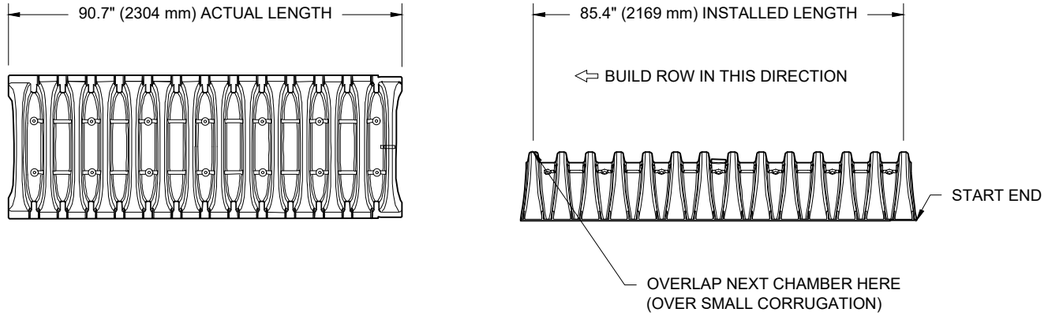


SC-310 TECHNICAL SPECIFICATION

NTS

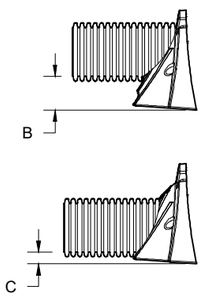


NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

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

PART #	STUB	B	C
SC310EPE06TPC	6" (150 mm)	5.8" (147 mm)	---
SC310EPE06BPC		---	0.5" (13 mm)
SC310EPE08TPC	8" (200 mm)	3.5" (89 mm)	---
SC310EPE08BPC		---	0.6" (15 mm)
SC310EPE10TPC	10" (250 mm)	1.4" (36 mm)	---
SC310EPE10BPC		---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	---	0.9" (23 mm)



ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL; PRE-CORED END CAPS END WITH "PC"

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12/09/24	RCT	RCT	REVISED PER NEW PLANS

THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE EOR'S SEAL AND SIGNATURE. THE ENGINEER OF RECORD ("EOR") OR OTHER PROJECT REPRESENTATIVE, THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS/STORMTECH UNDER THE DIRECTION OF THE PROJECT'S ENGINEER OF RECORD ("EOR") OR OTHER PROJECT REPRESENTATIVE. THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE EOR'S PRIOR APPROVAL. EOR SHALL REVIEW THIS DRAWING PRIOR TO BIDDING AND/OR CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE EOR TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

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40mmØ DCW IRRIGATION CONNECTION (REFER TO MECHANICAL DRAWINGS FOR DETAILS)

WALL MOUNTED HOSE BIB (BY MECHANICAL)

WALL MOUNTED HOSE BIB (BY MECHANICAL)

1.1m-250mmØ STM @ 1.15%

CB54 (600x600)
T/G=79.60
SE INV=78.092

20.6m-300mmØ STM

O CURB STOP AS A TEMPORARY BLOW OFF. FUTURE IRRIGATION SYSTEM BY OTHERS.

CBMH74 (1200Ø)
T/G=80.22
NE INV=77.985
W INV=77.925

40mmØ POLYETHYLENE (OR APPROVED EQUAL) WATER SERVICE (MINIMUM 2400mm COVER)

PROPOSED CLAY SEAL FOR PIPE TRENCHES (TYP.). SEE DETAIL ON C0009 AND GEOTECHNICAL REPORT FOR MORE DETAILS.

CB38.1 (600x600)
T/G=79.70
SW INV=77.950

10.9m-250mmØ STM @ 2.00%

7m-375mmØ STM @ 0.50%

INV=77.461

1.1m-250mmØ STM @ 2.00%

CB40.1 (600x600)
T/G=79.65
NE INV=77.483

DCBMH38 (1500Ø)
T/G=79.60
S INV=77.572
NE INV=77.732
NW INV=77.512

15.9m-375mmØ STM @ 0.31%

15

18m-300mmØ STM @ 0.85%

CR5

1.1m

15

DCBMH67 (1500Ø)
T/G=79.65
E INV=77.826

40mmØ TEE

40mmØx25mmØ REDUCER

25mmØ POLYETHYLENE (OR APPROVED EQUAL) WATER SERVICE (MINIMUM 2400mm COVER)

25mmØ POLYETHYLENE (OR APPROVED EQUAL) WATER SERVICE (MINIMUM 2400mm COVER)

STORMTECH SC-310 DETENTION GALLERY
INSTALLED SYSTEM VOLUME = 84.2m^3
c/w IMPERMEABLE LINER AND UNDERDRAIN
TOP OF CHAMBER: 78.180m
BOTTOM OF CHAMBER: 77.773m
BOTTOM OF STONE: 77.621m
MINIMUM COVER: 1.5m

15

CBMH39 (1200Ø)
T/G=79.70
N INV=77.621

15

RING ROAD

UIG HYDRO

UIG HYDRO

UIG HYDRO

UIG HYDRO

UIG HYDRO

GAS

GAS

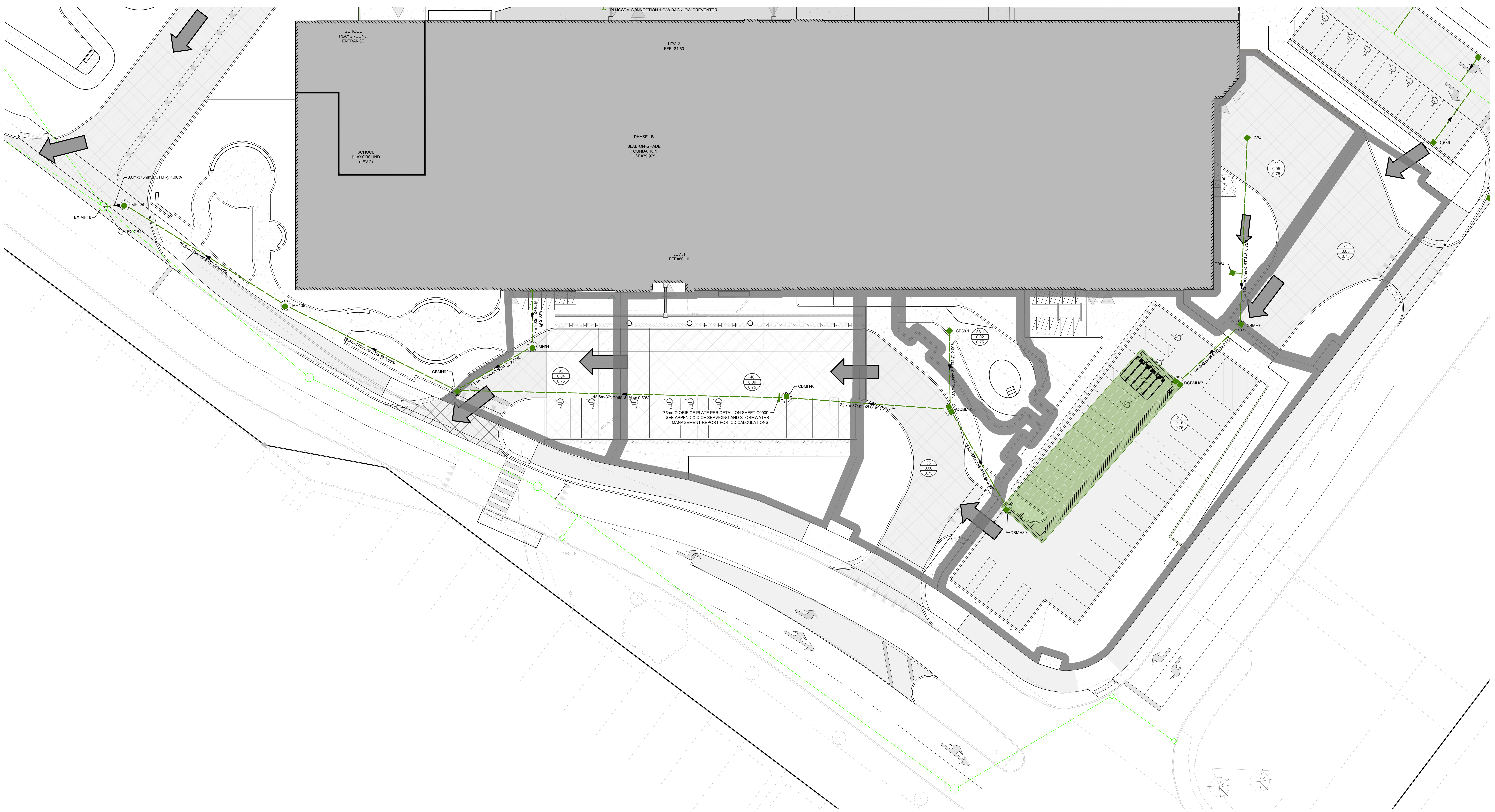
WALTERFEDY

STORM SEWER DESIGN CALCULATIONS

Project:	EllisDon - CHEO P3			Storm Parameters					
Project No:	2021-0821-10			A	998.071				
Date:	24-Feb-25			B	6.053	Design Frequency	5	Maximum Permitted Full Flow Velocity (m/s)	6.00
Designed By:	TDK	Checked By:	SF	C	0.814	Manning's 'n'	0.013	Minimum Permitted Full Flow Velocity (m/s)	0.80

	Pipe Data			Drainage Area					Time		Design Flow		Pipe Flow							
	From	To	Length (m)	Area ID	Area (ha)	C	AC	∑AC	Inlet (min)	System (min)	I (mm/hr)	Q (cu.m/s)	Diameter (mm)	Slope (%)	Q_{FULL} (cu.m/s)	Q/Q_{FULL}	V_{FULL} (m/s)	V (m/s)	Flow Time (min)	Remarks
	CB41	CBMH74	20.6	41	0.05	0.75	**0.04**	**0.04**	10.00	**10.00**	**104.2**	**0.012**	300	0.95	**0.094**	**12.3%**	**1.33**	**0.90**	**0.38**	**No Surcharge**
	CBMH74	DCBMH67	11.8	74	0.05	0.75	**0.04**	**0.08**		**10.38**	**102.2**	**0.023**	300	0.85	**0.089**	**25.5%**	**1.26**	**1.05**	**0.19**	**No Surcharge**
										10.57										
	CBMH39	DCBMH38	15.9	39	0.15	0.75	**0.11**	**0.19**	10.57	**10.57**	**101.3**	**0.053**	375	0.31	**0.098**	**54.7%**	**0.88**	**0.90**	**0.29**	**No Surcharge**
										10.86										
	CB38.1	DCBMH38	10.9	38	0.02	0.75	**0.02**	**0.02**	10.00	**10.00**	**104.2**	**0.006**	250	2.00	**0.084**	**6.9%**	**1.71**	**0.98**	**0.18**	**No Surcharge**
										10.18										
	DCBMH38	CBMH40	41.7	38	0.06	0.75	**0.05**	**0.26**	10.86	**10.86**	**99.9**	**0.072**	375	0.50	**0.124**	**58.2%**	**1.12**	**1.16**	**0.60**	**No Surcharge**
										11.45										
	CBMH40	CBMH92	27.2	40	0.09	0.75	**0.07**	**0.33**	11.45	**11.45**	**97.1**	**0.00821**	375	0.50	**0.123**	**6.6%**	**1.12**	**0.63**	**0.72**	**No Surcharge**
										12.17		*Flow overridden to demonstrate max flow through orifice								
	MH94	CBMH92	12.1	-	0.00	0.00	**0.00**	**0.00**	10.00	**10.00**	**104.2**	**0.00004**	300	2.00	**0.137**	**0.0%**	**1.93**	**0.21**	**0.98**	**No Surcharge**
										10.98		*Flow overridden to demonstrate base flow through weeping tile system								
	CBMH92	MH135	26.4	92	0.04	0.75	**0.03**	**0.03**	12.17	**12.17**	**94.0**	**0.008**	375	0.50	**0.124**	**6.3%**	**1.12**	**0.63**	**0.70**	**No Surcharge**
	MH135	MH133	26.3	-	0.00	0.00	**0.00**	**0.03**		**12.87**	**91.1**	**0.008**	375	0.50	**0.124**	**6.2%**	**1.12**	**0.62**	**0.70**	**No Surcharge**
	MH133	MH46 EX	3.0	-	0.00	0.00	**0.00**	**0.03**		**13.57**	**88.5**	**0.007**	375	1.00	**0.175**	**4.2%**	**1.59**	**0.79**	**0.06**	**No Surcharge**
										13.64										
	CBMH55	MH31 EX	14.2	55	0.06	0.90	**0.05**	**0.05**	10.00	**10.00**	**104.2**	**0.029**	450	1.09	**0.298**	**9.7%**	**1.87**	**1.19**	**0.20**	**No Surcharge**
					*Area of canopy & ground surface for this catchment					**10.20**		*Flow from building included								

10 — REACH #/CATCHMENT ID
0.75 — AREA IN HECTARES
0.2 — RUN OFF COEFFICIENT
OVERLAND DRAINAGE DIRECTION



CHEO

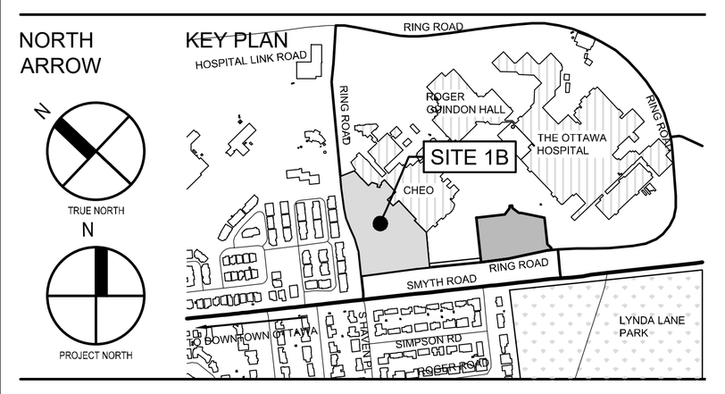
Infrastructure Ontario

EllisDon INFRASTRUCTURE Healthcare

WALTERFEDY
KITCHENER OFFICE
675 Queen Street South, Suite 111, Kitchener, Ontario N2M 1A1
T: 519.576.2150 F: 519.576.5499 walterfedy.com

NORTH ARROW

KEY PLAN



GENERAL NOTES

1. THIS SET OF PLANS SHALL NOT BE USED FOR CONSTRUCTION UNTIL STAMPED BY THE DESIGN ENGINEER AND APPROVED BY THE LOCAL MUNICIPALITY.
2. NO CHANGES ARE TO BE MADE WITHOUT THE APPROVAL OF THE DESIGN ENGINEER.
3. THIS PLAN NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF WALTERFEDY.
4. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM AND THOSE NOT LOCATED PRIOR TO CONSTRUCTION.
5. ANY AREA DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ITS ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CONSULTANT AND AUTHORITY HAVING JURISDICTION. THE CONTRACTOR IS RESPONSIBLE FOR RESTORING ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY TO MUNICIPAL STANDARDS.
6. ALL HEALTH AND SAFETY RELATED SIGNAGE MUST BE POSTED AT THE SITE AS REQUIRED BY APPLICABLE LAW AND BEST MANAGEMENT PRACTICES.
7. AT THE END OF CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE CONSULTANT WITH A DIGITAL FILE OF AS-CONSTRUCTED DRAWINGS. THE DRAWINGS MUST REFLECT THE CONSTRUCTED STATE OF THE WORK. SUBMISSION OF UNALTERED DESIGN DRAWINGS AND CONTRACT CHANGES WILL NOT BE ACCEPTED.

#	DATE:	REVISION:
12	24/11/27	ISSUED FOR 100% CD SUBMISSION
10	24/09/20	ISSUED FOR CSI–001 SITE CURB AT TUNNEL
9	24/08/23	ISSUED FOR BUILDING PERMIT
8	24/08/23	ISSUED FOR SITE PLAN CONTROL
7	24/08/07	ISSUED FOR 50% CD SUBMISSION
6	24/06/03	ISSUED FOR 100% DD SUBMISSION R2
5	24/05/10	ISSUED FOR FOUNDATION PERMIT
4	24/04/19	ISSUED FOR 100% DD SUBMISSION
3	24/01/24	RE–ISSUED FOR BUILDING PERMIT (TUNNEL)
2	23/12/20	ISSUED FOR BUILDING PERMIT (TUNNEL)
1	23/12/15	RE–ISSUED FOR 50% DD SUBMISSION
0	23/12/15	ISSUED FOR 50% DD SUBMISSION

REVISIONS

CLIENT

CHEO INTEGRATED
TREATMENT CENTRE
401 SMYTH RD. OTTAWA, ON K1H8L1

TITLE

STORM CATCHMENT AREA PLAN:
SOUTHWEST STORM SYSTEM

SCALE: 1:200
DRAWN BY: DL, TK, ZS
REVIEWED BY: SF
JOB NUMBER: 2021-0821-13
PLOT DATE: 2024.11.20

DRAWING NUMBER:

FIG-3

APPENDIX D

PCSWMM Report Files

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

WARNING 09: time series interval greater than recording interval for Rain Gage 2Yr

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 14
Number of nodes 30
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
100Yr	100Yr	INTENSITY	5 min.
10Yr	10Yr	INTENSITY	5 min.
25Yr	25Yr	INTENSITY	5 min.
2Yr	2Yr	INTENSITY	5 min.
50Yr	50Yr	INTENSITY	5 min.
5Yr	5Yr	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
222	0.11	53.00	30.00	0.1000	2Yr	225B
223	0.11	40.14	87.00	0.1000	2Yr	226
224A	0.14	37.12	90.00	0.0000	2Yr	228
224B	0.22	77.00	90.00	0.1000	2Yr	Roof_Storage
224C	0.12	43.66	90.00	0.1000	2Yr	227
225A	0.17	34.21	82.00	2.5000	2Yr	EX.MH31-S
225B	0.29	27.63	82.00	2.1000	2Yr	EX.MH36-S
226	0.10	26.63	79.00	3.5000	2Yr	EX.MH34-S
227	0.43	172.40	75.00	3.0000	2Yr	SurfaceStorage
228	0.21	18.61	25.00	3.0000	2Yr	RingRoadMajor
229	0.15	14.59	38.00	0.1000	2Yr	NorthMajor
EXT-1	0.28	15.00	90.00	0.1000	2Yr	EX.MH34-S
EXT-2	0.28	186.67	90.00	0.1000	2Yr	RingRoadMajor
EXT-3	0.96	61.04	86.00	0.1000	2Yr	223

****
LID Control Summary
****

Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated	% Perv Treated
224A	GreenRoof	1	246.92	16.43	18.16	0.00	0.00
224C	GreenRoof	1	418.41	16.43	34.02	0.00	0.00

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

cbmh40	JUNCTION	77.37	2.28	0.0	
CBMH52	JUNCTION	76.58	2.51	0.0	
CBMH55	JUNCTION	77.37	6.92	0.0	
CBMH92	JUNCTION	77.11	2.42	0.0	Yes
DCBMH38	JUNCTION	77.51	2.09	0.0	
EX.MH31	JUNCTION	76.62	5.64	0.0	
EX.MH31-S	JUNCTION	82.26	0.30	0.0	
EX.MH31-S1	JUNCTION	82.26	0.30	0.0	
EX.MH34	JUNCTION	78.40	2.89	0.0	
EX.MH34-S	JUNCTION	81.29	0.30	0.0	Yes
EX.MH36	JUNCTION	77.53	4.38	0.0	
EX.MH36-S	JUNCTION	81.92	0.30	0.0	
EX.MH43	JUNCTION	78.74	1.84	0.0	
EX.MH43-S	JUNCTION	80.58	0.30	0.0	
EX.MH44	JUNCTION	78.00	1.77	0.0	
EX.MH44-S	JUNCTION	79.77	0.30	0.0	
EX.MH45	JUNCTION	77.63	1.72	0.0	
EX.MH45-S	JUNCTION	79.35	0.30	0.0	
EX.MH46	JUNCTION	76.65	2.32	0.0	
EX.MH46-S	JUNCTION	78.96	0.30	0.0	
EXMH32	JUNCTION	75.74	2.69	0.0	
MH133	JUNCTION	76.75	2.40	0.0	
MH135	JUNCTION	76.95	2.50	0.0	
STM1	JUNCTION	77.60	6.75	0.0	
NorthMajor	OUTFALL	0.00	0.00	0.0	
RingRoadMajor	OUTFALL	78.62	0.30	0.0	
StormSewerSystem	OUTFALL	75.64	0.53	0.0	
Detention	STORAGE	77.62	0.71	0.0	
Roof_Storage	STORAGE	84.35	0.15	0.0	
SurfaceStorage	STORAGE	79.60	0.30	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	STM1	CBMH55	CONDUIT	8.4	2.0123	0.0130
C10	EX.MH45	EX.MH46	CONDUIT	37.1	2.6424	0.0130
C10-S	EX.MH45-S	EX.MH46-S	CONDUIT	37.1	1.0486	0.0160
C11	EX.MH46	CBMH52	CONDUIT	10.5	0.6857	0.0130
C11-S	EX.MH46-S	RingRoadMajor	CONDUIT	10.5	3.2398	0.0160
C12	CBMH52	EXMH32	CONDUIT	51.6	1.5079	0.0130
C13	MH135	MH133	CONDUIT	26.8	0.4925	0.0130
C13-S	EX.MH34-S	EX.MH43-S	CONDUIT	128.3	0.5536	0.0160
C14	MH133	EX.MH46	CONDUIT	2.6	1.1539	0.0130
C2	CBMH55	EX.MH31	CONDUIT	14.2	1.0916	0.0130
C3	EX.MH31	EXMH32	CONDUIT	86.7	1.0104	0.0130
C3-S	EX.MH31-S	EX.MH46-S	CONDUIT	84.2	3.9211	0.0160
C4	EX.MH36	EX.MH31	CONDUIT	97.2	0.9002	0.0130
C4-S	EX.MH31-S1	EX.MH36-S	CONDUIT	97.2	0.3498	0.0160
C5	EX.MH34	EX.MH36	CONDUIT	60.8	1.3241	0.0130
C5-S	EX.MH36-S	EX.MH34-S	CONDUIT	60.8	1.0362	0.0160
C6	DCBMH38	cbmh40	CONDUIT	22.7	0.5022	0.0130
C8	EX.MH43	EX.MH44	CONDUIT	71.4	1.0365	0.0130
C8-S	EX.MH43-S	EX.MH44-S	CONDUIT	71.4	1.1345	0.0160
C9	EX.MH44	EX.MH45	CONDUIT	35.1	1.0542	0.0130
C9-S	EX.MH44-S	EX.MH45-S	CONDUIT	35.1	1.1967	0.0160
CBMH32	EXMH32	StormSewerSystem	CONDUIT	10.0	1.0001	0.0130
CBMH92	CBMH92	MH135	CONDUIT	26.4	0.5000	0.0130
Ctention	Detention	DCBMH38	CONDUIT	15.9	0.4969	0.0130
C7	cbmh40	CBMH92	ORIFICE			
CFRD	Roof_Storage	STM1	OUTLET			
OL1	SurfaceStorage	Detention	OUTLET			

****
Cross Section Summary

****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.45	0.16	0.11	0.45	1	404.46
C10	CIRCULAR	0.38	0.11	0.09	0.38	1	285.03
C10-S	RingRoad	0.30	2.29	0.24	9.00	1	5642.11
C11	CIRCULAR	0.38	0.11	0.09	0.38	1	145.20
C11-S	RingRoad	0.30	2.29	0.24	9.00	1	9917.45
C12	CIRCULAR	0.47	0.18	0.12	0.47	1	404.43
C13	CIRCULAR	1.00	0.79	0.25	1.00	1	1682.76
C13-S	RingRoad	0.30	2.29	0.24	9.00	1	4099.48
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	188.35
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	297.90
C3	CIRCULAR	0.53	0.22	0.13	0.53	1	432.33
C3-S	HospitalRamp	0.30	2.60	0.23	10.50	1	12183.67
C4	CIRCULAR	0.53	0.22	0.13	0.53	1	408.07
C4-S	RingRoad	0.30	2.29	0.24	9.00	1	3258.74
C5	CIRCULAR	0.45	0.16	0.11	0.45	1	328.09
C5-S	RingRoad	0.30	2.29	0.24	9.00	1	5608.82
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	124.26
C8	CIRCULAR	0.30	0.07	0.07	0.30	1	98.45
C8-S	RingRoad	0.30	2.29	0.24	9.00	1	5868.79
C9	CIRCULAR	0.30	0.07	0.07	0.30	1	99.29
C9-S	RingRoad	0.30	2.29	0.24	9.00	1	6027.37
CBMH32	CIRCULAR	0.53	0.22	0.13	0.53	1	430.10
CBMH92	CIRCULAR	0.38	0.11	0.09	0.38	1	123.99
Ctention	CIRCULAR	0.38	0.11	0.09	0.38	1	123.59

****
Street Summary
****

Street RingRoad
Area:

0.0008	0.0031	0.0071	0.0125	0.0196
0.0282	0.0384	0.0502	0.0635	0.0784
0.0949	0.1129	0.1325	0.1537	0.1765
0.2000	0.2235	0.2471	0.2706	0.2941
0.3176	0.3412	0.3647	0.3882	0.4118
0.4353	0.4588	0.4824	0.5059	0.5294
0.5529	0.5765	0.6000	0.6235	0.6471
0.6706	0.6941	0.7176	0.7412	0.7647
0.7882	0.8118	0.8353	0.8588	0.8824
0.9059	0.9294	0.9529	0.9765	1.0000

Hrad:

0.0123	0.0246	0.0369	0.0492	0.0615
0.0738	0.0861	0.0984	0.1107	0.1230
0.1353	0.1476	0.1599	0.1722	0.1845
0.2089	0.2331	0.2574	0.2815	0.3056
0.3296	0.3535	0.3774	0.4013	0.4250
0.4488	0.4724	0.4960	0.5195	0.5430
0.5664	0.5897	0.6130	0.6363	0.6594
0.6825	0.7056	0.7286	0.7515	0.7744
0.7972	0.8200	0.8427	0.8653	0.8879
0.9104	0.9329	0.9553	0.9777	1.0000

Width:

0.0667	0.1333	0.2000	0.2667	0.3333
0.4000	0.4667	0.5333	0.6000	0.6667
0.7333	0.8000	0.8667	0.9333	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

```
Street HospitalRamp
Area:
            0.0007     0.0028     0.0062     0.0111     0.0173
            0.0249     0.0339     0.0443     0.0561     0.0693
            0.0838     0.0997     0.1171     0.1358     0.1558
            0.1773     0.2002     0.2242     0.2485     0.2727
            0.2970     0.3212     0.3455     0.3697     0.3939
            0.4182     0.4424     0.4667     0.4909     0.5152
            0.5394     0.5636     0.5879     0.6121     0.6364
            0.6606     0.6848     0.7091     0.7333     0.7576
            0.7818     0.8061     0.8303     0.8545     0.8788
            0.9030     0.9273     0.9515     0.9758     1.0000
Hrad:
            0.0126     0.0251     0.0377     0.0503     0.0628
            0.0754     0.0879     0.1005     0.1131     0.1256
            0.1382     0.1508     0.1633     0.1759     0.1884
            0.2010     0.2136     0.2323     0.2571     0.2819
            0.3066     0.3312     0.3558     0.3804     0.4049
            0.4293     0.4537     0.4780     0.5023     0.5265
            0.5507     0.5748     0.5989     0.6229     0.6469
            0.6708     0.6946     0.7184     0.7422     0.7659
            0.7895     0.8131     0.8366     0.8601     0.8836
            0.9070     0.9303     0.9536     0.9768     1.0000
Width:
            0.0571     0.1143     0.1714     0.2286     0.2857
            0.3429     0.4000     0.4571     0.5143     0.5714
            0.6286     0.6857     0.7429     0.8000     0.8571
            0.9143     0.9714     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000


****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 11/12/2024 00:00:00
Ending Date .............. 11/13/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 2
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
```

Initial LID Storage	0.001	0.242
Total Precipitation	0.057	15.940
Evaporation Loss	0.000	0.000
Infiltration Loss	0.015	4.093
Surface Runoff	0.038	10.540
Final Storage	0.007	1.863
Continuity Error (%)	-1.940	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.038	0.376
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.055	0.546
External Outflow	0.092	0.925
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	0.001	0.009
Continuity Error (%)	-1.328	

Time-Step Critical Elements

Link C14 (99.45%)

Highest Flow Instability Indexes

Link C6 (2)

Most Frequent Nonconverging Nodes

Convergence obtained at all time steps.

Routing Time Step Summary

Minimum Time Step	:	1.36 sec
Average Time Step	:	3.78 sec
Maximum Time Step	:	5.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.04
% of Steps Not Converging	:	0.06
Time Step Frequencies	:	
5.000 - 3.155 sec	:	72.58 %
3.155 - 1.991 sec	:	5.78 %
1.991 - 1.256 sec	:	21.63 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 0.500 sec	:	0.00 %

Subcatchment Runoff Summary

	Total Precip	Total Runon	Total Evap	Total Infil	Imperv Runoff	Perv Runoff	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff

Subcatchment	mm	mm	mm	mm	mm	mm	mm	10^6 ltr	LPS	
222	15.94	0.00	0.00	11.16	4.69	0.00	4.69	0.00	6.51	0.294
223	15.94	107.87	0.00	8.29	107.00	7.86	114.86	0.13	34.34	0.928
224A	15.94	0.00	0.00	1.30	14.21	0.00	14.21	0.02	17.58	0.574
224B	15.94	0.00	0.00	1.59	13.74	0.00	13.74	0.03	27.63	0.862
224C	15.94	0.00	0.00	1.05	9.15	0.00	9.15	0.01	12.09	0.574
225A	15.94	0.00	0.00	2.87	12.79	0.00	12.79	0.02	27.22	0.802
225B	15.94	1.70	0.00	3.17	13.95	0.00	13.95	0.04	38.47	0.791
226	15.94	133.62	0.00	13.86	117.48	17.77	135.24	0.13	36.36	0.904
227	15.94	2.61	0.00	4.64	13.52	0.00	13.52	0.06	68.82	0.729
228	15.94	0.00	0.00	11.96	3.91	0.00	3.91	0.01	11.08	0.245
229	15.94	0.00	0.00	9.88	5.76	0.00	5.76	0.01	6.34	0.361
EXT-1	15.94	0.00	0.00	1.59	13.35	0.00	13.35	0.04	9.85	0.837
EXT-2	15.94	0.00	0.00	1.59	13.93	0.00	13.93	0.04	44.59	0.874
EXT-3	15.94	0.00	0.00	2.23	12.78	0.00	12.78	0.12	37.95	0.802

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LID Performance Summary
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Subcatchment	LID Control	Total Inflow mm	Evap Loss mm	Infil Loss mm	Surface Outflow mm	Drain Outflow mm	Initial Storage mm	Final Storage mm	Continuity Error %
224A	GreenRoof	15.94	0.00	0.00	0.00	0.00	13.00	28.94	0.00
224C	GreenRoof	15.94	0.00	0.00	0.00	0.00	13.00	28.94	0.00

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	hr:min	Reported Max Depth Meters
cbmh40	JUNCTION	0.09	0.63	77.99	0	00:57	0.51
CBMH52	JUNCTION	0.05	0.13	76.71	0	01:17	0.13
CBMH55	JUNCTION	0.01	0.03	77.40	0	01:38	0.03
CBMH92	JUNCTION	0.02	0.07	77.17	0	01:18	0.07
DCBMH38	JUNCTION	0.06	0.38	77.89	0	01:09	0.37
EX.MH31	JUNCTION	0.01	0.07	76.69	0	00:59	0.07
EX.MH31-S	JUNCTION	0.00	0.03	82.29	0	00:55	0.03
EX.MH31-S1	JUNCTION	0.00	0.00	82.26	0	00:00	0.00
EX.MH34	JUNCTION	0.01	0.07	78.47	0	00:57	0.07
EX.MH34-S	JUNCTION	0.03	0.06	81.35	0	01:08	0.06
EX.MH36	JUNCTION	0.01	0.07	77.61	0	00:59	0.07
EX.MH36-S	JUNCTION	0.01	0.04	81.96	0	00:56	0.04
EX.MH43	JUNCTION	0.05	0.12	78.86	0	01:16	0.12
EX.MH43-S	JUNCTION	0.02	0.03	80.61	0	01:18	0.03
EX.MH44	JUNCTION	0.06	0.14	78.14	0	01:17	0.14
EX.MH44-S	JUNCTION	0.01	0.02	79.79	0	01:19	0.02
EX.MH45	JUNCTION	0.05	0.10	77.73	0	01:17	0.10
EX.MH45-S	JUNCTION	0.01	0.02	79.37	0	01:23	0.02
EX.MH46	JUNCTION	0.07	0.17	76.82	0	01:17	0.17
EX.MH46-S	JUNCTION	0.01	0.02	78.98	0	00:57	0.02
EXMH32	JUNCTION	0.06	0.14	75.88	0	01:09	0.14
MH133	JUNCTION	0.02	0.06	76.82	0	01:17	0.06
MH135	JUNCTION	0.02	0.05	77.00	0	01:18	0.05
STM1	JUNCTION	0.01	0.02	77.62	0	01:38	0.02
NorthMajor	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
RingRoadMajor	OUTFALL	0.00	0.02	78.64	0	00:57	0.02
StormSewerSystem	OUTFALL	0.06	0.14	75.78	0	01:09	0.14
Detention	STORAGE	0.06	0.24	77.86	0	01:17	0.24
Roof_Storage	STORAGE	0.00	0.01	84.36	0	01:38	0.01

SurfaceStorage	STORAGE	0.00	0.00	79.60	0	00:56	0.00	

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent	
cbmh40	JUNCTION	0.00	19.56	0	00:57	0	0.0555	-0.304	
CBMH52	JUNCTION	6.65	63.65	0	01:17	0.0428	0.819	0.051	
CBMH55	JUNCTION	0.00	2.19	0	01:38	0	0.0303	0.001	
CBMH92	JUNCTION	0.04	8.76	0	00:57	0.00346	0.0591	0.013	
DCBMH38	JUNCTION	0.00	29.36	0	00:57	0	0.0587	-0.228	
EX.MH31	JUNCTION	0.00	17.20	0	00:59	0	0.0548	-0.021	
EX.MH31-S	JUNCTION	27.22	27.22	0	00:55	0.0214	0.0214	-0.624	
EX.MH31-S1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
EX.MH34	JUNCTION	17.49	17.49	0	00:56	0.0245	0.0245	-0.011	
EX.MH34-S	JUNCTION	45.51	56.17	0	01:05	0.687	0.728	0.358	
EX.MH36	JUNCTION	0.00	17.20	0	00:57	0	0.0245	-0.011	
EX.MH36-S	JUNCTION	38.47	38.47	0	00:55	0.0408	0.0408	-0.733	
EX.MH43	JUNCTION	31.39	31.39	0	01:16	0.435	0.435	0.042	
EX.MH43-S	JUNCTION	-31.39	52.39	0	01:16	-0.435	0.726	0.242	
EX.MH44	JUNCTION	12.36	43.66	0	01:16	0.173	0.608	0.066	
EX.MH44-S	JUNCTION	-12.36	20.61	0	01:18	-0.173	0.289	0.149	
EX.MH45	JUNCTION	4.93	48.50	0	01:17	0.069	0.677	0.030	
EX.MH45-S	JUNCTION	-4.93	8.21	0	01:20	-0.069	0.115	0.186	
EX.MH46	JUNCTION	15.08	60.70	0	01:17	0.0403	0.776	0.029	
EX.MH46-S	JUNCTION	-15.08	25.13	0	00:55	-0.0403	0.0674	0.409	
EXMH32	JUNCTION	0.00	71.49	0	01:09	0	0.873	0.044	
MH133	JUNCTION	0.00	8.23	0	01:18	0	0.0591	0.010	
MH135	JUNCTION	0.00	8.28	0	01:18	0	0.0591	0.008	
STM1	JUNCTION	0.00	2.19	0	01:38	0	0.0303	0.007	
NorthMajor	OUTFALL	6.34	6.34	0	00:55	0.00851	0.00851	0.000	
RingRoadMajor	OUTFALL	51.06	56.22	0	00:55	0.00453	0.0571	0.000	
StormSewerSystem	OUTFALL	0.00	71.46	0	01:09	0	0.873	0.000	
Detention	STORAGE	0.00	60.13	0	00:57	0	0.0615	0.196	
Roof_Storage	STORAGE	27.63	27.63	0	00:55	0.0303	0.0303	-0.004	
SurfaceStorage	STORAGE	68.82	68.82	0	00:55	0.0582	0.0582	-0.024	

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Node Surcharge Summary
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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
cbmh40	JUNCTION	1.22	0.221	1.656

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Node Flooding Summary
****

No nodes were flooded.

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Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Detention	0.006	7.1	0.0	0.0	0.027	32.1	0 01:17	29.36
Roof_Storage	0.005	2.3	0.0	0.0	0.019	8.0	0 01:38	2.19
SurfaceStorage	0.000	0.0	0.0	0.0	0.000	0.0	0 00:56	68.82

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
NorthMajor	29.73	0.74	6.34	0.009
RingRoadMajor	99.93	1.23	56.22	0.057
StormSewerSystem	99.60	15.07	71.46	0.873
System	76.42	17.04	91.57	0.938

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Street Flow Summary
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Street Conduit	Peak Flow LPS	Maximum Spread m	Maximum Depth m	Inlet Design	Inlet Location	Inlet	Peak Flow Capture Pcnt	Avg. Flow Capture Pcnt	Bypass Flow Freq Pcnt	Back Flow Freq Pcnt	Peak Bypass / Inlet Capture LPS
C10-S	3.215	0.713	0.014	Inlet	ON-GRADE	1	60.00	60.00	99.90	0.00	0.96
1.29											
C11-S	8.127	0.914	0.018	Inlet	ON-SAG	1	81.84	99.83	1.38	0.00	3.33
1.48											
C13-S	52.394	2.218	0.044	Inlet	ON-GRADE	1	59.92	60.00	99.99	0.00	15.70
21.00											
C3-S	24.624	1.156	0.023	Inlet	ON-GRADE	1	60.00	60.00	91.73	0.00	7.39
9.85											
C4-S	0.000	0.915	0.018	Inlet	ON-GRADE	1					
C5-S	29.156	2.100	0.042	Inlet	ON-GRADE	1	60.00	60.00	88.24	0.00	8.75
11.66											
C8-S	20.608	1.418	0.028	Inlet	ON-GRADE	1	60.00	60.00	99.93	0.00	6.18
8.24											
C9-S	8.214	1.001	0.020	Inlet	ON-GRADE	1	60.00	60.00	99.92	0.00	2.46
3.29											

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Link Flow Summary
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	Maximum	Time of Max	Maximum	Max/	Max/

Link	Type	|Flow| LPS	Occurrence days	hr:min	|Veloc| m/sec	Full Flow	Full Depth
C1	CONDUIT	2.19	0	01:38	0.67	0.01	0.05
C10	CONDUIT	48.50	0	01:17	1.33	0.17	0.37
C10-S	CONDUIT	3.21	0	01:23	0.31	0.00	0.05
C11	CONDUIT	60.69	0	01:17	1.49	0.42	0.40
C11-S	CONDUIT	8.13	0	00:57	0.48	0.00	0.06
C12	CONDUIT	63.63	0	01:17	1.66	0.16	0.27
C13	CONDUIT	8.23	0	01:18	0.57	0.00	0.05
C13-S	CONDUIT	52.39	0	01:16	0.54	0.01	0.15
C14	CONDUIT	8.30	0	01:11	0.84	0.04	0.21
C2	CONDUIT	2.19	0	01:38	0.55	0.01	0.06
C3	CONDUIT	16.98	0	00:59	0.56	0.04	0.20
C3-S	CONDUIT	24.62	0	00:55	0.93	0.00	0.08
C4	CONDUIT	16.05	0	00:59	0.91	0.04	0.14
C4-S	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C5	CONDUIT	17.20	0	00:57	1.09	0.05	0.16
C5-S	CONDUIT	29.16	0	00:56	0.35	0.01	0.14
C6	CONDUIT	19.56	0	00:57	0.52	0.16	1.00
C8	CONDUIT	31.37	0	01:16	1.08	0.32	0.43
C8-S	CONDUIT	20.61	0	01:18	0.51	0.00	0.09
C9	CONDUIT	43.65	0	01:17	1.59	0.44	0.41
C9-S	CONDUIT	8.21	0	01:20	0.41	0.00	0.07
CBMH32	CONDUIT	71.46	0	01:09	1.47	0.17	0.28
CBMH92	CONDUIT	8.28	0	01:18	0.65	0.07	0.17
Ctention	CONDUIT	29.36	0	00:57	0.83	0.24	0.70
C7	ORIFICE	8.72	0	00:57			1.00
CFRD	DUMMY	2.19	0	01:38			
OL1	DUMMY	53.49	0	00:56			

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Flow Classification Summary
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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	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
C10-S	1.00	0.01	0.00	0.00	0.02	0.97	0.00	0.00	0.01	0.00
C11	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.14	0.00
C11-S	1.00	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.01	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	0.00	0.00	0.00	1.00	0.00	0.00
C13-S	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.02	0.02	0.00	0.96	0.00	0.00
C2	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C3	1.00	0.00	0.04	0.00	0.96	0.00	0.00	0.00	0.98	0.00
C3-S	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.95	0.00
C4	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
C4-S	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
C5-S	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C6	1.00	0.03	0.00	0.00	0.09	0.00	0.00	0.88	0.01	0.00
C8	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.99	0.00
C8-S	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9-S	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00
CBMH32	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.04	0.00
CBMH92	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Ctention	1.00	0.03	0.00	0.00	0.07	0.00	0.00	0.90	0.01	0.00

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C6	0.02	0.02	1.22	0.01	0.01

Analysis begun on: Wed Nov 20 08:03:02 2024
Analysis ended on: Wed Nov 20 08:03:03 2024
Total elapsed time: 00:00:01

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

WARNING 09: time series interval greater than recording interval for Rain Gage 5Yr

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 14
Number of nodes 30
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
100Yr	100Yr	INTENSITY	5 min.
10Yr	10Yr	INTENSITY	5 min.
25Yr	25Yr	INTENSITY	5 min.
2Yr	2Yr	INTENSITY	5 min.
50Yr	50Yr	INTENSITY	5 min.
5Yr	5Yr	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
222	0.11	53.00	30.00	0.1000	5Yr	225B
223	0.11	40.14	87.00	0.1000	5Yr	226
224A	0.14	37.12	90.00	0.0000	5Yr	228
224B	0.22	77.00	90.00	0.1000	5Yr	Roof_Storage
224C	0.12	43.66	90.00	0.1000	5Yr	227
225A	0.17	34.21	82.00	2.5000	5Yr	EX.MH31-S
225B	0.29	27.63	82.00	2.1000	5Yr	EX.MH36-S
226	0.10	26.63	79.00	3.5000	5Yr	EX.MH34-S
227	0.43	172.40	75.00	3.0000	5Yr	SurfaceStorage
228	0.21	18.61	25.00	3.0000	5Yr	RingRoadMajor
229	0.15	14.59	38.00	0.1000	5Yr	NorthMajor
EXT-1	0.28	15.00	90.00	0.1000	5Yr	EX.MH34-S
EXT-2	0.28	186.67	90.00	0.1000	5Yr	RingRoadMajor
EXT-3	0.96	61.04	86.00	0.1000	5Yr	223

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LID Control Summary
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Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated	% Perv Treated
224A	GreenRoof	1	246.92	16.43	18.16	0.00	0.00
224C	GreenRoof	1	418.41	16.43	34.02	0.00	0.00

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Node Summary
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

cbmh40	JUNCTION	77.37	2.28	0.0	
CBMH52	JUNCTION	76.58	2.51	0.0	
CBMH55	JUNCTION	77.37	6.92	0.0	
CBMH92	JUNCTION	77.11	2.42	0.0	Yes
DCBMH38	JUNCTION	77.51	2.09	0.0	
EX.MH31	JUNCTION	76.62	5.64	0.0	
EX.MH31-S	JUNCTION	82.26	0.30	0.0	
EX.MH31-S1	JUNCTION	82.26	0.30	0.0	
EX.MH34	JUNCTION	78.40	2.89	0.0	
EX.MH34-S	JUNCTION	81.29	0.30	0.0	Yes
EX.MH36	JUNCTION	77.53	4.38	0.0	
EX.MH36-S	JUNCTION	81.92	0.30	0.0	
EX.MH43	JUNCTION	78.74	1.84	0.0	
EX.MH43-S	JUNCTION	80.58	0.30	0.0	
EX.MH44	JUNCTION	78.00	1.77	0.0	
EX.MH44-S	JUNCTION	79.77	0.30	0.0	
EX.MH45	JUNCTION	77.63	1.72	0.0	
EX.MH45-S	JUNCTION	79.35	0.30	0.0	
EX.MH46	JUNCTION	76.65	2.32	0.0	
EX.MH46-S	JUNCTION	78.96	0.30	0.0	
EXMH32	JUNCTION	75.74	2.69	0.0	
MH133	JUNCTION	76.75	2.40	0.0	
MH135	JUNCTION	76.95	2.50	0.0	
STM1	JUNCTION	77.60	6.75	0.0	
NorthMajor	OUTFALL	0.00	0.00	0.0	
RingRoadMajor	OUTFALL	78.62	0.30	0.0	
StormSewerSystem	OUTFALL	75.64	0.53	0.0	
Detention	STORAGE	77.62	0.71	0.0	
Roof_Storage	STORAGE	84.35	0.15	0.0	
SurfaceStorage	STORAGE	79.60	0.30	0.0	

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	STM1	CBMH55	CONDUIT	8.4	2.0123	0.0130
C10	EX.MH45	EX.MH46	CONDUIT	37.1	2.6424	0.0130
C10-S	EX.MH45-S	EX.MH46-S	CONDUIT	37.1	1.0486	0.0160
C11	EX.MH46	CBMH52	CONDUIT	10.5	0.6857	0.0130
C11-S	EX.MH46-S	RingRoadMajor	CONDUIT	10.5	3.2398	0.0160
C12	CBMH52	EXMH32	CONDUIT	51.6	1.5079	0.0130
C13	MH135	MH133	CONDUIT	26.8	0.4925	0.0130
C13-S	EX.MH34-S	EX.MH43-S	CONDUIT	128.3	0.5536	0.0160
C14	MH133	EX.MH46	CONDUIT	2.6	1.1539	0.0130
C2	CBMH55	EX.MH31	CONDUIT	14.2	1.0916	0.0130
C3	EX.MH31	EXMH32	CONDUIT	86.7	1.0104	0.0130
C3-S	EX.MH31-S	EX.MH46-S	CONDUIT	84.2	3.9211	0.0160
C4	EX.MH36	EX.MH31	CONDUIT	97.2	0.9002	0.0130
C4-S	EX.MH31-S1	EX.MH36-S	CONDUIT	97.2	0.3498	0.0160
C5	EX.MH34	EX.MH36	CONDUIT	60.8	1.3241	0.0130
C5-S	EX.MH36-S	EX.MH34-S	CONDUIT	60.8	1.0362	0.0160
C6	DCBMH38	cbmh40	CONDUIT	22.7	0.5022	0.0130
C8	EX.MH43	EX.MH44	CONDUIT	71.4	1.0365	0.0130
C8-S	EX.MH43-S	EX.MH44-S	CONDUIT	71.4	1.1345	0.0160
C9	EX.MH44	EX.MH45	CONDUIT	35.1	1.0542	0.0130
C9-S	EX.MH44-S	EX.MH45-S	CONDUIT	35.1	1.1967	0.0160
CBMH32	EXMH32	StormSewerSystem	CONDUIT	10.0	1.0001	0.0130
CBMH92	CBMH92	MH135	CONDUIT	26.4	0.5000	0.0130
Ctention	Detention	DCBMH38	CONDUIT	15.9	0.4969	0.0130
C7	cbmh40	CBMH92	ORIFICE			
CFRD	Roof_Storage	STM1	OUTLET			
OL1	SurfaceStorage	Detention	OUTLET			

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Cross Section Summary

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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.45	0.16	0.11	0.45	1	404.46
C10	CIRCULAR	0.38	0.11	0.09	0.38	1	285.03
C10-S	RingRoad	0.30	2.29	0.24	9.00	1	5642.11
C11	CIRCULAR	0.38	0.11	0.09	0.38	1	145.20
C11-S	RingRoad	0.30	2.29	0.24	9.00	1	9917.45
C12	CIRCULAR	0.47	0.18	0.12	0.47	1	404.43
C13	CIRCULAR	1.00	0.79	0.25	1.00	1	1682.76
C13-S	RingRoad	0.30	2.29	0.24	9.00	1	4099.48
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	188.35
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	297.90
C3	CIRCULAR	0.53	0.22	0.13	0.53	1	432.33
C3-S	HospitalRamp	0.30	2.60	0.23	10.50	1	12183.67
C4	CIRCULAR	0.53	0.22	0.13	0.53	1	408.07
C4-S	RingRoad	0.30	2.29	0.24	9.00	1	3258.74
C5	CIRCULAR	0.45	0.16	0.11	0.45	1	328.09
C5-S	RingRoad	0.30	2.29	0.24	9.00	1	5608.82
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	124.26
C8	CIRCULAR	0.30	0.07	0.07	0.30	1	98.45
C8-S	RingRoad	0.30	2.29	0.24	9.00	1	5868.79
C9	CIRCULAR	0.30	0.07	0.07	0.30	1	99.29
C9-S	RingRoad	0.30	2.29	0.24	9.00	1	6027.37
CBMH32	CIRCULAR	0.53	0.22	0.13	0.53	1	430.10
CBMH92	CIRCULAR	0.38	0.11	0.09	0.38	1	123.99
Ctention	CIRCULAR	0.38	0.11	0.09	0.38	1	123.59

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Street Summary
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Street RingRoad
Area:

0.0008	0.0031	0.0071	0.0125	0.0196
0.0282	0.0384	0.0502	0.0635	0.0784
0.0949	0.1129	0.1325	0.1537	0.1765
0.2000	0.2235	0.2471	0.2706	0.2941
0.3176	0.3412	0.3647	0.3882	0.4118
0.4353	0.4588	0.4824	0.5059	0.5294
0.5529	0.5765	0.6000	0.6235	0.6471
0.6706	0.6941	0.7176	0.7412	0.7647
0.7882	0.8118	0.8353	0.8588	0.8824
0.9059	0.9294	0.9529	0.9765	1.0000

Hrad:

0.0123	0.0246	0.0369	0.0492	0.0615
0.0738	0.0861	0.0984	0.1107	0.1230
0.1353	0.1476	0.1599	0.1722	0.1845
0.2089	0.2331	0.2574	0.2815	0.3056
0.3296	0.3535	0.3774	0.4013	0.4250
0.4488	0.4724	0.4960	0.5195	0.5430
0.5664	0.5897	0.6130	0.6363	0.6594
0.6825	0.7056	0.7286	0.7515	0.7744
0.7972	0.8200	0.8427	0.8653	0.8879
0.9104	0.9329	0.9553	0.9777	1.0000

Width:

0.0667	0.1333	0.2000	0.2667	0.3333
0.4000	0.4667	0.5333	0.6000	0.6667
0.7333	0.8000	0.8667	0.9333	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

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Street HospitalRamp
Area:
            0.0007     0.0028     0.0062     0.0111     0.0173
            0.0249     0.0339     0.0443     0.0561     0.0693
            0.0838     0.0997     0.1171     0.1358     0.1558
            0.1773     0.2002     0.2242     0.2485     0.2727
            0.2970     0.3212     0.3455     0.3697     0.3939
            0.4182     0.4424     0.4667     0.4909     0.5152
            0.5394     0.5636     0.5879     0.6121     0.6364
            0.6606     0.6848     0.7091     0.7333     0.7576
            0.7818     0.8061     0.8303     0.8545     0.8788
            0.9030     0.9273     0.9515     0.9758     1.0000
Hrad:
            0.0126     0.0251     0.0377     0.0503     0.0628
            0.0754     0.0879     0.1005     0.1131     0.1256
            0.1382     0.1508     0.1633     0.1759     0.1884
            0.2010     0.2136     0.2323     0.2571     0.2819
            0.3066     0.3312     0.3558     0.3804     0.4049
            0.4293     0.4537     0.4780     0.5023     0.5265
            0.5507     0.5748     0.5989     0.6229     0.6469
            0.6708     0.6946     0.7184     0.7422     0.7659
            0.7895     0.8131     0.8366     0.8601     0.8836
            0.9070     0.9303     0.9536     0.9768     1.0000
Width:
            0.0571     0.1143     0.1714     0.2286     0.2857
            0.3429     0.4000     0.4571     0.5143     0.5714
            0.6286     0.6857     0.7429     0.8000     0.8571
            0.9143     0.9714     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000
            1.0000     1.0000     1.0000     1.0000     1.0000


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Analysis Options
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Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 11/12/2024 00:00:00
Ending Date .............. 11/13/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 2
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
```

Initial LID Storage	0.001	0.242
Total Precipitation	0.076	21.270
Evaporation Loss	0.000	0.000
Infiltration Loss	0.019	5.270
Surface Runoff	0.052	14.545
Final Storage	0.008	2.113
Continuity Error (%)	-1.929	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.052	0.519
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.055	0.546
External Outflow	0.107	1.068
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	0.001	0.009
Continuity Error (%)	-1.174	

Time-Step Critical Elements

Link C14 (99.47%)

Highest Flow Instability Indexes

Link C6 (1)

Most Frequent Nonconverging Nodes

Node NorthMajor (0.06%)
Node RingRoadMajor (0.06%)
Node StormSewerSystem (0.06%)
Node cbmh40 (0.06%)
Node DCBMH38 (0.03%)

Routing Time Step Summary

Minimum Time Step	:	0.56 sec
Average Time Step	:	3.63 sec
Maximum Time Step	:	5.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.04
% of Steps Not Converging	:	0.06
Time Step Frequencies	:	
5.000 - 3.155 sec	:	68.55 %
3.155 - 1.991 sec	:	3.94 %
1.991 - 1.256 sec	:	27.47 %
1.256 - 0.792 sec	:	0.04 %
0.792 - 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 LPS	Runoff Coeff
222	21.27	0.00	0.00	14.89	6.36	0.00	6.36	0.01	8.98	0.299
223	21.27	147.10	0.00	8.57	145.91	13.42	159.33	0.18	54.68	0.946
224A	21.27	0.00	0.00	1.74	19.39	0.00	19.39	0.03	26.34	0.587
224B	21.27	0.00	0.00	2.13	18.75	0.00	18.75	0.04	41.39	0.882
224C	21.27	0.00	0.00	1.40	12.48	0.00	12.48	0.02	17.56	0.587
225A	21.27	0.00	0.00	3.83	17.37	0.00	17.37	0.03	37.94	0.816
225B	21.27	2.30	0.00	4.24	18.98	0.00	18.98	0.06	56.31	0.805
226	21.27	185.34	0.00	14.29	162.56	29.28	191.83	0.19	60.96	0.928
227	21.27	3.56	0.00	6.21	18.27	0.00	18.27	0.08	93.87	0.736
228	21.27	0.00	0.00	15.95	5.30	0.00	5.30	0.01	15.22	0.249
229	21.27	0.00	0.00	13.19	7.85	0.00	7.85	0.01	9.78	0.369
EXT-1	21.27	0.00	0.00	2.13	18.20	0.00	18.20	0.05	16.08	0.856
EXT-2	21.27	0.00	0.00	2.13	18.97	0.00	18.97	0.05	63.87	0.892
EXT-3	21.27	0.00	0.00	2.98	17.43	0.00	17.43	0.17	62.95	0.820

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LID Performance Summary
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Subcatchment	LID Control	Total Inflow mm	Evap Loss mm	Infil Loss mm	Surface Outflow mm	Drain Outflow mm	Initial Storage mm	Final Storage mm	Continuity Error %
224A	GreenRoof	21.27	0.00	0.00	0.00	0.00	13.00	34.27	0.00
224C	GreenRoof	21.27	0.00	0.00	0.00	0.00	13.00	34.27	0.00

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
cbmh40	JUNCTION	0.13	0.62	77.99	0 00:55	0.58
CBMH52	JUNCTION	0.06	0.15	76.73	0 01:17	0.15
CBMH55	JUNCTION	0.01	0.03	77.40	0 01:37	0.03
CBMH92	JUNCTION	0.02	0.07	77.18	0 01:18	0.07
DCBMH38	JUNCTION	0.09	0.48	78.00	0 01:06	0.44
EX.MH31	JUNCTION	0.02	0.09	76.70	0 00:59	0.09
EX.MH31-S	JUNCTION	0.00	0.03	82.29	0 00:55	0.03
EX.MH31-S1	JUNCTION	0.00	0.00	82.26	0 00:00	0.00
EX.MH34	JUNCTION	0.01	0.09	78.49	0 00:57	0.09
EX.MH34-S	JUNCTION	0.03	0.07	81.36	0 01:07	0.07
EX.MH36	JUNCTION	0.01	0.09	77.62	0 00:58	0.09
EX.MH36-S	JUNCTION	0.01	0.04	81.96	0 00:56	0.04
EX.MH43	JUNCTION	0.05	0.13	78.87	0 01:18	0.13
EX.MH43-S	JUNCTION	0.02	0.04	80.62	0 01:11	0.04
EX.MH44	JUNCTION	0.06	0.18	78.18	0 01:12	0.18
EX.MH44-S	JUNCTION	0.01	0.03	79.80	0 01:14	0.03
EX.MH45	JUNCTION	0.05	0.13	77.76	0 01:13	0.13
EX.MH45-S	JUNCTION	0.01	0.02	79.37	0 01:18	0.02
EX.MH46	JUNCTION	0.07	0.21	76.86	0 01:16	0.21
EX.MH46-S	JUNCTION	0.01	0.02	78.98	0 00:57	0.02
EXMH32	JUNCTION	0.07	0.17	75.91	0 01:15	0.17
MH133	JUNCTION	0.02	0.12	76.87	0 01:16	0.11
MH135	JUNCTION	0.02	0.05	77.00	0 01:20	0.05
STM1	JUNCTION	0.01	0.03	77.63	0 01:37	0.03
NorthMajor	OUTFALL	0.00	0.00	0.00	0 00:00	0.00

RingRoadMajor	OUTFALL	0.01	0.02	78.64	0	00:57	0.02
StormSewerSystem	OUTFALL	0.07	0.17	75.81	0	01:15	0.17
Detention	STORAGE	0.08	0.32	77.94	0	01:18	0.32
Roof_Storage	STORAGE	0.00	0.02	84.37	0	01:37	0.02
SurfaceStorage	STORAGE	0.00	0.00	79.60	0	00:56	0.00

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
cbmh40	JUNCTION	0.00	20.60	0	00:55	0	0.076	-0.105
CBMH52	JUNCTION	8.63	93.57	0	01:16	0.0471	0.921	0.045
CBMH55	JUNCTION	0.00	3.04	0	01:37	0	0.0414	0.001
CBMH92	JUNCTION	0.04	9.30	0	01:06	0.00346	0.0796	0.010
DCBMH38	JUNCTION	0.00	32.40	0	00:58	0	0.0778	-0.257
EX.MH31	JUNCTION	0.00	26.22	0	00:58	0	0.0749	-0.027
EX.MH31-S	JUNCTION	37.94	37.94	0	00:55	0.0292	0.0292	-0.606
EX.MH31-S1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
EX.MH34	JUNCTION	26.33	26.33	0	00:56	0.0335	0.0335	-0.009
EX.MH34-S	JUNCTION	69.32	90.87	0	01:05	0.747	0.803	0.324
EX.MH36	JUNCTION	0.00	25.97	0	00:57	0	0.0335	-0.012
EX.MH36-S	JUNCTION	56.31	56.31	0	00:55	0.0556	0.0556	-0.812
EX.MH43	JUNCTION	40.00	40.00	0	01:04	0.474	0.474	0.039
EX.MH43-S	JUNCTION	-40.00	82.88	0	01:08	-0.474	0.801	0.237
EX.MH44	JUNCTION	23.24	63.24	0	01:12	0.195	0.669	0.060
EX.MH44-S	JUNCTION	-23.24	38.73	0	01:12	-0.195	0.325	0.138
EX.MH45	JUNCTION	9.21	72.27	0	01:13	0.0776	0.746	0.028
EX.MH45-S	JUNCTION	-9.21	15.36	0	01:15	-0.0776	0.129	0.184
EX.MH46	JUNCTION	21.28	94.58	0	01:17	0.0484	0.874	0.024
EX.MH46-S	JUNCTION	-21.28	35.47	0	00:55	-0.0484	0.0809	0.380
EXMH32	JUNCTION	0.00	101.47	0	01:14	0	0.995	0.040
MH133	JUNCTION	0.00	8.97	0	01:18	0	0.0796	0.021
MH135	JUNCTION	0.00	8.93	0	01:19	0	0.0796	0.009
STM1	JUNCTION	0.00	3.04	0	01:37	0	0.0414	0.004
NorthMajor	OUTFALL	9.78	9.78	0	00:55	0.0116	0.0116	0.000
RingRoadMajor	OUTFALL	72.85	80.39	0	00:55	0.0173	0.0753	0.000
StormSewerSystem	OUTFALL	0.00	101.29	0	01:15	0	0.995	0.000
Detention	STORAGE	0.00	86.16	0	00:56	0	0.0807	0.199
Roof_Storage	STORAGE	41.39	41.39	0	00:55	0.0414	0.0414	-0.002
SurfaceStorage	STORAGE	93.87	93.87	0	00:55	0.0787	0.0787	-0.005

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Node Surcharge Summary
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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
cbmh40	JUNCTION	1.98	0.219	1.658
DCBMH38	JUNCTION	0.03	0.049	1.604

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Detention	0.009	10.4	0.0	0.0	0.040	47.8	0 01:18	32.40
Roof_Storage	0.008	3.3	0.0	0.0	0.026	11.1	0 01:37	3.04
SurfaceStorage	0.000	0.0	0.0	0.0	0.000	0.0	0 00:56	93.87

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
NorthMajor	32.69	0.92	9.78	0.012
RingRoadMajor	99.95	1.71	80.39	0.075
StormSewerSystem	99.62	18.27	101.29	0.995
System	77.42	20.89	136.13	1.082

****
Street Flow Summary
****

Street Conduit	Peak Flow LPS	Maximum Spread m	Maximum Depth m	Inlet Design	Inlet Location	Inlet	Peak Capture Pcnt	Avg. Flow Capture Pcnt	Bypass Flow Freq Pcnt	Back Flow Freq Pcnt	Peak Capture / Inlet LPS	Peak Bypass Flow LPS
C10-S	6.055	0.894	0.018	Inlet	ON-GRADE	1	60.00	60.00	99.91	0.00	1.82	2.42
C11-S	11.700	1.042	0.021	Inlet	ON-SAG	1	73.76	99.61	4.03	0.00	4.31	3.07
C13-S	82.882	2.669	0.053	Inlet	ON-GRADE	1	48.26	59.79	99.99	0.00	20.00	42.88
C3-S	34.867	1.319	0.026	Inlet	ON-GRADE	1	60.00	60.00	91.83	0.00	10.46	13.95
C4-S	0.000	1.067	0.021	Inlet	ON-GRADE	1						
C5-S	43.878	2.434	0.049	Inlet	ON-GRADE	1	60.00	60.00	89.39	0.00	13.16	17.55
C8-S	38.726	1.796	0.036	Inlet	ON-GRADE	1	60.00	60.00	99.94	0.00	11.62	15.49
C9-S	15.355	1.272	0.025	Inlet	ON-GRADE	1	60.00	60.00	99.92	0.00	4.61	6.14

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	3.04	0	01:37	0.75	0.01	0.06
C10	CONDUIT	72.26	0	01:13	1.51	0.25	0.46
C10-S	CONDUIT	6.06	0	01:17	0.38	0.00	0.06
C11	CONDUIT	89.55	0	01:16	1.67	0.62	0.49
C11-S	CONDUIT	11.70	0	00:57	0.53	0.00	0.07
C12	CONDUIT	91.81	0	01:17	1.85	0.23	0.32
C13	CONDUIT	8.97	0	01:18	0.59	0.01	0.05
C13-S	CONDUIT	82.88	0	01:08	0.60	0.02	0.18
C14	CONDUIT	16.32	0	01:17	0.86	0.09	0.33
C2	CONDUIT	3.04	0	01:37	0.60	0.01	0.07
C3	CONDUIT	25.92	0	00:59	0.66	0.06	0.24
C3-S	CONDUIT	34.87	0	00:55	1.01	0.00	0.09
C4	CONDUIT	24.53	0	00:58	1.04	0.06	0.17
C4-S	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C5	CONDUIT	25.97	0	00:57	1.23	0.08	0.19
C5-S	CONDUIT	43.88	0	00:56	0.39	0.01	0.16
C6	CONDUIT	20.60	0	00:55	0.47	0.17	1.00
C8	CONDUIT	40.00	0	01:13	1.17	0.41	0.52
C8-S	CONDUIT	38.73	0	01:12	0.61	0.01	0.12
C9	CONDUIT	63.23	0	01:12	1.75	0.64	0.51
C9-S	CONDUIT	15.36	0	01:15	0.48	0.00	0.08
CBMH32	CONDUIT	101.29	0	01:15	1.62	0.24	0.33
CBMH92	CONDUIT	8.93	0	01:19	0.66	0.07	0.18
Ctention	CONDUIT	32.40	0	00:58	0.83	0.26	0.89
C7	ORIFICE	9.26	0	01:06			1.00
CFRD	DUMMY	3.04	0	01:37			
OL1	DUMMY	72.50	0	00:56			

****
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	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
C10-S	1.00	0.01	0.00	0.00	0.02	0.97	0.00	0.00	0.01	0.00
C11	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.15	0.00
C11-S	1.00	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.01	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	0.00	0.00	0.00	1.00	0.00	0.00
C13-S	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.04	0.01	0.00	0.95	0.00	0.00
C2	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C3	1.00	0.00	0.04	0.00	0.96	0.00	0.00	0.00	0.99	0.00
C3-S	1.00	0.00	0.00	0.00	0.87	0.12	0.00	0.00	0.95	0.00
C4	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00
C4-S	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C5-S	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C6	1.00	0.03	0.00	0.00	0.11	0.00	0.00	0.86	0.01	0.00
C8	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.99	0.00
C8-S	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9-S	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00
CBMH32	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.04	0.00

CBMH92	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Ctention	1.00	0.03	0.00	0.00	0.10	0.00	0.00	0.87	0.01	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C6	0.94	0.94	1.98	0.01	0.01
Ctention	0.01	0.01	0.03	0.01	0.01

Analysis begun on: Wed Nov 20 08:03:23 2024
Analysis ended on: Wed Nov 20 08:03:24 2024
Total elapsed time: 00:00:01

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

WARNING 09: time series interval greater than recording interval for Rain Gage 10Yr

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 14
Number of nodes 30
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
100Yr	100Yr	INTENSITY	5 min.
10Yr	10Yr	INTENSITY	5 min.
25Yr	25Yr	INTENSITY	5 min.
2Yr	2Yr	INTENSITY	5 min.
50Yr	50Yr	INTENSITY	5 min.
5Yr	5Yr	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
222	0.11	53.00	30.00	0.1000	10Yr	225B
223	0.11	40.14	87.00	0.1000	10Yr	226
224A	0.14	37.12	90.00	0.0000	10Yr	228
224B	0.22	77.00	90.00	0.1000	10Yr	Roof_Storage
224C	0.12	43.66	90.00	0.1000	10Yr	227
225A	0.17	34.21	82.00	2.5000	10Yr	EX.MH31-S
225B	0.29	27.63	82.00	2.1000	10Yr	EX.MH36-S
226	0.10	26.63	79.00	3.5000	10Yr	EX.MH34-S
227	0.43	172.40	75.00	3.0000	10Yr	SurfaceStorage
228	0.21	18.61	25.00	3.0000	10Yr	RingRoadMajor
229	0.15	14.59	38.00	0.1000	10Yr	NorthMajor
EXT-1	0.28	15.00	90.00	0.1000	10Yr	EX.MH34-S
EXT-2	0.28	186.67	90.00	0.1000	10Yr	RingRoadMajor
EXT-3	0.96	61.04	86.00	0.1000	10Yr	223

****
LID Control Summary
****

Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated	% Perv Treated
224A	GreenRoof	1	246.92	16.43	18.16	0.00	0.00
224C	GreenRoof	1	418.41	16.43	34.02	0.00	0.00

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

cbmh40	JUNCTION	77.37	2.28	0.0	
CBMH52	JUNCTION	76.58	2.51	0.0	
CBMH55	JUNCTION	77.37	6.92	0.0	
CBMH92	JUNCTION	77.11	2.42	0.0	Yes
DCBMH38	JUNCTION	77.51	2.09	0.0	
EX.MH31	JUNCTION	76.62	5.64	0.0	
EX.MH31-S	JUNCTION	82.26	0.30	0.0	
EX.MH31-S1	JUNCTION	82.26	0.30	0.0	
EX.MH34	JUNCTION	78.40	2.89	0.0	
EX.MH34-S	JUNCTION	81.29	0.30	0.0	Yes
EX.MH36	JUNCTION	77.53	4.38	0.0	
EX.MH36-S	JUNCTION	81.92	0.30	0.0	
EX.MH43	JUNCTION	78.74	1.84	0.0	
EX.MH43-S	JUNCTION	80.58	0.30	0.0	
EX.MH44	JUNCTION	78.00	1.77	0.0	
EX.MH44-S	JUNCTION	79.77	0.30	0.0	
EX.MH45	JUNCTION	77.63	1.72	0.0	
EX.MH45-S	JUNCTION	79.35	0.30	0.0	
EX.MH46	JUNCTION	76.65	2.32	0.0	
EX.MH46-S	JUNCTION	78.96	0.30	0.0	
EXMH32	JUNCTION	75.74	2.69	0.0	
MH133	JUNCTION	76.75	2.40	0.0	
MH135	JUNCTION	76.95	2.50	0.0	
STM1	JUNCTION	77.60	6.75	0.0	
NorthMajor	OUTFALL	0.00	0.00	0.0	
RingRoadMajor	OUTFALL	78.62	0.30	0.0	
StormSewerSystem	OUTFALL	75.64	0.53	0.0	
Detention	STORAGE	77.62	0.71	0.0	
Roof_Storage	STORAGE	84.35	0.15	0.0	
SurfaceStorage	STORAGE	79.60	0.30	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	STM1	CBMH55	CONDUIT	8.4	2.0123	0.0130
C10	EX.MH45	EX.MH46	CONDUIT	37.1	2.6424	0.0130
C10-S	EX.MH45-S	EX.MH46-S	CONDUIT	37.1	1.0486	0.0160
C11	EX.MH46	CBMH52	CONDUIT	10.5	0.6857	0.0130
C11-S	EX.MH46-S	RingRoadMajor	CONDUIT	10.5	3.2398	0.0160
C12	CBMH52	EXMH32	CONDUIT	51.6	1.5079	0.0130
C13	MH135	MH133	CONDUIT	26.8	0.4925	0.0130
C13-S	EX.MH34-S	EX.MH43-S	CONDUIT	128.3	0.5536	0.0160
C14	MH133	EX.MH46	CONDUIT	2.6	1.1539	0.0130
C2	CBMH55	EX.MH31	CONDUIT	14.2	1.0916	0.0130
C3	EX.MH31	EXMH32	CONDUIT	86.7	1.0104	0.0130
C3-S	EX.MH31-S	EX.MH46-S	CONDUIT	84.2	3.9211	0.0160
C4	EX.MH36	EX.MH31	CONDUIT	97.2	0.9002	0.0130
C4-S	EX.MH31-S1	EX.MH36-S	CONDUIT	97.2	0.3498	0.0160
C5	EX.MH34	EX.MH36	CONDUIT	60.8	1.3241	0.0130
C5-S	EX.MH36-S	EX.MH34-S	CONDUIT	60.8	1.0362	0.0160
C6	DCBMH38	cbmh40	CONDUIT	22.7	0.5022	0.0130
C8	EX.MH43	EX.MH44	CONDUIT	71.4	1.0365	0.0130
C8-S	EX.MH43-S	EX.MH44-S	CONDUIT	71.4	1.1345	0.0160
C9	EX.MH44	EX.MH45	CONDUIT	35.1	1.0542	0.0130
C9-S	EX.MH44-S	EX.MH45-S	CONDUIT	35.1	1.1967	0.0160
CBMH32	EXMH32	StormSewerSystem	CONDUIT	10.0	1.0001	0.0130
CBMH92	CBMH92	MH135	CONDUIT	26.4	0.5000	0.0130
Ctention	Detention	DCBMH38	CONDUIT	15.9	0.4969	0.0130
C7	cbmh40	CBMH92	ORIFICE			
CFRD	Roof_Storage	STM1	OUTLET			
OL1	SurfaceStorage	Detention	OUTLET			

****
Cross Section Summary

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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.45	0.16	0.11	0.45	1	404.46
C10	CIRCULAR	0.38	0.11	0.09	0.38	1	285.03
C10-S	RingRoad	0.30	2.29	0.24	9.00	1	5642.11
C11	CIRCULAR	0.38	0.11	0.09	0.38	1	145.20
C11-S	RingRoad	0.30	2.29	0.24	9.00	1	9917.45
C12	CIRCULAR	0.47	0.18	0.12	0.47	1	404.43
C13	CIRCULAR	1.00	0.79	0.25	1.00	1	1682.76
C13-S	RingRoad	0.30	2.29	0.24	9.00	1	4099.48
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	188.35
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	297.90
C3	CIRCULAR	0.53	0.22	0.13	0.53	1	432.33
C3-S	HospitalRamp	0.30	2.60	0.23	10.50	1	12183.67
C4	CIRCULAR	0.53	0.22	0.13	0.53	1	408.07
C4-S	RingRoad	0.30	2.29	0.24	9.00	1	3258.74
C5	CIRCULAR	0.45	0.16	0.11	0.45	1	328.09
C5-S	RingRoad	0.30	2.29	0.24	9.00	1	5608.82
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	124.26
C8	CIRCULAR	0.30	0.07	0.07	0.30	1	98.45
C8-S	RingRoad	0.30	2.29	0.24	9.00	1	5868.79
C9	CIRCULAR	0.30	0.07	0.07	0.30	1	99.29
C9-S	RingRoad	0.30	2.29	0.24	9.00	1	6027.37
CBMH32	CIRCULAR	0.53	0.22	0.13	0.53	1	430.10
CBMH92	CIRCULAR	0.38	0.11	0.09	0.38	1	123.99
Ctention	CIRCULAR	0.38	0.11	0.09	0.38	1	123.59

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Street Summary
****

Street RingRoad
Area:

0.0008	0.0031	0.0071	0.0125	0.0196
0.0282	0.0384	0.0502	0.0635	0.0784
0.0949	0.1129	0.1325	0.1537	0.1765
0.2000	0.2235	0.2471	0.2706	0.2941
0.3176	0.3412	0.3647	0.3882	0.4118
0.4353	0.4588	0.4824	0.5059	0.5294
0.5529	0.5765	0.6000	0.6235	0.6471
0.6706	0.6941	0.7176	0.7412	0.7647
0.7882	0.8118	0.8353	0.8588	0.8824
0.9059	0.9294	0.9529	0.9765	1.0000

Hrad:

0.0123	0.0246	0.0369	0.0492	0.0615
0.0738	0.0861	0.0984	0.1107	0.1230
0.1353	0.1476	0.1599	0.1722	0.1845
0.2089	0.2331	0.2574	0.2815	0.3056
0.3296	0.3535	0.3774	0.4013	0.4250
0.4488	0.4724	0.4960	0.5195	0.5430
0.5664	0.5897	0.6130	0.6363	0.6594
0.6825	0.7056	0.7286	0.7515	0.7744
0.7972	0.8200	0.8427	0.8653	0.8879
0.9104	0.9329	0.9553	0.9777	1.0000

Width:

0.0667	0.1333	0.2000	0.2667	0.3333
0.4000	0.4667	0.5333	0.6000	0.6667
0.7333	0.8000	0.8667	0.9333	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Street HospitalRamp
Area:

0.0007	0.0028	0.0062	0.0111	0.0173
0.0249	0.0339	0.0443	0.0561	0.0693
0.0838	0.0997	0.1171	0.1358	0.1558
0.1773	0.2002	0.2242	0.2485	0.2727
0.2970	0.3212	0.3455	0.3697	0.3939
0.4182	0.4424	0.4667	0.4909	0.5152
0.5394	0.5636	0.5879	0.6121	0.6364
0.6606	0.6848	0.7091	0.7333	0.7576
0.7818	0.8061	0.8303	0.8545	0.8788
0.9030	0.9273	0.9515	0.9758	1.0000

Hrad:

0.0126	0.0251	0.0377	0.0503	0.0628
0.0754	0.0879	0.1005	0.1131	0.1256
0.1382	0.1508	0.1633	0.1759	0.1884
0.2010	0.2136	0.2323	0.2571	0.2819
0.3066	0.3312	0.3558	0.3804	0.4049
0.4293	0.4537	0.4780	0.5023	0.5265
0.5507	0.5748	0.5989	0.6229	0.6469
0.6708	0.6946	0.7184	0.7422	0.7659
0.7895	0.8131	0.8366	0.8601	0.8836
0.9070	0.9303	0.9536	0.9768	1.0000

Width:

0.0571	0.1143	0.1714	0.2286	0.2857
0.3429	0.4000	0.4571	0.5143	0.5714
0.6286	0.6857	0.7429	0.8000	0.8571
0.9143	0.9714	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 11/12/2024 00:00:00
Ending Date 11/13/2024 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 2
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---------	-------

Initial LID Storage	0.001	0.242
Total Precipitation	0.088	24.767
Evaporation Loss	0.000	0.000
Infiltration Loss	0.022	6.039
Surface Runoff	0.061	17.215
Final Storage	0.008	2.276
Continuity Error (%)	-2.078	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.061	0.614
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.055	0.546
External Outflow	0.116	1.163
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	0.001	0.009
Continuity Error (%)	-1.074	

Time-Step Critical Elements

Link C14 (99.49%)

Highest Flow Instability Indexes

All links are stable.

Most Frequent Nonconverging Nodes

Node NorthMajor (0.08%)
Node RingRoadMajor (0.08%)
Node StormSewerSystem (0.08%)
Node DCBMH38 (0.06%)
Node cbmh40 (0.06%)

Routing Time Step Summary

Minimum Time Step	:	1.31 sec
Average Time Step	:	3.53 sec
Maximum Time Step	:	5.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.03
% of Steps Not Converging	:	0.08
Time Step Frequencies	:	
5.000 - 3.155 sec	:	65.43 %
3.155 - 1.991 sec	:	3.61 %
1.991 - 1.256 sec	:	30.95 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 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 LPS	Runoff Coeff
222	24.77	0.00	0.00	17.34	7.46	0.02	7.48	0.01	10.65	0.302
223	24.77	172.91	0.00	8.73	171.50	17.12	188.62	0.22	72.67	0.954
224A	24.77	0.00	0.00	2.03	22.81	0.01	22.82	0.03	32.26	0.593
224B	24.77	0.00	0.00	2.48	22.05	0.01	22.07	0.05	50.70	0.891
224C	24.77	0.00	0.00	1.63	14.67	0.01	14.68	0.02	21.22	0.593
225A	24.77	0.00	0.00	4.46	20.40	0.03	20.43	0.03	45.14	0.825
225B	24.77	2.71	0.00	4.94	22.31	0.02	22.33	0.07	68.27	0.813
226	24.77	219.41	0.00	14.52	192.25	37.04	229.28	0.22	80.82	0.939
227	24.77	4.19	0.00	7.23	21.45	0.09	21.54	0.09	111.49	0.744
228	24.77	0.00	0.00	18.57	6.22	0.02	6.23	0.01	18.04	0.252
229	24.77	0.00	0.00	15.36	9.24	0.00	9.24	0.01	12.14	0.373
EXT-1	24.77	0.00	0.00	2.48	21.39	0.00	21.39	0.06	20.84	0.864
EXT-2	24.77	0.00	0.00	2.48	22.30	0.02	22.32	0.06	76.75	0.901
EXT-3	24.77	0.00	0.00	3.47	20.49	0.00	20.49	0.20	81.23	0.827

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LID Performance Summary
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Subcatchment	LID Control	Total Inflow mm	Evap Loss mm	Infil Loss mm	Surface Outflow mm	Drain Outflow mm	Initial Storage mm	Final Storage mm	Continuity Error %
224A	GreenRoof	24.77	0.00	0.00	0.00	0.00	13.00	37.77	-0.00
224C	GreenRoof	24.77	0.00	0.00	0.00	0.00	13.00	37.77	-0.00

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
cbmh40	JUNCTION	0.15	0.64	78.00	0 01:18	0.64
CBMH52	JUNCTION	0.06	0.17	76.75	0 01:15	0.17
CBMH55	JUNCTION	0.01	0.03	77.41	0 01:37	0.03
CBMH92	JUNCTION	0.03	0.07	77.18	0 01:19	0.07
DCBMH38	JUNCTION	0.11	0.51	78.02	0 01:00	0.49
EX.MH31	JUNCTION	0.02	0.10	76.71	0 00:58	0.10
EX.MH31-S	JUNCTION	0.00	0.04	82.30	0 00:55	0.03
EX.MH31-S1	JUNCTION	0.00	0.00	82.26	0 00:00	0.00
EX.MH34	JUNCTION	0.01	0.09	78.49	0 00:57	0.09
EX.MH34-S	JUNCTION	0.03	0.07	81.36	0 01:07	0.07
EX.MH36	JUNCTION	0.01	0.10	77.63	0 00:58	0.10
EX.MH36-S	JUNCTION	0.01	0.05	81.97	0 00:56	0.05
EX.MH43	JUNCTION	0.05	0.13	78.87	0 01:07	0.13
EX.MH43-S	JUNCTION	0.02	0.05	80.63	0 01:10	0.05
EX.MH44	JUNCTION	0.07	0.20	78.20	0 01:11	0.20
EX.MH44-S	JUNCTION	0.01	0.03	79.80	0 01:12	0.03
EX.MH45	JUNCTION	0.05	0.14	77.77	0 01:12	0.14
EX.MH45-S	JUNCTION	0.01	0.03	79.38	0 01:15	0.03
EX.MH46	JUNCTION	0.08	0.24	76.89	0 01:13	0.24
EX.MH46-S	JUNCTION	0.01	0.02	78.98	0 00:57	0.02
EXMH32	JUNCTION	0.07	0.19	75.93	0 01:12	0.19
MH133	JUNCTION	0.02	0.13	76.89	0 01:13	0.13
MH135	JUNCTION	0.02	0.05	77.00	0 01:28	0.05
STM1	JUNCTION	0.01	0.03	77.63	0 01:36	0.03
NorthMajor	OUTFALL	0.00	0.00	0.00	0 00:00	0.00

RingRoadMajor	OUTFALL	0.01	0.02	78.64	0	00:57	0.02
StormSewerSystem	OUTFALL	0.07	0.19	75.83	0	01:12	0.19
Detention	STORAGE	0.10	0.38	78.00	0	01:18	0.38
Roof_Storage	STORAGE	0.01	0.02	84.37	0	01:36	0.02
SurfaceStorage	STORAGE	0.01	0.13	79.73	0	00:56	0.13

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
cbmh40	JUNCTION	0.00	13.31	0	00:54	0	0.0901	-0.085
CBMH52	JUNCTION	9.95	111.17	0	01:15	0.0503	0.988	0.042
CBMH55	JUNCTION	0.00	3.60	0	01:37	0	0.0487	0.001
CBMH92	JUNCTION	0.04	9.42	0	01:18	0.00346	0.0936	0.008
DCBMH38	JUNCTION	0.00	34.07	0	00:58	0	0.0911	-0.148
EX.MH31	JUNCTION	0.00	32.36	0	00:58	0	0.0881	-0.028
EX.MH31-S	JUNCTION	45.14	45.14	0	00:55	0.0343	0.0343	-0.617
EX.MH31-S1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
EX.MH34	JUNCTION	32.30	32.30	0	00:56	0.0394	0.0394	-0.009
EX.MH34-S	JUNCTION	90.69	115.57	0	01:05	0.787	0.853	0.300
EX.MH36	JUNCTION	0.00	31.93	0	00:57	0	0.0394	-0.012
EX.MH36-S	JUNCTION	68.27	68.27	0	00:55	0.0654	0.0654	-0.826
EX.MH43	JUNCTION	40.00	40.00	0	00:59	0.491	0.491	0.037
EX.MH43-S	JUNCTION	-40.00	105.74	0	01:07	-0.491	0.85	0.235
EX.MH44	JUNCTION	35.79	75.79	0	01:11	0.214	0.705	0.057
EX.MH44-S	JUNCTION	-35.79	59.68	0	01:11	-0.214	0.357	0.131
EX.MH45	JUNCTION	14.05	89.53	0	01:12	0.0855	0.79	0.026
EX.MH45-S	JUNCTION	-14.05	23.42	0	01:13	-0.0855	0.142	0.183
EX.MH46	JUNCTION	25.33	106.63	0	01:13	0.0547	0.938	0.023
EX.MH46-S	JUNCTION	-25.33	42.21	0	00:55	-0.0547	0.0913	0.364
EXMH32	JUNCTION	0.00	123.70	0	01:11	0	1.08	0.038
MH133	JUNCTION	0.00	9.42	0	01:19	0	0.0936	0.006
MH135	JUNCTION	0.00	9.42	0	01:19	0	0.0936	0.000
STM1	JUNCTION	0.00	3.60	0	01:36	0	0.0487	0.003
NorthMajor	OUTFALL	12.14	12.14	0	00:55	0.0137	0.0137	0.000
RingRoadMajor	OUTFALL	87.47	96.93	0	00:55	0.0255	0.0877	0.000
StormSewerSystem	OUTFALL	0.00	123.68	0	01:12	0	1.08	0.000
Detention	STORAGE	0.00	96.07	0	00:56	0	0.094	0.137
Roof_Storage	STORAGE	50.70	50.70	0	00:55	0.0488	0.0488	-0.001
SurfaceStorage	STORAGE	111.49	111.49	0	00:55	0.0928	0.0928	-0.003

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Node Surcharge Summary
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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
cbmh40	JUNCTION	2.37	0.230	1.647
DCBMH38	JUNCTION	0.93	0.076	1.577

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Node Flooding Summary
****

No nodes were flooded.

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Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Detention	0.011	13.2	0.0	0.0	0.049	58.9	0 01:18	34.07
Roof_Storage	0.009	4.0	0.0	0.0	0.031	13.2	0 01:36	3.60
SurfaceStorage	0.000	0.1	0.0	0.0	0.008	5.9	0 00:56	84.24

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
NorthMajor	34.38	1.01	12.14	0.014
RingRoadMajor	99.96	2.00	96.93	0.088
StormSewerSystem	99.63	20.28	123.68	1.076
System	77.99	23.29	166.50	1.177

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Street Flow Summary
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Street Conduit	Peak Flow LPS	Maximum Spread m	Maximum Depth m	Inlet Design	Inlet Location	Inlet	Peak Capture Pcnt	Avg. Flow Capture Pcnt	Bypass Flow Freq Pcnt	Back Flow Freq Pcnt	Peak Capture / Inlet LPS	Peak Bypass Flow LPS
C10-S	9.210	1.032	0.021	Inlet	ON-GRADE	1	60.00	60.00	99.91	0.00	2.76	3.68
C11-S	14.033	1.118	0.022	Inlet	ON-SAG	1	70.91	99.31	5.76	0.00	4.98	4.08
C13-S	105.745	2.988	0.060	Inlet	ON-GRADE	1	37.83	59.46	99.99	0.00	20.00	65.74
C3-S	41.532	1.413	0.028	Inlet	ON-GRADE	1	60.00	60.00	88.49	0.00	12.46	16.61
C4-S	0.000	1.151	0.023	Inlet	ON-GRADE	1						
C5-S	53.850	2.633	0.053	Inlet	ON-GRADE	1	59.99	60.00	89.53	0.00	16.15	21.55
C8-S	59.675	2.107	0.042	Inlet	ON-GRADE	1	59.97	60.00	99.94	0.00	17.89	23.89
C9-S	23.418	1.492	0.030	Inlet	ON-GRADE	1	60.00	60.00	99.92	0.00	7.03	9.37

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Link Flow Summary

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	3.60	0	01:37	0.79	0.01	0.07
C10	CONDUIT	89.52	0	01:12	1.59	0.31	0.51
C10-S	CONDUIT	9.21	0	01:15	0.43	0.00	0.07
C11	CONDUIT	106.49	0	01:13	1.73	0.73	0.55
C11-S	CONDUIT	14.03	0	00:57	0.55	0.00	0.07
C12	CONDUIT	111.12	0	01:15	1.95	0.27	0.36
C13	CONDUIT	9.42	0	01:19	0.60	0.01	0.06
C13-S	CONDUIT	105.74	0	01:07	0.62	0.03	0.20
C14	CONDUIT	12.30	0	01:30	0.87	0.07	0.40
C2	CONDUIT	3.60	0	01:37	0.64	0.01	0.08
C3	CONDUIT	32.01	0	00:58	0.70	0.07	0.26
C3-S	CONDUIT	41.53	0	00:55	1.05	0.00	0.09
C4	CONDUIT	30.32	0	00:58	1.11	0.07	0.18
C4-S	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C5	CONDUIT	31.93	0	00:57	1.31	0.10	0.21
C5-S	CONDUIT	53.85	0	00:56	0.41	0.01	0.18
C6	CONDUIT	13.31	0	00:54	0.49	0.11	1.00
C8	CONDUIT	40.00	0	01:07	1.20	0.41	0.55
C8-S	CONDUIT	59.68	0	01:11	0.68	0.01	0.14
C9	CONDUIT	75.77	0	01:11	1.82	0.76	0.57
C9-S	CONDUIT	23.42	0	01:13	0.54	0.00	0.10
CBMH32	CONDUIT	123.68	0	01:12	1.72	0.29	0.37
CBMH92	CONDUIT	9.42	0	01:19	0.67	0.08	0.18
Ctention	CONDUIT	34.07	0	00:58	0.76	0.28	0.97
C7	ORIFICE	9.38	0	01:18			1.00
CFRD	DUMMY	3.60	0	01:36			
OL1	DUMMY	84.24	0	00:56			

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	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	1.00	0.00
C10-S	1.00	0.01	0.00	0.00	0.02	0.97	0.00	0.00	0.02	0.00
C11	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.15	0.00
C11-S	1.00	0.01	0.00	0.00	0.01	0.98	0.00	0.00	0.02	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	0.01	0.00	0.00	0.99	0.01	0.00
C13-S	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.04	0.01	0.00	0.95	0.00	0.00
C2	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C3	1.00	0.00	0.04	0.00	0.96	0.00	0.00	0.00	0.99	0.00
C3-S	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.95	0.00
C4	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C4-S	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C5-S	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C6	1.00	0.03	0.00	0.00	0.13	0.00	0.00	0.84	0.01	0.00
C8	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.99	0.00
C8-S	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9-S	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00
CBMH32	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.05	0.00

CBMH92	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Ctention	1.00	0.03	0.00	0.00	0.12	0.00	0.00	0.86	0.01	0.00

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C6	1.49	1.49	2.37	0.01	0.01
Ctention	0.01	0.01	0.93	0.01	0.01

Analysis begun on: Wed Nov 20 08:03:40 2024
Analysis ended on: Wed Nov 20 08:03:41 2024
Total elapsed time: 00:00:01

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

WARNING 09: time series interval greater than recording interval for Rain Gage 25Yr

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Element Count
****
Number of rain gages 6
Number of subcatchments ... 14
Number of nodes 30
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
100Yr	100Yr	INTENSITY	5 min.
10Yr	10Yr	INTENSITY	5 min.
25Yr	25Yr	INTENSITY	5 min.
2Yr	2Yr	INTENSITY	5 min.
50Yr	50Yr	INTENSITY	5 min.
5Yr	5Yr	INTENSITY	5 min.

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Subcatchment Summary
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Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
222	0.11	53.00	30.00	0.1000	25Yr	225B
223	0.11	40.14	87.00	0.1000	25Yr	226
224A	0.14	37.12	90.00	0.0000	25Yr	228
224B	0.22	77.00	90.00	0.1000	25Yr	Roof_Storage
224C	0.12	43.66	90.00	0.1000	25Yr	227
225A	0.17	34.21	82.00	2.5000	25Yr	EX.MH31-S
225B	0.29	27.63	82.00	2.1000	25Yr	EX.MH36-S
226	0.10	26.63	79.00	3.5000	25Yr	EX.MH34-S
227	0.43	172.40	75.00	3.0000	25Yr	SurfaceStorage
228	0.21	18.61	25.00	3.0000	25Yr	RingRoadMajor
229	0.15	14.59	38.00	0.1000	25Yr	NorthMajor
EXT-1	0.28	15.00	90.00	0.1000	25Yr	EX.MH34-S
EXT-2	0.28	186.67	90.00	0.1000	25Yr	RingRoadMajor
EXT-3	0.96	61.04	86.00	0.1000	25Yr	223

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LID Control Summary
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Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated	% Perv Treated
224A	GreenRoof	1	246.92	16.43	18.16	0.00	0.00
224C	GreenRoof	1	418.41	16.43	34.02	0.00	0.00

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Node Summary
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

cbmh40	JUNCTION	77.37	2.28	0.0	
CBMH52	JUNCTION	76.58	2.51	0.0	
CBMH55	JUNCTION	77.37	6.92	0.0	
CBMH92	JUNCTION	77.11	2.42	0.0	Yes
DCBMH38	JUNCTION	77.51	2.09	0.0	
EX.MH31	JUNCTION	76.62	5.64	0.0	
EX.MH31-S	JUNCTION	82.26	0.30	0.0	
EX.MH31-S1	JUNCTION	82.26	0.30	0.0	
EX.MH34	JUNCTION	78.40	2.89	0.0	
EX.MH34-S	JUNCTION	81.29	0.30	0.0	Yes
EX.MH36	JUNCTION	77.53	4.38	0.0	
EX.MH36-S	JUNCTION	81.92	0.30	0.0	
EX.MH43	JUNCTION	78.74	1.84	0.0	
EX.MH43-S	JUNCTION	80.58	0.30	0.0	
EX.MH44	JUNCTION	78.00	1.77	0.0	
EX.MH44-S	JUNCTION	79.77	0.30	0.0	
EX.MH45	JUNCTION	77.63	1.72	0.0	
EX.MH45-S	JUNCTION	79.35	0.30	0.0	
EX.MH46	JUNCTION	76.65	2.32	0.0	
EX.MH46-S	JUNCTION	78.96	0.30	0.0	
EXMH32	JUNCTION	75.74	2.69	0.0	
MH133	JUNCTION	76.75	2.40	0.0	
MH135	JUNCTION	76.95	2.50	0.0	
STM1	JUNCTION	77.60	6.75	0.0	
NorthMajor	OUTFALL	0.00	0.00	0.0	
RingRoadMajor	OUTFALL	78.62	0.30	0.0	
StormSewerSystem	OUTFALL	75.64	0.53	0.0	
Detention	STORAGE	77.62	0.71	0.0	
Roof_Storage	STORAGE	84.35	0.15	0.0	
SurfaceStorage	STORAGE	79.60	0.30	0.0	

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	STM1	CBMH55	CONDUIT	8.4	2.0123	0.0130
C10	EX.MH45	EX.MH46	CONDUIT	37.1	2.6424	0.0130
C10-S	EX.MH45-S	EX.MH46-S	CONDUIT	37.1	1.0486	0.0160
C11	EX.MH46	CBMH52	CONDUIT	10.5	0.6857	0.0130
C11-S	EX.MH46-S	RingRoadMajor	CONDUIT	10.5	3.2398	0.0160
C12	CBMH52	EXMH32	CONDUIT	51.6	1.5079	0.0130
C13	MH135	MH133	CONDUIT	26.8	0.4925	0.0130
C13-S	EX.MH34-S	EX.MH43-S	CONDUIT	128.3	0.5536	0.0160
C14	MH133	EX.MH46	CONDUIT	2.6	1.1539	0.0130
C2	CBMH55	EX.MH31	CONDUIT	14.2	1.0916	0.0130
C3	EX.MH31	EXMH32	CONDUIT	86.7	1.0104	0.0130
C3-S	EX.MH31-S	EX.MH46-S	CONDUIT	84.2	3.9211	0.0160
C4	EX.MH36	EX.MH31	CONDUIT	97.2	0.9002	0.0130
C4-S	EX.MH31-S1	EX.MH36-S	CONDUIT	97.2	0.3498	0.0160
C5	EX.MH34	EX.MH36	CONDUIT	60.8	1.3241	0.0130
C5-S	EX.MH36-S	EX.MH34-S	CONDUIT	60.8	1.0362	0.0160
C6	DCBMH38	cbmh40	CONDUIT	22.7	0.5022	0.0130
C8	EX.MH43	EX.MH44	CONDUIT	71.4	1.0365	0.0130
C8-S	EX.MH43-S	EX.MH44-S	CONDUIT	71.4	1.1345	0.0160
C9	EX.MH44	EX.MH45	CONDUIT	35.1	1.0542	0.0130
C9-S	EX.MH44-S	EX.MH45-S	CONDUIT	35.1	1.1967	0.0160
CBMH32	EXMH32	StormSewerSystem	CONDUIT	10.0	1.0001	0.0130
CBMH92	CBMH92	MH135	CONDUIT	26.4	0.5000	0.0130
Ctention	Detention	DCBMH38	CONDUIT	15.9	0.4969	0.0130
C7	cbmh40	CBMH92	ORIFICE			
CFRD	Roof_Storage	STM1	OUTLET			
OL1	SurfaceStorage	Detention	OUTLET			

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Cross Section Summary

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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.45	0.16	0.11	0.45	1	404.46
C10	CIRCULAR	0.38	0.11	0.09	0.38	1	285.03
C10-S	RingRoad	0.30	2.29	0.24	9.00	1	5642.11
C11	CIRCULAR	0.38	0.11	0.09	0.38	1	145.20
C11-S	RingRoad	0.30	2.29	0.24	9.00	1	9917.45
C12	CIRCULAR	0.47	0.18	0.12	0.47	1	404.43
C13	CIRCULAR	1.00	0.79	0.25	1.00	1	1682.76
C13-S	RingRoad	0.30	2.29	0.24	9.00	1	4099.48
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	188.35
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	297.90
C3	CIRCULAR	0.53	0.22	0.13	0.53	1	432.33
C3-S	HospitalRamp	0.30	2.60	0.23	10.50	1	12183.67
C4	CIRCULAR	0.53	0.22	0.13	0.53	1	408.07
C4-S	RingRoad	0.30	2.29	0.24	9.00	1	3258.74
C5	CIRCULAR	0.45	0.16	0.11	0.45	1	328.09
C5-S	RingRoad	0.30	2.29	0.24	9.00	1	5608.82
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	124.26
C8	CIRCULAR	0.30	0.07	0.07	0.30	1	98.45
C8-S	RingRoad	0.30	2.29	0.24	9.00	1	5868.79
C9	CIRCULAR	0.30	0.07	0.07	0.30	1	99.29
C9-S	RingRoad	0.30	2.29	0.24	9.00	1	6027.37
CBMH32	CIRCULAR	0.53	0.22	0.13	0.53	1	430.10
CBMH92	CIRCULAR	0.38	0.11	0.09	0.38	1	123.99
Ctention	CIRCULAR	0.38	0.11	0.09	0.38	1	123.59

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Street Summary
****

Street RingRoad
Area:

0.0008	0.0031	0.0071	0.0125	0.0196
0.0282	0.0384	0.0502	0.0635	0.0784
0.0949	0.1129	0.1325	0.1537	0.1765
0.2000	0.2235	0.2471	0.2706	0.2941
0.3176	0.3412	0.3647	0.3882	0.4118
0.4353	0.4588	0.4824	0.5059	0.5294
0.5529	0.5765	0.6000	0.6235	0.6471
0.6706	0.6941	0.7176	0.7412	0.7647
0.7882	0.8118	0.8353	0.8588	0.8824
0.9059	0.9294	0.9529	0.9765	1.0000

Hrad:

0.0123	0.0246	0.0369	0.0492	0.0615
0.0738	0.0861	0.0984	0.1107	0.1230
0.1353	0.1476	0.1599	0.1722	0.1845
0.2089	0.2331	0.2574	0.2815	0.3056
0.3296	0.3535	0.3774	0.4013	0.4250
0.4488	0.4724	0.4960	0.5195	0.5430
0.5664	0.5897	0.6130	0.6363	0.6594
0.6825	0.7056	0.7286	0.7515	0.7744
0.7972	0.8200	0.8427	0.8653	0.8879
0.9104	0.9329	0.9553	0.9777	1.0000

Width:

0.0667	0.1333	0.2000	0.2667	0.3333
0.4000	0.4667	0.5333	0.6000	0.6667
0.7333	0.8000	0.8667	0.9333	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Street HospitalRamp
Area:

0.0007	0.0028	0.0062	0.0111	0.0173
0.0249	0.0339	0.0443	0.0561	0.0693
0.0838	0.0997	0.1171	0.1358	0.1558
0.1773	0.2002	0.2242	0.2485	0.2727
0.2970	0.3212	0.3455	0.3697	0.3939
0.4182	0.4424	0.4667	0.4909	0.5152
0.5394	0.5636	0.5879	0.6121	0.6364
0.6606	0.6848	0.7091	0.7333	0.7576
0.7818	0.8061	0.8303	0.8545	0.8788
0.9030	0.9273	0.9515	0.9758	1.0000

Hrad:

0.0126	0.0251	0.0377	0.0503	0.0628
0.0754	0.0879	0.1005	0.1131	0.1256
0.1382	0.1508	0.1633	0.1759	0.1884
0.2010	0.2136	0.2323	0.2571	0.2819
0.3066	0.3312	0.3558	0.3804	0.4049
0.4293	0.4537	0.4780	0.5023	0.5265
0.5507	0.5748	0.5989	0.6229	0.6469
0.6708	0.6946	0.7184	0.7422	0.7659
0.7895	0.8131	0.8366	0.8601	0.8836
0.9070	0.9303	0.9536	0.9768	1.0000

Width:

0.0571	0.1143	0.1714	0.2286	0.2857
0.3429	0.4000	0.4571	0.5143	0.5714
0.6286	0.6857	0.7429	0.8000	0.8571
0.9143	0.9714	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 11/12/2024 00:00:00
Ending Date 11/13/2024 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 2
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---------	-------

Initial LID Storage	0.001	0.242
Total Precipitation	0.104	29.131
Evaporation Loss	0.000	0.000
Infiltration Loss	0.025	6.941
Surface Runoff	0.074	20.641
Final Storage	0.009	2.480
Continuity Error (%)	-2.346	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.074	0.737
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.055	0.546
External Outflow	0.128	1.285
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	0.001	0.009
Continuity Error (%)	-0.915	

Time-Step Critical Elements

Link C14 (99.50%)

Highest Flow Instability Indexes

Link C11 (2)

Most Frequent Nonconverging Nodes

Node NorthMajor (0.04%)
Node RingRoadMajor (0.04%)
Node StormSewerSystem (0.04%)
Node cbmh40 (0.03%)
Node DCBMH38 (0.02%)

Routing Time Step Summary

Minimum Time Step	:	0.88 sec
Average Time Step	:	3.39 sec
Maximum Time Step	:	5.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.01
% of Steps Not Converging	:	0.04
Time Step Frequencies	:	
5.000 - 3.155 sec	:	61.39 %
3.155 - 1.991 sec	:	3.44 %
1.991 - 1.256 sec	:	35.17 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 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 LPS	Runoff Coeff
222	29.13	0.00	0.00	20.37	8.84	0.13	8.96	0.01	13.03	0.308
223	29.13	205.26	0.00	8.90	203.55	21.78	225.33	0.26	97.51	0.961
224A	29.13	0.00	0.00	2.38	27.08	0.08	27.16	0.04	40.07	0.600
224B	29.13	0.00	0.00	2.90	26.18	0.08	26.26	0.06	62.97	0.902
224C	29.13	0.00	0.00	1.91	17.40	0.08	17.48	0.02	26.07	0.600
225A	29.13	0.00	0.00	5.21	24.16	0.23	24.39	0.04	54.97	0.837
225B	29.13	3.24	0.00	5.74	26.49	0.16	26.64	0.08	84.08	0.823
226	29.13	262.12	0.00	14.78	229.39	46.84	276.23	0.27	107.90	0.948
227	29.13	4.99	0.00	8.16	25.37	0.70	26.06	0.11	137.62	0.764
228	29.13	0.00	0.00	21.83	7.36	0.12	7.48	0.02	22.11	0.257
229	29.13	0.00	0.00	18.06	10.97	0.03	10.99	0.02	15.28	0.377
EXT-1	29.13	0.00	0.00	2.91	25.38	0.01	25.39	0.07	27.37	0.872
EXT-2	29.13	0.00	0.00	2.89	26.44	0.15	26.59	0.07	93.86	0.913
EXT-3	29.13	0.00	0.00	4.08	24.31	0.02	24.32	0.23	106.17	0.835

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow mm	Evap Loss mm	Infil Loss mm	Surface Outflow mm	Drain Outflow mm	Initial Storage mm	Final Storage mm	Continuity Error %
224A	GreenRoof	29.13	0.00	0.00	0.00	0.00	13.00	42.13	-0.00
224C	GreenRoof	29.13	0.00	0.00	0.00	0.00	13.00	42.13	-0.00

****
Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
cbmh40	JUNCTION	0.19	0.74	78.11	0 01:19	0.74
CBMH52	JUNCTION	0.06	0.19	76.77	0 01:13	0.19
CBMH55	JUNCTION	0.02	0.04	77.41	0 01:29	0.04
CBMH92	JUNCTION	0.03	0.07	77.18	0 01:19	0.07
DCBMH38	JUNCTION	0.14	0.60	78.11	0 01:19	0.60
EX.MH31	JUNCTION	0.02	0.11	76.72	0 00:58	0.11
EX.MH31-S	JUNCTION	0.00	0.04	82.30	0 00:55	0.04
EX.MH31-S1	JUNCTION	0.00	0.00	82.26	0 00:00	0.00
EX.MH34	JUNCTION	0.01	0.11	78.51	0 00:56	0.11
EX.MH34-S	JUNCTION	0.03	0.08	81.37	0 01:07	0.08
EX.MH36	JUNCTION	0.01	0.11	77.64	0 00:58	0.11
EX.MH36-S	JUNCTION	0.01	0.05	81.97	0 00:56	0.05
EX.MH43	JUNCTION	0.05	0.13	78.87	0 01:06	0.13
EX.MH43-S	JUNCTION	0.02	0.06	80.64	0 01:09	0.06
EX.MH44	JUNCTION	0.07	0.21	78.21	0 01:07	0.21
EX.MH44-S	JUNCTION	0.01	0.05	79.82	0 01:11	0.05
EX.MH45	JUNCTION	0.05	0.16	77.79	0 01:11	0.16
EX.MH45-S	JUNCTION	0.01	0.03	79.38	0 01:13	0.03
EX.MH46	JUNCTION	0.08	0.27	76.92	0 01:13	0.27
EX.MH46-S	JUNCTION	0.01	0.02	78.99	0 00:57	0.02
EXMH32	JUNCTION	0.07	0.22	75.96	0 01:12	0.22
MH133	JUNCTION	0.03	0.17	76.92	0 01:12	0.17
MH135	JUNCTION	0.02	0.06	77.00	0 01:29	0.06
STM1	JUNCTION	0.01	0.03	77.63	0 01:28	0.03
NorthMajor	OUTFALL	0.00	0.00	0.00	0 00:00	0.00

RingRoadMajor	OUTFALL	0.01	0.02	78.65	0	00:57	0.02
StormSewerSystem	OUTFALL	0.07	0.22	75.86	0	01:13	0.22
Detention	STORAGE	0.13	0.49	78.11	0	01:19	0.49
Roof_Storage	STORAGE	0.01	0.02	84.37	0	01:28	0.02
SurfaceStorage	STORAGE	0.01	0.14	79.74	0	00:56	0.14

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
cbmh40	JUNCTION	0.00	13.26	0	00:53	0	0.11	-0.054
CBMH52	JUNCTION	11.74	142.44	0	01:13	0.0551	1.07	0.040
CBMH55	JUNCTION	0.00	4.31	0	01:29	0	0.058	0.001
CBMH92	JUNCTION	0.04	10.21	0	01:19	0.00346	0.113	0.007
DCBMH38	JUNCTION	0.00	30.04	0	00:58	0	0.11	-0.069
EX.MH31	JUNCTION	0.00	40.45	0	00:58	0	0.105	-0.028
EX.MH31-S	JUNCTION	54.97	54.97	0	00:55	0.041	0.041	-0.646
EX.MH31-S1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
EX.MH34	JUNCTION	40.00	40.00	0	00:56	0.0471	0.0471	-0.009
EX.MH34-S	JUNCTION	119.56	148.96	0	01:05	0.836	0.915	0.276
EX.MH36	JUNCTION	0.00	39.72	0	00:57	0	0.0471	-0.014
EX.MH36-S	JUNCTION	84.08	84.08	0	00:55	0.078	0.078	-0.830
EX.MH43	JUNCTION	40.00	40.00	0	00:56	0.506	0.506	0.036
EX.MH43-S	JUNCTION	-40.00	135.11	0	01:07	-0.506	0.912	0.227
EX.MH44	JUNCTION	40.00	80.00	0	01:06	0.236	0.742	0.054
EX.MH44-S	JUNCTION	-40.00	90.06	0	01:10	-0.236	0.404	0.124
EX.MH45	JUNCTION	28.82	108.83	0	01:11	0.1	0.842	0.025
EX.MH45-S	JUNCTION	-28.82	48.03	0	01:11	-0.1	0.167	0.183
EX.MH46	JUNCTION	30.98	132.14	0	01:12	0.0647	1.02	0.020
EX.MH46-S	JUNCTION	-30.98	51.64	0	00:55	-0.0647	0.108	0.344
EXMH32	JUNCTION	0.00	153.89	0	01:12	0	1.18	0.036
MH133	JUNCTION	0.00	10.21	0	01:19	0	0.113	0.010
MH135	JUNCTION	0.00	10.21	0	01:19	0	0.113	-0.008
STM1	JUNCTION	0.00	4.31	0	01:28	0	0.058	0.003
NorthMajor	OUTFALL	15.28	15.28	0	00:55	0.0163	0.0163	0.000
RingRoadMajor	OUTFALL	107.27	119.25	0	00:55	0.0354	0.104	0.000
StormSewerSystem	OUTFALL	0.00	153.88	0	01:13	0	1.18	0.000
Detention	STORAGE	0.00	106.89	0	00:56	0	0.113	0.064
Roof_Storage	STORAGE	62.97	62.97	0	00:55	0.058	0.058	-0.001
SurfaceStorage	STORAGE	137.62	137.62	0	00:55	0.112	0.112	-0.007

****
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
cbmh40	JUNCTION	2.85	0.334	1.543
DCBMH38	JUNCTION	1.66	0.161	1.492

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Detention	0.015	17.8	0.0	0.0	0.063	75.5	0 01:19	30.04
Roof_Storage	0.011	4.9	0.0	0.0	0.037	15.8	0 01:28	4.31
SurfaceStorage	0.000	0.1	0.0	0.0	0.011	7.9	0 00:56	100.39

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Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
NorthMajor	35.54	1.15	15.28	0.016
RingRoadMajor	99.97	2.39	119.25	0.104
StormSewerSystem	99.64	22.96	153.88	1.179
System	78.39	26.50	206.79	1.299

****
Street Flow Summary
****

Street Conduit	Peak Flow LPS	Maximum Spread m	Maximum Depth m	Inlet Design	Inlet Location	Inlet	Peak Capture Pcnt	Avg. Flow Capture Pcnt	Bypass Flow Freq Pcnt	Back Flow Freq Pcnt	Peak Capture / Inlet LPS	Peak Bypass Flow LPS
C10-S	18.302	1.303	0.026	Inlet	ON-GRADE	1	60.00	60.00	99.91	0.00	5.49	7.32
C11-S	17.223	1.213	0.024	Inlet	ON-SAG	1	68.18	98.93	6.41	0.00	5.87	5.48
C13-S	135.106	3.330	0.067	Inlet	ON-GRADE	1	29.61	58.99	99.99	0.00	20.00	95.11
C3-S	50.854	1.528	0.031	Inlet	ON-GRADE	1	60.00	60.00	87.68	0.00	15.26	20.34
C4-S	0.000	1.251	0.025	Inlet	ON-GRADE	1						
C5-S	67.103	2.869	0.057	Inlet	ON-GRADE	1	59.61	60.00	89.25	0.00	20.00	27.10
C8-S	90.061	2.547	0.051	Inlet	ON-GRADE	1	44.41	59.80	99.94	0.00	20.00	50.06
C9-S	48.033	1.946	0.039	Inlet	ON-GRADE	1	60.00	60.00	99.92	0.00	14.41	19.21

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	4.31	0	01:29	0.83	0.01	0.07
C10	CONDUIT	108.82	0	01:11	1.65	0.38	0.58
C10-S	CONDUIT	18.30	0	01:13	0.53	0.00	0.09
C11	CONDUIT	135.49	0	01:13	1.88	0.93	0.62
C11-S	CONDUIT	17.22	0	00:57	0.58	0.00	0.08
C12	CONDUIT	138.95	0	01:13	2.07	0.34	0.40
C13	CONDUIT	10.21	0	01:19	0.62	0.01	0.08
C13-S	CONDUIT	135.11	0	01:07	0.65	0.03	0.22
C14	CONDUIT	15.78	0	01:02	0.89	0.08	0.49
C2	CONDUIT	4.31	0	01:29	0.67	0.01	0.08
C3	CONDUIT	40.05	0	00:58	0.76	0.09	0.29
C3-S	CONDUIT	50.85	0	00:55	1.11	0.00	0.10
C4	CONDUIT	37.93	0	00:58	1.18	0.09	0.21
C4-S	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C5	CONDUIT	39.72	0	00:57	1.40	0.12	0.23
C5-S	CONDUIT	67.10	0	00:56	0.43	0.01	0.19
C6	CONDUIT	13.26	0	00:53	0.50	0.11	1.00
C8	CONDUIT	40.00	0	01:06	1.23	0.41	0.57
C8-S	CONDUIT	90.06	0	01:10	0.72	0.02	0.17
C9	CONDUIT	80.07	0	01:08	1.84	0.81	0.61
C9-S	CONDUIT	48.03	0	01:11	0.64	0.01	0.13
CBMH32	CONDUIT	153.88	0	01:13	1.82	0.36	0.41
CBMH92	CONDUIT	10.21	0	01:19	0.69	0.08	0.19
Ctention	CONDUIT	30.04	0	00:58	0.68	0.24	1.00
C7	ORIFICE	10.17	0	01:19			1.00
CFRD	DUMMY	4.31	0	01:28			
OL1	DUMMY	100.39	0	00:56			

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Flow Classification Summary
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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	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	1.00	0.00
C10-S	1.00	0.01	0.01	0.00	0.02	0.97	0.00	0.00	0.02	0.00
C11	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.16	0.00
C11-S	1.00	0.01	0.00	0.00	0.01	0.99	0.00	0.00	0.02	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	0.02	0.00	0.00	0.98	0.02	0.00
C13-S	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.04	0.01	0.00	0.94	0.00	0.00
C2	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C3	1.00	0.00	0.04	0.00	0.96	0.00	0.00	0.00	0.99	0.00
C3-S	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.95	0.00
C4	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C4-S	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C5-S	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C6	1.00	0.03	0.00	0.00	0.15	0.00	0.00	0.83	0.01	0.00
C8	1.00	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.99	0.00
C8-S	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9-S	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00
CBMH32	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.06	0.00

CBMH92	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Ctention	1.00	0.02	0.00	0.00	0.14	0.00	0.00	0.84	0.01	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C6	2.11	2.11	2.85	0.01	0.01
Ctention	1.04	1.04	1.66	0.01	0.01

Analysis begun on: Wed Nov 20 08:04:02 2024
Analysis ended on: Wed Nov 20 08:04:04 2024
Total elapsed time: 00:00:02

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

WARNING 09: time series interval greater than recording interval for Rain Gage 50Yr

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 14
Number of nodes 30
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
100Yr	100Yr	INTENSITY	5 min.
10Yr	10Yr	INTENSITY	5 min.
25Yr	25Yr	INTENSITY	5 min.
2Yr	2Yr	INTENSITY	5 min.
50Yr	50Yr	INTENSITY	5 min.
5Yr	5Yr	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
222	0.11	53.00	30.00	0.1000	50Yr	225B
223	0.11	40.14	87.00	0.1000	50Yr	226
224A	0.14	37.12	90.00	0.0000	50Yr	228
224B	0.22	77.00	90.00	0.1000	50Yr	Roof_Storage
224C	0.12	43.66	90.00	0.1000	50Yr	227
225A	0.17	34.21	82.00	2.5000	50Yr	EX.MH31-S
225B	0.29	27.63	82.00	2.1000	50Yr	EX.MH36-S
226	0.10	26.63	79.00	3.5000	50Yr	EX.MH34-S
227	0.43	172.40	75.00	3.0000	50Yr	SurfaceStorage
228	0.21	18.61	25.00	3.0000	50Yr	RingRoadMajor
229	0.15	14.59	38.00	0.1000	50Yr	NorthMajor
EXT-1	0.28	15.00	90.00	0.1000	50Yr	EX.MH34-S
EXT-2	0.28	186.67	90.00	0.1000	50Yr	RingRoadMajor
EXT-3	0.96	61.04	86.00	0.1000	50Yr	223

****
LID Control Summary
****

Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated	% Perv Treated
224A	GreenRoof	1	246.92	16.43	18.16	0.00	0.00
224C	GreenRoof	1	418.41	16.43	34.02	0.00	0.00

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

cbmh40	JUNCTION	77.37	2.28	0.0	
CBMH52	JUNCTION	76.58	2.51	0.0	
CBMH55	JUNCTION	77.37	6.92	0.0	
CBMH92	JUNCTION	77.11	2.42	0.0	Yes
DCBMH38	JUNCTION	77.51	2.09	0.0	
EX.MH31	JUNCTION	76.62	5.64	0.0	
EX.MH31-S	JUNCTION	82.26	0.30	0.0	
EX.MH31-S1	JUNCTION	82.26	0.30	0.0	
EX.MH34	JUNCTION	78.40	2.89	0.0	
EX.MH34-S	JUNCTION	81.29	0.30	0.0	Yes
EX.MH36	JUNCTION	77.53	4.38	0.0	
EX.MH36-S	JUNCTION	81.92	0.30	0.0	
EX.MH43	JUNCTION	78.74	1.84	0.0	
EX.MH43-S	JUNCTION	80.58	0.30	0.0	
EX.MH44	JUNCTION	78.00	1.77	0.0	
EX.MH44-S	JUNCTION	79.77	0.30	0.0	
EX.MH45	JUNCTION	77.63	1.72	0.0	
EX.MH45-S	JUNCTION	79.35	0.30	0.0	
EX.MH46	JUNCTION	76.65	2.32	0.0	
EX.MH46-S	JUNCTION	78.96	0.30	0.0	
EXMH32	JUNCTION	75.74	2.69	0.0	
MH133	JUNCTION	76.75	2.40	0.0	
MH135	JUNCTION	76.95	2.50	0.0	
STM1	JUNCTION	77.60	6.75	0.0	
NorthMajor	OUTFALL	0.00	0.00	0.0	
RingRoadMajor	OUTFALL	78.62	0.30	0.0	
StormSewerSystem	OUTFALL	75.64	0.53	0.0	
Detention	STORAGE	77.62	0.71	0.0	
Roof_Storage	STORAGE	84.35	0.15	0.0	
SurfaceStorage	STORAGE	79.60	0.30	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	STM1	CBMH55	CONDUIT	8.4	2.0123	0.0130
C10	EX.MH45	EX.MH46	CONDUIT	37.1	2.6424	0.0130
C10-S	EX.MH45-S	EX.MH46-S	CONDUIT	37.1	1.0486	0.0160
C11	EX.MH46	CBMH52	CONDUIT	10.5	0.6857	0.0130
C11-S	EX.MH46-S	RingRoadMajor	CONDUIT	10.5	3.2398	0.0160
C12	CBMH52	EXMH32	CONDUIT	51.6	1.5079	0.0130
C13	MH135	MH133	CONDUIT	26.8	0.4925	0.0130
C13-S	EX.MH34-S	EX.MH43-S	CONDUIT	128.3	0.5536	0.0160
C14	MH133	EX.MH46	CONDUIT	2.6	1.1539	0.0130
C2	CBMH55	EX.MH31	CONDUIT	14.2	1.0916	0.0130
C3	EX.MH31	EXMH32	CONDUIT	86.7	1.0104	0.0130
C3-S	EX.MH31-S	EX.MH46-S	CONDUIT	84.2	3.9211	0.0160
C4	EX.MH36	EX.MH31	CONDUIT	97.2	0.9002	0.0130
C4-S	EX.MH31-S1	EX.MH36-S	CONDUIT	97.2	0.3498	0.0160
C5	EX.MH34	EX.MH36	CONDUIT	60.8	1.3241	0.0130
C5-S	EX.MH36-S	EX.MH34-S	CONDUIT	60.8	1.0362	0.0160
C6	DCBMH38	cbmh40	CONDUIT	22.7	0.5022	0.0130
C8	EX.MH43	EX.MH44	CONDUIT	71.4	1.0365	0.0130
C8-S	EX.MH43-S	EX.MH44-S	CONDUIT	71.4	1.1345	0.0160
C9	EX.MH44	EX.MH45	CONDUIT	35.1	1.0542	0.0130
C9-S	EX.MH44-S	EX.MH45-S	CONDUIT	35.1	1.1967	0.0160
CBMH32	EXMH32	StormSewerSystem	CONDUIT	10.0	1.0001	0.0130
CBMH92	CBMH92	MH135	CONDUIT	26.4	0.5000	0.0130
Ctention	Detention	DCBMH38	CONDUIT	15.9	0.4969	0.0130
C7	cbmh40	CBMH92	ORIFICE			
CFRD	Roof_Storage	STM1	OUTLET			
OL1	SurfaceStorage	Detention	OUTLET			

****
Cross Section Summary

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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.45	0.16	0.11	0.45	1	404.46
C10	CIRCULAR	0.38	0.11	0.09	0.38	1	285.03
C10-S	RingRoad	0.30	2.29	0.24	9.00	1	5642.11
C11	CIRCULAR	0.38	0.11	0.09	0.38	1	145.20
C11-S	RingRoad	0.30	2.29	0.24	9.00	1	9917.45
C12	CIRCULAR	0.47	0.18	0.12	0.47	1	404.43
C13	CIRCULAR	1.00	0.79	0.25	1.00	1	1682.76
C13-S	RingRoad	0.30	2.29	0.24	9.00	1	4099.48
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	188.35
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	297.90
C3	CIRCULAR	0.53	0.22	0.13	0.53	1	432.33
C3-S	HospitalRamp	0.30	2.60	0.23	10.50	1	12183.67
C4	CIRCULAR	0.53	0.22	0.13	0.53	1	408.07
C4-S	RingRoad	0.30	2.29	0.24	9.00	1	3258.74
C5	CIRCULAR	0.45	0.16	0.11	0.45	1	328.09
C5-S	RingRoad	0.30	2.29	0.24	9.00	1	5608.82
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	124.26
C8	CIRCULAR	0.30	0.07	0.07	0.30	1	98.45
C8-S	RingRoad	0.30	2.29	0.24	9.00	1	5868.79
C9	CIRCULAR	0.30	0.07	0.07	0.30	1	99.29
C9-S	RingRoad	0.30	2.29	0.24	9.00	1	6027.37
CBMH32	CIRCULAR	0.53	0.22	0.13	0.53	1	430.10
CBMH92	CIRCULAR	0.38	0.11	0.09	0.38	1	123.99
Ctention	CIRCULAR	0.38	0.11	0.09	0.38	1	123.59

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Street Summary
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Street RingRoad
Area:

0.0008	0.0031	0.0071	0.0125	0.0196
0.0282	0.0384	0.0502	0.0635	0.0784
0.0949	0.1129	0.1325	0.1537	0.1765
0.2000	0.2235	0.2471	0.2706	0.2941
0.3176	0.3412	0.3647	0.3882	0.4118
0.4353	0.4588	0.4824	0.5059	0.5294
0.5529	0.5765	0.6000	0.6235	0.6471
0.6706	0.6941	0.7176	0.7412	0.7647
0.7882	0.8118	0.8353	0.8588	0.8824
0.9059	0.9294	0.9529	0.9765	1.0000

Hrad:

0.0123	0.0246	0.0369	0.0492	0.0615
0.0738	0.0861	0.0984	0.1107	0.1230
0.1353	0.1476	0.1599	0.1722	0.1845
0.2089	0.2331	0.2574	0.2815	0.3056
0.3296	0.3535	0.3774	0.4013	0.4250
0.4488	0.4724	0.4960	0.5195	0.5430
0.5664	0.5897	0.6130	0.6363	0.6594
0.6825	0.7056	0.7286	0.7515	0.7744
0.7972	0.8200	0.8427	0.8653	0.8879
0.9104	0.9329	0.9553	0.9777	1.0000

Width:

0.0667	0.1333	0.2000	0.2667	0.3333
0.4000	0.4667	0.5333	0.6000	0.6667
0.7333	0.8000	0.8667	0.9333	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Street HospitalRamp
Area:

0.0007	0.0028	0.0062	0.0111	0.0173
0.0249	0.0339	0.0443	0.0561	0.0693
0.0838	0.0997	0.1171	0.1358	0.1558
0.1773	0.2002	0.2242	0.2485	0.2727
0.2970	0.3212	0.3455	0.3697	0.3939
0.4182	0.4424	0.4667	0.4909	0.5152
0.5394	0.5636	0.5879	0.6121	0.6364
0.6606	0.6848	0.7091	0.7333	0.7576
0.7818	0.8061	0.8303	0.8545	0.8788
0.9030	0.9273	0.9515	0.9758	1.0000

Hrad:

0.0126	0.0251	0.0377	0.0503	0.0628
0.0754	0.0879	0.1005	0.1131	0.1256
0.1382	0.1508	0.1633	0.1759	0.1884
0.2010	0.2136	0.2323	0.2571	0.2819
0.3066	0.3312	0.3558	0.3804	0.4049
0.4293	0.4537	0.4780	0.5023	0.5265
0.5507	0.5748	0.5989	0.6229	0.6469
0.6708	0.6946	0.7184	0.7422	0.7659
0.7895	0.8131	0.8366	0.8601	0.8836
0.9070	0.9303	0.9536	0.9768	1.0000

Width:

0.0571	0.1143	0.1714	0.2286	0.2857
0.3429	0.4000	0.4571	0.5143	0.5714
0.6286	0.6857	0.7429	0.8000	0.8571
0.9143	0.9714	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 11/12/2024 00:00:00
Ending Date 11/13/2024 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 2
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---------	-------

Initial LID Storage	0.001	0.242
Total Precipitation	0.116	32.423
Evaporation Loss	0.000	0.000
Infiltration Loss	0.027	7.519
Surface Runoff	0.083	23.292
LID Drainage	0.000	0.008
Final Storage	0.009	2.626
Continuity Error (%)	-2.387	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.083	0.831
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.055	0.546
External Outflow	0.138	1.379
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	0.001	0.009
Continuity Error (%)	-0.790	

Time-Step Critical Elements

Link C14 (99.52%)

Highest Flow Instability Indexes

Link C11 (3)
Link C14 (1)

Most Frequent Nonconverging Nodes

Node NorthMajor (0.03%)
Node RingRoadMajor (0.03%)
Node StormSewerSystem (0.03%)
Node cbmh40 (0.03%)
Node DCBMH38 (0.02%)

Routing Time Step Summary

Minimum Time Step	:	1.27 sec
Average Time Step	:	3.29 sec
Maximum Time Step	:	5.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.01
% of Steps Not Converging	:	0.03
Time Step Frequencies	:	
5.000 - 3.155 sec	:	58.53 %
3.155 - 1.991 sec	:	3.41 %
1.991 - 1.256 sec	:	38.05 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 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 LPS	Runoff Coeff
222	32.42	0.00	0.00	22.46	9.86	0.34	10.20	0.01	14.93	0.315
223	32.42	229.84	0.00	9.03	227.88	25.33	253.21	0.29	117.46	0.965
224A	32.42	0.00	0.00	2.65	30.32	0.17	30.49	0.04	46.07	0.610
224B	32.42	0.00	0.00	3.14	29.29	0.19	29.48	0.07	72.39	0.909
224C	32.42	0.00	0.00	2.06	19.46	0.17	19.77	0.02	29.77	0.610
225A	32.42	0.00	0.00	5.60	26.98	0.48	27.46	0.05	62.56	0.847
225B	32.42	3.69	0.00	6.17	29.66	0.43	30.09	0.09	96.21	0.833
226	32.42	294.55	0.00	14.97	257.61	54.28	311.89	0.31	129.50	0.954
227	32.42	5.60	0.00	8.56	28.30	1.37	29.67	0.13	158.15	0.780
228	32.42	0.00	0.00	24.09	8.21	0.33	8.54	0.02	25.41	0.263
229	32.42	0.00	0.00	20.05	12.27	0.07	12.35	0.02	17.70	0.381
EXT-1	32.42	0.00	0.00	3.22	28.39	0.04	28.43	0.08	32.60	0.877
EXT-2	32.42	0.00	0.00	3.10	29.56	0.30	29.86	0.08	106.92	0.921
EXT-3	32.42	0.00	0.00	4.51	27.19	0.05	27.24	0.26	126.07	0.840

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow mm	Evap Loss mm	Infil Loss mm	Surface Outflow mm	Drain Outflow mm	Initial Storage mm	Final Storage mm	Continuity Error %
224A	GreenRoof	32.42	0.00	0.00	0.00	0.42	13.00	45.00	-0.00
224C	GreenRoof	32.42	0.00	0.00	0.00	0.42	13.00	45.00	-0.00

****
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
cbmh40	JUNCTION	0.23	0.86	78.22	0 01:27	0.86
CBMH52	JUNCTION	0.07	0.21	76.79	0 01:13	0.21
CBMH55	JUNCTION	0.02	0.04	77.41	0 01:28	0.04
CBMH92	JUNCTION	0.03	0.08	77.18	0 01:28	0.08
DCBMH38	JUNCTION	0.17	0.71	78.23	0 01:27	0.71
EX.MH31	JUNCTION	0.02	0.11	76.73	0 00:59	0.11
EX.MH31-S	JUNCTION	0.00	0.04	82.30	0 00:55	0.04
EX.MH31-S1	JUNCTION	0.00	0.00	82.26	0 00:00	0.00
EX.MH34	JUNCTION	0.01	0.11	78.51	0 00:58	0.11
EX.MH34-S	JUNCTION	0.03	0.08	81.37	0 01:06	0.08
EX.MH36	JUNCTION	0.01	0.11	77.65	0 00:58	0.11
EX.MH36-S	JUNCTION	0.01	0.05	81.97	0 00:56	0.05
EX.MH43	JUNCTION	0.06	0.13	78.87	0 01:04	0.13
EX.MH43-S	JUNCTION	0.02	0.06	80.64	0 01:09	0.06
EX.MH44	JUNCTION	0.07	0.21	78.21	0 01:05	0.21
EX.MH44-S	JUNCTION	0.01	0.05	79.82	0 01:10	0.05
EX.MH45	JUNCTION	0.05	0.17	77.80	0 01:10	0.17
EX.MH45-S	JUNCTION	0.01	0.04	79.39	0 01:12	0.04
EX.MH46	JUNCTION	0.08	0.30	76.95	0 01:12	0.30
EX.MH46-S	JUNCTION	0.01	0.03	78.99	0 00:56	0.03
EXMH32	JUNCTION	0.07	0.24	75.98	0 01:11	0.24
MH133	JUNCTION	0.03	0.19	76.95	0 01:12	0.19
MH135	JUNCTION	0.02	0.06	77.00	0 01:32	0.06

STM1	JUNCTION	0.02	0.03	77.63	0	01:28	0.03
NorthMajor	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
RingRoadMajor	OUTFALL	0.01	0.03	78.65	0	00:56	0.03
StormSewerSystem	OUTFALL	0.07	0.24	75.88	0	01:11	0.24
Detention	STORAGE	0.15	0.61	78.23	0	01:27	0.61
Roof_Storage	STORAGE	0.01	0.03	84.38	0	01:28	0.03
SurfaceStorage	STORAGE	0.01	0.15	79.75	0	00:56	0.15

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
cbmh40	JUNCTION	0.00	13.18	0	00:53	0	0.125	-0.037
CBMH52	JUNCTION	13.05	170.53	0	01:12	0.0592	1.14	0.031
CBMH55	JUNCTION	0.00	4.87	0	01:28	0	0.0654	0.001
CBMH92	JUNCTION	0.04	11.02	0	01:27	0.00346	0.129	0.006
DCBMH38	JUNCTION	0.00	27.89	0	00:57	0	0.125	-0.086
EX.MH31	JUNCTION	0.00	42.66	0	00:58	0	0.118	-0.029
EX.MH31-S	JUNCTION	62.56	62.56	0	00:55	0.0461	0.0461	-0.664
EX.MH31-S1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
EX.MH34	JUNCTION	40.00	40.00	0	00:55	0.0524	0.0524	-0.008
EX.MH34-S	JUNCTION	142.36	175.59	0	01:05	0.874	0.963	0.260
EX.MH36	JUNCTION	0.00	40.00	0	00:58	0	0.0524	-0.013
EX.MH36-S	JUNCTION	96.21	96.21	0	00:55	0.0881	0.0881	-0.826
EX.MH43	JUNCTION	40.00	40.00	0	00:55	0.516	0.516	0.036
EX.MH43-S	JUNCTION	-40.00	158.17	0	01:07	-0.516	0.96	0.221
EX.MH44	JUNCTION	40.00	80.00	0	01:04	0.248	0.764	0.052
EX.MH44-S	JUNCTION	-40.00	113.13	0	01:09	-0.248	0.443	0.119
EX.MH45	JUNCTION	40.00	120.05	0	01:09	0.116	0.879	0.023
EX.MH45-S	JUNCTION	-40.00	71.48	0	01:11	-0.116	0.194	0.179
EX.MH46	JUNCTION	35.43	151.47	0	01:12	0.0743	1.08	0.026
EX.MH46-S	JUNCTION	-35.43	59.05	0	00:55	-0.0743	0.124	0.323
EXMH32	JUNCTION	0.00	178.62	0	01:10	0	1.26	0.034
MH133	JUNCTION	0.00	11.02	0	01:28	0	0.129	0.010
MH135	JUNCTION	0.00	11.02	0	01:28	0	0.129	-0.014
STM1	JUNCTION	0.21	4.87	0	01:28	0.000281	0.0654	0.002
NorthMajor	OUTFALL	17.70	17.70	0	00:55	0.0183	0.0183	0.000
RingRoadMajor	OUTFALL	122.61	136.41	0	00:55	0.0427	0.118	0.000
StormSewerSystem	OUTFALL	0.00	178.38	0	01:11	0	1.26	0.000
Detention	STORAGE	0.00	116.54	0	00:56	0	0.128	0.075
Roof_Storage	STORAGE	72.39	72.39	0	00:55	0.0651	0.0651	-0.001
SurfaceStorage	STORAGE	158.15	158.15	0	00:55	0.128	0.128	-0.006

****
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
cbmh40	JUNCTION	3.18	0.452	1.425
DCBMH38	JUNCTION	2.11	0.279	1.374

****
Node Flooding Summary
****

No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Detention	0.018	21.6	0.0	0.0	0.074	88.9	0 01:27	27.89
Roof_Storage	0.013	5.6	0.0	0.0	0.041	17.8	0 01:28	4.87
SurfaceStorage	0.000	0.1	0.0	0.0	0.013	9.6	0 00:56	112.38

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Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
NorthMajor	35.55	1.28	17.70	0.018
RingRoadMajor	99.97	2.71	136.41	0.118
StormSewerSystem	99.65	25.03	178.38	1.258
System	78.39	29.02	238.19	1.394

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Street Flow Summary
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Street Conduit	Peak Flow LPS	Maximum Spread m	Maximum Depth m	Inlet Design	Inlet Location	Inlet	Peak Capture Pcnt	Avg. Flow Capture Pcnt	Bypass Flow Freq Pcnt	Back Flow Freq Pcnt	Peak Capture / Inlet LPS	Peak Bypass Flow LPS
C10-S	29.353	1.539	0.031	Inlet	ON-GRADE	1	60.00	60.00	99.92	0.00	8.81	11.74
C11-S	19.910	1.276	0.026	Inlet	ON-SAG	1	65.54	98.59	7.27	0.00	6.52	6.86
C13-S	158.174	3.552	0.071	Inlet	ON-GRADE	1	25.29	58.68	99.99	0.00	20.00	118.17
C3-S	58.170	1.608	0.032	Inlet	ON-GRADE	1	60.00	60.00	87.71	0.00	17.45	23.27
C4-S	0.000	1.319	0.026	Inlet	ON-GRADE	1						
C5-S	77.288	3.053	0.061	Inlet	ON-GRADE	1	51.75	59.94	87.55	0.00	20.00	37.29
C8-S	113.131	2.834	0.057	Inlet	ON-GRADE	1	35.36	59.52	99.94	0.00	20.00	73.13
C9-S	71.477	2.287	0.046	Inlet	ON-GRADE	1	55.96	59.99	99.93	0.00	20.00	31.48

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	4.87	0	01:28	0.86	0.01	0.08
C10	CONDUIT	120.02	0	01:10	1.68	0.42	0.62
C10-S	CONDUIT	29.35	0	01:12	0.62	0.01	0.10
C11	CONDUIT	161.14	0	01:12	2.04	1.11	0.67
C11-S	CONDUIT	19.91	0	00:56	0.60	0.00	0.09
C12	CONDUIT	160.56	0	01:13	2.15	0.40	0.44
C13	CONDUIT	11.02	0	01:28	0.63	0.01	0.09
C13-S	CONDUIT	158.17	0	01:07	0.67	0.04	0.24
C14	CONDUIT	13.17	0	01:36	0.91	0.07	0.55
C2	CONDUIT	4.87	0	01:29	0.70	0.02	0.09
C3	CONDUIT	42.45	0	00:59	0.77	0.10	0.30
C3-S	CONDUIT	58.17	0	00:55	1.14	0.00	0.11
C4	CONDUIT	39.61	0	00:58	1.20	0.10	0.21
C4-S	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C5	CONDUIT	40.00	0	00:58	1.40	0.12	0.24
C5-S	CONDUIT	77.29	0	00:56	0.45	0.01	0.20
C6	CONDUIT	13.18	0	00:53	0.49	0.11	1.00
C8	CONDUIT	40.00	0	01:04	1.25	0.41	0.57
C8-S	CONDUIT	113.13	0	01:09	0.73	0.02	0.19
C9	CONDUIT	80.09	0	01:07	1.84	0.81	0.62
C9-S	CONDUIT	71.48	0	01:11	0.71	0.01	0.15
CBMH32	CONDUIT	178.38	0	01:11	1.89	0.41	0.45
CBMH92	CONDUIT	11.02	0	01:28	0.70	0.09	0.20
Ctention	CONDUIT	27.89	0	00:57	0.73	0.23	1.00
C7	ORIFICE	10.98	0	01:27			1.00
CFRD	DUMMY	4.87	0	01:28			
OL1	DUMMY	112.38	0	00:56			

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Flow Classification Summary
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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	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.03	0.97	0.00	0.00	1.00	0.00
C10-S	1.00	0.00	0.01	0.00	0.02	0.97	0.00	0.00	0.02	0.00
C11	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.17	0.00
C11-S	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.02	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	0.02	0.00	0.00	0.98	0.02	0.00
C13-S	1.00	0.00	0.00	0.00	0.86	0.14	0.00	0.00	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.05	0.01	0.00	0.94	0.00	0.00
C2	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C3	1.00	0.00	0.02	0.00	0.97	0.00	0.00	0.00	0.99	0.00
C3-S	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.94	0.00
C4	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C4-S	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C5-S	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C6	1.00	0.02	0.00	0.00	0.16	0.00	0.00	0.81	0.01	0.00
C8	1.00	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.99	0.00
C8-S	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00

C9-S	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00
CBMH32	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.06	0.00
CBMH92	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Ctention	1.00	0.02	0.00	0.00	0.15	0.00	0.00	0.82	0.01	0.00

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C11	0.01	0.01	0.01	0.09	0.01
C6	2.46	2.46	3.18	0.01	0.01
Ctention	1.59	1.59	2.11	0.01	0.01

Analysis begun on: Wed Nov 20 08:04:26 2024
Analysis ended on: Wed Nov 20 08:04:27 2024
Total elapsed time: 00:00:01

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

WARNING 09: time series interval greater than recording interval for Rain Gage 100Yr

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 14
Number of nodes 30
Number of links 27
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
100Yr	100Yr	INTENSITY	5 min.
10Yr	10Yr	INTENSITY	5 min.
25Yr	25Yr	INTENSITY	5 min.
2Yr	2Yr	INTENSITY	5 min.
50Yr	50Yr	INTENSITY	5 min.
5Yr	5Yr	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
222	0.11	53.00	30.00	0.1000	100Yr	225B
223	0.11	40.14	87.00	0.1000	100Yr	226
224A	0.14	37.12	90.00	0.0000	100Yr	228
224B	0.22	77.00	90.00	0.1000	100Yr	Roof_Storage
224C	0.12	43.66	90.00	0.1000	100Yr	227
225A	0.17	34.21	82.00	2.5000	100Yr	EX.MH31-S
225B	0.29	27.63	82.00	2.1000	100Yr	EX.MH36-S
226	0.10	26.63	79.00	3.5000	100Yr	EX.MH34-S
227	0.43	172.40	75.00	3.0000	100Yr	SurfaceStorage
228	0.21	18.61	25.00	3.0000	100Yr	RingRoadMajor
229	0.15	14.59	38.00	0.1000	100Yr	NorthMajor
EXT-1	0.28	15.00	90.00	0.1000	100Yr	EX.MH34-S
EXT-2	0.28	186.67	90.00	0.1000	100Yr	RingRoadMajor
EXT-3	0.96	61.04	86.00	0.1000	100Yr	223

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LID Control Summary
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Subcatchment	LID Control	No. of Units	Unit Area	Unit Width	% Area Covered	% Imperv Treated	% Perv Treated
224A	GreenRoof	1	246.92	16.43	18.16	0.00	0.00
224C	GreenRoof	1	418.41	16.43	34.02	0.00	0.00

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Node Summary
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

cbmh40	JUNCTION	77.37	2.28	0.0	
CBMH52	JUNCTION	76.58	2.51	0.0	
CBMH55	JUNCTION	77.37	6.92	0.0	
CBMH92	JUNCTION	77.11	2.42	0.0	Yes
DCBMH38	JUNCTION	77.51	2.09	0.0	
EX.MH31	JUNCTION	76.62	5.64	0.0	
EX.MH31-S	JUNCTION	82.26	0.30	0.0	
EX.MH31-S1	JUNCTION	82.26	0.30	0.0	
EX.MH34	JUNCTION	78.40	2.89	0.0	
EX.MH34-S	JUNCTION	81.29	0.30	0.0	Yes
EX.MH36	JUNCTION	77.53	4.38	0.0	
EX.MH36-S	JUNCTION	81.92	0.30	0.0	
EX.MH43	JUNCTION	78.74	1.84	0.0	
EX.MH43-S	JUNCTION	80.58	0.30	0.0	
EX.MH44	JUNCTION	78.00	1.77	0.0	
EX.MH44-S	JUNCTION	79.77	0.30	0.0	
EX.MH45	JUNCTION	77.63	1.72	0.0	
EX.MH45-S	JUNCTION	79.35	0.30	0.0	
EX.MH46	JUNCTION	76.65	2.32	0.0	
EX.MH46-S	JUNCTION	78.96	0.30	0.0	
EXMH32	JUNCTION	75.74	2.69	0.0	
MH133	JUNCTION	76.75	2.40	0.0	
MH135	JUNCTION	76.95	2.50	0.0	
STM1	JUNCTION	77.60	6.75	0.0	
NorthMajor	OUTFALL	0.00	0.00	0.0	
RingRoadMajor	OUTFALL	78.62	0.30	0.0	
StormSewerSystem	OUTFALL	75.64	0.53	0.0	
Detention	STORAGE	77.62	0.71	0.0	
Roof_Storage	STORAGE	84.35	0.15	0.0	
SurfaceStorage	STORAGE	79.60	0.30	0.0	

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	STM1	CBMH55	CONDUIT	8.4	2.0123	0.0130
C10	EX.MH45	EX.MH46	CONDUIT	37.1	2.6424	0.0130
C10-S	EX.MH45-S	EX.MH46-S	CONDUIT	37.1	1.0486	0.0160
C11	EX.MH46	CBMH52	CONDUIT	10.5	0.6857	0.0130
C11-S	EX.MH46-S	RingRoadMajor	CONDUIT	10.5	3.2398	0.0160
C12	CBMH52	EXMH32	CONDUIT	51.6	1.5079	0.0130
C13	MH135	MH133	CONDUIT	26.8	0.4925	0.0130
C13-S	EX.MH34-S	EX.MH43-S	CONDUIT	128.3	0.5536	0.0160
C14	MH133	EX.MH46	CONDUIT	2.6	1.1539	0.0130
C2	CBMH55	EX.MH31	CONDUIT	14.2	1.0916	0.0130
C3	EX.MH31	EXMH32	CONDUIT	86.7	1.0104	0.0130
C3-S	EX.MH31-S	EX.MH46-S	CONDUIT	84.2	3.9211	0.0160
C4	EX.MH36	EX.MH31	CONDUIT	97.2	0.9002	0.0130
C4-S	EX.MH31-S1	EX.MH36-S	CONDUIT	97.2	0.3498	0.0160
C5	EX.MH34	EX.MH36	CONDUIT	60.8	1.3241	0.0130
C5-S	EX.MH36-S	EX.MH34-S	CONDUIT	60.8	1.0362	0.0160
C6	DCBMH38	cbmh40	CONDUIT	22.7	0.5022	0.0130
C8	EX.MH43	EX.MH44	CONDUIT	71.4	1.0365	0.0130
C8-S	EX.MH43-S	EX.MH44-S	CONDUIT	71.4	1.1345	0.0160
C9	EX.MH44	EX.MH45	CONDUIT	35.1	1.0542	0.0130
C9-S	EX.MH44-S	EX.MH45-S	CONDUIT	35.1	1.1967	0.0160
CBMH32	EXMH32	StormSewerSystem	CONDUIT	10.0	1.0001	0.0130
CBMH92	CBMH92	MH135	CONDUIT	26.4	0.5000	0.0130
Ctention	Detention	DCBMH38	CONDUIT	15.9	0.4969	0.0130
C7	cbmh40	CBMH92	ORIFICE			
CFRD	Roof_Storage	STM1	OUTLET			
OL1	SurfaceStorage	Detention	OUTLET			

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Cross Section Summary

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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.45	0.16	0.11	0.45	1	404.46
C10	CIRCULAR	0.38	0.11	0.09	0.38	1	285.03
C10-S	RingRoad	0.30	2.29	0.24	9.00	1	5642.11
C11	CIRCULAR	0.38	0.11	0.09	0.38	1	145.20
C11-S	RingRoad	0.30	2.29	0.24	9.00	1	9917.45
C12	CIRCULAR	0.47	0.18	0.12	0.47	1	404.43
C13	CIRCULAR	1.00	0.79	0.25	1.00	1	1682.76
C13-S	RingRoad	0.30	2.29	0.24	9.00	1	4099.48
C14	CIRCULAR	0.38	0.11	0.09	0.38	1	188.35
C2	CIRCULAR	0.45	0.16	0.11	0.45	1	297.90
C3	CIRCULAR	0.53	0.22	0.13	0.53	1	432.33
C3-S	HospitalRamp	0.30	2.60	0.23	10.50	1	12183.67
C4	CIRCULAR	0.53	0.22	0.13	0.53	1	408.07
C4-S	RingRoad	0.30	2.29	0.24	9.00	1	3258.74
C5	CIRCULAR	0.45	0.16	0.11	0.45	1	328.09
C5-S	RingRoad	0.30	2.29	0.24	9.00	1	5608.82
C6	CIRCULAR	0.38	0.11	0.09	0.38	1	124.26
C8	CIRCULAR	0.30	0.07	0.07	0.30	1	98.45
C8-S	RingRoad	0.30	2.29	0.24	9.00	1	5868.79
C9	CIRCULAR	0.30	0.07	0.07	0.30	1	99.29
C9-S	RingRoad	0.30	2.29	0.24	9.00	1	6027.37
CBMH32	CIRCULAR	0.53	0.22	0.13	0.53	1	430.10
CBMH92	CIRCULAR	0.38	0.11	0.09	0.38	1	123.99
Ctention	CIRCULAR	0.38	0.11	0.09	0.38	1	123.59

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Street Summary
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Street RingRoad
Area:

0.0008	0.0031	0.0071	0.0125	0.0196
0.0282	0.0384	0.0502	0.0635	0.0784
0.0949	0.1129	0.1325	0.1537	0.1765
0.2000	0.2235	0.2471	0.2706	0.2941
0.3176	0.3412	0.3647	0.3882	0.4118
0.4353	0.4588	0.4824	0.5059	0.5294
0.5529	0.5765	0.6000	0.6235	0.6471
0.6706	0.6941	0.7176	0.7412	0.7647
0.7882	0.8118	0.8353	0.8588	0.8824
0.9059	0.9294	0.9529	0.9765	1.0000

Hrad:

0.0123	0.0246	0.0369	0.0492	0.0615
0.0738	0.0861	0.0984	0.1107	0.1230
0.1353	0.1476	0.1599	0.1722	0.1845
0.2089	0.2331	0.2574	0.2815	0.3056
0.3296	0.3535	0.3774	0.4013	0.4250
0.4488	0.4724	0.4960	0.5195	0.5430
0.5664	0.5897	0.6130	0.6363	0.6594
0.6825	0.7056	0.7286	0.7515	0.7744
0.7972	0.8200	0.8427	0.8653	0.8879
0.9104	0.9329	0.9553	0.9777	1.0000

Width:

0.0667	0.1333	0.2000	0.2667	0.3333
0.4000	0.4667	0.5333	0.6000	0.6667
0.7333	0.8000	0.8667	0.9333	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

Street HospitalRamp
Area:

0.0007	0.0028	0.0062	0.0111	0.0173
0.0249	0.0339	0.0443	0.0561	0.0693
0.0838	0.0997	0.1171	0.1358	0.1558
0.1773	0.2002	0.2242	0.2485	0.2727
0.2970	0.3212	0.3455	0.3697	0.3939
0.4182	0.4424	0.4667	0.4909	0.5152
0.5394	0.5636	0.5879	0.6121	0.6364
0.6606	0.6848	0.7091	0.7333	0.7576
0.7818	0.8061	0.8303	0.8545	0.8788
0.9030	0.9273	0.9515	0.9758	1.0000

Hrad:

0.0126	0.0251	0.0377	0.0503	0.0628
0.0754	0.0879	0.1005	0.1131	0.1256
0.1382	0.1508	0.1633	0.1759	0.1884
0.2010	0.2136	0.2323	0.2571	0.2819
0.3066	0.3312	0.3558	0.3804	0.4049
0.4293	0.4537	0.4780	0.5023	0.5265
0.5507	0.5748	0.5989	0.6229	0.6469
0.6708	0.6946	0.7184	0.7422	0.7659
0.7895	0.8131	0.8366	0.8601	0.8836
0.9070	0.9303	0.9536	0.9768	1.0000

Width:

0.0571	0.1143	0.1714	0.2286	0.2857
0.3429	0.4000	0.4571	0.5143	0.5714
0.6286	0.6857	0.7429	0.8000	0.8571
0.9143	0.9714	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	1.0000	1.0000

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 11/12/2024 00:00:00
Ending Date 11/13/2024 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 2
Head Tolerance ..... 0.001500 m

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---------	-------

Initial LID Storage	0.001	0.242
Total Precipitation	0.128	35.854
Evaporation Loss	0.000	0.000
Infiltration Loss	0.029	8.068
Surface Runoff	0.093	26.136
LID Drainage	0.000	0.072
Final Storage	0.010	2.722
Continuity Error (%)	-2.497	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.094	0.935
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.055	0.546
External Outflow	0.148	1.476
Flooding Loss	0.000	0.003
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.001	0.009
Continuity Error (%)	-0.491	

Time-Step Critical Elements

Link C14 (99.54%)

Highest Flow Instability Indexes

Link C11 (3)
Link C14 (1)

Most Frequent Nonconverging Nodes

Node NorthMajor (0.05%)
Node RingRoadMajor (0.05%)
Node StormSewerSystem (0.05%)
Node cbmh40 (0.05%)
Node DCBMH38 (0.02%)

Routing Time Step Summary

Minimum Time Step	:	1.25 sec
Average Time Step	:	3.20 sec
Maximum Time Step	:	5.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.01
% of Steps Not Converging	:	0.05
Time Step Frequencies	:	
5.000 - 3.155 sec	:	56.22 %
3.155 - 1.991 sec	:	3.39 %
1.991 - 1.256 sec	:	39.19 %
1.256 - 0.792 sec	:	1.19 %
0.792 - 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 LPS	Runoff Coeff
222	35.85	0.00	0.00	24.40	10.94	0.84	11.78	0.01	16.98	0.329
223	35.85	255.84	0.00	9.17	253.56	29.08	282.63	0.32	138.96	0.969
224A	35.85	0.00	0.00	2.93	33.72	0.29	34.01	0.05	52.29	0.647
224B	35.85	0.00	0.00	3.35	32.54	0.35	32.89	0.07	82.17	0.917
224C	35.85	0.00	0.00	2.18	21.61	0.29	23.21	0.03	33.59	0.647
225A	35.85	0.00	0.00	5.94	29.94	0.82	30.76	0.05	70.44	0.858
225B	35.85	4.26	0.00	6.51	33.06	0.83	33.89	0.10	108.82	0.845
226	35.85	328.77	0.00	15.16	287.38	62.12	349.50	0.34	152.72	0.959
227	35.85	6.25	0.00	8.97	31.42	2.14	33.55	0.14	179.47	0.797
228	35.85	0.00	0.00	26.21	9.11	0.83	9.93	0.02	28.97	0.277
229	35.85	0.00	0.00	22.05	13.63	0.21	13.84	0.02	20.25	0.386
EXT-1	35.85	0.00	0.00	3.50	31.53	0.10	31.63	0.09	38.24	0.882
EXT-2	35.85	0.00	0.00	3.31	32.82	0.50	33.32	0.09	120.37	0.929
EXT-3	35.85	0.00	0.00	4.92	30.20	0.12	30.32	0.29	147.43	0.846

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow mm	Evap Loss mm	Infil Loss mm	Surface Outflow mm	Drain Outflow mm	Initial Storage mm	Final Storage mm	Continuity Error %
224A	GreenRoof	35.85	0.00	0.00	0.00	3.85	13.00	45.00	-0.00
224C	GreenRoof	35.85	0.00	0.00	0.00	3.85	13.00	45.00	-0.00

****
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
cbmh40	JUNCTION	0.26	0.96	78.33	0 01:15	0.96
CBMH52	JUNCTION	0.07	0.22	76.80	0 01:12	0.22
CBMH55	JUNCTION	0.02	0.04	77.41	0 01:28	0.04
CBMH92	JUNCTION	0.03	0.08	77.19	0 01:16	0.08
DCBMH38	JUNCTION	0.20	0.82	78.33	0 01:15	0.82
EX.MH31	JUNCTION	0.02	0.11	76.73	0 00:59	0.11
EX.MH31-S	JUNCTION	0.00	0.04	82.30	0 00:55	0.04
EX.MH31-S1	JUNCTION	0.00	0.00	82.26	0 00:00	0.00
EX.MH34	JUNCTION	0.01	0.11	78.51	0 00:58	0.11
EX.MH34-S	JUNCTION	0.03	0.09	81.38	0 01:06	0.09
EX.MH36	JUNCTION	0.01	0.11	77.65	0 00:59	0.11
EX.MH36-S	JUNCTION	0.01	0.06	81.98	0 00:56	0.06
EX.MH43	JUNCTION	0.06	0.13	78.87	0 01:03	0.13
EX.MH43-S	JUNCTION	0.02	0.07	80.65	0 01:08	0.07
EX.MH44	JUNCTION	0.07	0.21	78.21	0 01:01	0.21
EX.MH44-S	JUNCTION	0.01	0.06	79.83	0 01:09	0.06
EX.MH45	JUNCTION	0.05	0.17	77.80	0 01:07	0.17
EX.MH45-S	JUNCTION	0.01	0.05	79.40	0 01:11	0.05
EX.MH46	JUNCTION	0.09	0.32	76.97	0 01:11	0.31
EX.MH46-S	JUNCTION	0.01	0.03	78.99	0 01:12	0.03
EXMH32	JUNCTION	0.08	0.25	75.99	0 01:11	0.25
MH133	JUNCTION	0.03	0.21	76.97	0 01:12	0.21
MH135	JUNCTION	0.03	0.06	77.01	0 01:19	0.06

STM1	JUNCTION	0.02	0.04	77.64	0	01:28	0.04
NorthMajor	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
RingRoadMajor	OUTFALL	0.01	0.03	78.65	0	01:12	0.03
StormSewerSystem	OUTFALL	0.08	0.25	75.89	0	01:11	0.25
Detention	STORAGE	0.18	0.71	78.33	0	01:15	0.71
Roof_Storage	STORAGE	0.01	0.03	84.38	0	01:28	0.03
SurfaceStorage	STORAGE	0.01	0.15	79.75	0	00:56	0.15

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
cbmh40	JUNCTION	0.00	13.68	0	00:51	0	0.139	-0.029
CBMH52	JUNCTION	14.38	196.08	0	01:12	0.0648	1.21	0.024
CBMH55	JUNCTION	0.00	5.45	0	01:28	0	0.0752	0.001
CBMH92	JUNCTION	0.04	11.71	0	01:15	0.00346	0.142	0.006
DCBMH38	JUNCTION	0.00	36.25	0	00:56	0	0.139	-0.123
EX.MH31	JUNCTION	0.00	43.49	0	00:59	0	0.133	-0.025
EX.MH31-S	JUNCTION	70.44	70.44	0	00:55	0.0517	0.0517	-0.689
EX.MH31-S1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
EX.MH34	JUNCTION	40.00	40.00	0	00:54	0.0578	0.0578	-0.007
EX.MH34-S	JUNCTION	166.76	204.16	0	01:05	0.914	1.01	0.242
EX.MH36	JUNCTION	0.00	40.00	0	00:58	0	0.0578	-0.011
EX.MH36-S	JUNCTION	108.82	108.82	0	00:55	0.0993	0.0993	-0.811
EX.MH43	JUNCTION	40.00	40.00	0	00:55	0.525	0.525	0.035
EX.MH43-S	JUNCTION	-40.00	182.95	0	01:07	-0.525	1.01	0.220
EX.MH44	JUNCTION	40.00	80.00	0	01:03	0.259	0.784	0.051
EX.MH44-S	JUNCTION	-40.00	136.26	0	01:09	-0.259	0.484	0.110
EX.MH45	JUNCTION	40.00	120.08	0	01:07	0.129	0.913	0.023
EX.MH45-S	JUNCTION	-40.00	96.09	0	01:10	-0.129	0.225	0.172
EX.MH46	JUNCTION	39.93	167.97	0	01:11	0.0884	1.14	0.030
EX.MH46-S	JUNCTION	-39.93	66.56	0	00:55	-0.0884	0.147	0.304
EXMH32	JUNCTION	0.00	201.07	0	01:11	0	1.34	0.032
MH133	JUNCTION	0.00	11.71	0	01:19	0	0.143	0.016
MH135	JUNCTION	0.00	11.71	0	01:16	0	0.142	-0.034
STM1	JUNCTION	0.38	5.45	0	01:28	0.00256	0.0752	0.001
NorthMajor	OUTFALL	20.25	20.25	0	00:55	0.0205	0.0205	0.000
RingRoadMajor	OUTFALL	138.53	154.31	0	00:55	0.0497	0.135	0.000
StormSewerSystem	OUTFALL	0.00	200.92	0	01:11	0	1.34	0.000
Detention	STORAGE	0.00	134.43	0	00:56	0	0.145	0.063
Roof_Storage	STORAGE	82.17	82.17	0	00:55	0.0727	0.0727	-0.001
SurfaceStorage	STORAGE	179.47	179.47	0	00:55	0.145	0.145	0.003

****
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
cbmh40	JUNCTION	3.45	0.558	1.319
DCBMH38	JUNCTION	2.39	0.384	1.269

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
Detention	0.10	14.62	0 01:15	0.003	0.000

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
Detention	0.021	25.2	0.0	0.0	0.083	100.0	0 01:15	36.25
Roof_Storage	0.015	6.3	0.0	0.0	0.046	19.9	0 01:28	5.45
SurfaceStorage	0.000	0.2	0.0	0.0	0.016	11.5	0 00:56	121.20

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
NorthMajor	35.64	1.43	20.25	0.020
RingRoadMajor	99.98	3.14	154.31	0.135
StormSewerSystem	99.66	27.23	200.92	1.340
System	78.43	31.80	269.98	1.496

****
Street Flow Summary
****

Street Conduit	Peak Flow LPS	Maximum Spread m	Maximum Depth m	Inlet Design	Inlet Location	Inlet	Peak Capture Pcnt	Avg. Flow Capture Pcnt	Bypass Flow Freq Pcnt	Back Flow Freq Pcnt	Peak Capture / Inlet LPS	Peak Bypass Flow LPS
C10-S	53.608	1.915	0.038	Inlet	ON-GRADE	1	59.99	60.00	99.92	0.00	16.08	21.45
C11-S	22.623	1.338	0.027	Inlet	ON-SAG	1	63.58	98.22	7.62	0.00	7.19	8.24
C13-S	182.948	3.762	0.075	Inlet	ON-GRADE	1	21.86	58.37	99.99	0.00	20.00	142.95
C3-S	65.561	1.684	0.034	Inlet	ON-GRADE	1	60.00	60.00	87.77	0.00	19.67	26.22
C4-S	0.000	1.385	0.028	Inlet	ON-GRADE	1						

C5-S	88.021	3.234	0.065	Inlet	ON-GRADE	1	45.44	59.87	85.45	0.00	20.00 48.02
C8-S	136.262	3.068	0.061	Inlet	ON-GRADE	1	29.36	59.21	99.94	0.00	20.00 96.26
C9-S	96.087	2.664	0.053	Inlet	ON-GRADE	1	41.63	59.81	99.93	0.00	20.00 56.09

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	5.45	0	01:28	0.89	0.01	0.08
C10	CONDUIT	120.03	0	01:07	1.66	0.42	0.65
C10-S	CONDUIT	53.61	0	01:11	0.73	0.01	0.13
C11	CONDUIT	181.85	0	01:11	2.16	1.25	0.72
C11-S	CONDUIT	22.62	0	01:12	0.62	0.00	0.09
C12	CONDUIT	180.87	0	01:12	2.22	0.45	0.47
C13	CONDUIT	11.71	0	01:19	0.64	0.01	0.10
C13-S	CONDUIT	182.95	0	01:07	0.69	0.04	0.25
C14	CONDUIT	17.44	0	01:36	0.92	0.09	0.60
C2	CONDUIT	5.45	0	01:28	0.72	0.02	0.09
C3	CONDUIT	43.38	0	00:59	0.75	0.10	0.32
C3-S	CONDUIT	65.56	0	00:55	1.17	0.01	0.11
C4	CONDUIT	39.88	0	00:59	1.20	0.10	0.21
C4-S	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
C5	CONDUIT	40.00	0	00:58	1.40	0.12	0.24
C5-S	CONDUIT	88.02	0	00:56	0.45	0.02	0.22
C6	CONDUIT	13.68	0	00:51	0.46	0.11	1.00
C8	CONDUIT	40.00	0	01:03	1.25	0.41	0.57
C8-S	CONDUIT	136.26	0	01:09	0.73	0.02	0.20
C9	CONDUIT	80.08	0	01:06	1.85	0.81	0.62
C9-S	CONDUIT	96.09	0	01:10	0.73	0.02	0.18
CBMH32	CONDUIT	200.92	0	01:11	1.95	0.47	0.48
CBMH92	CONDUIT	11.71	0	01:16	0.72	0.09	0.21
Ctention	CONDUIT	36.25	0	00:56	0.76	0.29	1.00
C7	ORIFICE	11.67	0	01:15			1.00
CFRD	DUMMY	5.45	0	01:28			
OL1	DUMMY	121.20	0	00:57			

****
Flow Classification Summary
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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	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C10	1.00	0.00	0.00	0.00	0.04	0.96	0.00	0.00	1.00	0.00
C10-S	1.00	0.00	0.01	0.00	0.03	0.96	0.00	0.00	0.02	0.00
C11	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.18	0.00
C11-S	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.03	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	0.03	0.00	0.00	0.97	0.03	0.00
C13-S	1.00	0.00	0.00	0.00	0.86	0.14	0.00	0.00	0.00	0.00
C14	1.00	0.00	0.00	0.00	0.05	0.01	0.00	0.94	0.00	0.00
C2	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C3	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.99	0.00
C3-S	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.94	0.00
C4	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00

C4-S	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
C5-S	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C6	1.00	0.02	0.00	0.00	0.17	0.00	0.00	0.80	0.01	0.00
C8	1.00	0.00	0.00	0.00	0.03	0.97	0.00	0.00	0.99	0.00
C8-S	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
C9-S	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.00
CBMH32	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	0.06	0.00
CBMH92	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Ctention	1.00	0.02	0.00	0.00	0.16	0.00	0.00	0.81	0.01	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C11	0.01	0.01	0.01	0.22	0.01
C6	2.73	2.73	3.45	0.01	0.01
Ctention	1.98	1.98	2.39	0.01	0.01

Analysis begun on: Wed Nov 20 08:04:46 2024
Analysis ended on: Wed Nov 20 08:04:48 2024
Total elapsed time: 00:00:02